Medellín, Colombia
Somos 10—Integrating Ten Municipalities into One Metropolis
Andrea Restrepo-Mieth, Jorge Pérez-Jaramillo, and Felipe Montoya Pino
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CASE STUDY 6: METROPOLITAN MEDELLIN

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The Synthesis Report offers a range of integrated solutions (Mehrotra 2020).
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THE SOLUTION

Pooled financing and citizen-led street design for density and decarbonized mobility

Figure 1
Integrated planning model

KEY FINDINGS

1. Mobility enhancements alongside slum upgrading and major public space interventions laid the foundation for using integrated planning to achieve continuity in investment into the city’s poorest areas. The approach, which Metropolitan Medellin (AMVA) has been sharing with municipalities beyond Medellin, integrates urban design and architecture with civic participation.

2. As the largest economy, Medellin is the main contributor to AMVA, which effectively transfers financial resources to other municipalities. Transfers from Medellin-owned utilities company Grupo EPM, along with local taxes, generate the bulk of Medellin’s income.

3. Integrated slum upgrading supported by participatory processes and metro enhancements improved social and economic inclusion through education amenities and greater job accessibility for men and women. It has also reduced carbon emissions.
Cities can decarbonize by utilizing renewable energy supply and electrifying urban systems while scaling up neighborhood integrated solutions to benefit neighboring towns within the metropolitan cluster. Medellin’s model of metropolitan integration offers policymakers examples of how successful integrated solutions replicated at the neighborhood level can be extended to the metropolitan scale. Medellin’s power and water supplies both depend on dammed reservoirs with hydroelectric plants (locally known as EPM—Empresas Publicas de Medellin), and because the city owns the utility it has been able to finance urban innovation with the EPM dividends paid by EPM of about 80 to 100 million dollars each year.

Medellin offers a rare insight into how a metropolitan agglomeration can decarbonize urbanization utilizing renewable energy supply, electrifying urban systems such as light rail and gondolas, and seeking efficiency in urban systems, ranging from building energy efficiency to compact urban development. This model illustrates the possibility of decarbonizing the entire energy supply chain, not just electrifying or making efficiency improvements in a city’s energy use.
The Metropolitan Context

MEDELLIN, COLOMBIA’S SECOND LARGEST CITY, has garnered worldwide attention for its innovative and comprehensive approaches to integrated planning. Equally important, though less well known, are the integrated planning efforts carried out within its metropolitan area. Like many other cities around the world, twenty-first-century Medellin spills over its urban borders to encompass a metropolitan area whose extent exceeds the original city’s administrative boundaries. Metropolitan Medellin, formally known as the Metropolitan Area of the Aburra Valley (AMVA), consists of 10 municipalities. Mountain ranges to the east and west create natural limits to the expansion of the metropolitan area’s urban footprint. The Medellin River runs through the valley, creating a natural structuring element.

GEOGRAPHY AND DEMOGRAPHICS

Medellin is the capital of the Department of Antioquia and is located in Colombia’s north-west. The city’s tropical climate averages a temperature of 24 degrees Celsius (Alcaldía de Medellín 2016). Located in the central Andes mountains at an average altitude of 1,479 meters above sea level, it has a rugged terrain, just over half its territory sloping at more than 15 degrees (AMVA 2016). The highest point in the metropolitan area is Serranía de Las Baldías at 3,120 meters above sea level, while the lowest is the Medellín–Aburra River’s edge at 1,130 meters above sea level (AMVA 2016). This broad range in elevation creates a variety of microclimates, as well as waterfalls. The slopes, combined with tectonic faults and a high number of ravines, also create a complex terrain, which in turn impacts approaches to building infrastructure and housing.

The 10 municipalities that make up metropolitan Medellin began to have diffused borders in the 1960s. Industrialization and rural-urban migration led to increases in population that put pressure on the existing boundaries, resulting in a conurbation (Map 1). As Table 1 shows, in the nine years between 1964 and 1973 Medellin’s population grew by 47 percent while that of the metropolitan area grew by 45 percent. In the span of 54 years Medellin’s population has grown by 300 percent while the metropolitan population has grown by 335 percent.

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1 Barbosa, Girardota, Copacabana, and Bello to the north; Medellín in the center; and Itagui, Envigado, La Estrella, Sabaneta, and Caldas to the south.
According to the 2018 census, metropolitan Medellin is home to 3,725,682 people distributed across an area of 1,166.91 square kilometers. This means the Aburra Valley hosts 62.36 percent of Antioquia’s population (5,974,788 people) in just 1.83 percent of the department’s land (63,612 km²). Medellin, with 2,376,337 inhabitants and an area of 380.64 square kilometers, is the largest of the 10 municipalities. Barbosa, with 44,676 people, is the smallest municipality by population, and Sabaneta, with only 15 square kilometers, is the smallest by area. The primate city’s density of 6,243 people per square kilometer is almost twice the metropolitan area’s average density of 3,193 people per square kilometer (Map 2). Table 2 provides a breakdown of the population by municipality according to the 2018 census.

<table>
<thead>
<tr>
<th>YEAR</th>
<th>MEDELLIN</th>
<th>ABURRA VALLEY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1964</td>
<td>791,589</td>
<td>1,110,908</td>
</tr>
<tr>
<td>1973</td>
<td>1,163,868</td>
<td>1,613,910</td>
</tr>
<tr>
<td>1985</td>
<td>1,480,382</td>
<td>2,121,174</td>
</tr>
<tr>
<td>1993</td>
<td>1,834,881</td>
<td>2,689,798</td>
</tr>
<tr>
<td>2005</td>
<td>2,216,830</td>
<td>3,306,490</td>
</tr>
<tr>
<td>2018</td>
<td>2,376,337</td>
<td>3,725,682</td>
</tr>
</tbody>
</table>


### TABLE 2. POPULATION BY MUNICIPALITY, 2018 CENSUS

<table>
<thead>
<tr>
<th>MUNICIPALITY</th>
<th>POPULATION</th>
<th>HOUSEHOLDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medellin</td>
<td>2,376,337</td>
<td>815,447</td>
</tr>
<tr>
<td>Barbosa</td>
<td>44,676</td>
<td>16,092</td>
</tr>
<tr>
<td>Bello</td>
<td>478,602</td>
<td>161,622</td>
</tr>
<tr>
<td>Caldas</td>
<td>76,242</td>
<td>24,471</td>
</tr>
<tr>
<td>Copacabana</td>
<td>76,451</td>
<td>25,104</td>
</tr>
<tr>
<td>Envigado</td>
<td>212,365</td>
<td>74,454</td>
</tr>
<tr>
<td>Girardota</td>
<td>49,006</td>
<td>15,333</td>
</tr>
<tr>
<td>Itagui</td>
<td>262,190</td>
<td>85,341</td>
</tr>
<tr>
<td>La Estrella</td>
<td>68,016</td>
<td>21,969</td>
</tr>
<tr>
<td>Sabaneta</td>
<td>81,797</td>
<td>29,595</td>
</tr>
</tbody>
</table>

Source: DANE 2019a.

Figure 3
3D population density distribution
To estimate population density, LandScan uses remote sensing imagery analysis to disaggregate census counts within an administrative boundary. As a result, built-up areas such as airports and industry may appear to have a residential population where there isn’t one.
According to the most recent statistics, between 2017 and 2018 income per capita in the metropolitan area grew by 2 percent, from COP 995,928 to COP 1,015,796. The Gini coefficient for 2018 was 0.47. Nevertheless, metropolitan Medellin is tied with Bogota as the city with the second-largest proportion of middle-class citizens in Colombia (Medellin Como Vamos 2019).

Integration

Medellin in the 1980s and 1990s was in a profound socioeconomic crisis. The city’s once-vibrant industrial economy continued to decline while an illicit economy tied to drug trafficking blossomed. This resulted in increased unemployment, poverty, inequality, and violence. Colombia was also going through economic and political turmoil, the latter leading to significant political reforms.

Chief among the political changes was the drafting of a new constitution in 1991 that introduced requirements for participatory democracy and decentralized municipal governance. This social, economic, and political context led the national government to put together what became known as the Presidential Council for Medellin and its Metropolitan Area. This council brought together people from all walks of life to discuss the origins of the city’s problems, its manifestations, and, most important of all, pathways to address them. A new social contract was negotiated between business elites, community-based organizations, civil society groups, and academia.

The new dynamics generated in the city led to two important reforms: the development of a Strategic Plan for Medellin and the Aburra Valley and a new Municipal System of Planning (Corburn et al. 2019). These new navigation tools, combined with direct mayoral elections and increased opportunities for citizen participation, spelled the beginning of Medellin’s transformation. Key spatial interventions took place in the 1990s that would generate blueprints and lessons learned for the twenty-first century.

These included PRIMED, an integrated slum upgrading program that took place between 1993 and 2000; public space interventions such as Parque San Antonio (1993) and Parque de las Esculturas (2000); and the metro (1995).

2 At an exchange rate of USD 1 = COP 2,977.
What is key is what came next: building on these social, political, and technical processes, a concerted effort was made by technocrats and politicians, with support from non-state actors, to integrate planning, to focus multi-sectoral actions in the city’s poorest areas, and to pursue institutionalization strategies to achieve a continuity of efforts (Restrepo-Mieth 2019).

**METRO**

An important step towards integrating Medellin and the metropolitan area was the construction of the city’s metro. Built between 1984 and 1995, the metro became a visible representation of the need to connect the city from north to south and to extend connectivity to other municipalities. Only two lines were developed, due to the city’s topography and the costs of building a metro system. To overcome this apparent shortcoming and extend access to the mass transportation system, Medellin pioneered the use of aerial cables for public transport.

**METROCABLE**

One of the first key interventions that would transform Medellin’s public transport into a multi-modal system was the first Metrocable. Built to connect the Acevedo metro station with neighborhoods up the mountain across the city’s impoverished north-eastern area, the first cable car, inaugurated in 2004, represented an innovative use for this existing technology. The mode quickly gained acceptance among users as it connected people in Santo Domingo—the uppermost portion of the hill—to the metro in just nine minutes. The service represented an opportunity to improve accessibility to employment centers and important urban amenities. Its success was replicated several times with cable cars servicing other areas of the city: in 2008 in Nuevo Occidente/La Aurora, in 2010 in Arvi, in 2016 in Villa Sierra, and in 2019 in 13 de Noviembre. An additional cable line (Picacho/El Progreso) is currently under construction.

While Metrocable answered the question of how best to move people up hills, areas of the city with flat or minimal slopes were also in need of mass transportation systems. Taking a lesson from Bogota, the country’s capital, and its world-famous Transmilenio, in 2011 Medellin inaugurated its Bus Rapid Transit (BRT) system. That was followed in 2013 by feeder buses and in 2016 by a tram. Complementing all of this is EnCicla, a public bike-sharing system. The Metro and EnCicla reach other municipalities in the metropolitan area, extending this multi-modal system beyond Medellin (Map 3).
INTEGRATED URBAN PROJECTS AND NEIGHBORHOOD UPGRAADING

While the first Metrocable broke the mold on transportation, it is what came next that helped Medellin on the global urban planning radar. The city had experimented in the early 1990s with strategies to promote citizen participation in planning and to upgrade informal settlements. The results of these efforts were two programs: Nucleos de Vida Ciudadana (Citizen Life Nuclei) and PRIMED (Programa Integral de Mejoramiento de Barrios Subnormales or Integral Program for the Upgrading of Informal Neighborhoods). The programs sought to improve public spaces, urban amenities, and housing while mobilizing citizen input and involving neighborhood residents in different stages of the interventions. These two short-lived but impactful programs showed technocrats and citizens that different ways of city-making were possible. Using the Metrocable as an axis along which to incorporate urban amenities, and recalling upgrading lessons from Nucleos de Vida Ciudadana and PRIMED, the city developed two new methodologies to upgrade neighborhoods: integrated urban projects (Proyectos Urbanos Integrales or PUIs) and integrated neighborhood upgrading (Mejoramiento Integral de Barrios or MIB). Integrated urban projects were characterized by a project management style, in which a project director would coordinate different government agencies to ensure a timely and efficient intervention in the territory. This approach helped avoid the common problem of lack of coordination among government agencies, a problem that often occurs when designing interventions that require action from different government departments.

For example, the first integrated urban project, undertaken in the north-eastern area of the city, brought together planning, infrastructure, education, and economic development agencies, among others, and engaged in interventions that included large public libraries hosting a variety of citizen services, upgraded or new schools, sports fields and ball courts, and early childhood education centers. By contrast, integrated neighborhood upgrading projects were to be housing-centric while incorporating other interventions, such as improved pedestrian access and risk mitigation through soil stabilization. Juan Bobo (an informal settlement bordering a ravine) and Moravia (a high-density poor neighborhood located around a former solid waste disposal site) are two emblematic examples of the latter neighborhood-level upgrading approach. Juan Bobo became an example of how to conduct upgrading without relocating households and incorporated community participation.

AMVA has been working with municipalities to incorporate integrated neighborhood upgrading beyond Medellin. A 2011 study showed 77 neighborhoods in the metropolitan areas could benefit from integrated neighborhood upgrading, with 19 neighborhoods prioritized due to existing
conditions (Perez Jaramillo 2011). However, a project in the municipality of Caldas is the only current example from outside Medellín. An important aspect of this approach is that it integrates urban design and architecture with civic participation (Sotomayor 2015). Community input is sought through workshops and citizen committees, with design and architecture meant to incorporate the community’s hopes and vision. To achieve this, the city puts together teams of professionals from different fields, including architects, social workers, lawyers, and civil and environmental engineers. Participatory planning and local development plans are instituted to scale community input beyond particular interventions into longer-term instruments. The integrated urban project methodology was incorporated into Medellín’s land use plan in an effort to give this valuable instrument continuity.

These and other interventions carried out in Medellín have some institutional components in common. First, the city has not gone about building infrastructure for its own sake but, rather, has been careful to pair it with the appropriate agencies that can guarantee a successful offering of programs, activities, and services. This pairing of spatial interventions and services opens opportunities for long-marginalized communities to access employment centers throughout the metropolitan area as well as educational, training, cultural, and recreational facilities in their area. The implications for quality of life must not be overlooked.

Second, for the most part, citizen and stakeholder participation has been a key component of the city’s actions. This participation is important, as it not only helps guide the design of infrastructure and services to ensure that they meet a community’s wants and needs, but also helps bring the community onboard as a partner and not just a recipient.

Third, many of these interventions have maintained continuity despite the coming into office of different mayors from different political parties. For example, the water lifeline program is currently operating under its third mayor.

Lastly, the city has taken planning seriously: in recent decades, plans have acknowledged the “informal city” and have designed interventions to address the needs of all. Parallel to this last point is metropolitan planning. Medellín has become more cognizant of the need to acknowledge interrelations with the municipalities that make up the metropolitan area as well as with the region beyond it. As such, it has been an active player in the development of key metropolitan plans, such as the Metropolitan Land Use Directives (2006) and Plan Bio2030 (2011). These plans complement each other, and in their planning for the metropolitan area they take into account land use, densities, strategic urbanism projects, and integrated mobility.
Figure 4
Then and now, 2001, 2019

A. SLUM DEVELOPMENT ON THE HILLS
B. URBAN DEVELOPMENT ALONG THE CABLE CAR LINE
C. HIGH-RISE BUILDINGS NEAR THE CENTER
D. AIR POLLUTION AND LAND PRICES PUSH URBAN DEVELOPMENT IN THE NORTHERN PART OF THE CITY
FINANCING INNOVATIONS

The multiplicity of projects and programs carried out in Medellin in the last decades have been financed following the structures set up after the adoption of Colombia’s 1991 constitution. Decentralization created a fiscal structure in which Medellin sees the bulk of its budget coming from local taxes and a sizable contribution from Grupo EPM’s transfers. Government transfers complement the city’s inflows. Land and property taxes, together with industry and commerce taxes, have become increasingly important sources of income. Furthermore, land-use plans have been structured so that mechanisms to capture land-use value can help to co-finance public works. These mechanisms include plusvalia (capital gains), valorizacion (improved appraisal value), and obligaciones urbanisticas (a payment mechanism to help balance pressures created by new developments on existing public spaces, such as roads, public services, and urban facilities). More recently and with the support of the World Bank, the city has been exploring the use of other land-value capture instruments to finance urban redevelopment of blighted areas and key assets linked to transport infrastructure, such as tax-increment financing and transfer of development rights.

Another source of financing that has proved important for the city is international cooperation. Medellin received $107.72 million between 2004 and 2018 from efforts led by the city’s International Cooperation Agency (ACI 2019). The ability to raise funds through local taxation, boost finances thanks to Grupo EPM’s contributions (which are approximately 20 percent of the city’s budget), and attract foreign assistance is particularly important when it comes to financing the expansion and maintenance of key infrastructure. For example, while national legislation calls for the national government to co-finance between 40 and 70 percent of the cost of urban mass public transport systems, the reality is that most of the recent interventions carried out in Medellin’s system have been borne by the city, with little to no resources coming from the national or departmental governments. Figure 5 illustrates the historical evolution of the system’s financing.

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3 A multi-sector infrastructure utility that is an autonomous parastatal owned by the city of Medellin and contributes 30% of its annual financial surplus (about USD 400 million in 2018) towards the city’s social development investments.
4 Here and throughout this chapter, all dollar amounts refer to US dollars.
Metro system

- **Metro (1995):** National government pays for 40% of total construction cost USD 2.174 million while Metro Company pays for 60%. Debt being paid through a 10% gas surcharge in the 10 metropolitan municipalities and 40% of taxes collected in Antioquia on cigarettes and tobacco.

- **Ayacucho tram (2016) and cable cars H, M (2016, 2019):** Medellin undertook a twenty-year loan with AFD for USD 250 million. No national government guarantee and a five year grace period. Four rates based on disbursement dates: Libor 180 +1.7%, and fixed rates of 3.97%, 4.98% and 4.04%.

- **Picacho cable car (under construction):** 91.62% financed with investment funds from Medellin, including inflows from EPM’s sale of stocks it held in Isagen, and 8.38% funding from Antioquia. The project is estimated to cost COP 298,000,000,000.

- **Other cable cars:** lines K (2004) and J (2008) were fully financed by Medellin and Metro. Line L (2010) was financed by Medellin, Metro, Antioquia, and the National government.

Metroplus

Agreement Conpes had national government paying 61% of the initial construction costs (COP 636,476 million) and the remainder covered by Medellin (22.9%), Envigado (8%) and Itagui (8.2%).

EnCicla

As of 2018 the investment in the system was around COP 12,000 million (for stations, bicycles, and adaptation works). Recent expansion cost COP 1,879 million. Fully funded by AMVA.

Take away

The metropolitan area has designed a multi-modal mobility strategy emphasizing accessibility, affordability, equity, environmental sustainability and connectivity. Implementation has been slow due to city’s inability to access funds from the national government, who has delayed payments promised to the city for Metroplus and Cable Picacho.

Recent projects financed by the city and the mass transportation company, Metro, have gone forward without support from other government levels. These include Metrocable lines K and J, the metro’s extension towards the southern area, and the tram. A challenge to emerge from the current fiscal set-up is that the national government limits the city’s ability to incur further debt but at the same time does not contribute investment funds. This dynamic has slowed municipal and metropolitan plans to expand the multi-modal mobility system, limiting its ability to meet the needs and priorities of the city. The tide is expected to turn after years of lobbying by several mayors. Financial assistance from the national government to expand the mass transportation system is expected to materialize in the coming years, after the national government agreed in March 2020 to co-finance 70 percent of a third metro line for Medellin estimated to cost $1.2 billion.

INTEGRATION AND METROPOLITAN PLANNING

THE IMMINENT CONURBATION OF THE MUNICIPALITIES that make up metropolitan Medellin became clear in the second half of the twentieth century. Territorial, economic, social, and environmental dynamics then created interrelations among the 10 municipalities that persist today: workers travel daily from the north to employment hubs in the center and south, health and educational offerings bring people from the metropolitan area to Medellin, and environmental challenges such as air and water deterioration disregard administrative boundaries. As the population and urban footprint of the municipalities continued to grow, it became more apparent that coordination among them was merited to secure the sustainable development of the city. Four major challenges that led to integration were socio-spatial segregation, air quality deterioration, water quality deterioration, and the socially and spatially fragmented built environment.

Multi-sectoral integrated planning tackling mobility, public space, and public services, among others, has led to seminal interventions and innovations to confront these challenges. Key interventions include multi-modal mobility to address socio-spatial segregation as well as air pollution; the construction of water treatment plants that double as state-of-the-art recreational and cultural facilities; and the creation of a green belt that provides much-needed public space while reducing airborne contamination.

Building efforts across jurisdictions has required confronting political and economic power disparities among the municipalities: Medellin, as the capital of Antioquia and largest economy of the metropolitan area, has unmatched regional power. The adjoining municipality of Envigado negotiates a position of economic growth with its powerful next-door neighbor. Similar dynamics exist from Barbosa in the north to Caldas in the south. The integration process has been slow, has faced setbacks, and continues to be a work in progress, but the persistence by different actors through the years and their willingness to compromise have started to show results. Envigado’s decision to join AMVA in July 2016 means all the municipalities that make up the Aburra valley metropolitan cluster are now part of the entity. Its incorporation into the existing metropolitan framework was the result of a democratic exercise that its citizens chose to join in with. This led to the metropolitan organization’s current slogan: somos10 (we are ten).
UNPACKING INTEGRATED METROPOLITAN PLANNING

Integration in the AMVA has centered on four sectors: the environment, transportation, and security (all under AMVA), as well as utilities (under EPM). The integration of environmental planning is the strongest of all of AMVA’s sectors given that AMVA has been assigned both the authority and the means to finance action on this front. Environmental surcharges are to be used exclusively toward this end. Environmental actions include monitoring, managing, and planning to ensure sustainable water availability through the Ravines Plan and the Plan for the Use and Management of the Aburra River Basin (POMCA); working with municipalities to ensure the increase and protection of green areas for ecosystem services through initiatives such as the metropolitan green belt and metropolitan parks; and fostering sustainable production and consumption practices by optimizing resource use.

Transportation is another sector where AMVA has been mandated to take the lead, namely on matters of inter-municipal transportation and mass transportation. To this end, the entity builds infrastructure such as bridges to improve mobility and oversees the metropolitan mass transportation system, which currently consists of EnCicla, the bus system, and the Integrated Transportation System of the Aburra Valley (SITVA).

Security is the most recent sector to gain integration under AMVA. Efforts have centered on strengthening public order through the use of cameras networked across jurisdictions and drafting Colombia’s first security and coexistence strategic plan at a metropolitan level to help guide municipal expenditures. Utilities have also experienced metropolitan integration. Grupo EPM provides water, sewage, networked gas, and electricity services to all 10 municipalities, ensuring access to these services. The Medellin-owned company has played an important role in improving the built environment and increasing accessibility to these services by extending its utilities networks throughout the metropolitan area.

AMVA defines integration and sustainability as the two pillars for metropolitan spatial development. Its stated objective is to achieve an integrated and sustainable territory. Key aspects of integration are: “to join capabilities and strengths, to work together, to manage the territory, to harmonize planning, [strengthening] city-rural and regional linkages, social inclusion and equity, collective well-being, and economic development” (AMVA 2018b). Sustainability for AMVA’s purposes is defined as having “greater territorial efficiency, a reduction in the ecological footprint and an increase in social benefits for the entire territory” (AMVA 2018b).
The three stages of planning

While each plan varies, AMVA’s most recent plan-making process is divided into three stages: citizen input, diagnosis, and formulation. Integrated planning in AMVA brings together a wide range of experts who are expected to contribute to the plan-making process from their respective areas of knowledge. Teams usually include architects, planners, engineers, communicators, social workers, lawyers, geologists, and biologists, among others, who draw on their professional and technical expertise and seek inputs from stakeholders in the 10 municipalities. Stakeholders usually include experts and social actors, namely municipal, metropolitan, departmental, and national officials; citizens; interest groups such as environmental collectives and chambers of commerce; and public entities such as Grupo EPM.

The most recent metropolitan planning effort is the 2019–2030 Metropolitan Strategic Land Use Plan (PEMOT—Plan Estratégico Metropolitano de Ordenamiento Territorial). In 2013, the Colombian government passed Law 1625 mandating that every metropolitan authority create a PEMOT, a planning instrument for developing the spatial component of the Integral Metropolitan Development Plan (PIDM—Plan Integral de Desarrollo Metropolitano). The PEMOT currently under review started by incorporating a citizen input process, which was termed “Citizen dialogues and metropolitan development: Conversations around the city as a project.” The “communication, conversation, and consensus strategy” sought to “build technical agreements about the fundamental metropolitan projects among a group of experts and social actors” (AMVA 2018c). It included 25 workshops and plenaries; the first to introduce the initiative took place in October 2017, while the last to share results was held in March 2018 (AMVA 2018c).

Altogether, the PEMOT input process had 470 participants and a total of 723 inputs (421 during the diagnosis phase and 302 during the formulation phase). Participants included municipal cabinets, environmental groups, city councils, spatial planning councils, media, public entities including Grupo EPM, Metro, and Corantioquia, academia, the Antioquia governor’s office, ANDI (the national business association of Colombia), AMVA officials, and the Metropolitan Planning Council (AMVA 2018b). The plan’s “citizen dialogues” strategy, which is based on technical, legal, social, and communication inputs, aims to promote citizen buy-in throughout the metropolitan area. To this end, participants were sought from throughout the 10 municipalities; the final breakdown of those who participated was 34 percent from the northern municipalities, 37 percent from the main administrative city, and 29 percent from the southern municipalities (AMVA 2018b).

If the PEMOT is adopted, municipalities will be expected to integrate its general strategies for metropolitan planning into their respective land use plans (Plan de Ordenamiento Territorial or POT for large municipalities and PBOT for smaller ones).
With inputs from the first stage in mind, the second stage, diagnosis, begins. It consists of four steps. The first step is the presentation of criteria for developing PEMOT by themes. These include regional themes like integrated water management, large-scale infrastructure, food security, and safety, as well as key topics in metropolitan agglomeration including public spaces, mobility, and housing systems; housing density; rural interventions; and rural and urban land uses. The second step in the diagnosis consists of asking questions about the territory, such as, What is the potential metropolitan public space available? Which are the water catchment areas for the metropolitan area and what is their use intensity?

The third step in the diagnosis is the consideration of the strategic themes prioritized in Metropolitan Facts (Hechos Metropolitanos) as well as the minimum requirements for a PEMOT as set forth by Law 1625. Metropolitan Facts are, in effect, those phenomena that due to their magnitude must be addressed at a supra-municipal scale. They are identified in a set of statements made by the metropolitan board “regarding economic, social, technological, environmental, physical, cultural, territorial, political or administrative phenomena that affect or impact two or more municipalities simultaneously.” These facts are formally recorded in Metropolitan Agreements, and the rules for addressing them are set up by the metropolitan area director. They must then be incorporated into future PIDMs and PEMOTs. For example, AMVA is the first metropolitan area in Colombia to announce a Metropolitan Fact regarding metropolitan security.

The fourth and last component of the diagnosis stage is the review of existing metropolitan planning documents to understand proposed occupation models. For PEMOT this meant taking into account and understanding the metropolitan guidelines, Bio2030, the 10 municipal land use plans (both BOTs and PBOTs), and the current spatial situation.

The diagnosis stage is followed by a formulation stage, which has three steps. The first step is to develop strategies, drafting an objective for each problem identified. The second step is proposing actions: these must be in accordance with existing Metropolitan Facts, legal mandates, and AMVA’s general guidelines. The third and final step is to develop a strategic metropolitan spatial development model—locally referred to as a spatial occupation model—that has four elements: a management model, a system of indicators, a metropolitan case file (an instrument to monitor the PEMOT’s implementation), and recommendations to be incorporated in the next PIDM review. The finalized plan is discussed by the metropolitan board, which decides whether or not to adopt it. Different plans have different ways of soliciting input. For example, AMVA is
currently developing an updated mobility plan. A key input to it is an origin-destination survey, which allows technicians to better understand people’s travel behavior. Focus groups are carried out in the development of the updated plan, and virtual platforms are also employed to give citizens the opportunity to participate. Input is solicited to ensure the transportation network is developed to meet people’s travel needs and minimize the need for transfers. AMVA has found, based on such input, that people in the area are not only looking for a way to get to the metro, so it is pursuing an integrated system that must offer the services they need.

**Shortcomings**

The work carried out in plan-making processes requires technical tools to enable integration. These include guidelines, masterplans, strategic plans, and sectoral plans. Due to the current institutional set-up, these technical tools are not binding, and implementation is up to each municipality. The strongest sector is environmental planning, where national mandates to metropolitan authorities make AMVA’s resolutions binding. Mobility planning, including both infrastructure and operations, is also strong, but it faces limitations due to the multiplicity of special interests and political pressures on the sector.

Many of the plans developed to date by AMVA have not been systematically implemented, and some have not even been taken into account by state or non-state actors when planning within the territory. Furthermore, many of these plans lacked collective buy-in beyond the entity. Exceptions to this include the Strategic Plans for Aburra Norte and Sur, which brought together the municipalities, AMVA, and other entities under the leadership of Fundacion Social in a broadly participatory process from 2004 to 2008.

Reflecting on the average plan-making process, Jorge Coronel Lopez, head of the Aburra Sur Como Vamos program, shared this thought:

> Social organizations have not taken part in planning efforts, have not had spaces for substantive participation where they could have a say. This has occurred historically, and it is a mistake in the process that later has consequences given that social organizations do not take on something from which they have been excluded.⁷

The PEMOT and other recent planning efforts have sought to address these shortcomings by building on, and complementing, existing plans as well as by opening spaces for wider participation by both state and non-state actors. ⁷

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⁷ Interview by Andrea Restrepo-Mieth on August 21, 2019.
Implementation

Medellin conurbation has in many ways bound together the destinies of the Aburra Valley municipalities. However, the politico-administrative set-up is one that encourages municipal autonomy. As such, the coming together of the 10 municipalities that make up metropolitan Medellin has required a strong showing of political will and the determination of state and non-state actors. The desire by municipalities to retain as much of their autonomy as possible is evidenced by the fact that planning, systems, and initiatives implemented at the metropolitan scale center mainly on transportation and urban environmental matters (both the purview of AMVA) and on utilities and the protection of resources needed for their production (with Grupo EPM playing a dominant market role). However, AMVA and Grupo EPM do not act alone, and, as this section shows, state and non-state actors from the local to the national level play different roles in hindering or making possible metropolitan integration.

The idea of planning at the metropolitan scale dates back to the 1950s. The first set of interventions to cover the entirety of the metropolitan area was carried out by Grupo EPM, who found in these territories a market for its water, sewage, and electricity services. Interventions to connect the territories and address existing and emerging challenges began in the 1970s with viability studies for the metro, the first initiative in what would become SITVA and plans by Grupo EPM to clean up the Medellin River.

In the 1980s there were discussions to protect green areas, which were later incorporated into plans through key interventions and innovations that would only start being executed in the twenty-first century. These include the official declaration of the first protected urban area in 2009 and the inauguration of Jardin Circunvalar (Bypass Garden) as part of the metropolitan green belt in 2015, the same year the river parks began construction. The river clean-up program, started in the 1970s, strengthened with the introduction of the Plan for the Use and Management of the Aburra River Basin (POMCA) in 2007 and the Ravines Plan in 2015. The program also led to innovative initiatives such as the repurposing of sewage treatment plants to include multipurpose public spaces.

An air quality crisis between March and April 2016 showed the importance of the early warning system, SIATA, which had come into operation in 2013. The episode led to the development of integrated air-quality-improvement plans—PIGECA and POECA 8—in 2017 to tackle air pollution issues in the short, medium, and long term, and it also served as an incentive to expand EnCicla, the public bicycle and biking route system started in 2011 and currently integrated with SITVA, the integrated metropolitan transport system.

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8 Operational Plan to face Air Pollution Episodes in the Metropolitan Area.
**ACTORS AND ORGANIZATIONAL ARRANGEMENTS**

The main actors in the integration process have been municipal leaders, both mayors and councils. Mayors make up most of AMVA’s Metropolitan Board, which is the main decision-making body in the metropolitan area. Most importantly, given the autonomy granted to municipalities in the Colombian context, it is mayors and councils who have the ultimate say in the actual implementation of AMVA’s metropolitan plans.

**Political parties and political complexity**

Every four years the political landscape of those in power is sure to change: while city councilors can be re-elected, mayors serve a single term (mayors can be re-elected but not for consecutive terms).

Furthermore, given Colombia’s fragmented multi-party system, the number of political parties in power in the metropolitan area can easily be over a dozen during any given four-year administrative period. This means that many different agendas must be negotiated for metropolitan plans to get implemented. For example, in the 2016–19 governing period, the municipalities that make up the metropolitan area have elected officials from the Conservative and Liberal parties (the two historic political parties), as well as from national parties such as Cambio Radical, Centro Democratico, Alianza Verde, Partido de la U, MAIS and Polo Democratico; and from local parties such as Creemos, Consenso, Lista Civica Renovacion, and Movimiento soy Sabaneta.

Municipal politics greatly impact AMVA’s leadership every four years given that the key actors within the entity come to it through a political process rather than through direct election. Mayors and councilors representing their municipalities’ interests appoint individuals to key AMVA positions (director and seven deputy-director areas). Other actors, such as the private sector and civil society organizations, lack representation in the entity. The political negotiation for AMVA positions significantly impacts its management agenda, institutional priorities, and the assignment among municipalities of budgetary investments. This is reflected in how much the four-year plan under a new director may or may not reflect the priorities of Medellin, the metropolitan area and the wider region.

Medellin’s representational strength, due to its position as primate administrative city (given its budget and population size), translates into political complexity where city leaders must be willing to work with others instead of taking unilateral action. In other words, while Medellin has the resources and clout to act independently, its leaders must devote time and resources to negotiate plans and interventions with other municipalities. As a result, AMVA requires members to reach agreements to set an agenda in pursuit of metropolitan territorial equity and co-responsibility.
Division of roles between AMVA and other entities

AMVA’s role from a budgetary perspective is key. The entity serves as a tool to build and develop common-interest agendas. By financing studies, plans, programs, and metropolitan and municipal-scale works, AMVA helps balance the territory through common-interest solutions such as mobility infrastructure and environmental conservation. The entity provides a mechanism for Medellin, its main contributor, to transfer financial resources to other municipalities. For smaller ones, AMVA’s investments in infrastructure and environmental projects are often many times larger than their own.

None of the plans or interventions carried out in the metropolitan area has been the product of a single actor. AMVA, as the entity grouping the 10 municipalities, plays a role in all the plans and interventions that affect the area, but private, public, and societal actors from the local to the national scale also merit attention. Important organizations at the metropolitan level include Grupo EPM, Isagen (a privately owned electricity generation and commercialization firm), Metro (which operates the metro, Metrocable, tram, and feeder buses), and Metroplus (BRT). These entities, together with municipal waste management companies, smaller utility providers, and municipal and inter-municipal buses, ensure that citizens across the territory have access to key services.

In the case of utilities, this has meant that the 10 municipalities collectively have 99.5 percent electricity coverage, 97.3 percent aqueduct coverage, 95.4 percent sewage coverage, and 77.4 percent gas coverage, while waste management stands at 98.2 percent (DANE 2019b). Taken together, SITVA (which is made up of Metro and Metroplus) and the other public transport systems cover approximately 86 percent of the metropolitan area’s occupied territory. While transportation coverage is high, the systems are not fully integrated.

Corantioquia and Cornare are two environmental agencies that impact the Aburra Valley. Corantioquia, established by Law 99 in 1993, is the environmental authority for the metropolitan area’s rural territory—AMVA is the environmental authority for the metropolitan urban areas only. Cornare, which is the environmental authority for the region east of the metropolitan area, is an important partner when it comes to securing water resources to meet current and future needs.

Departmental and national actors

Other important players in Antioquia include the governor’s office and the Departmental Assembly. These entities sit higher in the administrative hierarchy (Figure 6), impacting policy formulation at the regional scale as well as the flow of resources. The departmental government of Antioquia has been an important partner for metropolitan projects such as the metro, of which it owns 50 percent.
Further impact on the metropolitan area is expected after the department’s decision in 2016 to create the Antioquia Railroad (Ferrocarril de Antioquia). The new railroad is expected to be multipurpose, with trains carrying solid waste, goods, and passengers.

Other stakeholders with direct influence over the territorial development of the metropolitan area are national actors. These include Invias, the agency in charge of maintaining, regulating, and supervising the construction of highways and roads, the environment and sustainable development ministry, and the national planning agency. Economic and civil society interests also participate in planning processes, although there is room to improve involvement by the latter. Strategic actors on this front include Medellin Como Vamos and Aburra Sur Como Vamos, private institutional alliances that monitor the implementation of public policies in the central and southern portions of the metropolitan area. They also include the chambers of commerce of Medellin and Aburra Sur, as well as business associations—Pro Aburra Norte, Corporacion Pro Sur, Proantioquia, Camacol, and Comite Intergremial de Antioquia. National business associations Andi and Fenalco complement the list.

Non-governmental and community-based organizations

Local academia is another participant, particularly the loosely grouped “G8” members: Universidad de Antioquia, Universidad Nacional, Universidad Pontificia Bolivariana, Universidad Eafit, Universidad CES, Universidad de Medellin, Universidad la Sallista, and Escuela de Ingenieria de Antioquia.

Last but not least are regular citizens, community-based organizations, non-governmental organizations, citizen collectives, and environmental groups such as Con-Vivamos, Nuestra Gente, Corporacion Region, and La Ciudad Verde. These are active from the neighborhood level all the way to the metropolitan scale. Citizens also affect the implementation of metropolitan initiatives. For example, technicians from the early warning system SIATA developed a set of small, cloud-shaped measuring devices to read ozone, PM2.5, carbon dioxide, and nitrogen monoxide throughout the area, thus complementing their 18 large-scale measuring devices. SIATA, an effort by AMVA in partnership with Grupo EPM, the office of the mayor of Medellin, and Isagen, then developed a program called Scientific Citizens that installed 102 of these devices at residences that volunteered to have one. Volunteering requires both powering the device and connecting it to the residence’s Wi-Fi so that it can transmit data back to SIATA in real time (AMVA 2017c).

PM2.5 is a microscopic particle that causes air pollution-related adverse health impacts. Measuring its concentration and understanding its sources is key to formulating policies to control its presence in the air people breathe.
**Figure 6** Division of responsibilities among the four levels of government

<table>
<thead>
<tr>
<th>FINANCE AND ECONOMY</th>
<th>ENVIRONMENT AND PLANNING</th>
<th>INFRASTRUCTURE AND TRANSPORT</th>
<th>EDUCATION AND CULTURE</th>
<th>SECURITY</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>National Government</strong></td>
<td></td>
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</tr>
<tr>
<td>Commerce and industry</td>
<td>Petroleum, gas and mining</td>
<td>Utilities regulation</td>
<td>Education policy</td>
<td>Conflict resolution</td>
<td>External affairs</td>
</tr>
<tr>
<td>Financial regulation</td>
<td>Housing and urban policy</td>
<td>Science and technology</td>
<td>Culture</td>
<td>Law and justice</td>
<td>Statistics</td>
</tr>
<tr>
<td>Taxation and inspection</td>
<td>Agriculture</td>
<td>Highways, rail and ports</td>
<td>Sports</td>
<td>Military</td>
<td>Health policy</td>
</tr>
<tr>
<td>Labor and employment</td>
<td>Environment and forests</td>
<td></td>
<td>National university</td>
<td>Police</td>
<td>Social welfare</td>
</tr>
</tbody>
</table>

| **Department Government** |                           |                             |                       |          |       |
|---------------------------|---------------------------|-----------------------------|                       |          |       |
| Regional development      | Environmental protection  | Electricity                 | Dept. university financing | Natural risk management | Social welfare |
| Taxation                  | Environmental authority (rural) | Public works               | Art, sport and culture |                      |       |

| **Metropolitan Government** |                           |                             |                       |          |       |
|-----------------------------|---------------------------|-----------------------------|                       |          |       |
| Environmental authority (urban) | Transportation authority | Coordinate planning        | Coordinate infrastructure | Coordinate safety | Coordinate coexistence |

| **Municipal Government** |                           |                             |                       |          |       |
|--------------------------|---------------------------|-----------------------------|                       |          |       |
| Local economic development | Housing                   | Utilities services          | Education infrastructure | Emergency services | Promote citizen |
| Taxation                 | Spatial planning and regulation | Public works               | Teacher training       | Manage security | Social welfare |
|                          | Public space               | Transportation              | Art, sport and culture |                      | Health services |

**INSTITUTIONAL ARCHITECTURE**

Law 1454 of 2011, which promotes associations within a territory, and Law 1625 of 2013, which covers metropolitan areas, constitute the building blocks for the legal architecture that currently enables integrated urban development in Colombia. AMVA is the organizational manifestation of the objectives of those laws, and it has been legally tasked by its 10 members to carry out the functions prescribed by the law over the Aburra Valley. Both urban and rural areas come under its purview, as do variously sized urban settlements.
The problem with the existing institutional architecture when it comes to metropolitan areas is that “neither legislation nor public policy recognize clearly and completely this [metropolitan] reality [...] the state’s prevailing territorial model in Colombia is built on the notion of municipalities” (Bustamante Perez 2014). The same author, who recently headed the citizen dialogues carried out across metropolitan Medellín, goes on to add that “despite the existing institutions, for most matters there are just ten municipalities carrying out dispersed and disjointed management” (Bustamante Perez 2014).

Consider, for example, AMVA’s environmental role. National environmental legislation and Law 1625 give AMVA environmental authority over its metropolitan urban area. Metropolitan rural areas are under the authority of Corantioquia, an autonomous regional-scale environmental corporation covering the central territory of Antioquia. Corantioquia can determine land occupancy guidelines and building densities on an individual basis with each municipality, thus limiting AMVA’s reach in these two key spatial planning areas.

This fragmentation has highly confusing results: AMVA carries out general management, including planning processes and works inside Corantioquia’s jurisdiction. But agreements on the spatial plans of the 10 municipalities require two separate processes, one with Corantioquia, the other with AMVA, as both are environmental authorities. Then, an additional agreement must be reached with AMVA when it comes to metropolitan matters. The legal order creates complexities as both entities manage territorial aspects in very different ways. The enforcement of the Plan for the Use and Management of the Aburra River Basin (POMCA) is complicated by this legal and institutional fragmentation, despite having been formulated between both environmental authorities. Such fragmentation creates inefficiencies and ineffectiveness in metropolitan management. POMCA and the wider environmental authority sector highlight how an inadequate legal framework can hamper important efforts.

There is also a multiplicity of providers and authorities overseeing public services such as water, electricity, waste management, and bus services. AMVA is tasked with coordinating the provision of these services within its territory, but it does not control their actual provision. Entities protecting the level of autonomy legally assigned to them but also requiring coordination in order to carry out their functions in the metropolitan area include the Antioquia government, Corantioquia, Invias, and Grupo EPM. Other key sectors, such as food provision, do not have any authority managing them.

A key takeaway is that AMVA has a diverse set of purviews and a wide scope, but these are shared through a complex web of national, departmental, metropolitan, and municipal jurisdictions. This reality complicates management and the extent to which results are achieved. In other words, the simultaneous and superimposed management by diverse entities over the same territory calls for a high level of productive interaction, but this has been difficult to achieve.
**SUSTAINABILITY**

Metropolitan land-use management has benefited from AMVA's leadership through studies, plans, and regulations to arrange and coordinate urbanization in the 10 municipalities (to the extent possible, given on-the-ground realities where municipalities function with autonomy). Some of these undertakings have been the entity's initiative rather than efforts mandated by laws. Even before Envigado joined AMVA, it was always included in planning efforts as a way of acknowledging its importance for the wider territorial development. AMVA's work has guided municipalities’ local planning decisions with positive results such as the incorporation of the Metropolitan Land Use Directives into municipalities' land use plans, thus institutionalizing the directives.

Due to the prevailing municipal autonomy to define and ultimately decide urban regulations and land use, AMVA’s reach and control is limited and diffused. For example, awareness of the challenges associated with the implementation and sustainability of planning efforts was front and center in the formulation of the most recent planning instrument, the Metropolitan Strategic Land Use Plan (PEMOT). The actors charged with developing this plan attempted to address the problem by bringing together a wide range of actors in hopes of better reflecting social and institutional requirements. In addition, the plan includes an implementation component that identifies concrete programs and projects that help turn the strategic objectives into actionable steps. This component includes a timeline and a budget for the financial resources needed.

**PRIVATE PARTICIPATION**

Distinguishing between territorial entities (municipalities) and administrative entities (AMVA) is key to understanding opportunities for private participation in metropolitan areas in Colombia. Given the distribution of powers granted by the constitution among these entities, Maximizing Finance for Development (MFD) activities—that gather private finance for development—are carried out at the municipal scale. As a legally constituted administrative entity, AMVA can sign agreements with both public and private actors to carry out studies, projects, and plans, and to construct physical infrastructure. An important caveat is that while this is generally permitted under the law, it is only possible if and when municipal authorities take the leadership or delegate these functions to AMVA. The entity could, if delegated, take advantage of Public-Private Partnership legislation and concessions, and even provide public services.

AMVA's main interaction with the private sector comes from its role as urban environmental authority. Through this responsibility the entity collects environmental fees and works with manufacturers (such as textiles and plastics), industries such as food processing, the construction sector, and the hospitality
sector to reduce their environmental footprint. Work on this front is nevertheless still fragmented, and currently sustainable production and consumption activities to improve resource efficiency and reduce negative externalities are mostly self-driven. As Carlos Fernando Cadavid Restrepo, a sustainability expert working closely with the private sector, states, “the work is still being done in silos, efforts are not cross-sectorial. Having several sectors working together on this front and partnering with the government is still seldom happening”.

**TYPES OF SOLUTIONS AND PHASING**

Despite the limitations discussed, it is important to understand the administrative architecture through which AMVA designs and adopts spatial and strategic plans to guide interventions in the metropolitan area. AMVA has been at the forefront of metropolitan-scale planning in Colombia, and its desire to improve the quality of life of its residents often pushes the national government to improve or write new legislation.

The plan-creation process starts with AMVA entering into a contract with an external agent to carry out any studies needed for the plan and to draft it. Studies usually include environmental, cartographic, economic, and legal analyses. Contractors are usually universities with the ability to assemble a team of experts in a short timeframe. Recent examples of plan contractors include: the Urban Studies Institute (IEU) at National University in Bogota (for the PEMOT) and the Center for Urban and Environmental Studies (Urbam) at Eafit University in Medellin (for Bio2030). The contractor maintains an open dialogue with relevant departments within AMVA during the analysis and formulation stages, and upon completion hands the spatial, strategic, or sectoral plan to AMVA.

The plan is then given to the Metropolitan Board, which discusses it. If the plan is deemed to meet the interests of the organization, the Metropolitan Board proceeds to adopt it through an administrative act known as a Metropolitan Agreement. Plans adopted in this manner include the Metropolitan Land Use Directives (2006), Plan Bio2030 (2011), and the PEMOT (in final stages of approval). Sectoral plans such as the Mobility Master Plan (2005–2020) are also adopted through agreements. While such agreements are said to be binding, in reality they are only followed so long as they remain at a higher level and respect municipal autonomy. Ultimately, municipalities have the last word in most spatial planning matters, and they have often implemented their own plans with elements that contradict the metropolitan models promoted at AMVA. Some plans within AMVA are adopted using a resolution by the environmental authority. These resolutions are binding, given the entity’s powers for urban environmental matters.

Plans usually describe strategic interventions in order to help achieve their

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10 Interview by Andrea Restrepo-Mieth on August 23, 2019
objectives, basing the suggestions on discussions where strategic and technical appropriateness have already been determined. The first phase in the implementation of a solution is its structuring by either AMVA or a municipality’s planning department. Additional, more detailed studies may be carried out at this time. For example, a study analyzing a terrain’s conditions or the environmental impacts of an intervention can be commissioned at this stage.

Besides coming up with designs, the planning stage also includes drafting legal documents to contract implementation, initiating risk-management efforts such as hedging financial risks, and estimating costs and needed time-to-completion. Interventions meant to provide metropolitan-scale solutions are therefore always found in plans such as the Directives or Bio2030 and do not arise suddenly. Furthermore, an intervention’s lines must be traceable to the metropolitan area’s PIDM (integral plan) as this is AMVA’s institutional agenda. Resource allocation is based on being part of integral planning strategies. The next stage is to contract via public tender or agreement, and then to commence construction or program rollout. Upon completion, the final product is handed to AMVA or to one of the 10 constituent municipalities.

The following cases briefly illustrate key interventions carried out in the metropolitan area, from planning to implementation.

**Mobility solutions: SITVA, EnCicla, and the move to integrate a large territory in more sustainable ways**

SITVA is the first multi-modal public transport system in Colombia to combine high-, medium-, and low-capacity modes, incorporating everything from metro to tram to public bicycles. In combination with conventional buses, SITVA covers approximately 86 percent of the metropolitan area’s occupied territory. The first intervention completed to create this system was the metro, which started with the establishment in May 1979 by Medellin and Antioquia of a public company appropriately called Metro de Medellin. The city and the Department of Antioquia have equal ownership. Metro carried out technical and economic feasibility studies, presented the project to the national government (given the high levels of debt Metro would have to incur and the national government’s required support), and in 1982 received the green light to proceed. Construction started in 1984 and was finalized in 1995 for Line A of what is, to date, still Colombia’s only metro.

SITVA’s 73.52 kilometers incorporate two metro lines, five cable cars, two BRT lines, and one tram line. Its total capacity is 69,923 passengers per hour in any one direction. Each mode is meant to complement the territory it serves. For example, the cable cars are suitable for moving people up and down steep slopes, while the BRT brings mass transportation to densely built but mostly flat areas. Smooth transfers among modes are achieved through carefully planned stations and the use of a single
card to pay for the different services. EnCicla, a free public bicycle system, helps expand the coverage area by maintaining docking stations close to SITVA’s strategic stops. Together, SITVA and EnCicla help address chronic air pollution problems by providing alternatives to private vehicle use while improving territorial equity.

The most recent mobility innovation to help with air quality concerns has been the introduction of electric buses. A pilot of this mode was implemented in 2018 with a fully electric articulated bus running on one of the feeder bus routes in Medellin. The 18-meter-long bus had a capacity to carry 160 passengers and cost COP 1,900 million ($638,226), which was paid by Metro and EPM (Metro 2018). The pilot was followed by the purchase of 64 electric buses for the BRT system Metroplus. These buses when fully operational are expected to annually prevent the emission of 3,666 tons of CO₂ and 88 kilograms of PM2.5 (Restrepo 2019).

Mobility achievements have been the result of integrated planning and implementation efforts by the city of Medellin, AMVA, and public transport companies Metro and Metroplus. AMVA drafts mobility plans and regulates service providers, while municipalities design the projects to keep the system moving. Current plans to expand the systems are incorporated in the Mobility Master Plan 2005–2020 and the Bicycle Metropolitan Master Plan 2030. Table 3 summarizes key events in the metropolitan area’s pursuit of integration through mobility.

### Table 3. Key Events in the Metropolitan Area’s Pursuit of Integration Through Mobility

<table>
<thead>
<tr>
<th>Timeline</th>
<th>Key Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>1977–1979</td>
<td>Creation of a public company to carry out technical and economic feasibility studies to build the metro.</td>
</tr>
<tr>
<td>2004</td>
<td>First cable car, Line K, begins operation. The cable links the metro, which runs parallel to the river, to the upper portion of the north-eastern hills. Five additional cable-car lines built between 2008 and 2019.</td>
</tr>
<tr>
<td>2007</td>
<td>Introduction of Civica, a contactless smart card to pay fares.</td>
</tr>
<tr>
<td>2011</td>
<td>BRT comes into operation.</td>
</tr>
<tr>
<td>2013</td>
<td>Feeder buses added to the public transit system.</td>
</tr>
<tr>
<td>2016</td>
<td>Tramway built to compliment multi-modal system.</td>
</tr>
<tr>
<td>2019</td>
<td>Ten lines, with capacities per mode ranging from 10 passengers (gondola) to 300 (metro car), have the ability to transport 77,705 passengers per hour per trip. The network has direct access to six municipalities: Bello, Medellin, Itagui, Envigado, La Estrella, and Sabaneta.</td>
</tr>
</tbody>
</table>

Source: Expert knowledge combined with dates/numbers from [https://www.metrodemedellin.gov.co](https://www.metrodemedellin.gov.co).
Medellin’s Metrocable is illustrative of the metropolitan enhancements that, with slum upgrading and major public space interventions, laid the foundation for using integrated planning in the city’s poorest areas. Shown here are cable cars gliding above Medellin’s Santo Domingo district.

Source: Panos Pictures/Samuel Aranda.
Protecting strategic water ecosystems and related services

Integral water management for the metropolitan area requires coordinated efforts by AMVA, utility services providers such as Grupo EPM, and regional partners such as Corantioquia and Cornare. Approximately 85 percent of the water consumed in the metropolitan area is captured outside its perimeter. Water providers include Grupo EPM (with a 93.83 percent market share), community aqueducts (5.52 percent), and underground water (0.65 percent). Two dammed reservoirs account for over 80 percent of the metropolitan area’s water needs: La Fe for 54.1 percent of the area’s water (58 percent of EPM’s system) and Río Grande II for 30.8 percent (33 percent EPM). In addition, these dams generate electricity at three different stations: Niquia, La Tasajera, and La Ayura (AMVA 2017b).

In consultation with key stakeholders, AMVA developed plans such as POMCA in 2007 and the Ravines Plan (Plan Quebradas) in 2015. POMCA addresses the management of the Medellín River (also known as the Aburra River), while the Ravines Plan seeks to restore water sources within the metropolitan area. Only Medellín and Envigado acknowledge within their strategic plans their dependence on water sources outside their jurisdiction and the need to carry out actions with other actors to protect future availability. To balance this, AMVA, Grupo EPM, the Department of Antioquia, the nonprofit Science and Technology Center of Antioquia (CTA), and Public-Private Partnerships such as Fondo Cuenca Verde have partnered to conserve, protect, and restore strategic ecosystems and, in that way, to help secure the future availability of water and electricity. For example, the Ravines Plan identified 19 ravines for intervention: six in the north, six in Medellín, and seven in the south. Technical and conservation activities carried out between 2017 and 2018 include tours to assess the condition of each microbasin and the development (in partnership with the municipalities) of an integral program to improve each basin, in addition to planting 27,000 trees.

POMCA has also become a contributor to the visioning of the metropolitan area’s public space system by planning for the consolidation of a metropolitan green belt that would complement the existing Medellin green belt. Discussions to conserve the upper portion of Medellin’s hillsides go back to 1981 (Alcaldía de Medellín 2011), and the other municipalities have subsequently joined the effort, with the idea of creating a metropolitan green belt. The green belt is considered a strategy to protect ecosystem services, particularly those associated with water. Nevertheless, the only project implemented toward this end has been a portion of Medellin’s green belt known as Jardin Circunvalar. Table 4 summarizes these and other key undertakings to protect the metropolitan area’s water ecosystems.
TABLE 4. KEY UNDERTAKINGS TO PROTECT THE METROPOLITAN AREA’S WATER ECOSYSTEMS

<table>
<thead>
<tr>
<th>TIMELINE</th>
<th>KEY EVENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970s</td>
<td>Medellin River clean-up program: For almost 50 years EPM has worked towards reversing the negative impact of industries and informal urbanization on the Medellin River.</td>
</tr>
<tr>
<td>1992</td>
<td>Creation of Mi Rio, an institute for the integral management of the Medellin River Basin. Responsibilities included spatial planning studies as well as the design and construction of hydraulic works, land risk mitigation, and reforestation.</td>
</tr>
<tr>
<td>2004</td>
<td>Creation of joint committee for the Plan for the Use and Management of the Aburra River Basin (POMCA).</td>
</tr>
<tr>
<td>2007</td>
<td>POMCA is approved.</td>
</tr>
<tr>
<td>2014</td>
<td>Creation of water fund Cuenca Verde as a joint public-private effort to help protect and manage the water supply basins for the Aburra Valley.</td>
</tr>
<tr>
<td>2015</td>
<td>Inauguration of Jardin Circunvalar, a portion of which is expected to be Medellin’s green belt. Besides hosting activities for the public in an area with little public space it also doubles as a source to protect water ecosystems.</td>
</tr>
<tr>
<td>2015</td>
<td>Plan Quebradas identifies 19 ravines for intervention: six in the north, six in Medellin, and seven in the south.</td>
</tr>
<tr>
<td>2017–2018</td>
<td>Implementation of Plan Quebradas has led to technical and conservation activities such as tours to assess the condition of each microbasin and the development in partnership with the municipalities of an integral program to improve each, in addition to planting 27,000 trees.</td>
</tr>
<tr>
<td>2018</td>
<td>Between 2014 and 2018 Cuenca Verde helped conserve 4,445.9 hectares and impact 13,975.9 hectares, meaning 44 percent of the area it wants to help protect for Rio Grande II dam and 12 percent for La Fe dam (Cuenca Verde 2019).</td>
</tr>
</tbody>
</table>

Source: Expert knowledge combined with dates/numbers from https://www.metropol.gov.co/Ambiental.

RISK MANAGEMENT

Legislation on risk management mandates that different government levels carry out risk and threat assessments following the Sendai framework\(^{11}\) for disaster risk reduction and meeting sustainable development goals. To this end, current norms require municipal land use plans to be updated to include risk studies. These mandates impact both municipal and metropolitan land use management. Both are directed to analyze their territories in detail and to incorporate in their plans and norms a sectoral map specifying risk levels. AMVA and Corantioquia help municipalities analyze and manage physical risks due to land movements, avalanches, rising water levels, and other adverse conditions that can impact lives and communities. The legal obligations for government employees and organizations lead to rigorous risk management actions being prioritized over urbanization processes. However, the accumulated level of informal urbanization creates important challenges going forward, as communities that inhabit high-risk territories must be resettled\(^{12}\).

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\(^{11}\) For more on the United Nation’s Sendai framework for disaster risk reduction see https://www.undrr.org/implementing-sendaiframework/what-sf

ACHIEVING GLOBAL ENVIRONMENTAL BENEFITS

Broadly speaking, the efforts carried out in the metropolitan area to achieve global environmental benefits can be categorized as actions to moderate emissions, manage day-to-day conditions, and conserve ecosystems.

The main actions to moderate emissions include improving access to services and urban amenities at the neighborhood level, increasing access to public transportation to improve connectivity and reduce private vehicle demand, and promoting clean production programs. Medellín has received considerable contributions to finance integrated urban planning projects and programs from Grupo EPM, which is primarily a renewable energy-based utility. The bulk of Grupo EPM’s electricity generation comes from hydroelectric plants (25 out of 27 plants, the others being one thermal and one wind). Many of these integrated urban planning programs have enabled the development of high-density mixed-land use development neighborhoods and offer enhanced social inclusion and economic opportunity for people living in low-income communities through well-serviced neighborhoods that have last-mile connectivity to mass transit systems. Additionally, attempts to reduce the use of private vehicles by promoting the use of mass transportation and bicycles have curtailed the carbon output of metropolitan mobility. Efforts through Metro, Metroplus, and EnCicla make up part of this category, as do recent moves to switch portions of the vehicle fleet from fossil fuel-dependent buses to electric ones. This electrification of high-capacity buses is significant because metropolitan power supply is mostly from renewable energy sources.

Another effort on this front is the clean production program carried out by the private sector in areas such as construction and the industrial production of textiles and chemicals, among others. Practices to reduce emissions have already shown their scale-up potential. For example, the networked public transport system has been in constant expansion over the past 20 years, providing more users with clean mobility solutions. Another example is the public bicycle system, which is being extended to more municipalities in the metropolitan area. Clean production can also be expanded to include more sectors. As the construction, plastics, and textiles sectors show, efforts can be expanded to better align with circular economy models.

A second set of initiatives seeks to manage harmful natural events such as extreme precipitation, which increases the risks for landslides on hillsides, as well as episodes of air quality deterioration due to black carbon, which
increase health impacts for vulnerable populations. The Medellin metropolitan area is the only one in the country with early warning systems for air pollution, extreme weather, flooding, and land movements. SIATA, together with plans PIGECA and POECA, also aim to give policy makers and citizens the tools to address atmospheric pollution episodes. Open access to SIATA’s portal allows citizens to see prevailing and expected weather conditions and plan their day accordingly. Government officials use SIATA to decide when to impose special measures such as suspending government-sponsored outdoor recreational activities when the air quality deteriorates significantly. AMVA recently launched an app, area 24/7, to facilitate access to SIATA and help users plan trips on public transport, among other uses. SIATA-like systems will become increasingly important as cities face climate change, creating opportunities to expand the technology to other places. The municipality of Escazu in Costa Rica is one such place; in partnership with AMVA, the municipality is adopting SIATA.

Finally, there are ongoing efforts to preserve ecosystems—such as the metropolitan green belt, the river clean-up program, and efforts to protect ravines and water basins. Two other initiatives merit consideration: protected urban areas and wildlife protection. In 2009, AMVA began to issue declarations identifying selected places as protected urban areas as a conservation and environmental education strategy. Declaring a place to be a protected urban area means that the municipality cannot change its land use to another purpose, thus protecting key urban ecosystems from housing, industrial, or other built-environment impacts. The ultimate objective is to create a metropolitan system of protected areas to conserve biological diversity, ecosystem services, and socio-cultural values associated with the areas (Alvarez Perez 2017). The first two areas so designated were El Volador and Nutibara, two hills located in Medellin. These were followed in 2011 by two other hill neighborhoods: Asomadera in Medellin and Piamonte in Bello. In 2019 two more areas were added to the list: wetland El Trianon and lineal park La Heliodora in Envigado, and wetland Ditaires in Itagui. AMVA had to innovate the legal instruments to achieve this, because the national environmental ministry did not recognize the protected urban area approach. These efforts have significant opportunity for scale-up, as other municipalities and metropolitan areas looking to design similar policies can now look at AMVA’s policies and replicate them to meet local urban ecosystem and wildlife protection needs. ☢️
Financing

THE BULK OF EXPENDITURES IN PROGRAMS, infrastructure, planning, and similar undertakings that impact the metropolitan scale are usually carried out by AMVA, either by itself or in partnership with its municipalities, with Antioquia, with the national government, with state-owned companies such as Grupo EPM or Metro, or with autonomous regional corporations such as Corantioquia. AMVA’s financing is mostly limited to contributions made by its members and mandatory environmental surcharges. Nevertheless, the entity has been active in the past decade in securing funding for initiatives, by working with the Department of Antioquia, the national government, and foreign governments and international organizations (including the United Nations Environment Programme and the European Union).

Municipalities, the Department of Antioquia, and the nation carry out a smaller number of interventions that impact the metropolitan area without AMVA’s financial involvement. Examples of these include the metro and a current partnership between the national government and the municipalities to upgrade 38 educational institutions. Co-financing initiatives have led to increased activity in the metropolitan area by allowing municipalities that otherwise could not cover the full costs to propose or request interventions in which they provide in-kind contributions (land, demolitions, and so on) while other actors shoulder the additional costs.

Budgets are drawn up every four years when a new AMVA director and metropolitan board take office. The budget is part of a four-year management plan that outlines the strategic interventions and the plans to be executed. Table 5 outlines AMVA’s income and expenditures over the current administrative period.
As shown in Table 5, AMVA has two main sources for current income: environmental surcharges on property taxes and contributions by its constituent municipalities. In 2018, these accounted for 37.8 percent and 17.8 percent of its income, respectively. Environmental surcharges guarantee environmental authorities will have a certain level of income to meet their mandates. This provides AMVA with some stability, as member contributions are subject to change, should municipal councils redefine them. Simultaneously, it means the entity must emphasize environmental investments.

Member contributions have continued to grow over the years, as the municipalities value AMVA’s role in promoting metropolitan development. The remainder of the current income comes from fees (remuneration rates to improve water resources) and fines (for example for landscape deterioration, pollutants emissions, and environmental norm violations); sales of services
(related to recreational services at the Metropolitan Water Park); licenses and permits for transportation and environmental services (for example, issuance of permits for the BRT and other mass public transit procedures); and other non-tributary income (such as leases).

The complement to current income is capital income. The board of directors can authorize AMVA to borrow funds to cover costs for infrastructure projects. Historically, the organization has been reluctant to expand its level of debt, although this has begun to change with the current administration as the board has just entered into a loan with a national development bank, Findeter. That decision was the product of a desire to begin the construction of infrastructure works, such as the Calle 77 Sur road exchange for Sabaneta and La Estrella and a sustainable mobility project emphasizing sidewalks and bike lanes in La Picacha (Medellín), Envigado, Copacabana, Bello, Barbosa, and Girardota.

Furthermore, for the first time in Colombian history, a metropolitan authority has been directly offered a loan by an international agency. It is still unclear whether AMVA will take this loan, which was offered by the Inter-American Development Bank to further expand AMVA’s zero-emissions metropolitan mobility through EnCicla. In addition to the funds received through the Findeter credit, AMVA also has income from portfolio recovery (environmental surcharges and municipal contributions owed from previous years), and financial surpluses and returns from financial operations, the product of liquidity management through bank accounts (AMVA 2019).

Considering the potential for other sources of income, AMVA's management plan for 2016–19 calls for the use of complementary financial instruments, such as Public-Private Partnerships (PPP). Another proposed instrument is to capture a portion of the value added from metropolitan infrastructure through impact fees and to invest those funds into other infrastructure projects. Currently there are no interventions or initiatives by the private sector to advance metropolitan integrated planning. In June 2019, Fitch Ratings increased AMVA’s long-term credit rating from AA+(col) to AAA(col) and maintained its F1+(col) short-term credit rating (Fitch 2019). The improved rating reflects the credit agency’s perception that AMVA has a medium-to-low risk profile, a product of solid income sources, a sustainable debt level, and a flexible expenditure structure.

The bulk of AMVA’s expenditures go to investments (86.96 percent), with the remainder distributed among operational expenses (10.37 percent) and debt servicing (2.68 percent). Another way to look at the components under the annual investment operational plan category is by strategic line. Allocations of expenditures under AMVA’s six strategic categories for 2018 were as follows: 19.82 percent for planning and managing for equity; 25.88 percent for environmental quality and sustainable development; 43.15 percent for sustainable, safe, and friendly mobility; 4.26 percent for safety, coexistence, and peace;
4.05 percent for institutional support, management, and cooperation; and 2.83 percent for public communication and social mobilization (AMVA 2019).

Percentage allocations between the three main expenditure categories—investments, operational expenditures, and debt servicing—remain relatively constant. There is a significant nominal increase in expenditures for 2017 and 2018 that is consistent with the increase in capital income from the Findeter credit. Another area that sees a notable nominal increase is environmental surcharges on property taxes, despite decreasing in the percentage of participation in overall income. The bulk of this nominal increase comes from efforts by municipalities to update their property valuation records, which in turn increases the fees going to AMVA. The entity has provided technical support on this front to municipalities.

A good illustration of the commitment by AMVA’s members to fund interventions that can help balance urban growth and development between lagging and leading municipalities within the metropolitan territory is found in the return on the investment of resources transferred. Medellin, the dominant actor among the municipalities, was responsible between 2016 and 2018 for 76.24 percent of municipalities’ contributions and environmental surcharges. During the same period, its return was just 35.6 percent. This is in stark contrast with other municipalities, such as Barbosa, which contributed 0.43 percent and had a return of 779.5 percent (AMVA 2019).

Two important conclusions can be drawn from these data: first, that metropolitan development cannot be understood using return-on-investment metrics. By such accounting, Medellin is not getting a good deal. However, municipal leaders understand that investments impacting their neighboring municipalities contribute indirectly to their own future, for example by putting less pressure on Medellin as a central node and by securing ecosystem services. Second, the numbers illustrate the importance of metropolitan entities such as AMVA, which can help funnel resources to smaller municipalities, and thus contribute to their institutional and physical development.

Replication

To speak of Medellin today is to speak of a 10-municipality conurbation. Geographic conditions present from its inception, combined with urbanization trends from the 1960s to date, have made the Aburra Valley a continuous city.
The late 1980s gave municipalities a lot of power. As a result, current administrative institutions incentivize municipal autonomy rather than integration. Despite this, the AMVA has become an essential administrative instrument for linking key regional sectors, such as mobility and the environment.

AMVA was the first metropolitan regional institution created in Colombia, and it continues to be a pioneer. While it faces limitations to both its scope and function, AMVA has shown that it is possible for complex territories and fragmented political interests to reach agreements and implement strategic and structural steps to address common challenges and seize opportunities. Under the leadership of AMVA, Medellin and the Aburra Valley have pioneered strategies and projects that illustrate to other Colombian regions how to conduct fruitful metropolitan planning and governance. Through the years, it has led the way by piloting strategies for the evolution of the country’s metropolitan institutions. Examples of its achievements range from leading the way in planning instruments such as the 2006 Metropolitan Land Use Directives and the PEMOT, currently under discussion, to being the first metropolitan area in Colombia with integrated mass transportation and public bicycle systems, SITVA and EnCicla. Table 6 summarizes some of the most significant solutions implemented to date.

### TABLE 6. INVENTORY OF SOLUTIONS—A PORTFOLIO OF POLICIES, PROGRAMS, AND PROJECTS

<table>
<thead>
<tr>
<th>SOLUTIONS</th>
<th>MECHANISM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-modal mobility</td>
<td>Tailor solutions to the territory</td>
<td>Network composed of modes appropriate for flat terrains and steep slopes</td>
</tr>
<tr>
<td></td>
<td>Incorporate the entire city into the network</td>
<td>Extend multi-modal network to all income levels</td>
</tr>
<tr>
<td>Metropolitan planning</td>
<td>Creation of a dedicated agency</td>
<td>Coordinate among 10 municipalities to harmonize land use plans</td>
</tr>
<tr>
<td></td>
<td>Draft and implement environmental sustainability plans</td>
<td>Exercise urban environmental authority in the metropolitan area</td>
</tr>
<tr>
<td></td>
<td>Integrate territory through multi-modal mobility</td>
<td>Build common-interest transportation infrastructure. Work with municipalities to integrate transportation networks</td>
</tr>
<tr>
<td>Integrated planning</td>
<td>Intervene in territories holistically through integrated urban projects</td>
<td>Design interventions that incorporate mobility, public space, educational facilities, public services, and other key urban facilities. Coordinate among agencies to ensure efficiencies and incorporate community in the planning process</td>
</tr>
</tbody>
</table>

*Source: World Bank, compiled from Colombian government data.*
A gradual accumulation of know-how and a willingness to work together has led metropolitan Medellin to formulate land-use planning frameworks that allow it to have strategic metropolitan urbanism projects, management instruments, and guidelines to negotiate municipal spatial plans in an integrated fashion. Ultimately this has allowed the metropolitan area to carry out common-interest projects and to have a long-term vision centered on integration and sustainability, its two pillars for future development. While the majority of plans issued by AMVA are non-binding, the institutional reality in Colombia is that even seemingly binding instruments are often moved from paper to practice only through the willingness of elected leaders. In other words, many formal institutions are characterized by institutional weakness. Great achievements often require social and political compromise. AMVA is therefore tasked with getting private and public interests across its municipalities to commit to a metropolitan purpose. This requires continuing to define that common purpose, generating trust among its members, and opening spaces for dialogue and negotiation.

The current legal framework makes most metropolitan management efforts in Colombia non-binding, hampering progress on this front. There is a need for legal frameworks to strike a balance between municipal spatial planning autonomy and the interlinked vision of metropolitan territories. Municipalities and the institutional frameworks that guide them must acknowledge that in reality municipal autonomy has limits due to metropolitan interdependence. The relationships that develop between municipalities and the wider regions that provide goods and services, such as water, electricity, and food, need to succeed. Metropolitan areas are the cities of the twenty-first century. Without proper institutions, metropolitan areas will continue to be just municipalities experiencing conurbation.

**REPLICATION**

Metropolitan Medellin offers many attributes that are replicable in other metropolitan areas. First, it is important to design governance arrangements that clarify rules of engagement for metropolitan actors and can help balance socio-spatial inequalities. Metropolitan Medellin has found this through AMVA—despite its imperfections. Second, metropolitan areas require integrated multi-modal public transport solutions that respond to user needs and the conditions of the territory. SITVA and EnCicla have not only physically connected users across the metropolitan area, but have also aided environmental efforts. Third and last, AMVA, EPM, Corantioquia, and Cornare show the importance of developing multi-party mechanisms to work with regional actors beyond the metropolitan area to protect ecosystems needed to secure future ecosystem services availability.
Density

Figure 7

**POPULATION DENSITY, 2000**

Municipal
- Maximum: 47,894 people/km²
- Minimum: 1 person/km²
- Average: 3,860 people/km²

Metro
- Maximum: 45,718 people/km²
- Minimum: 1 person/km²
- Average: 646 people/km²
Population Density, 2017

Municipal
  Maximum: 54,040 people/km²
  Minimum: 1 person/km²
  Average: 5,511 people/km²

Metro
  Maximum: 77,026 people/km²
  Minimum: 1 person/km²
  Average: 1,474 people/km²

Figure 9
Overlay of density levels, 2000–2017
REFERENCES


____. 2017a. “Sistema de Alerta Temprana—SIATA.” Videotaped presentation. www.youtube.com/watch?v=ByNBVhdGonQ.


MEDELLIN: SOMOS10—INTEGRATING TEN MUNICIPALITIES INTO ONE METROPOLIS

ACRONYMS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMVA</td>
<td>Metropolitan Area of the Aburra Valley</td>
</tr>
<tr>
<td>BRT</td>
<td>Bus Rapid Transit</td>
</tr>
<tr>
<td>CONPES</td>
<td>National Economic and Social Policy Council</td>
</tr>
<tr>
<td>Grupo EPM</td>
<td>Empresas Publicas de Medellin</td>
</tr>
<tr>
<td>IEU</td>
<td>Institute for Urban Studies</td>
</tr>
<tr>
<td>MIB</td>
<td>Integrated Neighborhood Upgrading</td>
</tr>
<tr>
<td>PBOT</td>
<td>Basic Territorial Plan</td>
</tr>
<tr>
<td>PEMOT</td>
<td>Metropolitan Strategic Land Use Plan</td>
</tr>
<tr>
<td>PIDM</td>
<td>Integral Metropolitan Development Plan</td>
</tr>
<tr>
<td>PIGECA</td>
<td>Integrated Plan for Air Quality Management</td>
</tr>
<tr>
<td>POMCA</td>
<td>Plan for the Use and Management of the Aburra River Basin</td>
</tr>
<tr>
<td>POT</td>
<td>Territorial Plan</td>
</tr>
<tr>
<td>PPP</td>
<td>Public-Private Partnerships</td>
</tr>
<tr>
<td>SIITVA</td>
<td>Integrated Transportation System of the Aburra Valley</td>
</tr>
</tbody>
</table>

Currency exchange rate: 1 USD = 2,977 COP (2018)
Cities are the source of over 70 percent of the world’s greenhouse gas emissions. Cities are also the engines of the global economy, concentrating more than half the world’s population. By the year 2050, two-thirds of the world will be urban, with cities accommodating an additional 2.5 billion people over today’s total. Nearly all of this urban growth will occur in developing countries. This concentration of people and assets also means that the impacts of natural disasters, exacerbated by the changing climate, may be even more devastating, both in terms of human lives lost and economic livelihoods destroyed. Earth is on a trajectory of warming more than 1.5°C unless important decarbonizing steps are taken.

Often urban policymakers prescribe integration as the solution to steering urbanization towards decarbonization to achieve greater global and local environmental benefits. However, little is known about the struggles—and successes—that cities in developing countries have in planning, financing, and implementing integrated urban solutions.

Greater Than Parts: A Metropolitan Opportunity presents nine diverse metropolitan areas as individual case studies each with a selection of urban innovations. From the analysis, the report derives models, poses guiding questions, and presents key principles to provoke and inspire action by cities around the world.

The main objective of this report is to understand how developing and emerging economies are successfully utilizing horizontal integration—across multiple infrastructure sectors and systems—at the metropolitan scale to deliver greater sustainability. Integrated planning processes extending well beyond city boundaries are examined to determine how they have been financed and implemented. The report’s primary audience is therefore city decision makers, their financiers, technical advisers, and practitioners most interested in applying integrated approaches to sustainable urban planning in capacity-constrained environments.