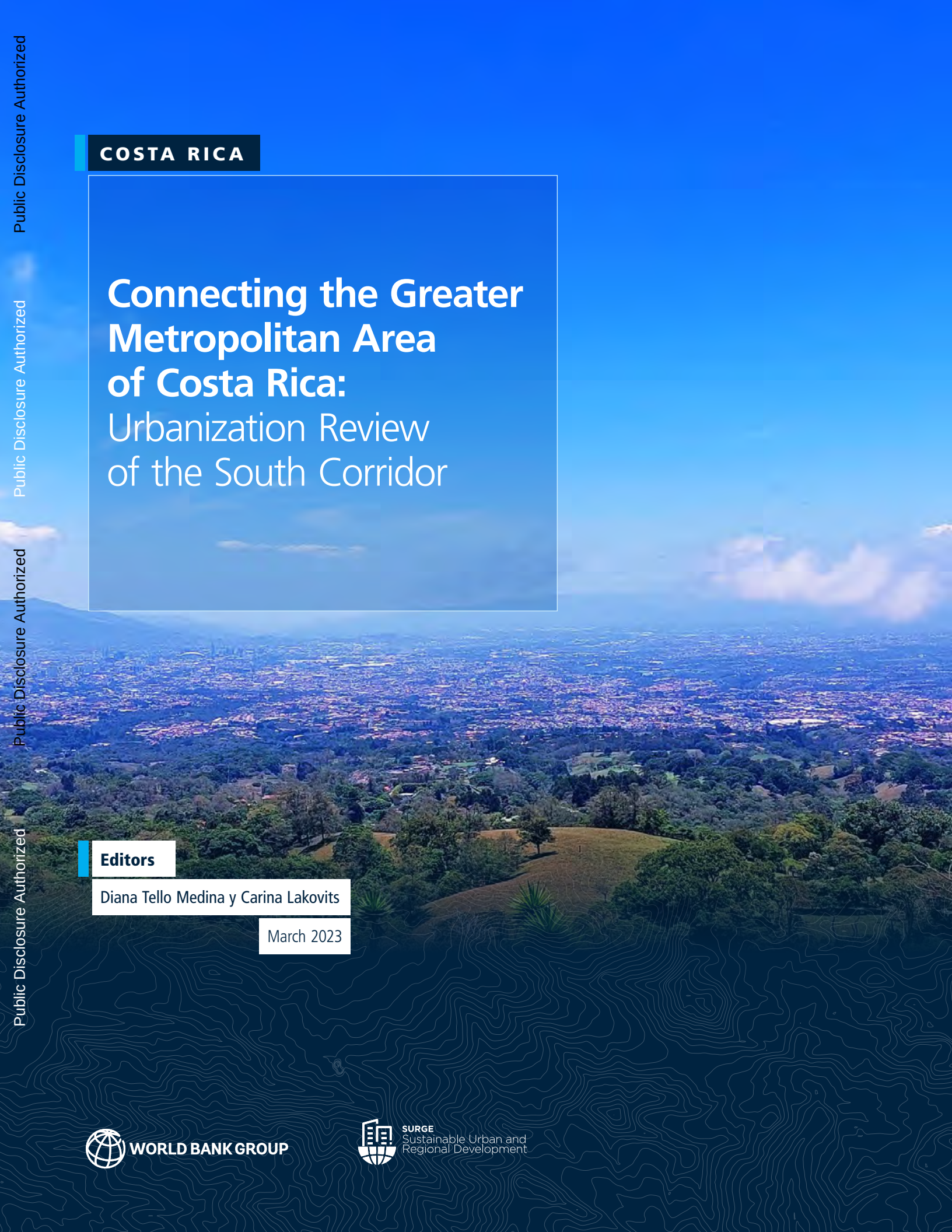
COSTA RICA

Connecting the Greater Metropolitan Area of Costa Rica: Urbanization Review of the South Corridor



Editors

Diana Tello Medina y Carina Lakovits

March 2023

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SURGE
Sustainable Urban and Regional Development

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Foreword

Costa Rica is the most urbanized country in Central America: over the past 60 years, the country's urban population more than doubled from 34 to 80 percent today. However, this rapid urbanization took place largely unplanned, leading to the uncontrolled expansion of our cities in ways that undermined living conditions and sustainability. The lack of updated regional and local land use plans to guide urban growth led to rapid land consumption, severe housing deficits, the occupation of unsafe areas, limited access to services in some areas, traffic congestion, insufficient quantity and quality of public spaces, and insecurity, among others.

The Greater Metropolitan Area of Costa Rica (GAM) is the clearest reflection of the urban crisis we are experiencing. This region concentrates Costa Rica's economic activity and more than half of its population. The land area comprising the GAM tripled between 1979 and 2021, and its peripheral development is marked by waves of informal land occupation. Despite leading the region in terms of GDP, access to employment, and human development indices, the GAM exhibits significant territorial inequalities, as well as other challenges derived from its accelerated growth and unplanned urban expansion.

The cantons of the South Corridor (Desamparados, Aserrí, and Alajuelita) are suffering the consequences of the lack of regional and local planning and management. These cantons concentrate a large number of informal settlements and exhibit the highest levels of poverty and households with unmet basic needs in the GAM. The scarcity of employment opportunities forces part of the population to travel long distances for their daily livelihoods, impacting their quality of life and causing serious problems of mobility and low productivity.

Our country, and particularly the GAM, must lead a paradigm shift to improve municipal management and address the needs of the most vulnerable households. This is a priority in our National Development and Public Investment Plan 2023-2026. It is necessary to design and implement planning tools that guide territorial development with a long-term vision, and to expedite the processes for updating regional and regulatory plans. Additionally, we must respond to the housing deficit in a sustainable and inclusive manner, including through a land use policy that brings homes closer to consolidated urban centers. It is necessary to shift towards an active and sustainable mobility model that includes an efficient public transportation system and promotes the reduction of private car dependence. Inter-institutional coordination, participation of the private sector, and diversification of financial resources will be fundamental to implementing these and other policies that improve the quality of life of Costa Rican citizens.

The Urbanization Review of the South Corridor, "Connecting the Greater Metropolitan Area of Costa Rica," is an important effort to increase our understanding of the main issues of housing, mobility, planning, and municipal finance in the GAM and represents a huge opportunity to inform our public policies in order to achieve sustainable and inclusive urban development. I invite you to read and analyze it to jointly promote better territorial and urban development in Costa Rica."

Jéssica Martínez Porras,
Minister of Housing and Human Settlement, and President of the National Institute of Housing and Urbanism (Instituto Nacional de Vivienda y Urbanismo, INVU)

Acknowledgements

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Acronyms

AMSJ	San José Metropolitan Area (Área Metropolitana de San José)
ARESEP	Regulatory Authority for Public Services
BANHVI	Banco Hipotecario de la Vivienda
BRT	Bus Rapid Transit
BSS	Bike Sharing System
CABEI	Central American Bank for Economic Integration
CAF	Development Bank of Latin America
CCCI	Cantonal Institutional Coordination Council
CDI	*Centralidades Densas Integrales* (Integrated and Dense Centralities)
CGR	Comptroller General of the Republic
CNE	*Comisión Nacional de Emergencia* (National Commission for Risk Prevention and Emergency Attention)
CONAPDIS	National Council for Persons with Disabilities
COSEVI	Costa Rica Road Safety Council
CRC	Regional Coordination Council
CTP	Public Transport Council
EBAIS	*Equipos Básico de Atención en Salud* (Comprehensive Multidisciplinary Primary Health Care Teams)
ENAHO	Encuesta Nacional de Hogares
EPR	Extended Producer Responsibility
ESPH	Heredia Public Utilities Company (Empresa de Servicios Públicos de Heredia)
EV	Electric Vehicle
FEMETRON	Metropolitan Federation of Municipalities of San José
FOSUVI	Housing Subsidy Fund (Fondo de Subsidio para la Vivienda)
GAM	*Gran Area Metropolitana* (Greater Metropolitan Area)
GDC	German Development Cooperation
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIZ	German Agency for International Cooperation (*Deutsche Gesellschaft für Internationale Zusammenarbeit*)
GWR	Geographically Weighted Regression
ICAA/AyA	Costa Rican Institute of Aqueducts and Sewerage (Instituto de Acueductos y Alcantarillados)
ICT	Information and Communications Technology
IFAM	Municipal Development and Advisory Institute
IMN	*Instituto Meteorológico Nacional* (National Weather Service)
INAMU	National Women's Institute
INCOFER	Costa Rican Railroad Institute
INEC	Instituto Nacional de Estadísticas y Censos
INVU	*Instituto Nacional de Vivienda y Urbanismo* (National Housing and Urbanism Institute)
ISWM	Integrated Solid Waste Management
MEIC	Ministry of Economy, Industry, and Commerce
MINAE	Ministry of Environment and Energy Ministerio de Ambiente y Energía
MIVAH	Ministry of Housing and Human Settlements (Ministerio de Vivienda y Asentamientos Humanos)

MOPT	Ministry of Public Works and Transportation
MPI	Multidimensional Poverty Index
MRF	Materials Recovery Facility
MSP	Ministry of Public Security
NDC	Nationally Determined Contribution
OECD	Organisation for Economic Co-operation and Development
PAAM	Fifth Stage Metropolitan Aqueduct Supply Project (Proyecto Abastecimiento para el Acueducto Metropolitano Quinta Etapa)
PAGIR	Action Plan for Integrated Solid Waste Management
PIMUS	*Plan de Movilidad Urbana Sostenible* (Integrated Sustainable Urban Mobility Plan)
PNE	National Energy Plan
PNOT	National Land-Use Planning Policy
ProDUS	Research Program in Sustainable Urban Development
PRUGRAM	Regional Urban Plan of the Greater Metropolitan Area of Costa Rica (Plan Regional Urbano del Gran Área Metropolitana de Costa Rica)
PSA	Payment for Environmental Services Program
SETENA	National Technical Secretariat
SINIGIR	National Information System for Integrated Management of Wastes
SIPP	Information System on Plans and Budgets
SMEs	Small and Medium Enterprises
TOD	Transit-Oriented Development
UBN	Unmet Basic Need
UCA	University of Costa Rica
WHO	World Health Organization

Executive Summary

This urbanization review "Connecting the Greater Metropolitan Area of Costa Rica" focuses on the South Corridor, a lagging (sub)region within Costa Rica's Greater Metropolitan Area (*Gran Area Metropolitana*, GAM), and the challenges facing the subregion as a result of rapid and unplanned urbanization. The aim is to provide a framework for thinking about possible solutions to these challenges, with a view to improving the living conditions of its residents, connecting them to opportunities in the capital city, and addressing barriers to achieving sustainable development. As the analysis focuses on the different dimensions that constitute processes of rapid urbanization and how to manage them, the findings may be relevant for other urban centers and municipalities that may face a similar set of challenges as the South Corridor does.

CONTEXT

Costa Rica is a Latin American success story. As the second most prosperous country in Central America and a member of the Organisation for Economic Co-operation and Development (OECD), it enjoys high standards of living, growing economic activity, stable democratic institutions, and income levels comparable to Uruguay, Chile, and Eastern European Union countries. Moreover, Costa Rica is a global leader in its response to climate change and environmental degradation, particularly in biodiversity conservation and the reversal of deforestation.

Notwithstanding its many achievements, Costa Rica faces challenges in terms of territorial divides. Territorial inequality in the country is a mounting concern. Poverty rates have remained stagnant for two decades, even as the income of some households increased steadily. The growing inequality in the country is reflected in spatial disparities—between urban and rural cantons and between and within urban areas, where pockets of poverty persist in some of the most economically dynamic parts of the country.

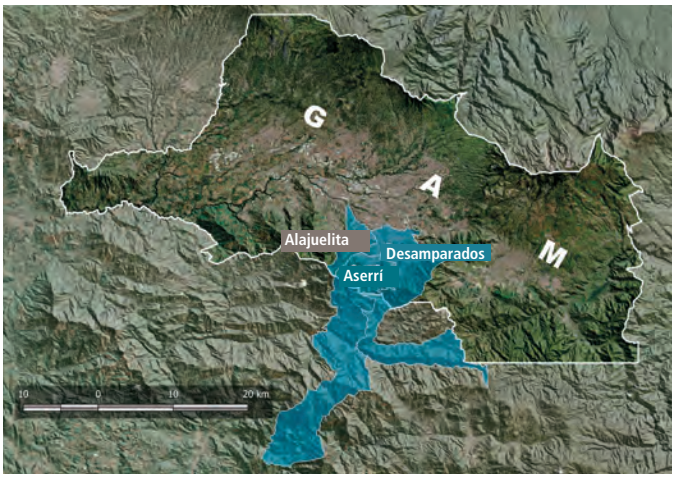
Costa Rica's economic prosperity is concentrated in the GAM, where more than half the country's population (3.1 out of 5.2 million people) now resides (see Figure 1). The region comprises 31 cantons and 4 metropolitan areas—San José, Alajuela, Cartago, and Heredia. The GAM is the country's political and administrative capital and the center of its economic activity: the region accounts for 73 percent of national production, 80 percent of wholesale and retail trade, and 73 percent of manufacturing production.

Despite its economic power, the GAM has concentrations of poverty and segregation. 49 percent of the region's economic activity is generated by only two of its municipalities—San José and Alajuela. Other districts and residential areas in the peripheries of the GAM, including the South Corridor, are unplanned, mono-functional areas, characterized by severe deficits in jobs, infrastructure, and services, which effectively shuts the population out of economic opportunities and the high standard of living afforded by the capital city.

The GAM as the driving force behind the country's growth and urbanization

FIGURE 1. The GAM concentrates the economic activity and the population of Costa Rica

FIGURE 2. The South Corridor is a subregion in the south of the GAM



Source: National System for Territorial Information (https://www.snitcr.go.cr/) and INVU 1983.

The South Corridor is an urban subregion to the south of the capital city of San José which, despite its territorial proximity to the country's economic center, largely failed to catch up. The South Corridor comprises the municipalities of Desamparados, Alajuelita, and Aserrí. They are among the poorest and most unequal in the GAM, with a higher proportion of households with unmet basic needs, lower education attainment, and lower primary health care coverage than the rest of the region. The population of the South Corridor, about 14 percent of the total population of the GAM, is heavily dependent on neighboring municipalities, particularly San José, for their daily needs and livelihoods.

Much of the difficulty plaguing the South Corridor stems from its history of unplanned and informal urbanization. Rapid population growth in the South Corridor was not accompanied by public investment in infrastructure and services. For the past 50 years, the South Corridor's population grew much more rapidly than that of the GAM at large. Though the economic downturn in the 1980s slowed urban growth throughout the country, large informal settlements emerged in the South Corridor and led to even more accelerated population growth. The extent of the displacement and squatting in the South Corridor was so significant that the country's social housing system was engineered on its heels.

The Urbanization Review focuses on a set of barriers to achieving economic and social integration of the South Corridor with the rest of the GAM, and proposes a set of recommendations to address them. The principal challenges identified in the region relate to: informal and inadequate housing; the lack of public transport and integrated mobility systems; and unclear roles and responsibilities and limited municipal capacities and resources to manage urban growth.

Informal and inadequate housing

The GAM faces a significant housing problem, resulting from a combination of factors including (a) the lack of affordability of housing considering the payment capacity of low-income families; (b) limited and concentrated supply of social housing in terms of location and types of housing; and (c) a reduction in the number of housing subsidies allocated in the region. As a result, the poorest population segment tends to rely on informal housing, and settlements located in risky areas persist in the region.

The scale and concentration of social housing in the South Corridor have contributed to high levels of social segregation, poverty and inequality. Although it is important to note that informality had been reduced due to the significant investments of the social housing program over the years, some observers suggest that the

The South Corridor is the GAM's lagging region

concentration of social housing in the region, has contributed to social segregation and reinforced the conditions of poverty of its beneficiaries. Today, a large part of the social housing stock built in the South Corridor is between two and three decades old and is in various states of deterioration.

Many low-income homes and settlements in the South Corridor are exposed to natural hazards and climate risks. Local authorities lack the technical capacity and financial resources, land-use regulations, and enforcement procedures to manage processes of rapid urban expansion. As a result, much of the land occupation, unregulated construction, and unplanned development in the South Corridor is still taking place in high-risk or protected areas, putting residents at increased risk from flooding, landslides, hurricanes, and other natural and climate-related hazards. The South Corridor has some of the most active landslide areas in the country; the municipality of Desamparados has the highest recurrence of flood events in the GAM; and Alajuelita has a significant concentration of informal settlements in areas at high risk of disasters.

Lack of public transport and integrated mobility systems

The dispersed and sprawling urbanization of the GAM, which tripled in size between 1979 and 2021, created the need for effective transport infrastructure, which neither the government nor the municipalities have been able to meet. In the South Corridor, which accounts for about 14 percent of the GAM's population but only 7.4 percent of its employment, residents undertake lengthy daily commutes to and from their jobs. An analysis of commuting patterns reveals that travel flows from outlying areas to and from San José lead to major congestion along the access roads to the central district.

Public transport options are limited, costly, and time consuming. Compared to more populated Latin American cities, the GAM has a low and declining modal share of public transport. Public transportation was used by 70 percent of the population in the 1990s, but only by 53 percent in 2007, the result of lack of investment, which undermined the quality and coverage of the public transport system. Today, different transport services are operated independently and in competition with each other, and there is no integration of either routes or fares in the GAM. Bus and train stops are scattered and disconnected, making it difficult to transfer between bus and rail lines. Further, each transfer to a new service involves another fare. The average travel time by bus is 70 percent longer than the travel time by car, primarily due to transfers and wait times.

The lack of efficient public transport penalizes those who rely on the system and perpetuates inequality. As this report demonstrates, approximately 33 percent of the GAM population lacks access to public transport within 10 walking minutes. The lack of access to public transport is particularly troubling given the lack of amenities, jobs, and services in municipalities like those of the South Corridor, and the reliance of the low-income population on public transportation options or walking as their only options for mobility.

In the absence of efficient public transport, the country's private vehicle-based transportation system has had an impact on emissions, air pollution, and health that cannot be overstated. Over the past forty years, the number of cars on the road increased almost ten times, or 6 percent a year, compared to a population growth of only 2 percent during the same period. From 2000 to 2014, Costa Rica generated the largest CO_2 emissions per capita from transportation in Latin America, surpassing the much larger and more populous countries of Brazil, Argentina, and Mexico. Levels of harmful air pollutants and suspended particulates in the GAM are above the limits recommended by the World Health Organization (WHO), and substantially higher than in comparable cities in the region. One of the main causes of poor air quality in Costa Rica is vehicle congestion and an outdated vehicle and public transportation fleet. Nationally, annual health care costs due to air pollution are estimated at US$280 million. Although Costa Rica has set ambitious targets to decarbonize the transportation sector, the implementation of this reform program is lagging.

The lack of coordination between the entities in charge of planning, regulating, and managing public transport, road projects, and active mobility, makes it difficult to advance in the transformation of the transport sector. Public transport is the responsibility of the national government, while each canton is in charge of pedestrian and bicycle infrastructure. There is no

centralization of planning, regulation, operation, and definition of public transport fares and in the implementation of infrastructure and policies that promote active mobility. Moreover, decisions related to urban transport are too often made independent of considerations related to urban development and urban growth trends.

Limited municipal capacities and resources to manage urban growth

The regulatory framework for urban and land-use planning is complex and involves numerous actors at the national, regional, and local levels. The roles and responsibilities of the different agencies are ill-defined, making coordination cumbersome and costly. For example, the strategic development vision for the country and mandates for matters such as environmental impact, conservation, water management, and solid waste management are established at the national level. At the regional level, the Greater Metropolitan Area Plan 2013–2030 (or GAM Plan) details criteria for the development specific to the region. And at the local level, municipalities rely on regulatory land-use plans (*Plan Regulador*) as the primary instrument for management of their territory, including the development of infrastructure for fee-based services, such as water and solid waste management, which could provide the municipality with a reliable income stream.

The municipalities in the South Corridor do not have adequate resources to carry out the functions of land-use planning, solid waste management, and other aspects of self-governance that would support equitable and sustainable development of the region and put it on a par with the rest of the GAM. Alajuelita, Aserri, and Desamparados are the poorest municipalities in the GAM, based on per capita revenue. They derive their income from property taxes (15–20 percent), business licenses/operating permits (15–30 percent), solid waste collection fees (20–25 percent), and capital transfers from the central government (10–30 percent). However, the tax rates are low, tax evasion is high because of high levels of informality, and the country lacks an effective revenue-sharing arrangement between the central and local governments. Capital transfers for community development, sports facilities, and minor road works are small, highly volatile from year to year, and dependent on congressional approval. Lacking predictability, the capital transfer system does not contribute to more sustainable municipal finances or allow municipalities to pursue longer-term development priorities.

Most municipalities in the country lack a regulatory land-use plan (*Plan Regulador*), which functions as the main instrument for local land-use planning. The preparation of a regulatory land-use plan implies significant investments of financial and technical resources, but these resources are not available in all municipalities. As a result, more than half the municipalities in the country lack a land-use plan, and half of the existing plans are either outdated or incomplete. In the absence of a land-use plan, a municipality derives its urban regulations from generic national regulations that can be applied at the local level but tend to lack the specificity and forward-looking vision for territorial development of a dedicated regulatory land-use plan. In the South Corridor, Aserri and Alajuelita lack a regulatory land-use plan, though one is in preparation in Alajuelita (as of May 2023). The update of the Regulatory Plan of Desamparados is advanced. Nevertheless, our analysis finds that in 2020 alone, about 5,000 m^2 of construction in the South Corridor took place without building permits, including, most prominently, in Desamparados

RECOMMENDATIONS

Based on the analysis of development patterns in the region, and the challenges and opportunities for growth in the South Corridor, this review advocates for the following actions, with a particular focus on the municipalities of the South Corridor:

Reverse the current situation of socioeconomic segregation in the South Corridor

- **Increase access to affordable housing in the region through one or more of the following approaches:** (a) integrate social housing into different types of neighborhoods; (b) finance integrated interventions in informal settlements to improve housing, basic infrastructure and foster local economic development; (c) better integrate housing programs with urban development priorities, and include affordable housing in urban renewal and Transit-Oriented Development (TOD) projects; (d) introduce new and more diverse housing finance options, including rental options, for low-income families; and (c) limit real estate speculation.

- **Improve access to basic services.** The municipalities of the South Corridor are underserved in terms of access to basic health care and education facilities. Comprehensive Multidisciplinary Primary Health Care Teams (*Equipos Básico de Atención en Salud*,EBAIS) need to be established in Alajuelita and Desamparados. Similarly, and together with the Public Education Ministry, improvements must be made to public education facilities, along with increased diversity within the educational service (language programs and technical training), to increase residents' capacity to enter the South Corridor's labor market.

Improve mobility and connectivity

- **Advance implementation of regional mobility plans.** Identify potential areas for investment to advance in the implementation of regional mobility plans. Numerous regional plans, including the GAM Plan 2013–2030, 2008 Regional Urban Plan of the Greater Metropolitan Area of Costa Rica (PRUGRAM), and the Bus Sectorization Project (Plan de Sectorización), lay out a vision for the region that is highly connected, prioritizes mass transit, and leverages mobility investments for urban renewal. This vision has yet to be realized. Potential areas for investment in the South Corridor to spur transit-oriented development (TOD), improve densification, and increase economic opportunity include Alajuelita Central Park and Desamparados Park.

- **Increase and improve transportation services between the South Corridor and downtown San José.** The reliance of the residents of the South Corridor and other peripheral municipalities on San José for their daily needs and livelihoods calls for an improvement of the transportation infrastructure linking San José with peripheral regions. This could include the formation of bus rapid transit corridors to connect the South Corridor to San José and the introduction of subsidies on outlying routes, as well as express services to locations where jobs are concentrated, such as industrial areas. The improvement of the public transport network will need to balance the affordability of users to pay for the service.

- **Improvements in public transport should include gender considerations.** Women's mobility needs should be addressed, such as security concerns and affordability considering that women make more, and more interrupted, daily trips than men. In the case of active mobility, women should be able to ride a bicycle and walk safely, and this means that infrastructure should respond to their needs.

- **Promote institutional and regulatory reforms for more efficient management of mobility.** The reform process could start with a roundtable of the agencies in charge of planning, managing, and regulating public transportation, with the goal of streamlining coordination and decision making. Progress could then be made toward improving legal certainty for the private sector operators, technology providers, financial and insurance institutions, and rolling stock providers, with respect to the investments required to improve transportation infrastructure and services. To improve the bankability of future investments in the sector, the national development bank and financial authorities will need to develop financial products that will facilitate the mobilization of private capital.

- **Consider extending the duration of public transportation operational licenses** and updating the methodology used to calculate the operator's remuneration, with the goal of attracting new players to increase competition, attracting new private investment, and improving service provision. Implementation of the *Plan de Sectorización* will also give security to private investors. Public transport in the GAM can benefit from public-private partnership structures that have successfully been applied in other sectors.

- **Implement a mass transit system with physical and fare integration.** This requires a public transportation demand study in the GAM, with data disaggregated by gender and age and prioritizing the South Corridor and other underserved municipalities. The urban environment surrounding transport infrastructure must also be improved, including through upgrades to public spaces, the installation of bus stops and support infrastructure, and infrastructure development to encourage modal shifting.

Strengthen municipal governance, finance, and planning capacities

- **Review and update relevant municipal regulations.** In the South Corridor municipalities, particularly in Alajuelita and Aserri, all regulatory land-use plans and sector-specific regulations need updating. These include district and municipal development plans, annual operational plans, and road conservation plans.

- **Improve the efficiency of the approval process for regulatory land-use plans.** The processes required to create or modify municipal regulations embedded in the land-use plans (zoning, subdivision and urbanization, official map, and urban renewal and construction) must be approved by two national-level institutions. These approval processes are lengthy and focus on defining the studies needed to justify the regulation, instead of on the regulation itself. Simplifying the approval procedures would make it easier for municipalities to adopt and update regulatory land-use plans.

- **Metropolitan governance in the GAM could be improved by strengthening intermunicipal associations.** Many urban management challenges are of regional nature, and coordinating regulatory practices and urban development objectives could help municipalities with interdependencies in the areas of jobs, housing, or basic services.

- **Carry out regional studies on recurring floods and landslides to inform municipal regulations and to reduce exposure to these events in all GAM districts.** Even though emergency response to extreme events is well organized and coordinates national-level institutions with municipalities and community-level actors, the systematization of disaster-related information is poor. There are numerous case studies but few systematic analyses, including on the extent and magnitude of past events. Relevant studies and analyses could be carried out and coordinated by the National Disaster Risk Management System of Costa Rica, which facilitates cooperation among municipalities, universities, and central government institutions.

Improve municipal finances

- Improve municipal finances to provide better local services and infrastructure. Four measures are suggested to improve municipal finances: (a) increase business license taxes and service fees; (b) improve the collection and management of local taxes and tariffs; (c) improve the efficiency of public expenditure; and (d) introduce an effective and equitable revenue-sharing and capital transfer system between the central government and the municipalities.

Policy Matrix

The following table summarizes the main challenges identified in the Urbanization Review and their corresponding proposed priority actions.

Binding constraints	Priority actions
Informal and inadequate housing.	
A combination of factors contributes to the region's housing problems including (a) lack of affordability of housing considering the payment capacity of low-income families; (b) limited and concentrated supply of social housing in terms of location and types of housing; and (c) a reduction in the number of housing subsidies allocated in the region.	(a) integrate social housing into different types of neighborhoods; (b) finance integrated interventions in informal settlements to improve housing, basic infrastructure and foster local economic development; (c) better integrate housing programs with urban development priorities, and include affordable housing in urban renewal and Transit-Oriented Development (TOD) projects; (d) introduce new and more diverse housing finance options, including rental options, for low-income families; and (c) limit real estate speculation aimed at building new units far from job opportunities.
The scale and concentration of social housing has contributed to the high levels of social segregation, poverty, and inequality in the South Corridor (SC). Municipalities in the South Corridor experience higher proportion of households with unmet basic needs and lower education attainment.	Improve access to basic services. Comprehensive Multidisciplinary Primary Healthcare Teams (*Equipos Básico de Atención en Salud,*EBAIS) need to be established in Alajuelita and Desamparados. Similarly, and together with the Public Education Ministry, improvements must be made to public education facilities, along with increased diversity within the educational service (language programs and technical training), to increase residents' capacity to enter the South Corridor's labor market.
Lack of public transport and integrated mobility systems.	
Lack of investment in public transport options, which undermines the quality and coverage of the system.	Increase and improve transportation infrastructure and services between the South Corridor (SC) and downtown San José. This could include the formation of bus rapid transit corridors to connect the SC to San José and the introduction of subsidies on outlying routes, as well as express services to locations where jobs are concentrated, such as industrial areas. The improvement of the public transport network will need to balance the affordability of users to pay for the service. Improvements in public transport should include gender considerations. Women's mobility needs should be addressed, such as security concerns and affordability considering that women make more, and more interrupted, daily trips than men. Consider extending the duration of public transportation operational licenses and updating the methodology used to calculate the operator's remuneration, with the goal of attracting new players to increase competition, attracting new private investment, and improving service provision. Implementation of the *Plan de Sectorización* will also give security to private investors. Public transport in the GAM can benefit from public-private partnership structures that have successfully been applied in other sectors.

Continues >

Policy Matrix (continued)

Binding constraints	Priority actions
There is no integration of either routes or fares in the GAM - different transport services are operated independently and in competition with each other, bus and train stops are scattered and disconnected, making it difficult to transfer between bus and rail lines, plus each transfer to a new service involves another fare.	Implement a physically and fare-integrated mass transit system. This requires a public transportation demand study in the GAM, with data disaggregated by gender and age and prioritizing the SC and other underserved municipalities. The urban environment surrounding transport infrastructure must also be improved, including upgrades to public spaces, the installation of bus stops and support infrastructure, and infrastructure development to encourage modal shifting. Advance implementation of regional mobility plans such as the GAM Plan 2013–2030, 2008 Regional Urban Plan of the Greater Metropolitan Area of Costa Rica (PRUGRAM), and the Bus Sectorization Project (*Plan de Sectorización*), lay out a vision for the region that is highly connected, prioritizes mass transit, and leverages mobility investments for urban renewal. Consider Alajuelita Central Park and Desamparados Park as potential areas for investment in the South Corridor to spur transit-oriented development (TOD), improve densification, and increase economic opportunity.
The implementation of the reform to decarbonize the transportation sector is lagging, while an outdated vehicle and public transportation fleet prevails, having an impact on emissions, air pollution, and health.	The National Decarbonization Plan (PND) 2018-2050 can kick-start its implementation with the below actions: (i) replacing obsolete public transit vehicle fleets with low-emission vehicles; (ii) promoting active mobility as an integral part of city mobility could reduce emissions and vehicular congestion while revitalizing downtown areas; (iii) developing a GAM Active Mobility Master Plan that identifies priority corridors or areas for metro-wide interventions and develop traffic and use patterns to preclude partial interventions; (iv) implementing a GAM-wide Bike Sharing System (BSS) that increases the public transport system's ridership, favor modal shift, and lessen vehicular congestion by replacing motorized trips.
Lack of coordination between entities in charge of planning, regulating, and managing public transport, road projects, and active mobility. Decisions related to urban transport are often made independent of considerations related to urban development.	Promote institutional and regulatory reforms for more efficient management of mobility. The reform process could start with a roundtable of the agencies in charge of planning, managing, and regulating public transportation, with the goal of streamlining coordination and decision making. Progress could then be made toward improving legal certainty for the private sector operators, technology providers, financial and insurance institutions, and rolling stock providers, with respect to the investments required to improve transportation infrastructure and services. To improve the bankability of future investments in the sector, the national development bank and financial authorities will need to develop financial products that will facilitate the mobilization of private capital.
Unclear roles and responsibilities and low municipal capacities and resources to manage urban growth.	
The regulatory framework for urban and land-use planning is complex and involves numerous actors at the national, regional, and local levels. The roles and responsibilities of the different agencies are ill-defined, making coordination cumbersome and costly. Regulatory and planning instruments at the national, regional, and local levels are not always aligned.	The national regulatory framework concerning land-use planning and urban management needs to be updated. It is urgent to adjust the regulatory framework that governs the powers and resources available to local governments, especially those related to urban management and planning. The urban planning law is over sixty years old. Although adjustments have been made, it is imperative to define with greater clarity the relationship between national, regional, and local planning. Review and update relevant municipal regulations. In the South Corridor municipalities, particularly in Alajuelita and Aserri, all regulatory land-use plans and sector-specific regulations need updating. These include district and municipal development plans, annual operational plans, and road conservation plans.

Continues >

Policy Matrix (continued)

Binding constraints	Priority actions
Municipalities in the South Corridor do not have adequate resources to carry out local functions. Tax rates are low, tax evasion is high because of high levels of informality, and the country lacks an effective revenue-sharing arrangement between the central and local governments. Capital transfers for community development, sports facilities, and minor road works are small, highly volatile from year to year, and dependent on congressional approval.	Improve municipal finances to provide better local services and infrastructure, by: (a) increasing business license taxes and service fees; (b) improving the collection and management of local taxes and tariffs; (c) improving the efficiency of public expenditure; and (d) introducing an effective and equitable revenue-sharing and capital transfer system between the Central Government and the municipalities.
Local authorities lack technical resources to develop their regulatory land-use plans (*Plan Regulador*) and other municipal instruments to support urban development.	Improve the efficiency of the approval process for regulatory land-use plans. Approval processes are lengthy and focus on defining the studies needed to justify the regulation, instead of on the regulation itself. Simplifying the approval procedures would make it easier for municipalities to adopt and update regulatory land-use plans. Metropolitan governance in the GAM could be improved by strengthening intermunicipal associations.
The systematization of disaster-related information to inform territorial planning is poor, and municipalities don't have the financial or technical resources to develop it themselves.	Carry out regional studies on recurring floods and landslides to inform municipal regulations and to reduce exposure to these events in all GAM districts. Relevant studies and analyses could be carried out and coordinated by the National Disaster Risk Management System of Costa Rica, which facilitates cooperation among municipalities, universities, and central government institutions.

Summary of Chapters

The study is organized as follows:

CHAPTER 1

The Greater Metropolitan Area as an engine for growth and urbanization in Costa Rica.

This chapter describes the processes and patterns of urban growth and production in the GAM, as well as patterns of inequality and poverty and their manifestations in terms of housing, exposure to natural hazards, and lack of public safety.

CHAPTER 2

A territorial approach to the South Corridor.

This chapter uses statistical and geographic analysis, supported by literature, to describe the population and urban growth processes, the local economy, and public investment needs in the South Corridor. The chapter highlights the historical-geographic context of the South Corridor and describes the demographic trends in these districts, contrasting them with the entirety of the GAM.

CHAPTER 3

Connecting the South Corridor.

This chapter presents the main connectivity challenges between the South Corridor and rest of the GAM and provides recommendations to address them. The chapter includes a series of findings based on innovative spatial and movement analyses, built by cross-checking data from Mapbox, Quadrant, Facebook, mobile phones, censuses, and other information sources.

CHAPTER 4

Institutions, capabilities, and financing in the South Corridor.

This chapter focuses on the institutional, capacity, and financing opportunities available to the South Corridor to achieve the kind of urban development consistent with local and national land-use policies. It includes a brief spotlight on comprehensive solid waste management and the potential for increasing municipal revenue streams by promoting a circular economy model based on improved solid waste management, including the composting of organic waste and the recovery of reusable materials and their reintegration into value chains.

CHAPTER 1

The Greater Metropolitan Area as the driving force behind Costa Rica's growth and urbanization

Authors

Eduardo Pérez Molina, Alonso Brenes Torres, and Leonardo Sánchez Hernández

Introduction

Costa Rica is a Central American upper-middle-income country characterized by a high degree of spatial concentration of its economic activity in the Greater Metropolitan Area (*Gran Area Metropolitana*, GAM). Before the COVID-19 pandemic, Costa Rica's gross domestic product (GDP) grew above the Latin American and Caribbean[1] average, at an average annual rate of 4.3 percent between 1990 and 2019, compared to 2.6 percent in Latin America and the Caribbean. Within the country, the GAM generates the greatest amount of wealth and is where 76 percent of sales and 66 percent of national purchases occur (Jiménez and Guzmán 2022). The central region is also home to more than 50 percent of the country's population (INEC 2021). The spatial concentration of economic activity is replicated within the GAM itself, where only two cantons, San José and Alajuela, generate 49 percent of the economic activity of the entire central region (Brenes, Campos and Loaiza 2021).

Territorial inequality across the GAM and Costa Rica is a mounting concern, with implications for the quality of life of the region's inhabitants. Poverty rates in Costa Rica and the GAM have remained stagnant for three decades, even as the income of some households increased steadily. This has resulted in growing inequality which is reflected in territorial divides: between urban and rural cantons and between urban areas that concentrate the poor and those that concentrate the rich. Within the metropolitan area, there are cantons with significant housing deficits, lack of jobs, and deficient public services. New residential areas are marked by rapid and oftentimes unplanned growth, contributing to the creation of mono-functional areas and increasing the need for basic services. This reinforces spatial patterns of segregation and inequality. Finally, spatial concentrations of poverty coincide with insecurity and greater exposure to disaster risk in the face of extreme weather events.

1 World Bank Open Data, GDP growth (annual %).

Territorial inequality in the GAM will persist if urban expansion is not accompanied by quality services and infrastructure that provide opportunities for all, in all cantons. When urban growth patterns are analyzed, it is evident that the expansion in the periphery of the GAM continues; but the GAM is also experiencing incipient densification in some central locations. Growth patterns are changing toward in situ densification. However, this densification is not being accompanied by economic opportunities nor by improvements in connectivity to ease access to centers of employment and basic services.

This dynamic compels us to ask: how can one mitigate the negative externalities stemming from economic and demographic concentration? And how can lagging regions within the metropolitan area be better connected so that opportunities arising from this concentrated economic growth can be shared?

This chapter describes the GAM's urban growth and economic production patterns, as well as inequality and poverty (and their manifestations in terms of housing), the risk of extreme events, and insecurity. It contains a descriptive review based on statistics and spatial analysis, supported by academic literature that articulates the evolution of the different social processes under consideration. The growth patterns study also involves satellite land cover mapping.

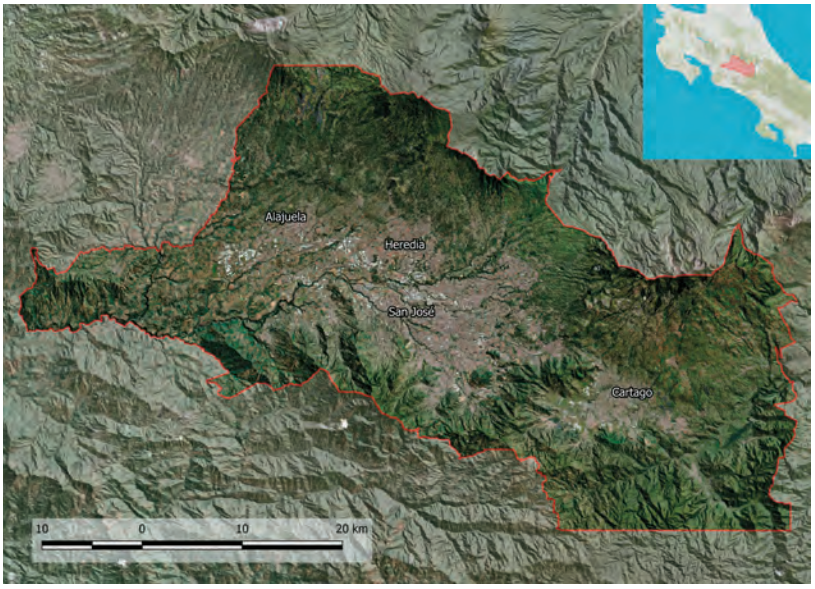
I. The GAM is Costa Rica's Economic and Population Hub

A. More than half of the country's population lives in the GAM

The GAM has most of Costa Rica's population concentrated in a small area of diverse physiography. Based on the 2011 census, Costa Rica had a population of 4.3 million people, of whom 2.27 million resided in the GAM (about 52 percent). The GAM area is 1,781 km^2 (3.5 percent of the national territory), including 425 km^2 within the region's growth boundary. That is, they are developable under relevant regulations; the other 1,356 km^2 are rural and natural areas bordering the GAM, although much of it has been developed at low densities.

Despite its designation, the GAM is not strictly a metropolitan area but a polycentric urban system made up of four metropolitan areas (San José, Alajuela, Cartago, and Heredia). The GAM emerged as a cluster of rural towns and small cities that have been growing in a physiographic context characterized by large variations in relief and other variables (climate, vegetation, or soil fertility). The topography of the region includes deep canyon rivers and mountains as barriers to connectivity between the different population centers across the region (Pujol 2005b, see Figure 1). These barriers hindered the formation of a large conurbation and restrained the development of a road system that would link an urban development integrated with and centered in San José. Instead, the other three metropolitan areas (Alajuela, Heredia, and Cartago) maintained varying degrees of functional autonomy owing to their relative isolation. In the same vein, some municipalities within these metropolitan areas were able to preserve significant degrees of functional autonomy. As a result, the region's structure continues to be, even today, disconnected and poorly integrated (Carvajal and Vargas 1987).

FIGURE 1. The GAM is located within a tectonic depression in the center of the country, covering approximately 3,250 km^2



Source: Sistema Nacional de Información Territorial (https://www.snitcr.go.cr/).

The GAM is divided politically into 31 cantons that are either partly or wholly contained within the boundaries of the GAM region. These cantons are functionally clustered into the four metropolitan areas of San José, Alajuela, Cartago, and Heredia (Figure 1).[2] The 1982 Regional Plan

2 Metropolitan areas are analytical designations based on the functioning of the urban system. The metropolitan area of San José includes 14 cantons: San José, Escazú, Desamparados, Aserrí, Mora, Goicoechea, Santa Ana, Alajuelita, Coronado, Tibás, Moravia, Montes de Oca, Curridabat, and La Unión; the metropolitan area of Alajuela, Alajuela itself, Atenas, and Poás; the Cartago metropolitan area, Cartago, Paraíso, Alvarado, Oreamuno, and El Guarco; the metropolitan area of Heredia, Heredia, Barva, Santo Domingo, Santa Bárbara, San Rafael, San Isidro, Belén, Flores, and San Pablo.

(INVU 1983) defined the GAM and established a growth boundary aimed at protecting the environmental assets of the foothills surrounding the GAM (Pérez et al. 2011). Many of the cantons in the central GAM are wholly urbanized, while on the periphery there are still cantons with large rural areas (Figure 2). It is important to remember that the creation of the GAM, in 1983, was part of a strategy that involved the creation of regional regulations for the main urban area of the country and an institutional framework to manage them; this institutionality was never cemented, but the regulations, particularly the growth limit, were very important in shaping the urban development of the GAM.

B. The GAM historically expanded toward its peripheries

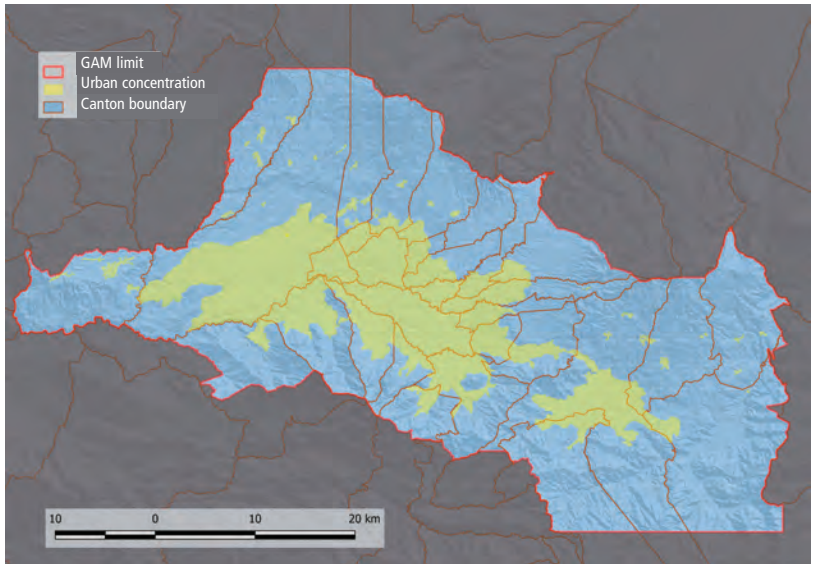
The metropolitan area is characterized by significant urban sprawl.[3] The GAM's population increased from 1.35 million in 1984 to 2.27 million in the 2011 census. National GDP per capita rose in real terms by 85 percent between 1985 and 2010, fueling a stronger preference of households to live in larger areas, accompanied by an increased dependence on private vehicles. The creation of a relatively high-capacity national and regional highway system lowered private travel costs, moving residents away from consumption centers.

The most important urban expansion in the past few years has taken place outside of the San José Metropolitan Area (AMSJ). Although the AMSJ has historically been the most important urban center (Hall 1976), since the 1980s, and especially during the last 20 years, the most important urban expansion occurred in the cities of Heredia and Alajuela (Figure 3). Three reasons can explain this: (a) the availability of affordable land in Heredia and Alajuela for the region's middle class; (b) the development of an economic base of industrial electronics and medical equipment manufacturing zones in Belén-Flores,[4] South Heredia, and El Coyol, Alajuela; and (c) linked to the above, the creation of new local jobs attracting new residents. Cartago's spatial connectivity is constrained by the barrier formed by the Ochomogo mountains.

Between 1979 and 2019, the GAM's impervious area increased. An analysis of the GAM's build-up area, as measured by household income and population increase, shows an expansive urban growth pattern. The impervious area tripled between 1979 and 2021, while the population grew steadily from 1 million to 2.5 million, and real household income was 50 percent higher in the 2010s than in the 1990s. This growth pattern helps explain the growth of the built-up area in the region (Figure 4).

The rapid expansion of the urban area of the GAM between 1985 and 1993 was driven by informal occupation, later formalized by the central government; while from the mid-90s, a real estate market for formal housing emerged. Much of the urban growth that occurred in the GAM between 1985 and 1993 was informal, through land seizures that were later formalized by the government (Valverde and Trejos 1993)—that is, during this period, the region was essentially configured through social housing built by the state. Starting in the mid-1990s, the real estate market began to generate most of the construction of buildings, in particular formal housing.

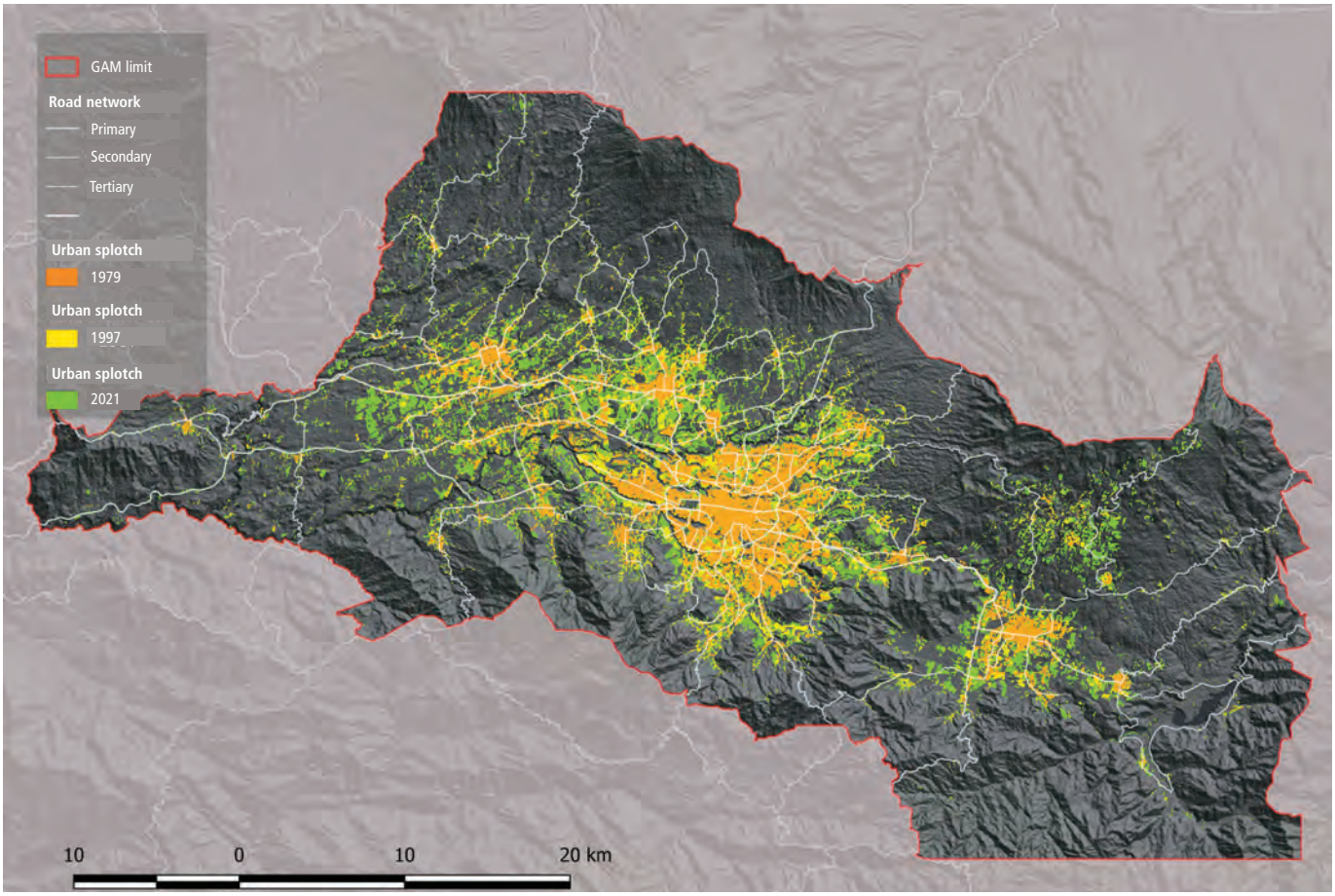
FIGURE 2. The 31 cantons of the GAM have different rural / urban concentration ratios



Source: Sistema Nacional de Información Territorial (https://www.snitcr.go.cr/) and National Institute of Housing and Urbanism - INVU 1983.

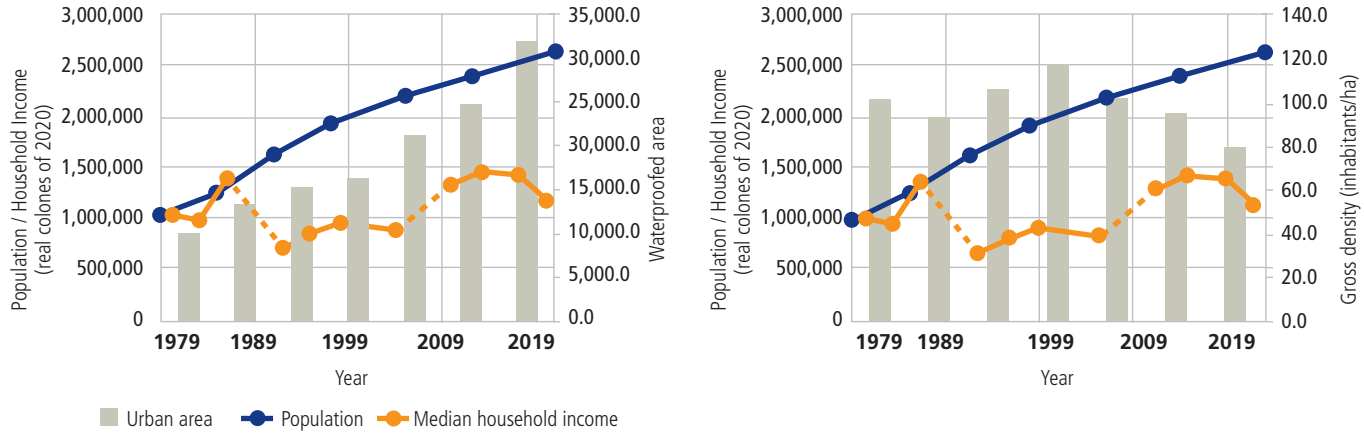
3 The historical patterns of urban growth in the GAM have been peripheral development along local roads, originally a consequence of the fragmentation of coffee plantations through successive inheritances; see Hall (1976).
4 This area, together with the industrial zone of El Guarco in Cartago, are the only ones in which the development of heavy industry is allowed in the region.

FIGURE 3. Between 1997 and 2021, the conurbation of the cities of Alajuela and Heredia with San José intensified, while the spatial links with Cartago are less pronounced



Source: Developed by authors, based on Landsat images 5, 7, and 8.

FIGURE 4. The GAM's impervious area rose from 1979 to 2019



Source: Landsat (1979, 1985, 1991, 1997, 2005, 2012, and 2021) and Centro Centroamericano de Población (https://ccp.ucr.ac.cr/).

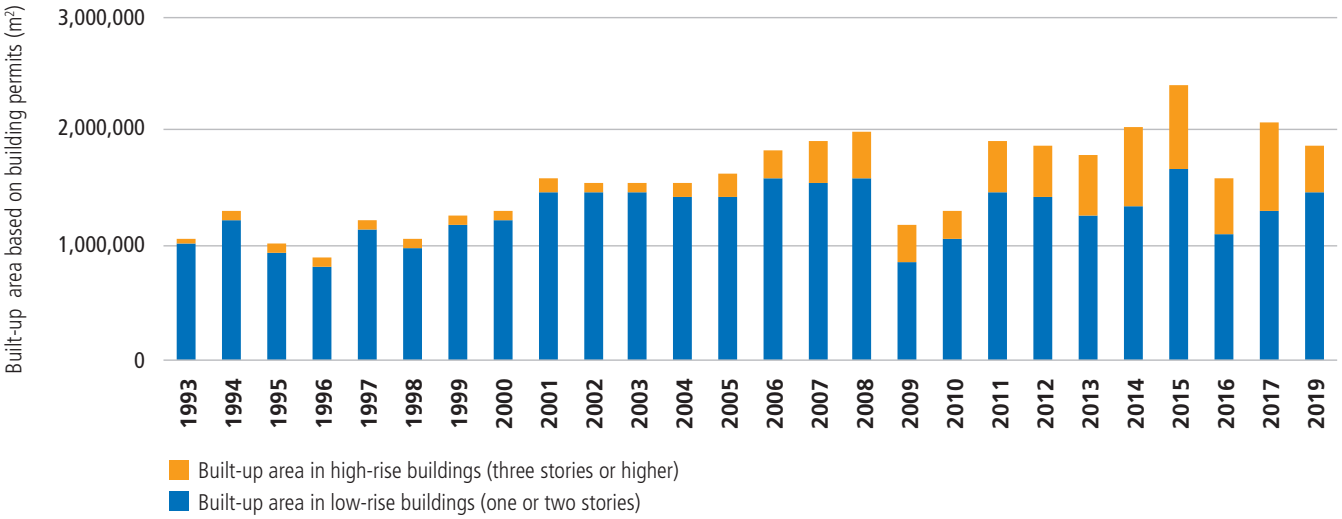
GAM urban regulations contribute to maintaining low structural densities.[5] Two types of GAM-wide regulations fostered low density: (a) the Regional Plan defined an urban growth boundary that allows development in a 42,500 ha area (INVU 1983); this implies that there has never been a shortage of potentially developable rural land to encourage densification in the more accessible central areas; and (b) building height regulations in the Regional Plan and almost every regulatory plan in force until 2006 (except for the canton of San José) were strictly enforced. Generally speaking, in all cantons with municipal regulations, the maximum building height allowed until 2016 was two stories (Pujol, Pérez, and Castillo 2006).

While over the past 15 years, some GAM cantons have permitted higher building heights, there is no evidence that this has resulted in significant population density gains—housing remains unaffordable to many. As seen in Figure 5, before 2005, more than 95 percent of the built-up area was classified as one- or two-story buildings. Over the past 15 years, the relative importance of buildings of three stories or higher increased. Increased levels of congestion appear to have changed the locational preferences of GAM residents, now favoring more central locations (with higher land prices) that are being constructed with greater density (and close to better urban amenities and activities) but do not necessarily lead to greater population density. There is evidence of potential speculative dynamics behind this type of high-rise development—particularly the price differentials between apartments and individual homes[6]—explained by consumer preferences for larger (less dense) housing for upper-middle-income residents.

C. The population will continue to grow in peripheral areas, highlighting the importance of planning and service provision

In the short run, the GAM's population will continue to grow at a slower rate and concentrate in the outskirts of the four metropolitan areas. The older urbanized central locations are declining in population as they have exhausted their reserves of developable land, precluding them from accommodating new growth. The peripheral areas, which are more accessible and available for development, are experiencing an increase in

FIGURE 5. The GAM has begun to feature taller buildings over the past 15 years



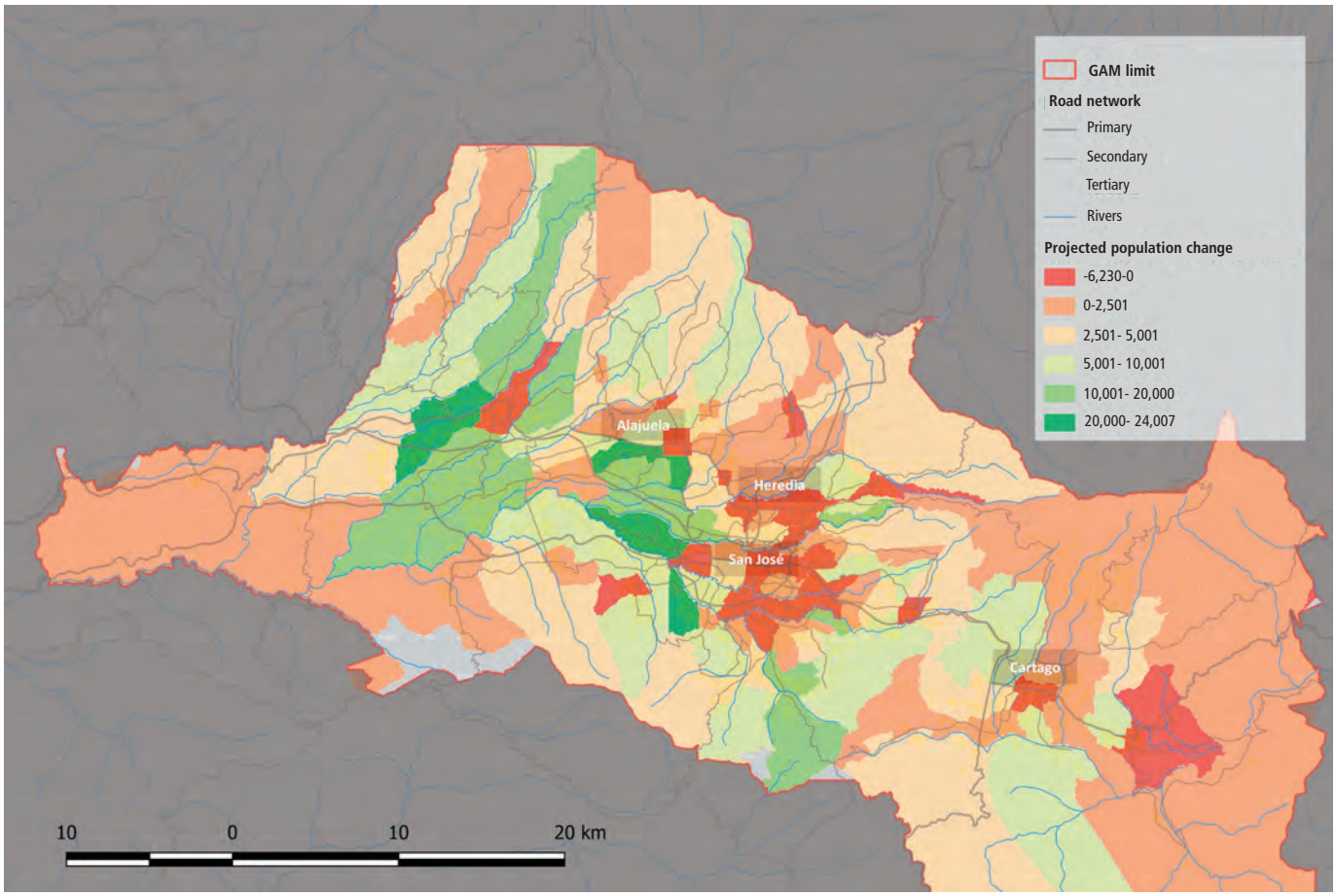
Source: INEC 1993–2019.

5 Structural density is the ratio of capital value (that is, construction) to land value; in practice, it is a function of building height; however, note that higher structural densities do not necessarily coincide with higher population densities.
6 Data reported in Pérez and Pujol (2021).

population. Figure 6 shows in red the districts that will experience the largest depopulation. These are the urban centers of the four metropolitan areas and the cantons neighboring the canton of San José. The second cluster of districts with modest population growth is shown in orange and yellow. Finally, green shades show the districts that will experience the greatest population growth; these are peripheral districts with good accessibility to the national highway system or some districts with poverty concentrations (for example, Pavas and La Uruca, San José; or San Felipe, Alajuelita). The population in these poverty pockets tends to be relatively young and, above all, characterized by a deficit in housing and housing affordability problems (Pujol, Pérez, and Castillo 2006). Many of them can be found in the South Corridor (the municipalities of Desamparados, Aserri, and Alajuelita).

New residential areas grow fast, and are often unplanned, creating mono-functional areas, increasing the demand for basic services, and causing road congestion. On the fringes of cities, the construction of low-income housing projects and the authorization of middle- and high-income gated communities are burgeoning (Quesada-Román, Villalobos-Portilla, and Campos-Durán 2021); specifically, the cantons of the South Corridor (Desamparados, Aserrí, and Alajuelita) are fundamentally residential areas (Alajuelita and Aserrí in a very high proportion; Desamparados is a little more diverse), which function as dormitory cantons (see section III of this chapter on this). The rapid population growth, the paucity of urban planning, and the lack of updated regulatory plans in most of the cantons of the GAM (Quesada 2014) hamper efforts to foster the right mix of uses; instead, the vast majority of development

FIGURE 6. 2010–2050 population projections show that peripheral districts will grow rapidly while central districts will depopulate



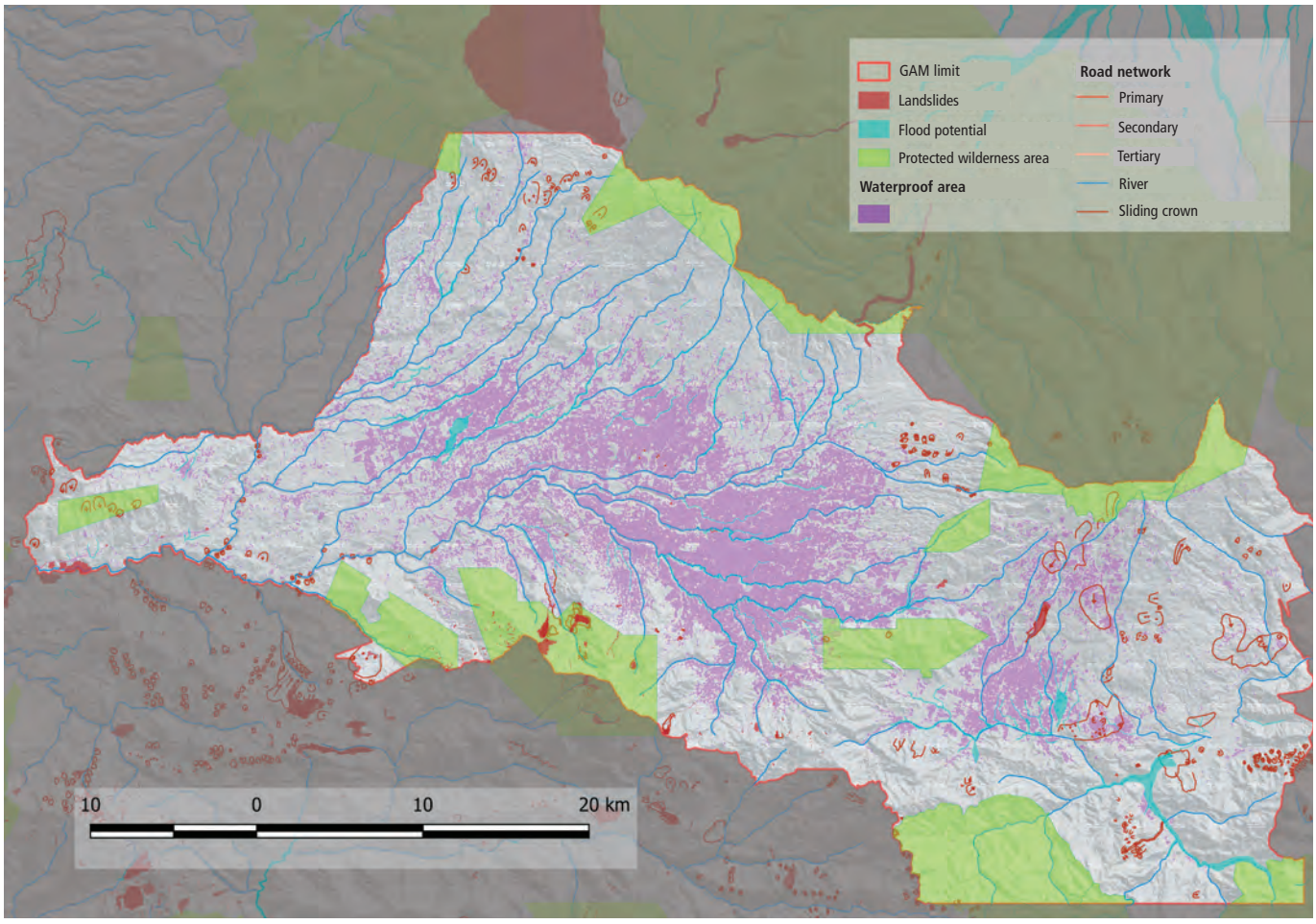
Source: Centro Centroamericano de Población 2011.

is residential only. This results in a constant need for people to commute to meet their day-to-day needs, thus creating an excessive dependence on the different metropolitan centers, particularly San José. The resulting saturation and congestion of the road network in this area and its access roads (Gómez and Cubero 2018) complicates mobility.

The growth of the urbanized area toward the peripheries of the GAM, without adequate planning and investment, increases the exposure of some communities to disaster risk. The geomorphological conditions of the GAM tend to drive the expansion of the urban area in some high-slope sectors or close to riverbeds (Figure 7). In these areas, the buildings require design parameters to reduce their vulnerability; however, there is evidence that this is not usually complied with (Arroyo 2018). Construction in high-slope areas, located in the foothills of the mountains that surround the GAM, is usually affected by landslides or slope destabilization. At the same time, in recent years the National Commission for Risk Prevention and Emergency Attention (*Comision Nacional de Emergencia*, CNE) has registered an increase in urban floods with annual recurrence (Fernández et al. 2019). In this regard, there is no conclusive evidence on the causality of this increase; however, some experts believe that it may be due to a combination of variation in the intensity of the rains, together with an increase in surface runoff and a saturation of natural channels and sewers with solid waste. The combination of these factors may explain floods in the surroundings of rivers and urban streams.[6]

GAM-wide risk levels are relatively low; however, multi-hazard risk concentrations are highly correlated with the location of lower-income households. Although disaster risk is low in the GAM compared to the rest of the country, there are still some population concentrations in high-risk areas where building restrictions have not

FIGURE 7. Unplanned, underinvested urban expansion toward the GAM's outskirts exacerbates exposure to disaster risks



Source: CNE.

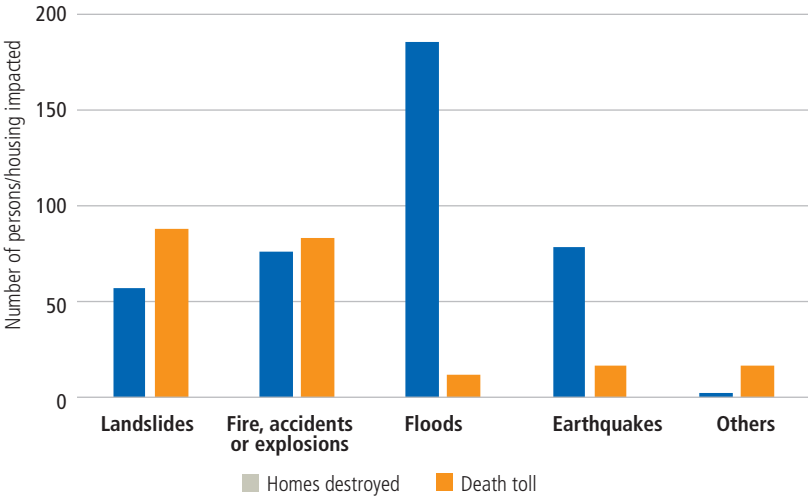
been enforced in the last 30 years. Most of these population concentrations are located on riverbanks in high-slope areas. These areas show the highest hydrogeological dynamics and the lowest land value.

The impacts of disasters vary depending on the type of event that generates them—landslides are the deadliest events, although floods have a greater impact on housing and public infrastructure. As seen in Figure 8, the impacts of disasters depend on the type of event. The deadliest events include landslides, fires, accidents, and explosions; but most housing damage (47 percent) is attributed to flooding. Despite being a highly seismic area, earthquake damage in the GAM has been limited due to a long-standing history of seismic-resistant building codes (since 1977). In contrast, flooding is an increasing hazard; its rising frequency and impact suggest a built-up setting that is becoming increasingly exposed to these recurring events.

Between 1970 and 2019, the GAM was affected by 7,513 disasters, including 91 major disasters. DesInventar reports 7,513 disasters across the 31 cantons of the GAM (see Figure 9), including 91 events causing housing damage or destruction, deaths, or injuries.[7,8] Most disasters were triggered by floods (48 percent), followed by landslides (26 percent) and man-made disasters: fires, accidents, explosions, or leaks (11 percent).

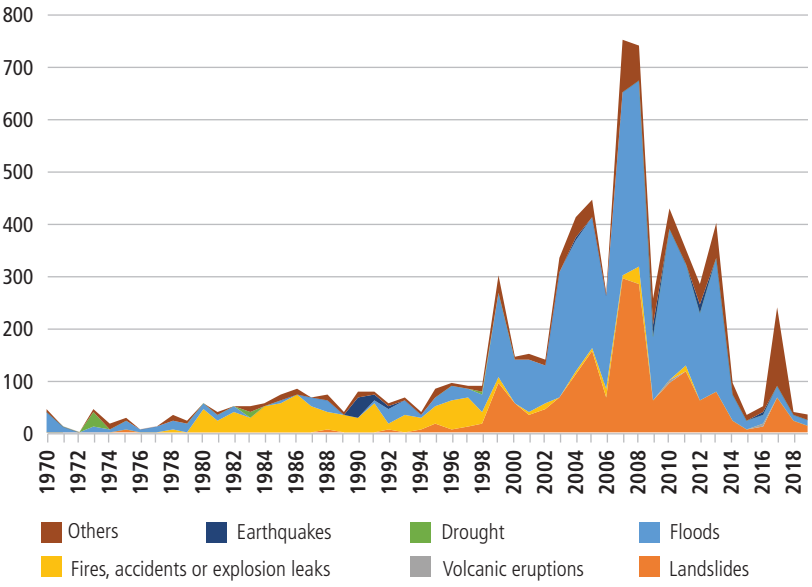
Climate-related disasters surged during the 21st century in comparison with the previous decades. Since 1970, the frequency of disasters has varied: in the 1970s and 1980s, fires and accidents used to be the most common events; floods and landslides have increased over the past 20 years (Figure 9). This rise in the frequency of hydrometeorological events is likely associated with urban growth in risk-prone areas. However, the first expansions of informal settlements in the 1980s and 1990s do not seem to have caused an increase in the number of adverse events, even though they occupied areas that were high-slope areas or adjacent to river courses, usually beyond

FIGURE 8. During the 1970–2019 period, floods and earthquakes mostly damaged dwellings



Source: DesInventar (https://www.desinventar.net/index.html).

FIGURE 9. Since 1970, the frequency of disasters has varied in the GAM



Source: DesInventar (https://www.desinventar.net/index.html).

Note: The figure depicts the changes over time in the number and type of disasters occurring in the GAM between 1970 and 2019.

7 https://www.desinventar.net/index.html; epidemics, plagues, collapsed structures, pollution and panic have been excluded from the analysis.
8 In the 1990s, LA RED, a Latin American extreme event risk research group, began to build a conceptual framework and a comparable disaster register for several Latin American countries. This effort has recently been expanded in collaboration with the United Nations Office for Disaster Risk Reduction. The resulting database is DesInventar.

the regional urban growth boundary. This may be related to variations in rainfall patterns within the GAM, although data from the National Weather Service (*Instituto Meteorológico Nacional*, IMN) do not provide sufficient evidence.

The GAM's vulnerability to extreme dry events is high. The underlying causes of vulnerability are related to water supply that fluctuates over time and to a growing demand localized in the outskirts, at an elevation higher than the city's aqueduct. Costa Rica has dams only for hydropower generation.[9] However, the hydropower dam approach poses some drawbacks. First, it is necessary to convey water from the Reventazón river basin because the Virilla river basin reservoirs are situated at a lower elevation than the metropolitan aqueduct and, more importantly, the Virilla river is heavily polluted due to the GAM's sewage discharge (Calvo and Mora 2007). Second, the GAM aqueducts operate mainly by gravity, which implies challenges to supply the mountainous fringes around the region. And third, particularly in the northern outskirts of Alajuela and Heredia, urban development has resulted in the imperviousness of recharge zones refilling the same aquifers that supply 46 percent of the region's drinking water. In this context, the increasing frequency of extreme dry events would in turn reduce the availability of water from aquifers and springs.

9 Since the 1980s, the Costa Rican Institute of Aqueducts and Sewerage (Instituto de Acueductos y Alcantarillados - AyA) has been extracting water from the El Llano reservoir in Orosi (2.1 m^3/s), while the Fifth Stage Metropolitan Aqueduct Supply Project (Proyecto Abastecimiento para el Acueducto Metropolitano Quinta Etapa - PAAM) is seeking to extract an additional 2.5 m^3/s from the Macho River reservoir. Both are used for hydropower generation purposes.

II. Costa Rica's Economic Activity is Concentrated in a Few Cantons within the GAM

A. GAM-wide production is concentrated in the San José Metropolitan Area

Except for agricultural output, Costa Rica's economic production is concentrated in the GAM.[10] The region is home to 73 percent of national production, 80 percent of wholesale and retail trade, and 73 percent of manufacturing production. It even accounts for 32 percent of agricultural production, despite being a largely urban region that favors agglomeration economies of industry and wholesale and retail trade. The past 15 years have seen these concentration tendencies grow stronger, as the most dynamic activities have created jobs for GAM-based highly educated professionals. This concentration of wealth explains the recent increase in GAM median household income (see Figure 12 and the discussion on the country's most dynamic economic activities).

Within the GAM, most of the production is concentrated in the AMSJ and, to some extent, the metropolitan area of Alajuela. Table 1 disaggregates production data by the six cantons that have the largest share of total production (which is half of the national production). Two cantons, San José and Alajuela, alone account for about 36 percent of national production and 49 percent of GAM production. This degree of spatial concentration of production underscores the importance of quality basic services as well as an efficient transportation system that allows workers access to jobs, something the region currently is lacking (Agüero, Pujol, and Pérez 2021; see also Chapter 3).

TABLE 1. National production is concentrated in a few cantons within the GAM

	Manufacturing				Services				
Canton	Agriculture	*Light*	*Electronics*	Construction	Wholesale and retail trade	*Tourism and hospitality*	*Banking*	*Professional*	Total overall
San José	60.9	132.7	154.2	2.6	785.8	225.1	845.3	1,405.5	**7,349.0**
Alajuela	227.2	94.5	120.9	2.8	183.7	154.3	129.4	215.4	**2,671.9**
Cartago	112.6	130.1	29.0	0.5	87.5	38.2	108.6	67.9	**1,176.7**
Desamparados	29.9	26.8	41.4	2.6	127.9	37.0	199.9	124.6	**1,134.3**
Heredia	47.0	98.0	37.5	2.5	106.7	20.4	100.5	120.0	**1,049.6**
Santa Ana	20.6	10.0	7.4	1.1	202.2	19.2	22.7	177.1	**712.8**
Rest of GAM	305.5	264.9	185.1	15.3	617.4	455.1	878.4	760.5	**6,000.4**
Rest of the country	**1,717.2**	**251.0**	**130.4**	**201.0**	**531.5**	**219.3**	**270.7**	**307.3**	**7,515.7**

Source: Central Bank of Costa Rica 2020.
Note: The table shows production in US$, millions (2017).

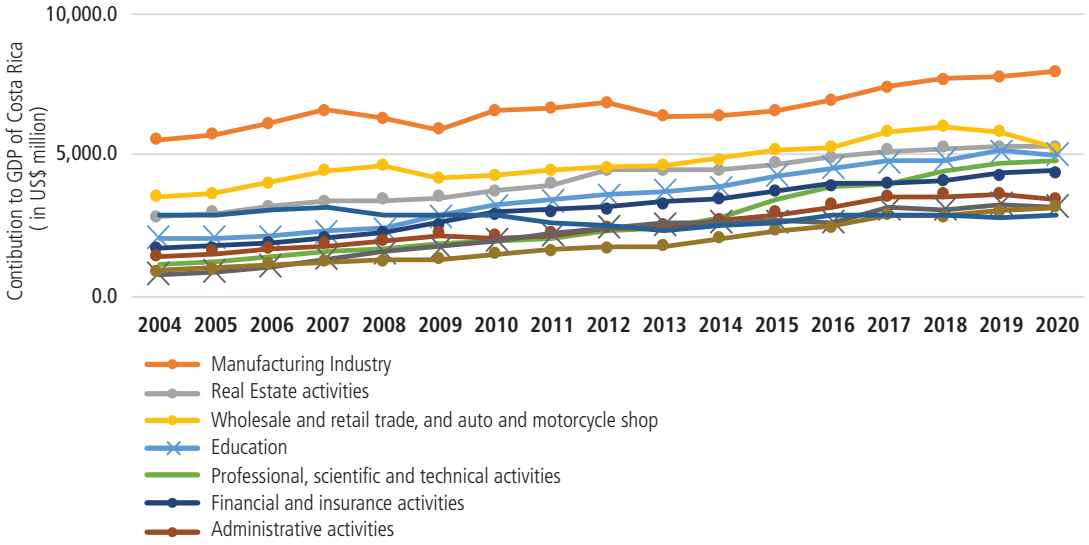
10 Production by canton was obtained from the Central Bank of Costa Rica's regional input-output matrix; see Brenes, Campos, and Loaiza (2021).

The economic and business concentration in San José is remarkable not only for its magnitude but also for its diversity. The importance of San José as the political capital, financial hub, and urban centrality of the main national metropolitan area is remarkable. For example, the canton of San José produces approximately twice as much as the other five cantons listed in Table 1 and the rest of the GAM (22 cantons), as well as more than four times as much as the rest of the country (51 cantons). While agricultural production in the GAM is concentrated in Alajuela (coffee and vegetables) and Cartago (vegetables); and electronics manufacturing in the industrial parks in South Heredia, Belen-Flores, and, particularly, El Coyol in Alajuela (two of three areas in the region planned for heavy industry development, which gives them important regulatory advantages and access to infrastructure), San José is still the canton with the highest output of light manufacturing and electronics nationwide.

When considering Costa Rica's national production, the most dynamic sectors are clustered in the GAM. Figure 10 shows ten selected sectors that in 2020 accounted for 77.4 percent of national GDP. Overall, the different sectors have shown sustained, albeit modest, growth, except in the final year of the series (explained by the economic impact of the COVID-19 pandemic) and in wholesale and retail trade, which had declined since 2018, possibly due to the lingering financial crisis affecting the public sector.[11] The leading activities are manufacturing, wholesale and retail trade, real estate activities, and education; all except education are concentrated in the GAM.

In terms of relative growth, the three most dynamic activities in real terms between 2004 and 2020 were *professional, scientific, and technical activities, administrative support activities, and information and technology activities*. These activities are not only concentrated in the GAM but also benefit medium to highly educated professionals in the region.[12] Professional activities increased 4.5 times, administrative support activities 3.8 times, and information and technology activities 3.5 times. In contrast, other less skilled labor activities (agriculture, manufacturing industry, and wholesale and retail trade) have the slowest growth: agricultural activities stagnated during this period while industry and wholesale and retail trade increased 1.4 and 1.5 times, respectively.

FIGURE 10. Professional activities soared in Costa Rica, while agriculture, manufacturing, and wholesale and retail trade grew the slowest



Source: Central Bank of Costa Rica 2020.

11 Since the 1980s, the Costa Rican Institute of Aqueducts and Sewerage (Instituto de Acueductos y Alcantarillados - AyA) has been extracting water from the El Llano reservoir in Orosi (2.1 m^3/s), while the Fifth Stage Metropolitan Aqueduct Supply Project (Proyecto Abastecimiento para el Acueducto Metropolitano Quinta Etapa - PAAM) is seeking to extract an additional 2.5 m^3/s from the Macho River reservoir. Both are used for hydropower generation purposes.

12 Note that part of the success observed in these activities has to do with the agglomeration economies generated by their GAM-based concentration; this implies, however, that these benefits are not found in other regions of Costa Rica. As discussed later, the income inequality and socioeconomic residential segregation in the GAM also suggest that the benefits derived from this economic growth have been restricted to one part of society.

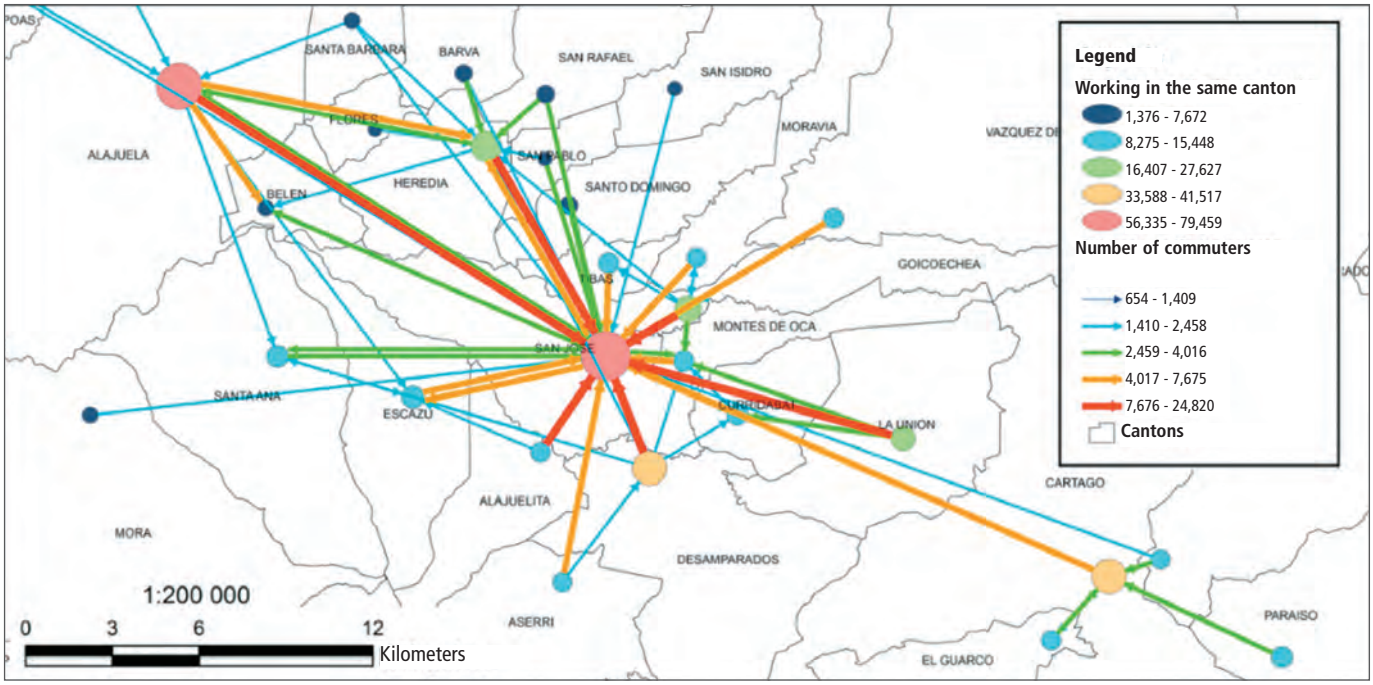
B. People have to commute significant distances to access job opportunities

Labor force location patterns replicate these production concentration levels, albeit to a lesser degree. The 2011 census reported 1,674,275 occupied workers, including some 57.7 percent (965,353 workers) living in the GAM cantons. The GAM cantons account for 947,214 jobs, including 907,751 jobs filled by GAM-based residents: 95.8 percent of the GAM's labor demand is supplied by GAM residents.

In the GAM, each of the four metropolitan areas functions as a labor market.[13] Based on the 2011 census, 84.7 percent of those living in the AMSJ[14] work in any of the cantons of the same metropolitan area. This figure is 82.1 percent for the Alajuela Metropolitan Area, 93.0 percent for the Cartago Metropolitan Area, and 67.9 percent for the Heredia Metropolitan Area. It is also noteworthy to mention that 49.4 percent of GAM residents work in the same canton where they reside, although there are significant differences by type of activity.

In addition, there is a strong concentration of jobs in just a few cantons. In the GAM, 50.1 percent of jobs are based in the cantons of San José (26.8 percent), Alajuela (10.0 percent), Heredia (7.7 percent), and Cartago (5.6 percent). Twenty-five percent of employment is created in the cantons of Desamparados, Escazú, Montes de Oca, Goicoechea, Santa Ana, Belén, and Curridabat. The other 25 percent comes from the remaining 20 cantons of the GAM. This explains why 430,000 people travel from one canton to another to work within the GAM. These commutes are mostly directed to the cantons of San José, Alajuela, Heredia, and Cartago (which are the centers of their respective metropolitan areas), and to a lesser extent to the cantons of Desamparados, Escazú, Montes de Oca, Goicoechea, Santa Ana, Belén and Curridabat (Figure 11).[15]

FIGURE 11. The largest commuting trips between home and work are toward the canton of San José



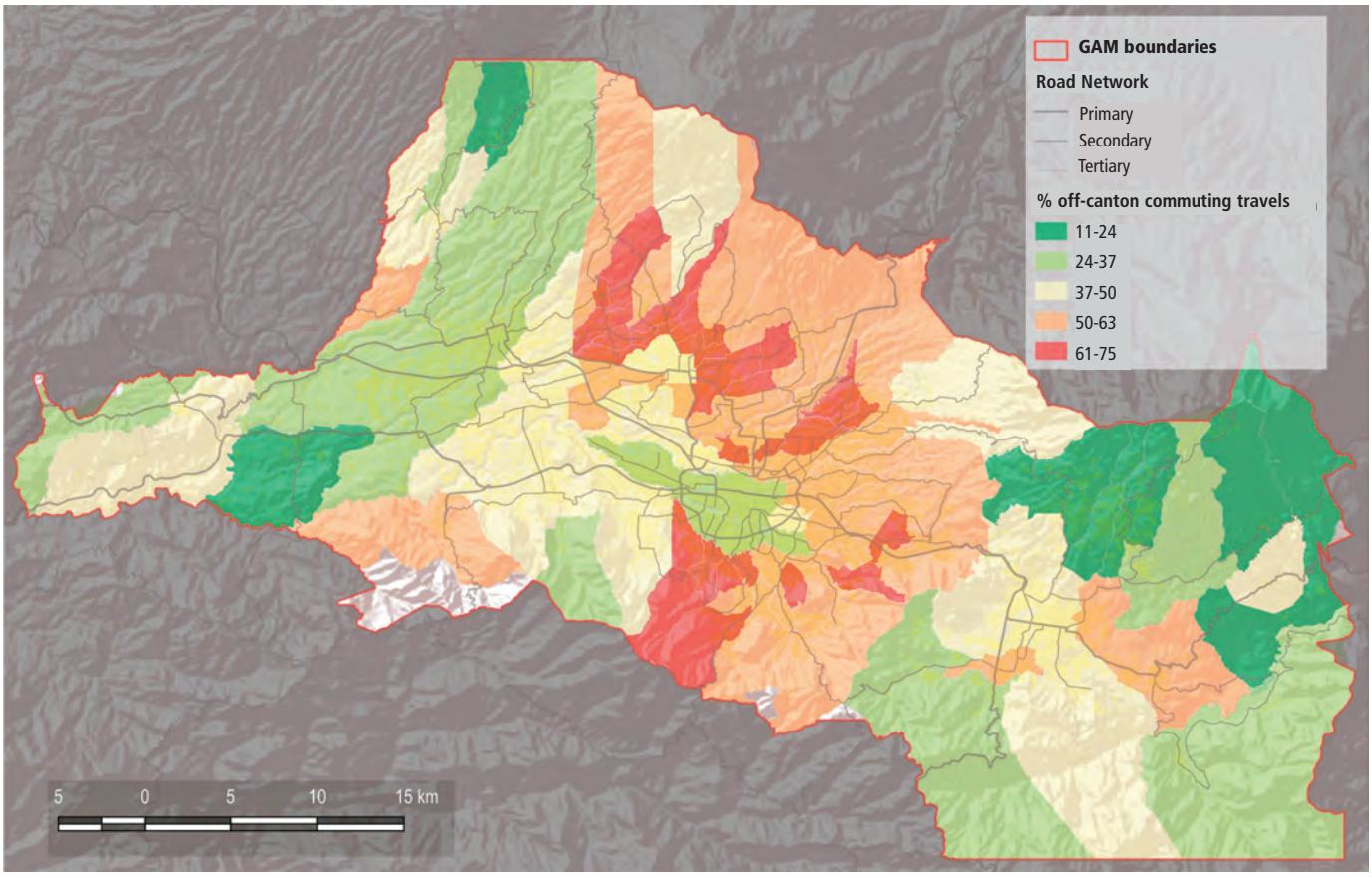
Source: Agüero, Pujol, and Pérez 2014, based on 2011 population census data.

13 In Dijkstra, Poelman, and Veneri (2019), a city is defined as an area in which people commute daily to work.
14 A metropolitan area has been defined as the area encompassing the set of cantons that are part of the province and are within the boundaries of the region. An exception is made for the canton of La Unión, which is administratively part of the province of Cartago, but functionally linked to San José, thus being included in the latter.
15 Outside the GAM, most cantons account for more than three-fourths of workers living within the same canton; the most extreme case is Talamanca, with 93.42 percent: that is, there is very little inter-cantonal commuting for work outside the GAM. The rural nature of these areas combined with the large size of many of these cantons may partly explain this situation.

In the GAM, 50.6 percent of workers are employed in a canton other than the one where they live, while outside the GAM this figure drops to only 17.6 percent. This means that half of the GAM-based workers must commute daily to their jobs in another canton; that is, they contribute to the demand for transportation during peak hours, both in the morning and in the afternoon. Figure 12 shows the GAM districts according to the share of workers whose employment is located outside of the canton where they live (based on the 2011 census). A majority of districts in the metropolitan areas of San José and Heredia have more than 63 percent of workers commuting out of the canton (thus making them dormitory cantons, see Figure 12). The exceptions are the central canton of San José, which concentrates a large share of jobs, and some districts in cantons on the western side of San José, which benefit from worksites along National Route 27.

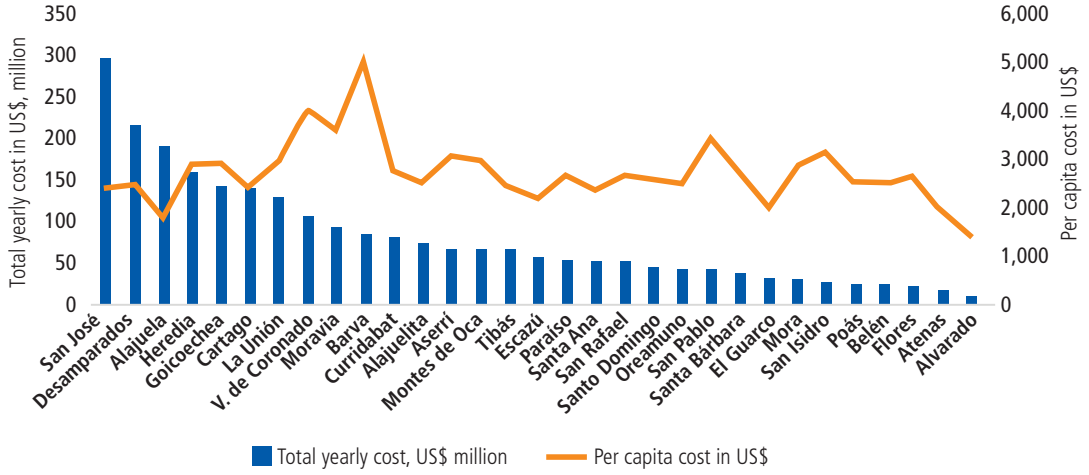
The most important dormitory cantons include the South Corridor cantons of Desamparados, Aserrí, and Alajuelita. The high commuting rates of these cantons are related to the proximity to San José, a proximity that does not translate to easy access, as Chapter 3 will further specify, and the inability of the local economies to generate production and jobs (see Chapter 2). As for the rest of the region, the canton of La Unión on the east side of San José and the outskirts of the Heredia metropolitan area are noteworthy.

FIGURE 12. The largest dormitory cantons are South San José, North Heredia, and La Unión



Source: National Population and Housing Census (INEC 2011).

FIGURE 13. Total costs of transportation externalities are higher in central cantons such as San José, Alajuela, or Heredia and smaller in rural areas



Source: Sánchez 2018.

C. The concentration of economic activity in the GAM and the lack of an effective and integrated transportation system carries significant costs for the country

The costs of an inadequate transportation network in the GAM are estimated at US$2,864 million, including US$691.2 million due to traffic congestion.[16] Figure 13 shows the per capita and total costs by canton, based on estimates by the Research Program in Sustainable Urban Development, ProDUS (cited in Sánchez [2018]). As expected, cantons with a larger labor force, such as San José, accumulate a higher cost. The cantons with the highest per capita costs (Barva, Coronado, Moravia, San Pablo, San Isidro, Aserrí, and La Unión) are generally located on the outskirts of the San José and Heredia metropolitan areas. Earlier and more extensive estimates of regional negative externalities (Otoya 2009), developed under the GAM Regional Urban Planning (Proyecto de Planificación Urbana Regional de la Gran Área Metropolitana – PRUGAM) project, assessed the costs associated with (a) road crashes at 0.30 percent of GDP (2005); (b) traffic congestion at 1.23 percent; (c) fuel consumption at 0.18 percent; (d) air and solid waste pollution at 1.11 percent; and (e) citizen insecurity at 1.42 percent. The comparison of both estimates suggests that there has been a significant increase in congestion costs, which is consistent with the situation that the region is currently undergoing, according to Gómez and Cubero (2018).

For example, the manufacturing industry has been decentralizing away from San José mainly due to increased costs associated with traffic congestion. Since 1984, manufacturing economic activities have been relocating from their original sites in the canton of San José to other locations—specifically to industrial parks in Heredia, Cartago, and, more recently, Alajuela (Arias and Sánchez 2012).[17] These new industrial zones gained relative importance in terms of the development of industrial activities. San José, meanwhile, witnessed a decline in both its industrial park and investors' investment prospects in the territory. Arias and Sánchez (2012) attribute this decentralization process to, among other reasons, the industrial saturation in San José and the escalating transaction costs associated with road obstacles, transportation costs, and excessive red tape.

16 Sustainable Urban Mobility Plan for the San José Metropolitan Area (*Plan de Movilidad Urbana Sostenible para el Área Metropolitana de San José*), COSTA RICA PIMUS (cited in Sánchez [2018]).
17 Arias and Sánchez (2012) examined manufacturing workers by their canton of residence through the five most recent censuses (from 1963 to 2011).

The GAM traffic congestion-related costs are high in the Latin American context. The per capita cost estimated by the Integrated Sustainable Urban Mobility Plan (*Plan de Movilidad Urbana Sostenible*, PIMUS) in 2017 due to congestion is US$304. This figure is significantly higher compared to those of the most important metropolitan areas in Latin America—US$177 per capita cost for Montevideo, US$156 for Santiago de Chile, and US$112 for Buenos Aires (Calatayud et al. 2021). As a share of national GDP, traffic congestion accounted for 1.1 percent of GDP in Buenos Aires, Montevideo, and Sao Paulo; 1.0 percent in Santiago; 0.9 percent in Bogotá and Rio de Janeiro; 0.8 percent in Lima; 0.7 percent in Santo Domingo; and 0.5 percent in San Salvador and Mexico City. In contrast, this figure for the GAM is 0.9 percent of national GDP, similar to the highest costs reported in Latin America.

Congestion costs are explained by serious deficiencies found in the regional road network and public transportation—a detailed analysis of the GAM transportation is discussed in Chapter 3 of this study. The regional road system was first built in the mid-1970s, but the economic crisis in the 1980s resulted in severe road investment curtailments, lasting until at least 2008.[18] For decades, only sections of major highways were in service (in particular, National Routes 2, 27, and 39) that even today lack the necessary intersections with the rest of the road network.[19] According to Sánchez (2018), US$1,634 million in investments are needed to expand the regional system's capacity, despite notable advances in road construction in recent years.

18 Figures are reported annually in the Ministry of Public Works and Transportation (MOPT) statistical yearbooks, available at: http://repositorio.mopt.go.cr:8080/xmlui/handle/123456789/4

19 Insufficient interchanges on sections of the national road network were completed, notably on National Routes 1 and 39.

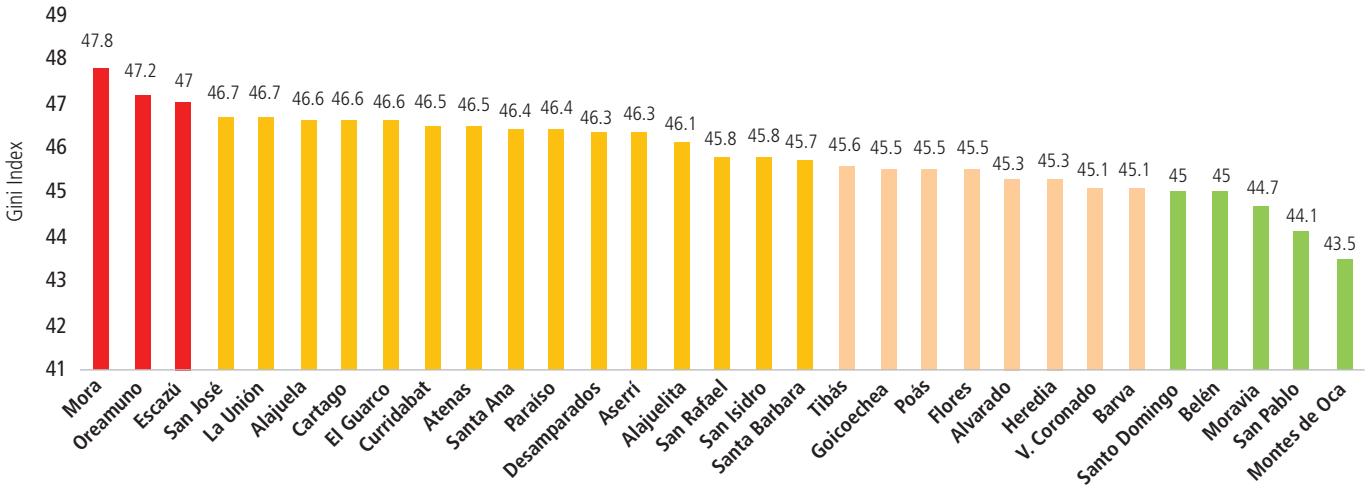
III. Territorial Inequality Rises, Poverty Stagnates, and Segregation Intensifies in the GAM

A. Some cantons in the GAM are highly segregated

Inequality in Costa Rica is driven by income differences between urban and rural areas, a trend that is replicated within the GAM itself. Arias and Sánchez (2012) found the overall Gini index of Costa Rica to be greater than the Gini index for only urban areas, whereas the Gini index for urban areas is greater than for rural areas. Within the GAM, (Figure 14), the urban upper-middle-class cantons of Belen, Moravia, San Pablo, and Montes de Oca show the lowest levels of inequality (households with lower human capital have been gradually displaced from these territories). The three cantons with the highest levels of inequality are Mora, Escazú—both with concentrations of wealth and large rural areas—and Oreamuno, and they show significant social segregation. As seen in Table 2, the correlation between poverty and the Gini index is relatively high.

Inequality and poverty in the GAM are highly correlated. As can be seen in Table 2, the correlation between poverty and the Gini index is relatively high (0.67): this means that cantons with high levels of poverty also seem to exhibit greater inequality and cantons with less poverty, which concentrate the professional upper/middle classes and where the market may have acted as a mechanism of social homogenization, are also less unequal for that reason. In general, when the relationship between potential determinants is examined, as in Table 2 (for example, various measures of education, such as variables of human capital, shown in light blue, or of employment, in purple), it is clear that (a) the indicators correlate, both with poverty and with the Gini Index, and

FIGURE 14. Inequality is more pronounced in cantons with high concentrations of poverty and wealth and less in cantons inhabited mainly by upper-middle-class professionals



Source: INEC 2011.

(b) the magnitude of the correlation coefficient (which represents the degree of association) is greater for poverty and each determinant than for inequality. For example, the level of schooling is negatively related to both poverty and the Gini Index and is higher (0.87) for poverty than for inequality (0.46).

B. The GAM concentrates the largest number of poor households

Costa Rica's progress in reducing poverty stagnated in the 1990s. While the country succeeded in reducing poverty from the 1950s to the 1980s, this reduction has stagnated for the past 30 years. After the debt crisis in the late 1970s and early 1980s,[20] which led to significant (though short-lived) increases in poverty levels, the country recovered.[21] The slowdown in poverty reduction efforts in the 1990s was related to the decline in education and the fiscal and productive disengagement of the new economy (high-tech, non-traditional exports, free-trade zones, tourism, financial sector) from the rest of the economy (PEN 2009).

While the GAM has large numbers of urban poor, the incidence of poverty is lower than in the rest of the country. In the GAM, between 14.6 percent (measured on the basis of the poverty threshold) and 18.1 percent (when defined by unmet basic needs [UBNs]) of total households live in poverty, constituting 35 percent of poor households in Costa Rica. There are 95,000 poor households in the GAM, according to the poverty line method. The number of households living in poverty (those with one UBN[22]) is 97,000 and in extreme poverty (those with more than one UBN) is 21,000: the aggregate is 118,000 households—37 percent of all households nationwide based on the UBN approach.

TABLE 2. GAM inequality and poverty by canton are correlated

Variable	Poverty	Gini Index
Poverty	1.00	0.67
Gini	0.67	1.00
Schooling	–0.87	–0.46
Education lag	0.73	0.44
Secondary education completed	–0.79	–0.42
University	–0.82	–0.45
Rates of employment	–0.83	–0.62
Primary employment	0.79	0.41
Entrepreneurship	–0.62	–0.36
Unpaid employment	0.79	0.61

Source: INEC 2011.

Eight GAM cantons have poverty rates exceeding 20 percent (see Figure 15). Poverty in some cantons is concentrated in formalized urban settlements, including Alajuelita, Aserrí, and Paraíso, as well as peripheral rural cantons (Alvarado, Peas, Oreamuno, Mora, and El Guarco). This distinction is important because, despite their material deprivation, there is evidence that the environmental externalities of rural cantons significantly improve the residents' satisfaction with their living conditions (Pérez 2012). In Chapter 2, patterns of poverty within the South Corridor will be examined in more detail.

C. Access to housing in the GAM is a persistent problem for most of its inhabitants, despite the success of the social housing program in reducing housing informality

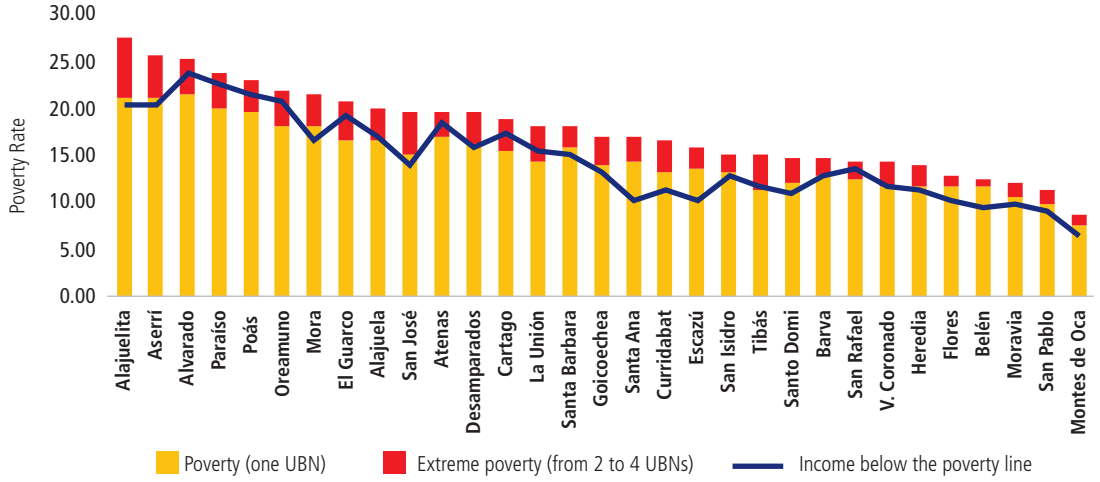
The majority of GAM residents lack access to affordable and adequate housing. A combination

20 By the late 1970s, the external debt service—necessitated by a mixture of external (1973 and 1978 oil price crises, political unrest in Central America) and internal factors (chronic balance of trade deficit, growing public fiscal deficit, poorly diversified economy dependent on agro-exports)—became unsustainable. Faced with the Costa Rican government's failure to repay, a default was declared, resulting in a 600 percent inflation between August 1980 and March 1982, followed and accompanied by a severe economic downturn and a rapid and substantial increase in unemployment (see Villasuso [2000]).

21 Failure to complete high school education has been repeatedly recognized as a key variable in identifying households in poverty by the *Programa Estado de la Nación* (particularly dependent households with heads who did not complete high school education). See, for example, Chapter 6 of PEN (2020).

22 The indicators of UBNs were defined by Méndez and Trejos (2004) as a method for identifying critical needs based on census information. They are four: (a) shelter, which identifies substandard dwellings (built with inferior or scrap materials, no electricity, or with overcrowding); (b) health, which measures access to safe drinking water or sanitation; (c) knowledge, which measures the educational attendance and achievement (progress) of children under 17 years of age in the household; and (d) consumption, which considers education, age, and environment (urban/rural) of the adults contributing income to the household—because these variables correlate with household income, measured through household surveys (Méndez and Trejos, 2004).

FIGURE 15. Poverty distribution in GAM cantons (2011)

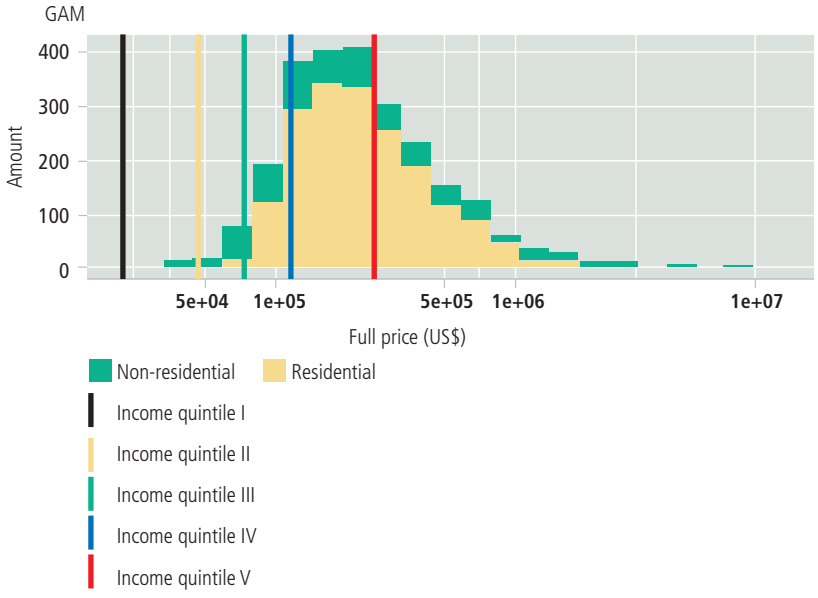


Source: INEC 2011.

of factors contribute to the region's housing problems, including (a) the lack of affordability of housing in terms of payment capacity (no more than 30 percent of family income) and (b) limited and concentrated supply of social housing in terms of location and types of housing provided; also, the allocation of housing subsidies in the region has decreased. As a result, the poorest population segment continues to rely on informal housing, and settlements located in risky areas persist in the region—although it is important to note that informality had been reduced over the long term due to the significant investments of the social housing program.

The GAM faces a serious housing affordability problem for low- and middle-income families. Most GAM households cannot become homeowners because their income is insufficient to qualify for a mortgage loan unless they accept a monthly cost burden exceeding 30 percent of their gross income. Figure 16 compares the ability to repay, assuming that a mortgage payment is not a cost burden, with GAM house prices.[23] As seen, 60 percent of households in the region can afford a very small share of homes available for sale, while the bottom 20 percent are completely excluded

FIGURE 16. Most of the GAM population cannot afford homeownership without sacrificing a significant share of their household income



Source: Agüero et al. 2020.

23 Ability to repay was estimated by assuming that 30 percent of gross household income would be dedicated to a 30-year mortgage repayment at a 6.25 percent interest rate, using the household income of the Central Region in 2020, based on INEC's Encuesta Nacional de Hogares (ENAHO). The 30 percent threshold as a cutoff between being cost burdened or not was adopted from Fernald (2020).

The property data are from a sample of 2,533 records downloaded from the website www.encuentra24.com, a real estate listing aggregator; housing data of this sample is described by Perez (2021).

TABLE 3. The number of social housing subsidies has been shrinking in the GAM since 1987

	Housing Subsidies					
Spatial Unit	1987–1993	1994–2000	2001–2007	2008–2014	2015–2018	Total
San José Metropolitan Area	21,776	13,688	6,297	4,637	2,487	48,885
Alajuela Metropolitan Area	4,781	6,165	3,032	2,045	509	16,532
Cartago Metropolitan Area	9,300	11,644	4,893	5,627	2,460	33,924
Heredia Metropolitan Area	7,188	4,485	2,656	1,297	601	16,227
Rest of Costa Rica	40,613	58,242	54,344	59,262	89,225	301,686

Source: Ministry of Housing and Human Settlements).

from the market (considering, for example, that the Costa Rican government's housing subsidy was only US$11,000 in 2020, insufficient to purchase a home in the market).

Housing affordability issues are linked not only to limited access to demand-side mortgage loans, but also to a housing supply that is insufficiently diverse in terms of housing type, location, and price. Table 3 shows the total number of housing subsidies granted in Costa Rica.[24] Some of these subsidies (about 20 percent) refer to housing units constructed directly by a housing developer for the Mortgage Bank (*Banco Hipotecario de la Vivienda,* BANHVI) (see Box 1),[25] which improves the prospects of GAM's residents for accessing social housing; other housing subsidies consist of grant allocation to families for self-construction on the beneficiary's own land or housing expansion/improvement (this subsidy type makes up 66.5 percent of subsidies allocated in 2018). The latter mechanisms are less efficient to address housing affordability in the GAM, given the high land prices in the metropolitan area and the lack of access to land on the part of poor families. Overall, the share of subsidized housing in the GAM has been shrinking at an accelerated pace. In an earlier phase of the housing program, 51 percent of subsidies were distributed in the GAM; this percentage dropped to 38 percent in 1994–2000, 24 percent in 2001–2007, 19 percent in 2008–2014, and just 6 percent in 2015–2018.

There are no effective alternative arrangements for supporting poor families in need of shelter. The *Instituto Mixto de Ayuda Social* provides subsidies to families in extreme poverty that can be allocated to cover rent, but this program is limited. In addition to the severe affordability and mortgage market exclusion issues faced by most of the population, the supply of housing fails to meet the needs of the region's population.

BOX 1.
Costa Rica's social housing program

The social housing program in Costa Rica subsidizes affordable housing for the poorest households and finances social housing developers. This scheme is made up of BANHVI, a second-tier bank, and housing cooperatives: authorized housing institutions that process subsidies for potential beneficiaries (Republic of Costa Rica 1986). BANHVI, in turn, is comprised of two funds: The National Housing Fund lends money to social housing developers; the Housing Subsidy Fund (FOSUVI) awards subsidies to eligible households (mainly based on income). Thus, a developer can finance the urban development using BANHVI funds and then recover their investment by delivering the houses to the beneficiaries (who in turn 'repay', financed by FOSUVI, housing subsidies or *bonos* de Vivienda).

The social housing development initiative falls on the developers. This has created a persistent issue because the land is selected by developers to minimize costs under criteria such as cheap land values resulting from inaccessible or unsuitable conditions for urbanization. Often, the developers arrange the beneficiary lists with organizations of families living in informal settlements. This has caused the state to finance housing units in unsuitable zones and at costs higher than the real estate markets would indicate, considering the quality of homes and conditions of the land (Pujol, Pérez, and Sánchez 2011).

24 Based on the statistical digests of the Ministry of Housing and Human Settlements (MIVAH), 2016 and 2018.
25 In general, housing subsidies consist of monetary assistance provided by the state to families who own a plot of land to be used for building a housing unit on that plot; in GAM, the number of poor families with access to land is much smaller than in rural areas.

Informal housing has been declining rapidly in Costa Rica. Pujol, Pérez, and Sánchez (2014) compared the number of informal housing units[26] in 2000 versus 2011 and established the impacts of housing projects financed by BANHVI. Their overall results are shown in Table 4. They found that (a) GAM-wide housing informality dropped substantially during the intercensal period and that (b) part of this reduction and improvement, especially in terms of housing conditions and access to infrastructure (but not legal tenure status) could be attributed to the government-financed social housing programs. However, housing informality persists and is spatially concentrated in sites where illegal occupations or initial housing program interventions occurred (between 1987 and 1993); in particular, lack of titling remains an issue for many of these dwellings (Pujol, Pérez, and Sánchez 2014; Valverde and Trejos 1993). As shown below (for example, figures 15 and 17), these districts tend to be on the periphery of the region or physically isolated and are often exposed to impacts from potential flood or landslide disasters.

Between 2000 and 2011, housing informality in the GAM was low compared to Latin American levels. Pujol, Pérez, and Sánchez (2014) compared the levels of informality in the GAM (shown in Table 4) against data from other Latin American cities. The percentage of housing informality in the GAM stood at 11.9 percent of total housing stock in 2000 and declined to 8.1 percent in 2011. These informality percentages were similar to those of Montevideo (8 percent) and higher than Santiago de Chile (1 percent), but much lower than other Latin American cities: Bogotá reported 24 percent; Mexico City 40 percent; Lima between 37 and 40 percent; Guatemala City 40 percent; Tegucigalpa 50 percent; San Pedro de Sula 25 percent; and Managua 50 percent.

The canton of San José is host to 31.9 percent of informal housing (lacking legal title) in the GAM. The cantons of Curridabat, Desamparados, and Tibás have a significant presence of informal settlements with 15.5 percent, 14.7 percent, and 13.8 percent, respectively. The GAM's informal homes (75.9 percent) are concentrated in these four cantons. As seen in Table 4, they account for a small percentage of the informality issue, but also, being a highly complex legal concern, they are often the most difficult to resolve.

The informal settlements in these four cantons (including districts of Alajuelita, Cartago, and Heredia) correspond to the location of the social housing projects that originally formalized settlements in the 1985–1993 period. Many of these then informal settlements, especially in the 1980s, are located in the cantons

TABLE 4. Informal housing declined dramatically[21] in the GAM between 2000 and 2011 (excluding informality caused by lack of land title)

		2000		2011	
		GAM	Costa Rica	GAM	Costa Rica
	Percentage	100	100	100	100
Informal Housing (total)[21]	Number	58,845	192,166	49,889	139,899
	Percentage	11.9	20.5	8.1	11.5
Precarious housing (lacking legal title)[21]	Number	10,750	18,101	11,436	16,019
	Percentage	2.2	1.9	1.8	1.3
Poorly maintained dwelling[21]	Number	43,842	106,674	34,189	73,245
	Percentage	8.9	11.4	5.5	6.0
Housing with no access to infrastructure[21]	Number	23,515	129,689	16,117	81,227
	Percentage	4.7	13.9	2.6	6.7

Source: Pujol et al. 2014.

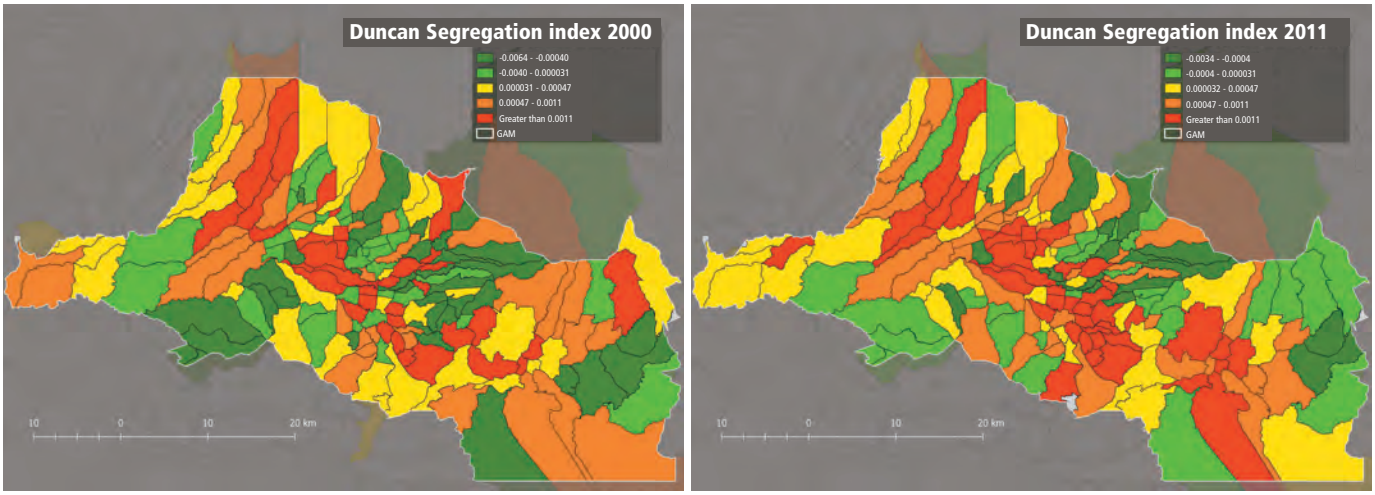
26 The studies conducted by Pujol, Pérez, and Sánchez (2011) and Sánchez (2015) analyzed the characteristics, spatial location, and concentration patterns of residential segregation for the group of low-income households in all GAM districts and cantons in the 2000 and 2011 census periods. They used the UBN for shelter as a variable to identify low-income households.

corresponding to the South Corridor (for example, Concepción and San Felipe in Alajuelita, Los Guido and Patarrá in Desamparados, and Salitrillos in Aserrí). These lands were close to the canton of San José but had a relatively low land value, partly because they were outside the regional growth boundary due to their exposure to extreme events. This allowed settlement leaders to agree on their occupation with the property owners (either private or public institutions; Mora and Solano 1993). Although these settlements were formalized by the state, they have laid the seed for continued informal housing development around their edges.

The concentration of poverty and informal settlements within the GAM generates territorial patterns of social segregation. According to Pujol, Pérez, and Sánchez (2011) and Sánchez (2015), the levels of social segregation increased in the intercensal period from 2000 to 2011.[27] They detected that segregation was most pronounced in San José and Heredia Metropolitan Areas (Table 5). As expected, as the study area expands, the concentration of low-income groups decreases and the interaction between low-income groups increases; that is, the larger the area, the lower the segregation. Finally, they found a significant spatial correlation when segregation patterns were examined at the district level, which confirms the spatial nature of social segregation in the GAM. Social segregation in the GAM is spatially correlated with districts that are home to informal settlements and social housing. Government policy, either active or passive, plays a major role in the social segregation patterns. Housing projects for the poorest have generated new informal settlements in their vicinity. The absence of sanitation infrastructure in many places across the region, in part because they were originally settlements in areas unsuitable for urban development, generates the highest values of dissimilarity (that is, the relative proportion of majority and minority households that would have to exchange their spatial unit to reach an even distribution/integration) as measured by the Duncan Segregation Index (Figure 17).

There are significant spatial concentrations of social segregation in certain clusters of districts. The territorial patterns of residential segregation for low-income populations are concentrated in a small group of high-density areas, although they are also found around the periphery of the region. Figure 17 shows that social segregation is more pronounced in (a) districts relatively isolated by large river canyons, which is reflected in the end area of the bus routes (La Uruca, Pavas, Tejarcillos, and Rio Azul); (b) GAM rural areas, especially along the

FIGURE 17. Duncan Segregation Indexes for 2000 and 2011 display the socioeconomic residential segregation patterns in the GAM



Source: Sánchez 2015.

27 The studies conducted by Pujol, Pérez, and Sánchez (2011) and Sánchez (2015) analyzed the characteristics, spatial location, and concentration patterns of residential segregation for the group of low-income households in all GAM districts and cantons in the 2000 and 2011 census periods. They used the UBN for shelter as a variable to identify low-income households.

TABLE 5. Inequality, exposure, and concentration indices by district and canton (2000–2011)[28]

Metropolitan area	Duncan Segregation Index		Isolation Index		Adjusted Isolation Index		Boundary-corrected inequality index		Boundary length-corrected inequality index		Shape-corrected inequality index		Interaction index		Concentration index	
	2000	2011	2000	2011	2000	2011	2000	2011	2000	2011	2000	2011	2000	2011	2000	2011
Estimated by canton																
GAM	0.097	0.122	0.097	0.070	0.005	0.006	0.076	0.102	0.096	0.121	0.083	0.109	0.903	0.930	0.432	0.438
San José	0.108	0.122	0.103	0.079	0.005	0.007	0.084	0.097	0.107	0.121	0.099	0.113	0.897	0.921	0.371	0.360
Alajuela	0.010	0.024	0.095	0.059	0.000	0.001	-0.006	0.007	0.010	0.024	0.009	0.023	0.905	0.941	0.216	0.214
Cartago	0.073	0.048	0.090	0.063	0.002	0.001	0.058	0.038	0.073	0.048	0.072	0.048	0.910	0.937	0.224	0.299
Heredia	0.071	0.097	0.078	0.048	0.002	0.003	0.050	0.078	0.071	0.097	0.068	0.095	0.922	0.952	0.361	0.369
Estimated by district																
GAM	0.229	0.262	0.122	0.096	0.030	0.032	0.180	0.221	0.222	0.254	0.084	0.135	0.878	0.904	0.536	0.534
San José	0.262	0.294	0.137	0.113	0.039	0.041	0.058	0.060	0.256	0.260	0.159	0.160	0.863	0.887	0.471	0.486
Alajuela	0.147	0.158	0.104	0.067	0.009	0.008	0.114	0.133	0.147	0.158	0.142	0.155	0.896	0.933	0.359	0.385
Cartago	0.186	0.218	0.107	0.081	0.019	0.019	0.136	0.189	0.185	0.218	0.169	0.206	0.893	0.919	0.464	0.501
Heredia	0.185	0.202	0.091	0.057	0.015	0.012	0.149	0.174	0.184	0.201	0.161	0.181	0.909	0.943	0.472	0.453

Source: Sánchez 2015.

fringes of the region or its subregions (Cascajal, La Carpintera, Ochomogo, and Rio Azul); (c) in high-slope areas, such as Tejarcillos de Alajuelita; and (d) flood and landslide-prone areas, like the banks of the rivers crossing the AMSJ.

Slums are located in areas unsuitable for urban development. Figure 18 shows the districts according to the number of precarious dwellings, estimated using census data. While there are some differences in the slum inventories, these settlements essentially coincide with those reported by the MIVAH. According to MIVAH (2005), 86 of the 116 slum settlements in the GAM province of San José are found on state-owned lands, 19 on private lands, and 11 on properties owned by landowning families or state institutions. Of these settlements on state-owned lands, 63 percent are found in high-risk and river protection zones, while 62 percent of settlements on private land are exposed to some type of risk, as are 82 percent of those located on mixed ownership lands.

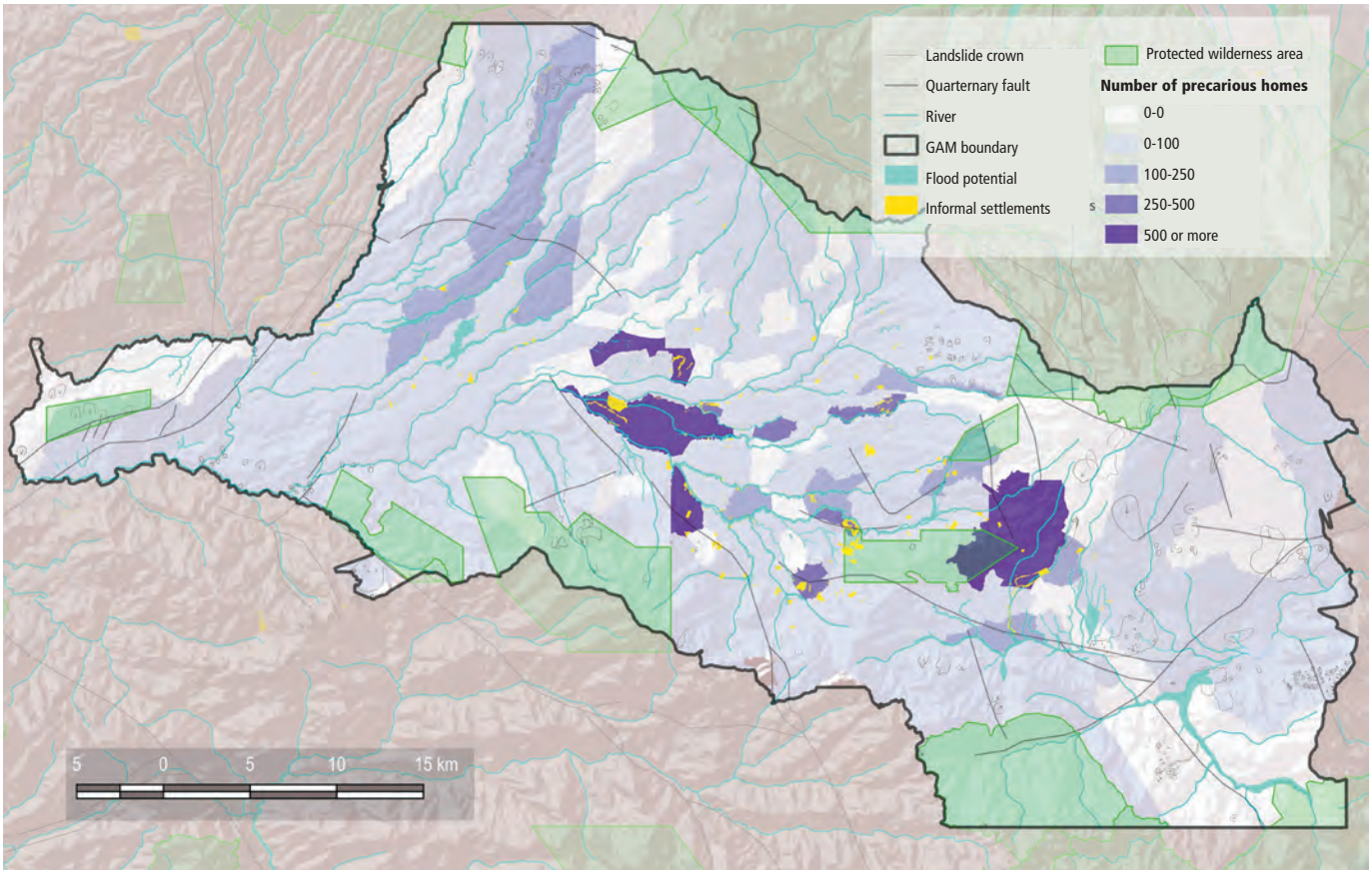
D. High level of access to basic services in the GAM, except for sanitation

Based on the 2011 census, access to basic services and infrastructure is practically universal in the GAM. The share of households with access to electricity, safe water, and solid waste collection services exceeds 98.5 percent throughout the region (see Figure 19).

Sanitation coverage has always been the exception to the rule. Only 35.2 percent of homes have

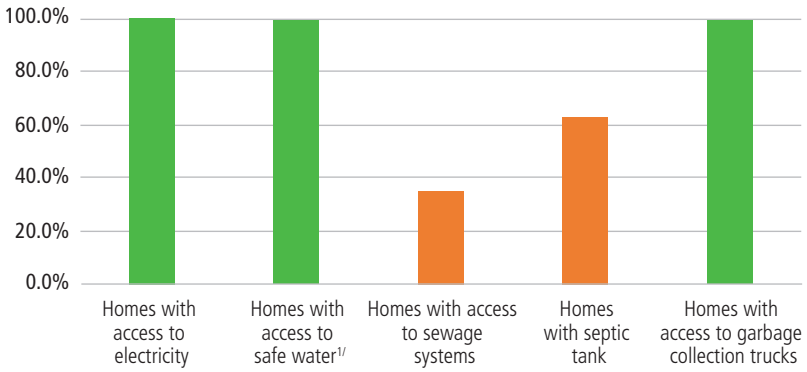
28 The Duncan Segregation Index (also called the "inequality" indicator) is obtained by estimating $0{,}5\cdot\sum[x_i/x-(t_i-x_i)/(t-x))]$ with x_i the number of minority group members in spatial unit i, x the sum of x_i for all units in the study area, t_i the total population of spatial unit i, and t, the total population of all units in the study area. The isolation index is estimated with the formula: $\sum[(x_i/x)\cdot(x_i/t_i)]$. The interaction index is defined by estimating this product but with respect to the majority group (i.e. the subtraction between the total population and that of the minority group in i): : $\sum[(x_i/x)\cdot[(t_i-x_i)/t_i]]$. The concentration index is defined as $0{,}5\cdot\sum[x_i/x-a_i/a]$, where a_i is the area of spatial unit i and a is the sum of all ai within the study area. The corrections made to these indices seek to reflect that neighboring spatial units are more closely related than more distant spatial units; the correction itself only considers whether two spatial units are adjacent (share boundary); the correction for boundary length considers how long the common boundary segment is; the correction for shape corrects for the ratio of perimeter to area, which has been shown to be a potential determinant of segregation. See Sánchez (2015) for more details.

FIGURE 18. GAM slums are more exposed to disaster risk than other areas in the region



Source: CNE and MIVAH.

FIGURE 19. Except for sanitation, access to infrastructure and other urban services is almost universal in the GAM



Source: 2011 census.
Note: 1/ Excludes households supplied by wells, streams, springs, and others (including water cisterns).

sewer connections, and for nearly three decades, this sewerage system used to discharge sewage directly into the region's rivers (a wastewater treatment plant was recommissioned in 2015). Of the GAM households, 62.7 percent treat their wastewater through septic tanks. Although under certain urban density conditions and soil characteristics this technology may provide for adequate wastewater treatment, much of the GAM probably exceeds density levels where septic tanks are appropriate and soils are impervious to sewage infiltration. Septic tanks are only a partial and imperfect sanitation solution.

IV. Additional Challenges Faced by the GAM: Water, Violence, and COVID-19

A. The GAM faces water supply challenges

The GAM is facing potable water supply issues caused by rapid urban growth coupled with inadequate infrastructure. Based on a regional water balance analysis, GeoAdaptive (2015) concluded that the drinking water supply in the region would be insufficient to meet regional supply needs under drought conditions; moreover, water is being over-exploited in certain areas of the region. The drinking water infrastructure that supplies the metropolitan aqueduct currently fails to meet the demand.[29] Since 2015, the region has experienced scheduled service interruptions lasting between 6 and 12 hours per day.

GAM's water is supplied mostly from aquifers and surface water resources. A Ministry of Environment and Energy (MINAE) water concessions review reported that, in 2015, 9.1 m^3/s of total flow had been used for all human uses in the GAM (GeoAdaptive 2015). About 66 percent of this flow was used for drinking water supply by utility operators. Additionally, 92 percent of the flow was extracted from groundwater aquifers located mainly in North Heredia and Alajuela or from springs.

Drinking water in the GAM is supplied by public utilities, including the AyA, the Heredia Public Utilities Company (ESPH), and municipal and rural aqueducts. In 2011, based on the housing census, the AyA supplied 54 percent of households throughout the region, the ESPH supplied 8 percent, municipal aqueducts accounted for 21 percent, and 8 percent were supplied by small rural aqueduct systems. The source of the remaining 9 percent is unknown because homes were unoccupied at the time of the census. The rest of the households used wells, rivers, or rainwater.

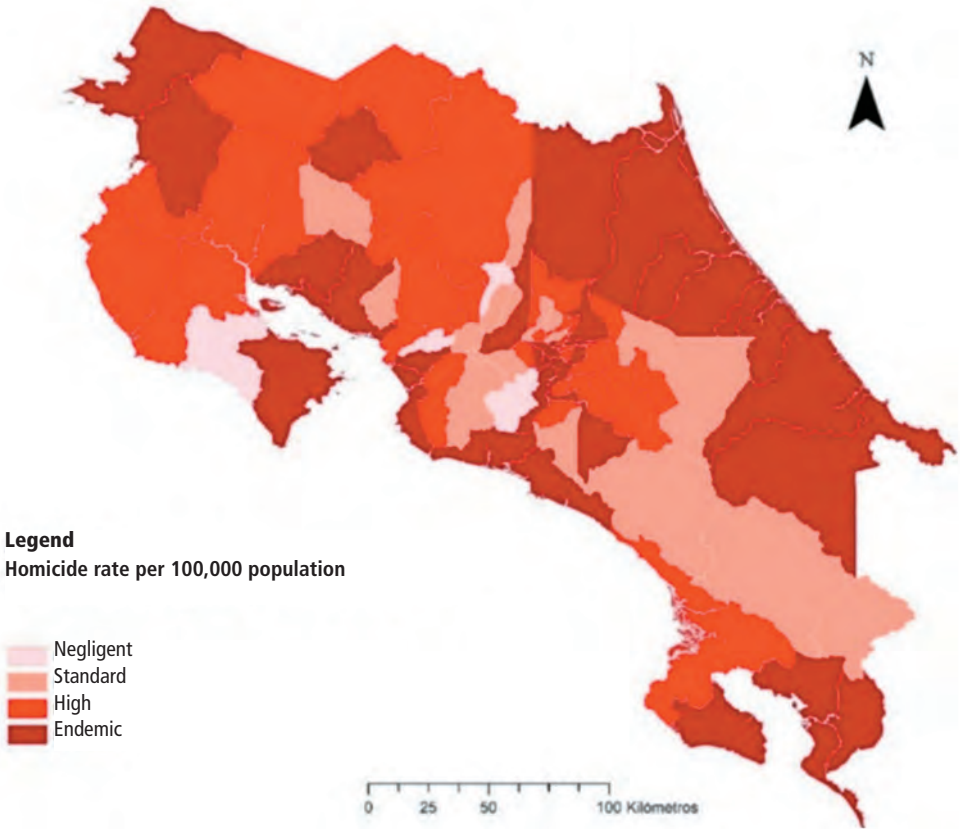
The AyA-managed metropolitan aqueduct is being expanded. The Central American Bank for Economic Integration (CABEI) is providing US$399.2 million for the construction of 44.3 km of pipelines, a new wastewater treatment plant, and 40,000 m^3 of additional storage capacity, collectively known as the PAAM. This project would take 2.5 m^3/s of water from Orosi, the Reventazón watershed, to supply the metropolitan aqueduct located in the Virilla river watershed. It is estimated that the new volume of water would serve 638,000 people for human consumption.[30]

B. Social exclusion and lack of opportunities spur violence and organized crime

Violence in Costa Rica and the GAM soared to historically high levels in recent years. The GAM reports that ten cantons have a homicide rate of over 10 per 100 individuals, the threshold for an epidemic: San José, Escazú, Desamparados, Aserrí, Goicoechea, Alajuelita, Coronado, Tibás, Alajuela, and La Unión (Figure 20). By district, an analysis of the 2014–2018 period shows a clear concentration of homicides in a few GAM districts, specifically the districts of Pavas, Hatillo, Uruca, San Sebastián, and Hospital in San José, as well as León XIII in Tibás. One out of every three homicides occurred in these areas.

29 https://www.larepublica.net/noticia/empresarios-denuncian-problemas-en-planificacion-y-ejecucion-de-proyectos-de-aya
30 For further details, see: https://www.presidencia.go.cr/comunicados/2020/11/bcie-aprueba-3992-millones-para-megaproyecto-de-ampliacion-del-acueducto-metropolitano/

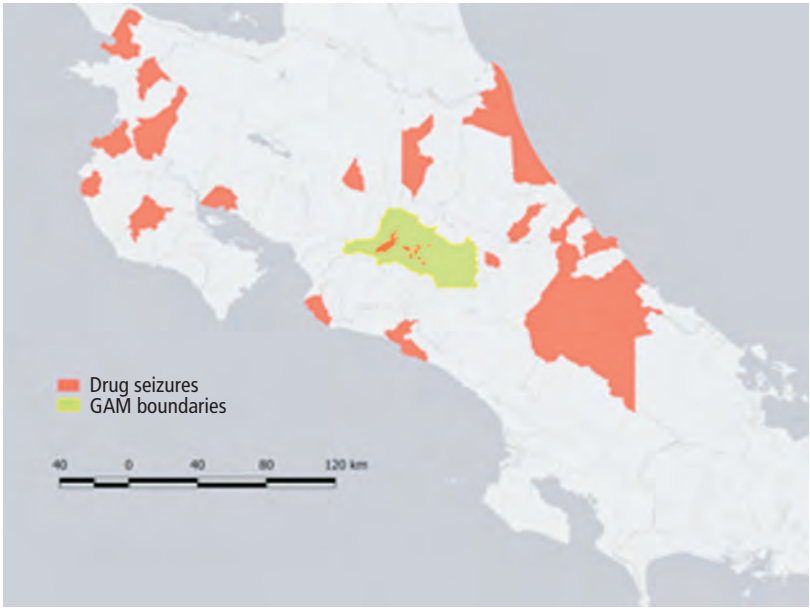
FIGURE 20. Most cantons in Costa Rica reported homicide rates of epidemic proportions in 2014–2018



Source: Sanchez (2018) with data from ICD

GAM-wide citizen insecurity is related to the drug trade. Between 2014 and 2018, more than 94,000 drug seizure events were reported with nearly 119,000 people involved (86 percent males), 70 percent of them under 40 years of age. About 50 percent of these cases occurred in only 33 districts (see Figure 21); that is, less than 7 percent of the country's districts, denoting a high geographic concentration. Among them, 17 districts (51 percent) are located within the GAM.[31] In these districts, there is a distinct concentration of poverty featuring very specific socioeconomic characteristics: more than 99 percent of their population lives in urban, high-density, and populated areas; 40 percent of the population over age 25 only completed primary education; and one-third

FIGURE 21. Drug seizures in Costa Rica are a highly localized issue: 50 percent of drug seizures from 2014 to 2018 took place in 33 districts - 17 of them in the GAM



Source: ICD 2018.

31 Specifically, in the canton of San José, the districts of Pavas, Hatillo, La Uruca, Carmen, Catedral, Hospital, Mata Redonda, San Sebastián, and Merced; San Pedro de Montes de Oca; Calle Blancos and Ipís in Goicoechea; San Juan in Tibás; Los Guido in Desamparados; San Felipe de Alajuelita; Pozos in Santa Ana; Occidental in Cartago; the central districts of Heredia and Curridabat, as well as the districts of the canton of Alajuela: the first district (Alajuela) and San José, San Rafael, Guácima, and Río Segundo.

of the population lives in poverty, which describes more than 65 percent of the population living in slums (INEC 2011).

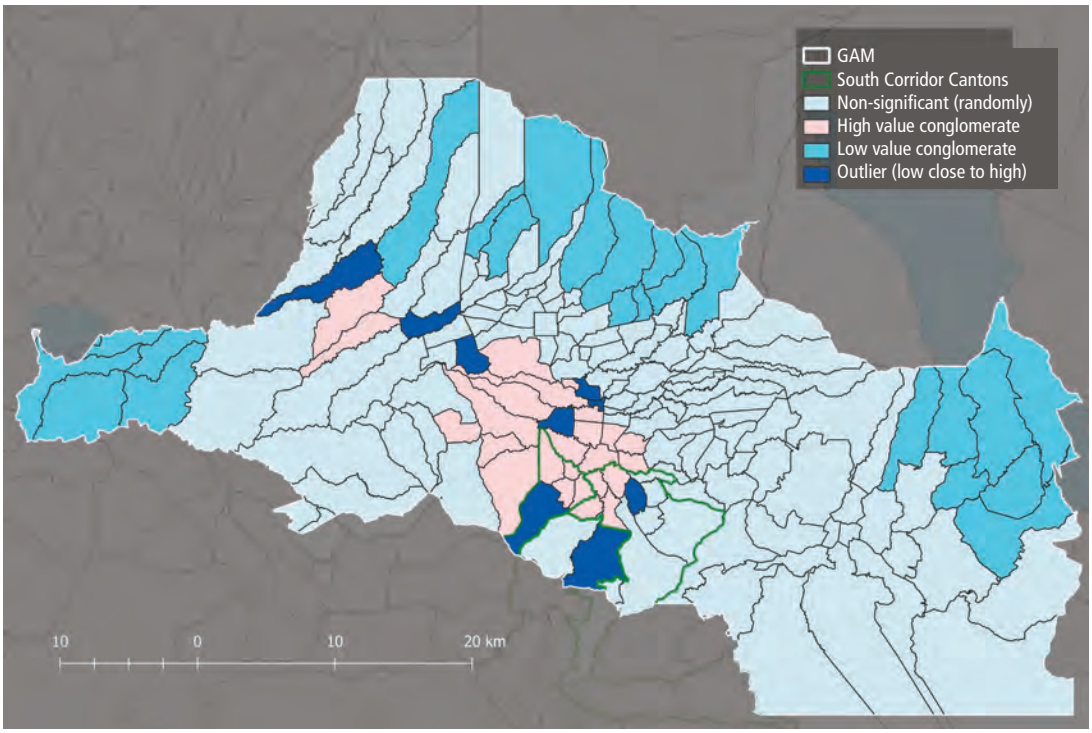
C. GAM's labor and socioeconomic conditions exacerbated COVID-19 impacts

The GAM hosts about 58 percent of all COVID-19 cases reported in Costa Rica by September 5, 2021, and 60 percent of the fatalities. Figure 22 shows that the territorial distribution of COVID-19 cases is not random; on the contrary, there are at least three agglomeration patterns: districts with a high incidence of COVID-19 adjacent to other high incidence districts (light red color), that is, what happens in one district affects the neighboring district; districts with a low incidence of COVID-19 adjacent to other low incidence districts (light blue color); and atypical cases consisting of districts with a low incidence of COVID-19 that coexist adjacently to other high incidence districts (blue color).

The largest COVID-19 cluster is around San José and its neighboring cantons and comprises most of the districts of Alajuelita and the northwestern districts of Desamparados. In this pattern, the low value in this cluster tends to correspond to relatively high-income districts (for example, Mata Redonda in the canton of San José) or peripheral districts with some rurality, such as San Josecito in Alajuelita or Salitrillos de Aserrí.

As noted, a series of socioeconomic inequalities converge within the GAM, even within the same canton or district, which helps explain the variability observed in the locations of COVID-19 clusters within the region. The spatial incidence of COVID-19 partially reflects these asymmetries. Which and to what extent these characteristics impact virus spread may be approximated by applying econometric techniques to define a set of variables that explain such variability to a greater or lesser extent in different areas of the GAM (see Annex 2).[33]

FIGURE 22. COVID-19 cases are clustered around San José (according to Moran Local I, LISA[32])



Source: Prepared by authors based on data from the Ministry of Health updated by September 5, 2021.

32 See Anselin (1995)

33 The Geographically Weighted Regression (GWR) method has been applied: for each spatial unit in the dataset, a linear regression centered on that unit is estimated; the weight of the data corresponding to other units is determined by proximity to this unit. Thus, it is possible to estimate how the regression coefficients vary (that is, how the relationships between the dependent variable and each of its determinants vary) in space, as well as the goodness of fit of the model (Fotheringham, Brunso, and Charlton 2002).

References

Agüero, J., R. Pujol, and E. Pérez. 2014. "Actividad económica, características sociales y demanda de transporte: Una exploración de los patrones de viajes residencia-trabajo en el censo de 2011." In *Costa Rica a la luz del Censo 2011,* edited by J. Barquero et al. San José: INEC.

Agüero, J., R. Pujol, and E. Pérez. 2021. *Patrones de movilidad en transporte público en la Gran Área Metropolitana de Costa Rica: desafíos e impactos*. Investigación de base para el Informe del Estado de la Nación en Desarrollo Urbano Sostenible 2021. San José, Costa Rica: Programa Estado de la Nación.

Agüero, J., E. Pérez, R. Pujol, and F. Zumbado. 2020. *Actualización del Plan Regulador. del cantón Goicoechea Etapa Diagnóstico. Eje Económico*. San José, Costa Rica: ProDUS-UCR.

Angel, S., et al. 2016. *Atlas of Urban Expansion. Vol I*. Cambridge, MA: NYU Urban Expansion Program at New York University, UN-Habitat, and the Lincoln Institute of Land Policy.

Anselin, L. 1995. *Local indicators of spatial association*—LISA. Geographical Analysis 27 (2), 93-115.

Arias, R., and L. Sánchez. 2012. "Patrones de localización, concentración y evolución del empleo industrial en la Gran Área Metropolitana (GAM) de Costa Rica." *Revista de Ciencias Económicas 30* (2): 131–154.

Arias, R., L. Sánchez, and R. y Sánchez. 2013. "Análisis de la desigualdad socioeconómica en Costa Rica." *Economía y Sociedad* 39–40: 73–107.

Arroyo-González, L. 2018. "Riesgos de desastres en áreas periurbanas en la Gran Área Metropolitana, consideraciones pasadas y recientes: orientaciones y alcances reales de la gestión del riesgo y el ordenamiento territorial, cantones de Aserrí, Alajuelita, Desamparados, Escazú, Santa Ana y Mora." *Revista Geográfica De América Central* 1 (60): 231–254. https://doi.org/10.15359/rgac.60-1.8

Berti Lungo, C. G., and C. E. Ferrufino Martínez. 2009. *Ordenamiento territorial en Centroamérica y República Dominicana: insumos para la construcción de una agenda regional*. San Salvador: Conferencia Centroamericana por la Descentralización del Estado y el Desarrollo Local; Fundación Nacional para el Desarrollo.

Blanco, A., V. Fretes, and A. Muñoz. 2014. *Se busca vivienda en alquiler. Opciones de política en América Latina y el Caribe*. Washington DC: Banco Interamericano de Desarrollo.

Brenes, C. S. Campos, and K. Loaiza. 2021. *Regionalización de la matriz insumo-producto costarricense*. Documento de trabajo No 1. San José, Costa Rica: Banco Central.

Brueckner, J. K. 1987. "The Structure of Urban Equilibria: A Unified Treatment of the Muth-Mills Model." In *Handbook of Regional and Urban Economics*, volume 2, edited by E. S. Mills, 821–845. Amsterdam: North-Holland.

Carvajal, G. and J. Vargas. 1987. "El surgimiento de un espacio urbano – metropolitano en el Valle Central de Costa Rica: 1950 – 1980." *Anuario de Estudios Centroamericanos* 13 (1): 71–94.

Calatayud, A., S. S. González, F. Bedoya-Maya, F. Giraldez, and J. M. Márquez. 2021. *Congestión urbana en América Latina y el Caribe: características, costos y mitigación*. IDB-MG-902. Washington DC: Banco Interamericano de Desarrollo.

Calvo-Brenes, G., and J. Mora-Molina. 2007. Evaluación y clasificación preliminar de la calidad de agua de la cuenca del río Tárcoles y el Reventazón Parte III: Calidad de cuerpos receptores de agua, según el Sistema Holandés de Valoración. *Revista Tecnología En Marcha* 20 (4). Recuperado a partir de https://181.193.125.13/index.php/tec_marcha/article/view/452

Cioc, M. 2002. *The Rhine: An Eco-biography, 1815-2000*. Weyerhaeuser Environmental Books. Seattle, WA: University of Washington Press.

Credit, K. 2018. "Transit-oriented economic development: The impact of light rail on new business starts in the Phoenix, AZ Region, USA." *Urban Studies* 55 (13): 2838–2862.

Dijkstra, L., H. Poelman, and P. Veneri. 2019. "The EU-OECD definition of a functional urban area." OECD Regional Development Working Papers, No. 2019/11. OECD Publishing, París https://doi.org/10.1787/d58cb34d-en.

CHAPTER 2

A Territorial Approach to the South Corridor

Authors

Eduardo Pérez Molina, Alonso Brenes Torres, and Leonardo Sánchez Hernández

Introduction

For 40 years, the South Corridor, which comprises the cantons of Alajuelita, Aserrí, and Desamparados, was marked by significant concentrations of poverty and a weak local economy. While diverse, the South Corridor cantons share two challenges: relative isolation from the rest of San José, despite their territorial proximity, and significant concentrations of poverty in their territories. This resulted in very weak local economies, requiring workers to commute elsewhere in the region daily to access quality services and job opportunities. The South Corridor's urban growth largely involves the lower-income population. In addition, these cantons experience negative externalities, due to lack of investment and the consequences of the spatial concentration of poverty.

The South Corridor's population growth has not always been accompanied by sufficient public investment. Historically, the South Corridor's population has grown faster than the Greater Metropolitan Area (*Gran Area Metropolitana,* GAM). And while the recent expansion of secondary education improved access to educational infrastructure, a deficit in health facilities and quality service persists. The principal exception is public investment in social housing. But this was partially counterproductive because the concentration of housing supply for low-income families in the area contributes to clustering and segregating this population. Social housing in the GAM stems from successive government administrations' formalization of informal settlements over the past 30 years (see also Chapter 1).

Priorities for the South Corridor include investments in affordable housing, transportation, and public infrastructure. Specifically, it is important to (a) incentivize the housing sector to expand affordable housing options for the most vulnerable populations in the South Corridor and the GAM; (b) diversify the type and location of social housing toward denser and more diverse developments in the South Corridor and the rest of the GAM, reducing the high territorial concentration of social housing; and (c) strengthen rental housing options for all GAM residents. Furthermore, it is critical to improve connections between the cantonal centers of Alajuelita, Aserrí, and Desamparados and downtown San José, both by road and public

transportation. Finally, it is necessary to address the shortage of health centers and improve the quality of health and education services.

This chapter makes use of statistical and geographic analyses, supported by literature, to describe the processes of population and urban growth, the local economy, and the need for public investments in the South Corridor. The results first provide a historical-geographical background of the South Corridor, to then elaborate on the demographic trends in these cantons within the context of the GAM. Subsequently, it zeroes in on the local economy and describes the relationship of the South Corridor's economies with other cantons, which, like the rest of the GAM, are clustered in San José and Alajuela. Finally, the manifestations of poverty in housing and public services are discussed.

I. Population Growth in the South Corridor Exceeds the National and GAM Average Rates

A. The South Corridor cantons are characterized by densely populated areas, as well as large swaths of uninhabited rural areas

The South Corridor cantons—Desamparados, Aserrí and Alajuelita—are part of the southern periphery of the San José Metropolitan Area (AMSJ). Originally, the South Corridor cantons used to be rural population centers that, through rapid urbanization processes, were incorporated into the AMSJ.[34] Furthermore, during the 1980 economic crisis, a large portion of the South Corridor cantons were subject to squatting by homeless families (Rovira 1985; Valverde and Trejos 1993). Eventually, these land occupations were formalized by the Costa Rican state. The extent of this squatting was so significant that the Costa Rican social housing system was engineered around the formalization of these informal occupations of lands largely owned by the state (Gutiérrez et al. 1993).

Aserrí and Desamparados cover large but sparsely populated territories outside of the GAM. Both Desamparados and Aserrí include large mountain areas that divide the GAM from the Pacific Coast of Costa Rica (Figure 1). Specifically, three districts of Desamparados

FIGURE 1. The GAM's South Corridor is situated in a complex geographic context

FIGURE 1a. South Corridor cantons compared to the GAM

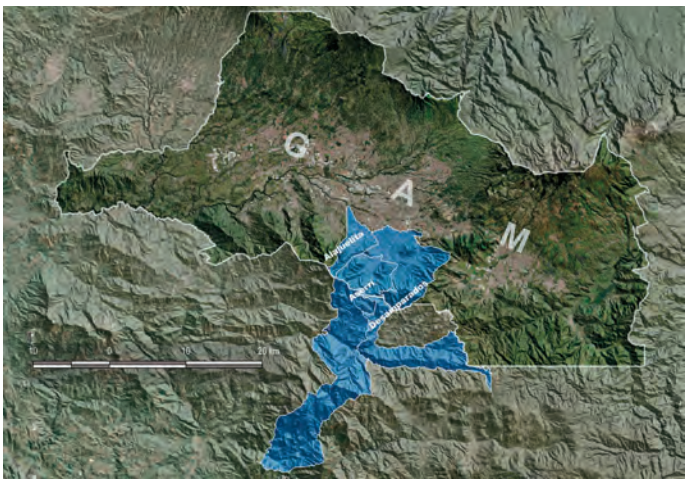
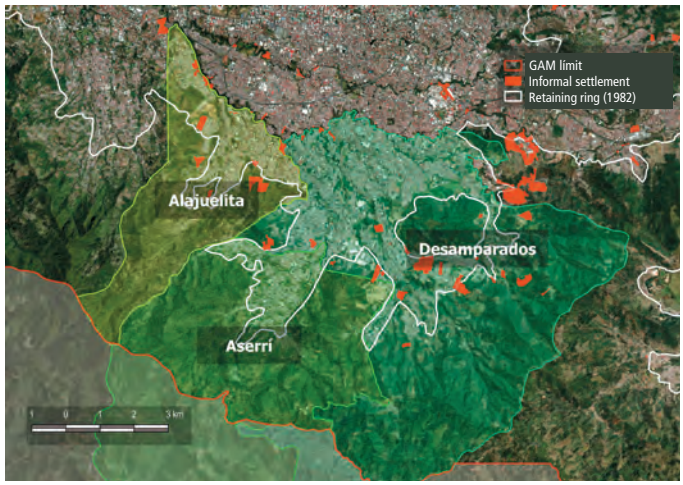


FIGURE 1b. South Corridor canton sections belonging to the GAM



Source: Sistema Nacional de Información Territorial (https://www.snitcr.go.cr/) and National Institute of Housing and Urbanism - INVU 1983.

34 Some cantons are very ancient. Aserrí, for example, dates back to the Spanish Conquista period.

(Frailes, Rosario, and San Cristóbal) lie outside of the GAM boundaries. Based on the 2011 census, these three districts account for 5.2 percent of the canton's population. In Aserrí, only two of the seven districts (Aserrí and Salitrillos) are located inside the GAM, but their population is 72.3 percent of the cantonal population. The analysis under this section considers only the population living within the GAM.

B. Population dynamics in the South Corridor

For the past 50 years, the South Corridor's population has grown much more rapidly than that of the GAM at large. In 1963, this area had a population of 48,713 (7.5 percent of the GAM), which doubled to 104,753 in 1973—accounting for 11 percent of the GAM's total population. In terms of annual growth rates, the 1960s saw the fastest growth in the South Corridor, standing at 8 percent annually between 1963 and 1973, twice as much as the rates reported by the GAM (3.9 percent) and the country (3.5 percent) in the same period. Desamparados (8.6 percent), Alajuelita (7.6 percent), and Aserrí (7.0 percent) showed similar growth rates. In 1963, the total population density in the South Corridor was 1.4 times the GAM average and 18.9 times the national average. Alajuelita has been the most densely populated, followed by Desamparados. In the case of Aserrí, density has always been below the GAM average, because of its partially rural nature (Table 1).

The South Corridor's growth rate is a result of its functional dependence on the rest of the GAM in terms of jobs and services. The GAM has run out of developable land in the initial expansion zones of the canton of San José, in San Pedro de Montes de Oca, and Guadalupe de Goicoechea, as well as in Tibás and the districts at the west of the canton of San José (Mata Redonda and Pavas). This has caused urban sprawl to occur in specific areas within the GAM, including the South Corridor cantons. Moreover, the construction of radial highways linking the South Corridor cantons with the rest of the GAM stimulated the spread of the population to this area by facilitating access to services and job opportunities offered by other cantons in the GAM. These radial roads were accompanied by large-scale investments in urban infrastructure, such as electrification and aqueducts.

The economic downturn in the 1980s slowed urban growth throughout the country, the GAM, and the South Corridor. By the 1970s and mid-1980s (1973–1984), the relative population growth rate in the South Corridor slowed to 3.7 percent, although it remained higher than the GAM average (2.8 percent) and the national average (2.4 percent). This decline was more pronounced in the cantons of Alajuelita (2.9 percent) and Desamparados (3.8 percent). The annual growth rate in Aserrí stayed over 5 percent.

However, total density rose within the South Corridor. Density went from 947 inhabitants per km^2 in 1973 to 1,416 in 1984, which is 2.2 times the average density of the GAM and 21 times the national average (Table 1). One of the main manifestations of the crisis was the real estate standstill and the accruing housing shortage, causing a shortfall of tens of thousands of housing units by the mid-1980s.[35] Accordingly, the new population was forced to settle in areas with higher densities, creating overcrowded households.

Between 1985 and 1993, large informal settlements emerged in the GAM. To address housing informality, the government instituted a social housing program which led to the relocation of a large part of the GAM's population to the regional periphery (where land prices are cheaper), especially to the South Corridor cantons. In the 1980s and 1990s (1984–2000), the annual population growth rate in the South Corridor was even higher than in the previous decade, reaching an annual growth rate of 4 percent, higher in comparison with the GAM (3 percent) or the national average (2.9 percent).

C. The South Corridor has been experiencing rapid population and urban growth trends for decades

Within the South Corridor, population growth in the 1980s and 1990s took place largely in the canton of Alajuelita, rising from 31,390 to 70,297 inhabitants (an average annual rate of

35 Note that the 1984 census was carried out the year before the housing crisis broke out, with squatting and formalization of squatters.
On the extent of the deficit and its relationship with the financial system, see Gutiérrez et al. (1993); the economic crisis was described by Rovira (1985); Valverde and Trejos (1993) describe the sociological dynamics of social movements, which were one of the main explanations for internal migration across the region in 1985–1993.

5.2 percent). This is partly explained by the state's housing investment, which in turn followed large squatting events organized around 1985, especially in the districts of San Felipe de Alajuelita and Los Guido-Patarrá de Desamparados, where previous squatting events were formalized (Pujol, Pérez, and Sánchez 2014).

In this period, the total population density in the South Corridor rose in comparison with previous decades, standing at 2,633 people per km² (in the year 2000)—2.6 times the GAM average and 28 times the national average. These figures are high in the Costa Rican context but not necessarily in the Latin American context. For example, Lima, Peru had an average density of 3,697 people per km² by 2020, which is ten times higher in certain districts such as Surquillo or Breña. Within the South Corridor, in 2000, Alajuelita was the canton with the highest density (3,272 persons per km²), followed by Desamparados (3,086 persons per km²) and, averaging half these values and similar to the GAM, Aserrí (1,186 persons per km²).

During the first decade of the 21st century, the population growth rate in the South Corridor dropped considerably because of the unavailability of land for new urban developments. During the 2000–2011 intercensal period, the growth rate was less than 1 percent annually (0.8 percent). This is explained by the low growth in the cantons of Alajuelita (0.9 percent) and Desamparados (0.7 percent). These values are on par with the GAM average (0.8 percent) and lower than the national average (1.1 percent). Density for the 2000–2011 period increased on par with the GAM and stood at 2,886 people per km², which is 2.6 times the GAM average value and 32 times the national average.

In the long term, the South Corridor population is expected to remain stable. The Instituto Nacional de Estadísticas y Censos - INEC's population projections for the next 30 years (2021–2050) reflect the demographic transition that the country has been experiencing. Declines in fertility and birth rates, increase in life expectancy, and relatively constant net migration flows are expected to lead to very low population growth in the coming years. The total projected growth for the South Corridor cantons is only 13,471 persons (see Table 1).

Population stabilization represents an opportunity to improve the living conditions of the South Corridor's residents. Population growth in the South Corridor has been associated with increased demand for public services. A slowdown in population growth and the future stabilization of the population could free up resources to increase investments in urban services and infrastructure. However, this will require adjustments to municipal revenue mechanisms: much of the investment and financing in Costa Rica's municipalities is associated with population growth (such as taxes on construction, see Chapter 4). Therefore, it will be important, especially for the South Corridor, to review the public financing strategy and objectives in light of future demographic dynamics (for example, see Box 1).

TABLE 1. The South Corridor's population growth and densification rates have outpaced the GAM's and the country's rates

	Period						
Zone	**1963**	**1973**	**1984**	**2000**	**2011**	**2021**	**2050**
Population							
Desamparados	29,750	68,096	102,310	183,904	197,646	283,043	265,881
Aserrí	5,920	11,653	20,968	34,992	41,867	45,913	48,933
Alajuelita	11,080	23,013	31,390	70,297	77,603	95,868	123,481
South Corridor	46,750	102,762	154,668	289,193	317,116	424,824	438,295
GAM	653,840	955,718	1,288,082	2,067,475	2,268,248	2,644,0843	2,974,799
Costa Rica	1,326,930	1,871,780	2,416,809	3,810,179	4,301,712	5,213,362	6,093,012
South Corridor/GAM	0.072	0.108	0.120	0.140	0.140	0.016	0.147
South Corridor/Costa Rica	0.035	0.055	0.064	0.076	0.074	0.081	0.072

Continues >

TABLE 1. The South Corridor's population growth and densification rates have outpaced the GAM's and the country's rates (continued)

	Period						
Zone	**1963**	**1973**	**1984**	**2000**	**2011**	**2021**	**2050**
Gross Density							
Desamparados	499.3	1,142.9	1,717.2	3,086.7	3,317.3	3,995.4	4,462.6
Aserrí	200.7	395.0	710.8	1,186.2	1,419.2	1,556.4	1,658.7
Alajuelita	515.8	1,071.4	1,461.4	3,272.7	3,612.8	4,463.1	5,748.6
South Corridor	440.6	947.3	1,416.9	2,633.8	2,886.5	3,453.7	3,982.9
GAM	319.9	467.6	630.2	1,011.5	1,109.7	1,293.6	1,455.4
Costa Rica	26.0	36.6	47.3	74,6	84.2	102.0	119.2
South Corridor/GAM	1.4	2.0	2.2	2,6	2.6	2.7	2.7
South Corridor/Costa Rica	16.9	25.9	30.0	35,3	34.3	33.9	33.4
Inter-annual population growth rate							
		1963–1973	**1973–1984**	**1984–2000**	**2000–2011**	**2011–2021**	**2021–2050**
Desamparados		8.6	3.8	3.7	0.7	1.7	0.4
Aserrí		7.0	5.5	3.3	1.6	0.8	0.2
Alajuelita		7.6	2.9	5.2	0.9	1.9	0.9
South Corridor		8.0	3.7	4.0	0.8	1.6	0.5
GAM		3.9	2.8	3.0	0.8	1.4	0.4
Costa Rica		3.5	2.4	2.9	1.1	1.8	0.5

Source: National Population Census, 1963–2011 (INEC 1963–2011).

II. The Local Economy of the South Corridor

A. The local economy in the South Corridor is dominated by small businesses

Tertiary economic activities account for the highest-value output in the South Corridor cantons. The top ten economic activities in the South Corridor are all tertiary. Out of the total, some are more clearly associated with consumption by the local population or businesses, such as commerce, freight transportation, real estate, and financial services. Others include professional and technical activities, partly associated with servicing foreign capital. When examining South Corridor cantons' outputs and inputs (the three most important ones are listed in Table 2), overall, they appear more concentrated in the first group than in the second, suggesting local economies that, while important, are also typical of primarily residential locations (see Chapter I).

TABLE 2. Commercial activity and some services (finance, real estate) are the most important business sectors in the South Corridor

	Spatial Unit		
	Desamparados	Aserrí	Alajuelita
Total inputs (USD, millions)	486.8	44.6	40.5
% with respect to Costa Rica	1.76	0.16	0.15
Principal activities (inputs)*	Wholesale and retail trade (10.7%)	Hairdressing and other beauty parlor activities (18.9%)	Wholesale and retail trade (11.3%)
	Central banking activities (4.0%)	Advertising and market research activities (10.1%)	Human health care and social work activities (5.0%)
	House rental and other services (3.8%)	Wholesale and retail trade (8.3%)	House rental and other services (3.8%)
Total outputs (USD, millions)	1134.4	159.6	223.3
% with respect to Costa Rica	4.11	0.58	0.81
Principal activities (outputs)*	House rental and other services (13.7%)	Machinery and equipment maintenance, repair, and installation (18.7%)	House rental and other services (13.9%)
	Wholesale and retail trade (11.3%)	Central banking activities (12.7%)	Central banking activities (10.4%)
	Central banking activities (9.6%)	Wholesale and retail trade (9.5%)	Wholesale and retail trade (9.7%)

Continues >

TABLE 2. Commercial activity and some services (finance, real estate) are the most important business sectors in the South Corridor (continued)

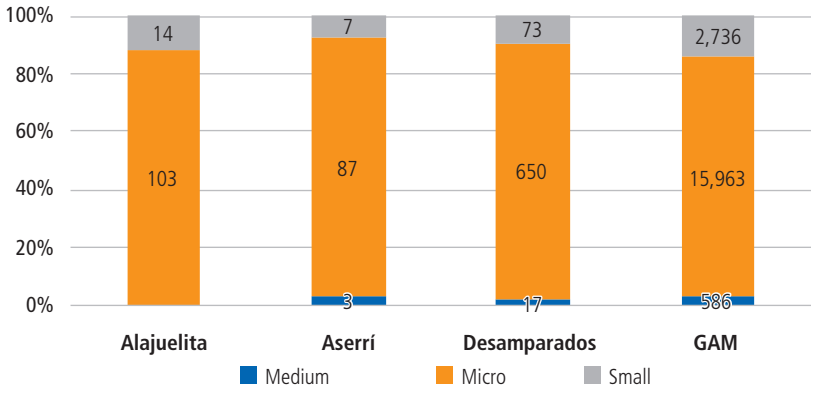
	Spatial Unit	
	GAM	Costa Rica
Total inputs (USD, millions)	20,520.70	27,610.50
% with respect to Costa Rica	74.32	100.00
Principal activities (inputs)*	Wholesale and retail trade (9.5%)	Wholesale and retail trade (9.1%)
	Machinery and equipment maintenance, repair, and installation (4.8%)	Construction of residential buildings (4.6%)
	House rental and other services (4.0%)	Food and drink services (3.9%)
Total outputs (USD, millions)	20,094.80	27,610.50
% with respect to Costa Rica	72.78	100.00
Principal activities (outputs)*	Wholesale and retail trade (10.5%)	Wholesale and retail trade (9.6%)
	Central banking activities (6.3%)	House rental and other services (6.0%)
	House rental and other services (6,1%)	Central banking activities (5,3%)

Source: BCCR 2020.

The South Corridor has local economies with fewer production linkages. This is due to the dependence on local services that require minimal inputs, undermining the opportunity for production linkages. The contrast between the South Corridor cantons and the overall region is, however, striking: in the GAM, sales (total outputs) and purchases (inputs) across the region are approximately similar; while in all South Corridor cantons, the aggregate of outputs oscillates between two and five and a half times the aggregate of inputs.

Overall, South Corridor enterprises are smaller than those based in the GAM. Although the differences are relatively small, it is noticeable that the GAM has a larger share of SMEs than Desamparados and Alajuelita (see Figure 2). These cantons also have a lower share of microenterprises than Aserrí. Note that although the differences in terms of the number of enterprises may seem slight, they are not marginal. The definition of SMEs in Costa Rica depends on the number of employees, assets, and annual sales of each business, and may imply different magnitudes in terms of annual production. This means that a few medium-size enterprises may account for much more productive activity than many micro or small enterprises.

FIGURE 2. South Corridor enterprises are smaller than those based in the GAM



Source: Ministry of Economy, Industry, and Commerce (MEIC) 2021.[36]

Note: The figure shows the number of businesses registered as small and medium enterprises (SMEs) in September 2021. Labels indicate the total number of enterprises in each category.

36 MEIC, September 2021. https://www.meic.go.cr/meic/web/761/datos-abiertos/pyme/registro-de-empresas.php

The South Corridor economy, like the rest of the GAM and the country, is strongly tied to the cantons of San José and Alajuela. This confirms the findings mentioned in Chapter 1 on the concentration of activity and importance of certain cantons in the GAM. The canton of San José is the primary source of inputs for production in the South Corridor, followed by the canton of Alajuela. Collectively, they account for about 60 percent of the input production value for the South Corridor. Table 3, which disaggregates production by the origin of inputs, confirms the total dominance not only of GAM within the national economy but also of the canton of San José (and to a lesser extent, Alajuela) within the national, GAM, and South Corridor economies. About half of the production inputs of Desamparados, Aserrí, and Alajuelita come from San José and about 10 percent from Alajuela.

The South Corridor is home to 14.1 percent of the GAM's population; however, it accounts for only 7.4 percent of the GAM's workers (2011 Census). Based on the 2011 Census, the South Corridor's workforce is concentrated in the tertiary or service sector and wholesale and retail trade (75 percent), and about 20 percent in the secondary or manufacturing sector. Out of every 100 workers, 85 are employed by the private sector (Table 4), in both the South Corridor and GAM cantons. As seen, these figures are consistent with the characteristics of South Corridor output as described in the preceding section. The shares of private sector workers are relatively constant across cantons, so although the employer structure provides some resilience to the South Corridor cantons, it is not an advantage over other cantons in the region.

TABLE 3. Cantons of Alajuela and San José are the leading input suppliers for the South Corridor (2017)

	Spatial Unit									
	Desamparados		Aserrí		Alajuelita		GAM		Costa Rica	
Total outputs (US$, millions)		1,134.4		159.6		223.3		20,094.8		27,610.5
Primary input supplying cantons (%)*	San José	54.48	San José	50.44	San José	53.26	San José	48.75	San José	46.87
	Alajuela	11.48	Alajuela	11.69	Alajuela	11.19	Alajuela	12.88	Alajuela	13.14
	Limón	2.73	Heredia	3.49	Cañas	2.89	Limón	2.66	San Carlos	2.87
	Heredia	2.57	Corredores	3.30	Heredia	2.70	San Carlos	2.58	Limón	2.63

Source: Central Bank of Costa Rica - BCCR 2020.
Note: * Percentage of total output.

TABLE 4. South Corridor workers share similar economic activity to GAM workers, but they tend to work outside of the canton where they live.

	Percentage of the working population			Percentage of position in employment			Workplace		
Canton	Secondary Sector	Tertiary sector	Private sector	Employer	Self-employed	Salaried employee	In the same canton	In another canton	In several cantons
Costa Rica	18.0	68.2	84.7	6.6	20.6	71.8	63.8	33.0	3.0
San José	18.9	80.4	84.9	7.2	18.6	73.6	64.5	31.4	3.9
Escazú	16.8	80.7	91.0	12.7	18.6	67.9	54.0	42.3	3.0
Desamparados	19.6	78.2	84.6	5.7	20.2	73.6	41.8	52.0	6.0
Aserrí	19.0	73.8	83.1	5.5	20.1	73.7	40.6	54.4	4.8
Mora	16.2	75.6	83.8	8.1	18.3	72.9	45.3	51.0	3.4
Goicoechea	16.7	82.3	83.3	7.0	17.5	74.9	40.9	54.3	4.6
Santa Ana	17.8	79.2	90.8	11.8	16.9	70.5	55.4	40.8	3.2
Alajuelita	22.6	76.6	87.5	6.7	19.6	73.3	32.2	61.5	6.1

Continues >

TABLE 4. South Corridor workers share similar economic activity to GAM workers, but they tend to work outside of the canton where they live. (Continued)

	Percentage of the working population			Percentage of position in employment			Workplace		
Canton	Secondary Sector	Tertiary sector	Private sector	Employer	Self-employed	Salaried employee	In the same canton	In another canton	In several cantons
Coronado	16.2	81.7	82.0	6.8	17.5	75.0	38.6	56.8	4.4
Tibás	17.1	82.1	83.5	7.3	18.4	73.7	39.9	55.4	4.4
Moravia	16.1	82.1	83.1	7.9	18.6	72.9	36.8	57.8	5.1
Montes de Oca	12.4	86.5	80.0	9.3	16.5	73.5	46.4	49.6	3.6
Curridabat	17.5	81.2	85.6	10.0	17.9	71.3	40.7	53.8	5.0
Alajuela	26.9	67.4	88.2	6.1	16.8	46.5	64.9	32.1	2.8
Atenas	20.4	67.1	80.9	7.1	20.5	71.4	65.7	30.8	3.3
Poás	24.4	58.7	87.3	5.0	17.0	77.5	55.0	40.9	3.9
Cartago	23.3	66.5	83.5	6.1	20.0	73.3	62.6	33.7	3.6
Paraíso	23.3	60.6	82.3	5.2	19.0	75.2	55.2	41.1	3.6
La Unión	20.1	78.1	84.2	6.0	16.9	76.6	38.1	56.4	5.2
Alvarado	14.6	42.1	91.7	6.4	28.4	64.4	68.6	27.3	4.1
Oreamuno	20.4	59.6	86.3	5.3	20.5	73.7	50.2	45.4	4.2
El Guarco	28.7	59.1	86.9	6.1	22.9	70.0	56.1	39.6	4.1
Heredia	23.0	75.8	82.6	6.7	14.8	78.0	49.9	46.3	3.5
Barva	19.6	76.7	80.5	7.1	17.0	75.1	36.9	57.3	5.5
Santo Domingo	18.7	78.8	82.5	7.7	17.3	74.5	41.1	54.0	4.7
Santa Bárbara	24.5	69.6	85.8	6.4	17.4	75.7	37.4	56.9	5.5
San Rafael	21.6	75.9	82.0	7.1	17.8	74.6	37.2	57.2	5.4
San Isidro	18.1	77.2	81.7	6.9	17.7	74.7	38.4	57.0	4.5
Belén	26.0	71.3	90.4	10.5	13.5	75.0	51.8	45.8	2.1
Flores	24.0	74.0	83.3	8.9	14.8	75.7	37.2	59.0	3.6
San Pablo	17.7	81.0	77.6	7.5	14.8	77.3	26.4	69.3	3.9

Source: INEC 2011.

The vast majority of workers in the South Corridor are salaried employees. Estimates suggests that 74 percent of workers are salaried employees; 20 percent are self-employed and less than 6 percent are entrepreneurs (Table 4). These percentages are similar to other GAM cantons, except for rural cantons (which have lower percentages of wage earners and higher percentages of self-employed, such as Alvarado or El Guarco in Cartago) or the canton of Escazú, which concentrates wealth and has a higher share of employers.

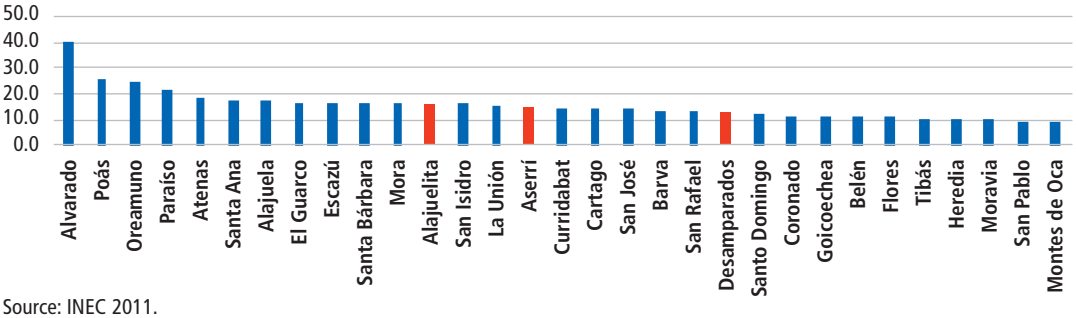
The South Corridor can be considered a *dormitory zone*—58 percent of the South Corridor's workforce works outside the canton, with the highest percentage found in Alajuelita, with 68 percent. These percentages are slightly higher than in other cantons of the AMSJ. In the cantons of San José, Escazú, and Santa Ana, this percentage ranges between 30 and 40 percent. The percentages in other cantons (such as Goicoechea, Montes de Oca, or Curridabat) are similar to Desamparados (58 percent) but lower than other cantons. When compared to the GAM, Alajuelita is the canton with the second-highest percentage of inhabitants working elsewhere.

One of the key challenges faced by the South Corridor is the high percentage of unskilled employment in its population—a common challenge shared by several of the GAM's cantons. Sixteen percent of employment in Alajuelita is unqualified; 15 percent in Aserrí, and 13 percent in Desamparados (Figure 3). This generates employment instability and low wages that

impact poverty and inequality levels. However, when compared to other cantons in the region, unskilled employment in the South Corridor is not particularly high. The issue is pressing for many cantons in the region and especially severe in the rural cantons of the GAM, such as Atenas, Paraíso, Oreamuno, Poás, and Alvarado.

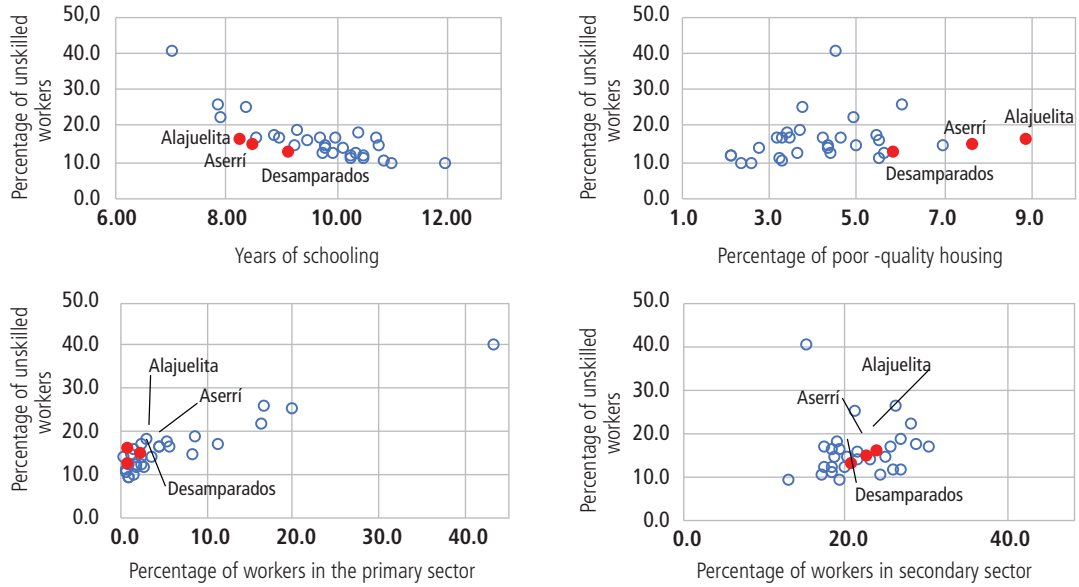
In the South Corridor and the GAM, the percentage of unskilled workers is correlated with poor-quality housing conditions. The percentage of unskilled workers, by canton, is correlated with low average years of schooling and poor housing conditions (Figure 4). For example, three of the top five cantons with the highest percentage of inadequate housing in the GAM are located in the South Corridor. The South Corridor cantons are among the poorest urban and rural cantons in the GAM with schooling averaging less than 9 years.[37] This relationship between the share of unskilled workers and inadequate housing demonstrates the effect of unskilled labor on household welfare. The South Corridor cantons have very small percentages of primary sector employment. Around 20 percent of jobs in the South Corridor are in the secondary sector, thus occupying the mid-range in the ratio of unskilled workers to secondary sector workers.

FIGURE 3. The percentage of workers in unskilled jobs in the South Corridor is not as large as in other rural cantons of the GAM



Source: INEC 2011.

FIGURE 4. The percentage of unskilled workers is correlated with average years of schooling, housing condition, and the percentage of workers in the primary or secondary economic sectors.



Source: INEC 2011.
Note: Percentage of unskilled employed workers by canton according to socioeconomic characteristics based on the 2011 census: years of schooling, housing in poor condition, and sector of work.

37 In Costa Rica, primary and secondary education total 11 years; 9 of these correspond to primary plus the lower secondary cycle. These 9 years are designated as basic general education and are compulsory.

III. High Incidence of Poverty and Unmet Basic Needs in the South Corridor

A. The incidence of poverty in the South Corridor is higher than in the region as a whole, and one of its consequences is heightened insecurity

The South Corridor cantons have some of the highest incidence of poverty and inequality in the GAM. The total number of poor households in the South Corridor is over 16,000, which accounts for 18 percent of the total number of poor households in the GAM and 6 percent of total households nationwide. As shown in Table 5, the South Corridor cantons have higher than median values for poverty and inequality percentages. Desamparados has lower poverty levels than Alajuelita and Aserrí, although inequality levels are similar.

Of the 31 cantons in the GAM, Alajuelita ranks fifth highest in poverty incidence and Aserrí sixth. One out of every five households in both Aserrí and Alajuelita is in poverty—the GAM cantonal median is just 13.6 percent. The twelfth place goes to Desamparados. In terms of inequality, the Gini coefficient for the three cantons is 0.46, surpassed only by the cantons of Oreamuno and Mora with 0.47 (refer to the discussion about inequality in Chapter 1).

The South Corridor has higher levels of insecurity than the GAM as a whole. In 2016, the three cantons of the South Corridor recorded 56 homicides (accounting for 17.9 percent of the GAM-wide total that year), 1,162 cocaine and crack busts (7.8 percent of the regional total), and 3,060 marijuana busts (7.2 percent of the regional total). The three South Corridor cantons had homicide rates in 2016 that were far higher than both the GAM cantonal median (corresponding to El Guarco canton, 6.7 homicides per 100,000 inhabitants) and the regional average (14.5 homicides per 100,000 inhabitants). The evidence on drug crackdowns is less clear, but the cocaine and crack seizure rates in Desamparados and Alajuelita are higher than the GAM cantonal median. As discussed in Chapter I, Costa Rica's insecurity

TABLE 5. Poverty and inequality in the South Corridor cantons are higher than the regional median and so is insecurity

	Percentage of poverty				Citizen insecurity		
Canton	Income line	Poverty for UBN	Extreme Poverty for UBN	Gini index	Marijuana seized	Cocaine and crack seized	Homicides
Desamparados	15.8	16.2	3.2	46.3	601.6	337.5	9.8
Aserrí	20.2	21.0	4.4	46.3	1,527.6	207.1	19.6
Alajuelita	20.5	21.2	6.3	46.1	789.6	268.1	23.6
GAM Median	13.6	14.2	3.1	45.8	1,028.3	238.8	6.7
(Canton falling at median)	San Rafael	Santa Ana	Goicoechea	San Rafael	Alvarado	Curridabat	El Guarco

Source: 2011 INEC poverty and inequality data; 2016 Costa Rican Drug Institute's drug seizure data; 2016 Judicial Investigation Department's homicide data.
Note: Poverty rates and Gini index as a percentage. Seizure and homicide rates per 100,000 inhabitants. UBN = Unmet Basic Need.

is highly concentrated geographically. Of the 33 key drug-and-violence-ridden districts, two (Los Guido in Desamparados and San Felipe de Alajuelita) are located in the South Corridor; other districts that contribute to a higher proportion of drug seizures in the South Corridor include the districts of Alajuelita, Desamparados, San Miguel, and San Rafael Abajo.

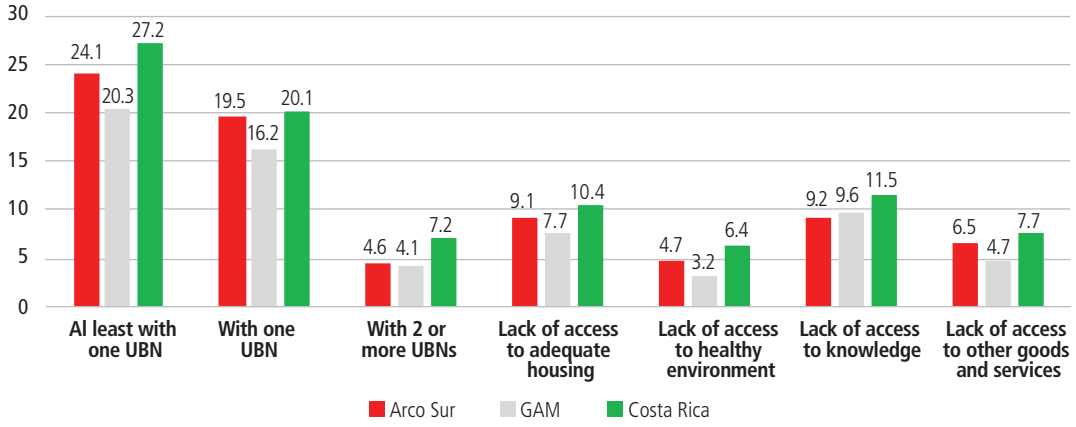
B. Unmet basic needs[38] in the South Corridor are higher than in the GAM, albeit lower than in the country overall

Population growth in the South Corridor has not been proportional to the provision of services, infrastructure, and employment generation, leading to deteriorating socioeconomic indicators in this area. As illustrated in Figure 5, the share of households with UBNs[39] is generally higher in the South Corridor than the GAM average, albeit lower than the national average. As mentioned in Chapter 1, it is noteworthy that national economic activity is highly concentrated in the GAM; this greater prosperity is reflected in overall better urban infrastructure than in the rest of the country.

The UBNs reflect low-income households' lack of access to infrastructure or public services. UBN indicators are used to measure and characterize the poverty of Costa Rican households and are directly related to the provision of infrastructure and public services nationwide. In Costa Rica, the state is responsible for supplying these minimum services for households living in poverty and, in general, for the majority of the Costa Rican population (with the exception of housing, for which the government only focuses on the low-income population). First, in terms of access to decent housing, the state supplies social housing to lower-income households. Second, for access to a healthy lifestyle, the Costa Rican state is entirely responsible for public water and sanitation infrastructure. Finally, the government is responsible for education, with over 90 percent of primary and secondary enrollment in public schools.

In the South Corridor, 9.1 percent of households lack adequate housing. More people live in inadequate homes in the South Corridor compared to the GAM as a whole, where 'only' 7.7 percent live in inadequate homes. (Figure 5). The deficiencies in this indicator are related, in part, to

FIGURE 5. South Corridor enterprises are smaller than those based in the GAM



Source: Ministry of Economy, Industry, and Commerce (MEIC) 2021.[36]
Note: The figure shows the number of businesses registered as small and medium enterprises (SMEs) in September 2021. Labels indicate the total number of enterprises in each category.

38 The indicators of UBNs were defined by Méndez and Trejos (2004) as a method for identifying critical needs based on census information. They are four: (a) shelter, which identifies substandard dwellings (built with inferior or scrap materials, no electricity, or with overcrowding); (b) health, which measures access to safe drinking water or sanitation; (c) knowledge, which measures the educational attendance and achievement (progress) of children under 17 years of age in the household; and (d) consumption, which considers education, age and environment (urban/rural) of the adults contributing income to the household—because these variables correlate with household income, measured through household surveys (Méndez and Trejos 2004).
39 Refer to Section III, Chapter 1 (specifically footnote 22), as well as to Méndez and Trejos (2004) for the definition of UBN indicators.

the concentration of social housing in the South Corridor. Although housing may have originally been of high quality, housing maintenance is a widespread challenge in Costa Rica. As described in Chapter 1, housing subsidies in Costa Rica are one-time grants rather than subsidized credit or conditional transfers. This encourages already 'formalized' housing to slip back into informality because the maintenance cost, particularly to keep it in good physical condition, exceeds the means of families (Galiani and Schargrodsky 2011). Today, much of the social housing stock is between two and three decades old and maintenance issues have already piled up.

About 4.7 percent of households in the South Corridor lack access to safe water and sanitation services ('healthy environment'), more than the GAM average. The vast majority of households in the South Corridor and the wider GAM have access to safe drinking water and waste disposal systems that protect them from disease.[40] In general, this indicator tends to have smaller incidences than other UBN indicators because access to drinking water in Costa Rica is provided by a state-owned company (the Costa Rican Institute of Aqueducts and Sewerage [AYA]), which delivers the service directly or supports municipal or rural waterworks. This same institution is entrusted with providing access to sanitation. The successful implementation of this scheme translates into generalized, though not universal, coverage of access to piped water. Based on the 2011 census, 93.0 percent of occupied dwellings have running water, a figure that rises to 98.4 percent when only urban dwellings are considered.

As discussed in Chapter 1, access to sanitation infrastructure in Costa Rica, including the South Corridor, is poor. The UBNs related to a healthy environment are low because the septic tank has been considered an appropriate sanitation technology for households across the board. However, this condition may not be adequate for many households in Costa Rica, especially in the South Corridor, given its population density characteristics.

Formal education enrollment and educational attainment of South Corridor youth are lower than in the GAM and the country as a whole, as evidenced by the incidence of the UBN for lack of access to knowledge (Figure 5). This incidence is 9.2 percent in the South Corridor, which means that children and youth ages 7 to 17 are mostly in school and, on average, with little time lag between their age and the normal grade level expected for their age group. This figure is slightly lower than the incidence in the GAM (9.6 percent) and lower than the national incidence (11.8 percent, see Figure 5). Given the historical characteristics of Costa Rican education (the universalization of primary education and the still-existing challenges of secondary education coverage), it is to be expected that the UBN related to the lack of access to education would concentrate on older youth.

The incidence of UBNs in terms of consumption capacity is 6.5 percent in the South Corridor: higher than the GAM average but lower than the national average (see Figure 5). This result is consistent with both the characteristics of the workforce and the various indicators of poverty, inequality, and their consequences. In general, South Corridor households have more unskilled members, implying that their chances of making a personal income are limited. However, as it is part of the largest urban economy of the country (the GAM), a higher degree of human capital (that is, education in the labor force) with respect to the national average is to be expected and is part of the advantages that poor households in urban areas like the South Corridor can expect in contrast with rural areas of Costa Rica.

C. The South Corridor struggles with access to health care, higher education, and childcare services

Day care coverage is low in the South Corridor, representing an obstacle to women's integration into the labor market. The share of children under 5 attending day care, nursery, or prekindergarten stands at 11 percent in Alajuelita, 12 percent in Aserrí, and 14 percent in Desamparados, while

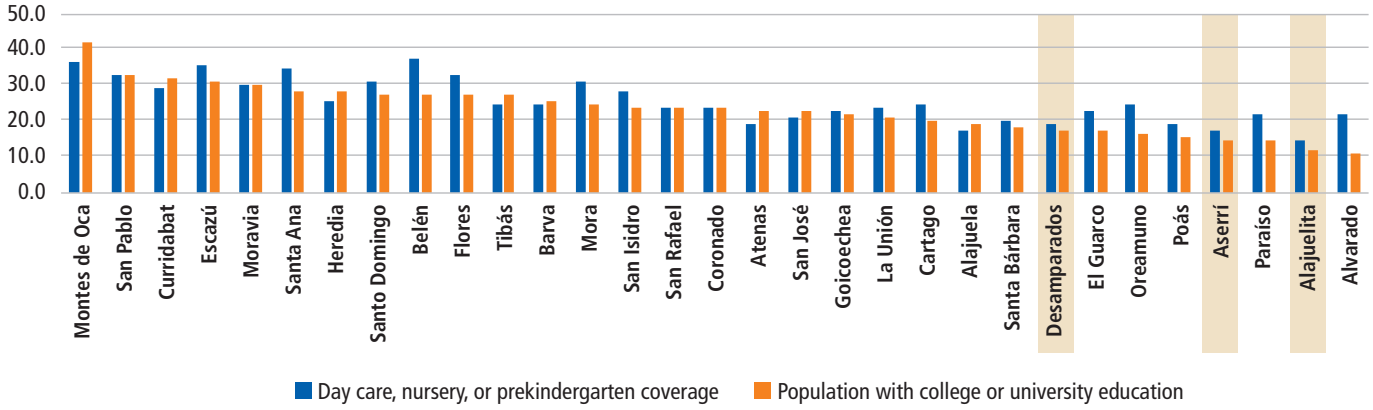
40 The public health nature of the indicator should be emphasized: septic tanks are among the wastewater treatment systems considered acceptable under the indicator but may cause groundwater contamination under certain physical and urban environment conditions.

the GAM average exceeds 19 percent (Figure 6). The Costa Rican state has endeavored to expand the early childhood development systems in the last decade, but the gap in the South Corridor versus the GAM is predictably widening. This poses a barrier primarily to the labor market incorporation of women.[41]

The share of the population in the South Corridor age 17 years and older who have a tertiary education is low (see Figure 6). In Alajuelita it was 11 percent, 12 percent in Aserrí, and 14 percent in Desamparados, placing them among the eight cantons in the GAM with the lowest percentage. The average value for the GAM is around 30 percent, while 10 cantons have a percentage between 30 percent and 40 percent, and five cantons have percentages over 40 percent. This deficiency is consistent with the poverty characteristics of the South Corridor and the UBNs related to consumption.

The primary health care coverage of the Comprehensive Multidisciplinary Primary Health Care Teams (*Equipos Básico de Atención en Salud*, EBAIS) is inadequate in the South Corridor.[42] The South Corridor's population as of 2021 was 379,824 people, relative to 69 EBAISs registered. One EBAIS is considered to have an optimal level of coverage of 4,500 inhabitants, so there is a shortfall of at least 16 EBAISs in the South Corridor, distributed equally between Desamparados and Alajuelita. In Aserrí, the current population may be covered by the EBAIS located within this canton. The service gap within the GAM is notorious and is present to a greater or lesser extent in 80 percent of the cantons (Figure 7). On the other hand, both the cantons of the South Corridor and the GAM generally benefit from the concentration of secondary and tertiary level hospitals (higher specialization), which take care of more complex problems, in the neighboring canton of San José.

FIGURE 6. South Corridor cantons rank among the lowest in day care coverage and population with a college education

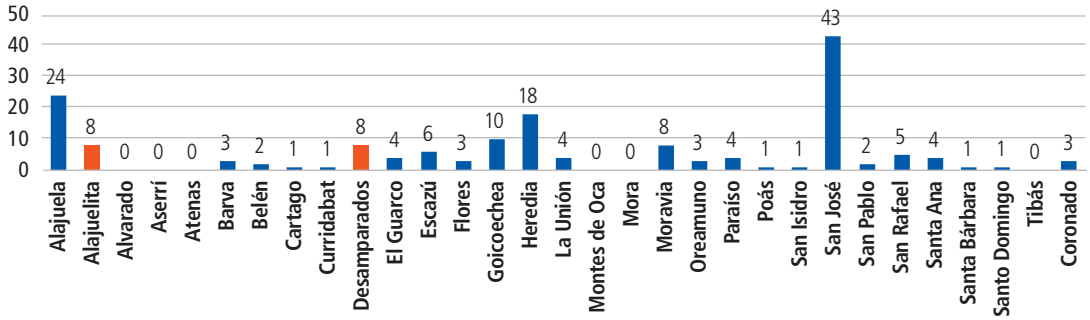


Source: INEC 2011.

41 This problem is severe all over Latin America, where female labor force participation rates are low in many countries: in the case of Central American countries, including Costa Rica and Mexico, the rate stood at around 50 percent in 2015; in contrast, this percentage was 65 percent or higher in Uruguay and Brazil, 60 percent in Colombia and Trinidad and Tobago, and 55 percent in Chile (Mateo and Rodríguez-Chamussy 2017). A significant correlation of this labor force participation rate with the percentage of children age 0-3 years who attended childcare centers has also been found: in Central America and Mexico, this share was less than 10 percent; 20 percent in Trinidad and Tobago; 30 percent for Colombia; 35 percent for Chile; and 50 percent for Uruguay (for Brazil, atypically, this share was 25 percent). See Figure 4. 3 in Mateo and Rodriguez-Chamussy (2017).

42 Primary health care in Costa Rica is provided by the EBAIS. The role played by the primary health care infrastructure has a significant impact on the improvement of the living conditions of the population. An EBAIS entails the assignment of a primary health care team to a geographical sector whose population is around 4,500 inhabitants, defined by demographic criteria, means of communication and accessibility, number and type of available human resources, allocation of resources as needed, use of lower-cost infrastructure, cost-benefit, and economies of scale. Their objective is the actual improvement in gaining access to health care services, with a bio-psycho-social approach to the health-disease process, providing comprehensive and continuous care for the health of persons and the environment, with emphasis on promotion and prevention, based on the Primary Health Care strategy. Services and activities include general medical consultations, educational lectures, vaccinations, home visits, and programs for children, adolescents, women, and the elderly.

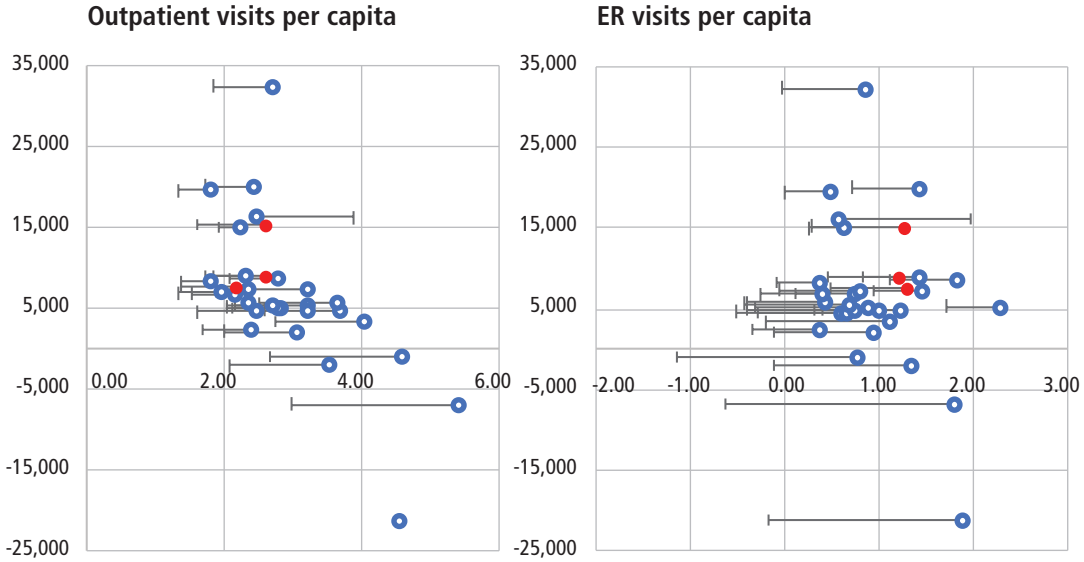
FIGURE 7. More EBAISs are required in Alajuelita and Desamparados to meet their primary health care needs



Source: Estimated based on INEC (2021) and on Contraloría General de la República (2015).

The population growth from 2000 to 2011, accompanied by public underinvestment, seems to have hurt health services along the South Corridor. Overall, the GAM saw per capita outpatient and ER visits rise, including in the South Corridor cantons (Figure 8). This is probably associated with the absence of investment in health care services in Costa Rica, especially in primary health care. Indeed, as discussed, EBAIS coverage in the South Corridor in 2011 was inadequate.

FIGURE 8. Population growth between 2000 and 2011 is associated with increasing demands per capita for health services in the GAM and the South Corridor



Source: Caja Costaricense del Seguro Social (2021)
Note: On the vertical axis, population growth between 2000 and 2011; the circles indicate medical visits in 2011; dashes, in 2000.

IV. Weak Planning, Underinvestment in Infrastructure, and Concentration of Social Housing are the Main Challenges in the South Corridor

A. The absence of regulatory land-use plans and the presence of buildings in hazardous areas create risk scenarios in the South Corridor

Municipal planning instruments for the South Corridor cantons, particularly regulatory land-use plans, are outdated or nonexistent. Currently, only the canton of Desamparados in the South Corridor has a regulatory plan, but it is outdated. Alajuelita and Aserrí are in the process of defining their municipal land-use regulations (see detailed information on these processes in this Chapter). Although it is a time-consuming approval process, it is expected that land-use management—particularly concerning the risks of extreme events—will improve in the long run once these municipalities have appropriate and updated regulatory tools in place.

The South Corridor is one of the areas with the highest number of active landslides, surveilled and monitored by the National Commission for Risk Prevention and Emergency Attention (*Comision Nacional de Emergencia*, CNE) and local authorities in the GAM. Areas remain that are prone to landslides in the communities of San Miguel, near cerro Tablazo, in Desamparados; San Antonio district, in Alajuelita, near cerro Cascabela; and in Aserrí, in the central district and Vuelta de Jorco. Although authorities enforce reallocations periodically in the high-risk areas, informal settlements are often built back. Additionally, the actions implemented by the municipalities of the South Corridor oriented to climate change adaptation and mitigation show little relation with planning normatives in the medium and long term. In this regard, the National Comptroller Office recommended better coordination and alliances with other municipalities within the area, such as Escazú and Santa Ana, to exchange good practices and lessons that can be replicated.

Between 2005 and 2011,[43] Desamparados was the canton with the highest recurrence of flood events. During this period, Desamparados experienced 22 flood events during each rainy season, due to its vulnerability, resulting in losses exceeding US$10 million (US$30.61 million); similar events affected cantons such as Pérez Zeledón and Acosta (adjacent to Desamparados and Aserrí). An analysis of the disaster risk prevention measures adopted by the municipality of Desamparados (2013) indicates that despite the existence of a regulatory land-use plan and the consideration of natural hazards and special control zones, the plan does not prevent construction in all risky areas or require mitigation measures in all cases; in some cases, building permits are granted solely on the basis of compliance with seismic and foundations codes.

43 Based on Estado de la Nación report (2013).

Both informal (precarious) and formal settlements are exposed to disasters in Alajuelita. Nationally, Alajuelita ranks fourth with the highest number of informal (precarious) housing units (1,000 households) located in the San Felipe district, which is highly vulnerable to disasters. La Violeta slum is located on landslide- and flood-prone land, just like most slums in the GAM. They have been repeatedly evacuated and the families relocated to safe places (Estado de la Nación, 2013). But there is also significant exposure of formal housing: the formal urbanization in Calle El Mango, in San Josecito de Alajuelita was affected by a landslide in 2017 and 2018, despite hazard warnings issued by geologists of the CNE. Nonetheless, the information on hazard location was not taken into account when formal housing construction took place in these areas. Despite efforts on behalf of the municipality of Alajuelita[44] to mitigate the risk, the lack of a sustained risk prevention plan and regulatory land-use plan have undermined their effectiveness.

FIGURE 9. With no control or technical studies, the vulnerability of the canton of Alajuelita is high

Source: Authors based on Sistema Nacional de Información Territorial (https://www.snitcr.go.cr/)

FIGURE 10. The urban and rural topography of the canton of Aserrí

Source: The right photo is taken from the Municipality of Aserrí's website and the left photo from the Facebook page of the District Council of Vuelta de Jorco, Aserrí.

FIGURE 10. The urban and rural topography of the canton of Aserrí

Source: Photos taken from the Aserrí Municipal Mayor's Report, 2015–2016.

44 Actions include cleaning up culverts; replacing pipes to increase channel hydraulic capacity; excavating, dredging, and rechanneling riverbeds; repairing bridges; and building roadside gutters, gabion walls, and slope protection work on some roads.

Meanwhile, during the 2011–2012 period, Aserrí invested approximately US$781,000[45] in risk mitigation works (slope stabilization, wall construction, and road rehabilitation, see examples in Figure 10) and US$40,500 in emergency response. Although the local government carries out disaster prevention and mitigation tasks, the municipality has no technical instruments or qualified staff to assess the issuance of building permits in vulnerable areas.

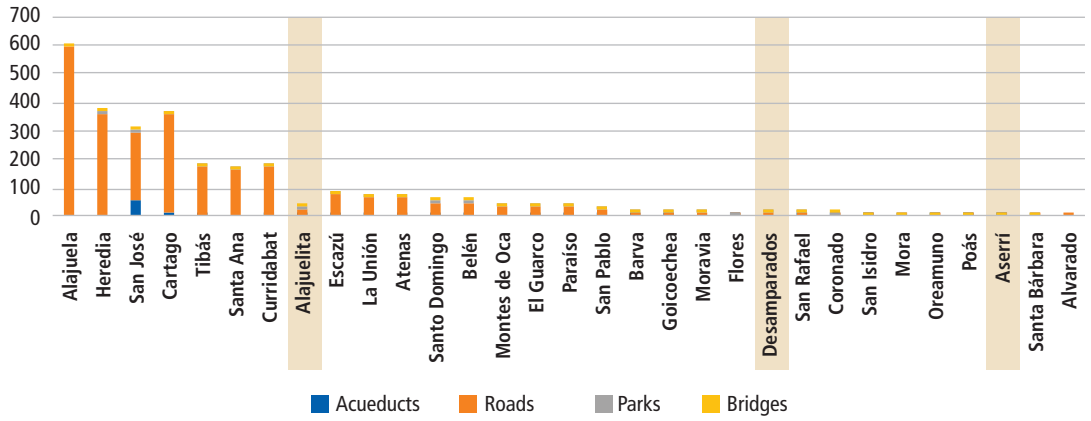
B. The South Corridor received little investment in road and water infrastructure in 2014–2020

Out of the total area of public infrastructure built (roads, aqueducts, and parks) in the GAM between 2014 and 2020, only 2.0 percent took place in the South Corridor (see Figure 12). Of the area built in the South Corridor, 81.9 percent was roadways, 16.6 percent was categorized as parks, only 1.4 percent went into bridges or waterworks. When compared against GAM totals, roads received a similarly high percentage of investment (92.3 percent of infrastructure in the GAM), and bridge and aqueduct investments similarly small (3.7 percent), but in contrast, the percentage for parks was much lower than the South Corridor (2.3 percent).

Expansion of other urban amenities, and parks in particular, lags throughout the GAM, especially in the South Corridor cantons. These areas combine urban development density with a lack of amenities. The fourth canton, in terms of square meters of new parks built during this period in any of the GAM cantons, was Alajuelita, which points to a municipal effort to upgrade the urban environment which should be promoted and supported by the state. This opens the door for cooperation with other agencies that use recreation and sports as a strategy to address inequalities and violence, including the Institute for Social Assistance (*Instituto Mixto de Ayuda Social*), the Institute of Sports and Recreation, and the Ministry of Housing and Human Settlement and of Public Security.

Urban infrastructure coverage (electricity, potable water, and solid waste collection) in the South Corridor, like in the GAM, is very strong. For electricity and potable water, coverage exceeds 98 percent (see Figure 13). Both electricity and potable water are run in the South Corridor by state-owned companies; the solid waste collection is a local service, although the landfill where solid waste is dumped is regional. For further details on solid waste management, see Spotlight in this review.

FIGURE 12. South Corridor cantons have smaller investments in roads and parks than the region as a whole



Source: INEC 2011.

45 Based on the exchange rate effective as of November 2021.

Approximately one-third of the households in the South Corridor discharge their sewage into the sewer, but most households use septic tanks, which have become a challenge given the high population density in these cantons (Figure 13). Like the entire GAM, much of the sanitation solutions in South Corridor households has been decentralized, using septic tanks (as opposed to being connected to the sewer system). This follows a regional regulatory vision (INVU 1983) that engineered the city's urban form as individualized, relatively low-density dwellings, with landscaped private patios. This yard would have served as a drainage area, resulting in the septic tank as an effective treatment alternative. However, the reality of the regional urban development resulted in far greater densification than anticipated. The current sanitation situation suggests the need for small-scale solutions to complement the regional sanitation system (GAM sewerage system operated by the AYA; see Rosales, Kohler, and Zamora 2012).

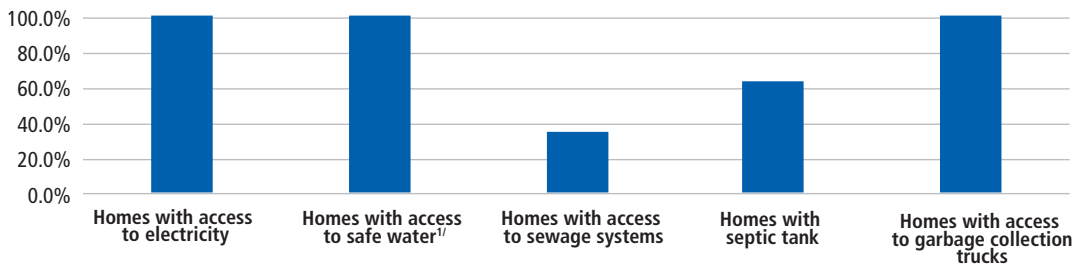
C. The South Corridor concentrates social housing in the GAM

Public investment in social housing has been notably concentrated in the South Corridor cantons (Pujol, Pérez, and Sánchez 2014). The Costa Rican social housing program provides cost-free housing to families that cannot access homeownership through the real estate market. Table 6 shows the number of housing subsidies that have been granted by the state to GAM-based beneficiary families (a housing subsidy is roughly the equivalent of a social housing unit). Social housing subsidies in the GAM have been concentrated in the South Corridor. The aggregate subsidies in the three cantons of the South Corridor are similar to the aggregate subsidies provided in the other ten cantons of the AMSJ combined and larger than those provided in the Alajuela and Heredia Metropolitan Areas, which are twice as populated as the South Corridor.

This concentration has been consistent over time. Since 1987, 130,000 housing subsidies have been granted throughout the GAM. Based on the 2011 census, the GAM had 662,706 housing units, suggesting that between 10 and 20 percent of the region's housing stock was financed by the state, with a strong concentration in the South Corridor (some social housing may have been demolished or converted to other uses). The South Corridor has accounted for roughly 42 percent to 53 percent of total subsidies in the AMSJ (see Chapter 1 for more detail on social housing in other GAM areas).

The number of housing units built throughout the region has declined consistently since 1987. The emergence of large-scale informal settlements in the GAM prompted the creation of the national housing program (*el Sistema Financiero Nacional de la Vivienda*). At the outset of the program, housing solutions were disproportionately over-concentrated there. Since then, the relative decline of the amount of housing subsidies in the GAM, in part, is an extension of Costa Rica's broader system, which favors relatively lower-income families and families with access to a plot of land (both criteria favoring many families in non-GAM rural cantons).

FIGURE 13. Urban infrastructure coverage for occupied dwellings is nearly universal in the South Corridor (with the possible exception of sanitation)



Source: INEC 2011.

Note: 1/ Non-safe water includes wells, streams, springs, and others (including water cisterns).

TABLE 6. Housing subsidies provided in different GAM areas (1987–2018)

Spatial Unit	1987–1993	1994–2000	2001–2007	2008–2014	2015–2018	Total
Desamparados	5,827	2,804	1,798	1,190	650	12,269
Aserrí	753	1,330	603	688	388	3,762
Alajuelita	3,256	1,700	912	291	204	6,363
Rest of San José Metropolitan Area	11,940	7,854	2,984	2,468	1,245	26,491
Alajuela Metropolitan Area	4,781	6,165	3,032	2,045	509	16,532
Cartago Metropolitan Area	93,00	11,644	4,893	5,627	2,460	33,924
Heredia Metropolitan Area	7,188	4,485	2,656	1,297	601	16,227

Source: Ministry of Housing and Human Settlements - MIVAH 2016 and 2018.

The concentration of social housing has other negative local impacts. First, unless social housing developments are accompanied by complementary sectoral investments, including more and better schools, electricity, internet, and public transit, they can reinforce cycles of poverty. Complementary investments are determining factors in promoting human capital development and thus local economic development. However, the opposite is happening in the South Corridor. Social housing developers (public and private) are not required to provide complementary infrastructure. Second, social housing developments tend to provide facilities of lesser quality than those demanded from private developers building other types of housing, for example, narrower streets and sidewalks and smaller or non-existent playgrounds. Third, because they are exempt from property tax, they erode the municipal revenue tax base; this issue is especially pressing in Alajuelita (see Chapter 4).

The South Corridor displays significant differences in their concentrations of social housing; Desamparados being the largest and most diverse canton. This implies that the negative externalities of social housing concentration differ across cantons and even within cantons. Note that the South Corridor has been approached as a unit in this analysis; however, there are substantial differences in the impacts and concentration of social housing in the three South Corridor cantons. Desamparados, in particular, is diverse and has both low-income and high-income concentrations, such as the San Antonio district. Alajuelita concentrates much of the problem in its three most populated and urban districts: Alajuelita, but especially San Felipe and Concepción. Some districts and areas of Aserrí and Desamparados more closely resemble these poverty concentrations, dominated as they are by relatively old social housing developments. One of the classic examples in this regard is the district of Los Guido in Desamparados, with a succession of social housing developments that formalized an informal settlement.

References

Caja Costarricense del Seguro Social. 2021. *Estadísticas actuariales*. Available at: https://www.ccss.sa.cr/estadisticas-actuariales (Accessed: 8 Nov. 2021).

Contraloría General de la República. 2015. Informe de la auditoría operativa sobre la eficiencia y eficacia de la gestión del servicio de consulta externa-medicina general en el primer nivel de atención de la CCSS. Informe No. DFOE-SOC-IF-26-2015. San José, Costa Rica: CGR.

Galiani, S., and E. Schargrodsky. 2011. *The Dynamics of Land Titling Regularization and Market Development* (Working Paper No 2011/88). UNU-WIDER. Helsinki, Finland. Retrieved from: https://www.wider.unu.edu/publication/dynamics-land-titling-regularization-and-market-development

Gutiérrez, J., W. van Vliet, E. Arias, and R. Pujol. 1993. "In Defence of Housing. Housing Policies and Practices in Costa Rica." *Habitat International* 17 (2): 63–72.

INEC. 2021. *X Censo Nacional de Población y VI de Vivienda 2011*. Available at: (Accessed: 8 Nov. 2021).

INVU. 1983. *Plan Regional de la Gran Área Metropolitana (Plan GAM)*. San José, Costa Rica: Dirección de Urbanismo del INVU.

Mateo, M., and L. Rodríguez-Chamussy. 2017. *Educación que rinde. Mujeres, trabajo y cuidado infantil en América Latina y el Caribe*. Washington DC: Banco Interamericano de Desarrollo.

Méndez, F., and J. D. Trejos. 2004. "Costa Rica: Un mapa de carencias críticas para el año 2000." In *Costa Rica a la luz del censo 2000*, edited by L. En Rosero. San José, Costa Rica: Centro Centroamericano de Población de la Universidad de Costa Rica.

MIVAH. 2016. *Informe compendio estadístico. Reporte socioeconómico y de vivienda en Costa Rica. Año 2016*. San José, Costa Rica: el ministerio.

MIVAH. 2018. *Compendio Estadístico de Vivienda 2018*. San José, Costa Rica: el ministerio.

PEN (Programa Estado de la Nación). 2017. *Sexto informe estado de la educación*. San José, Costa Rica: PEN y CONARE.

Pujol, R., E. Pérez, and L. Sánchez. 2014. "Informalidad en la vivienda de la Gran Área Metropolitana: El impacto de los proyectos de vivienda social, 2000-2011." *Costa Rica a la luz del Censo 2011*, edited by J. En Barquero et al. San José: INEC.

Rosales, E., P. Kohler, and L. Zamora. 2012. "El saneamiento ambiental en Costa Rica: un desafío pendiente En: Serie." *Evidence for Policy. Edición Regional de Centroamérica y el Caribe*. No. 3. San José, Costa Rica: NCCR Norte-Sur. Disponible en: http://www.north-south.unibe.ch/

Rovira, J. 1985. "Del desarrollo de Costa Rica y su crisis en el periodo de postguerra: 1948-1984." *Anuario de Estudios Centroamericanos* 11 (1): 23–42

Valverde, J. M., and M. E. Trejos. 1993. "Diez años de luchas sociales en Costa Rica (1982-1992)." *Revista de Ciencias Sociales* 61: 7–16.

Yu, W., and J. Zaleski. 2019. *The Leveraging Potential of Public Investments in Flood Protection. The case of Wroclaw, Poland*. Washington DC: World Bank.

CHAPTER 3

Connecting the South Corridor

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Spatial Analysis

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Introduction

The sprawling and poorly planned urban growth in the Greater Metropolitan Area (*Gran Area Metropolitana*, GAM) has conditioned mobility patterns within the metropolitan area, establishing a private vehicle-based model. The GAM's development process involved the conurbation of a series of formerly isolated rural towns and small cities. The resulting scattered, low-density urban development model had serious impacts on the transportation model. On the one hand, the scarcity of jobs and facilities in the cantons surrounding the GAM led to a functional dependence between them and the canton of San José, which consolidated a growing inter-cantonal mobility pattern. On the other hand, the GAM lacks a high-quality public transport service that covers the extensive metropolitan area. The existing network is not integrated physically, technologically, operationally, or in terms of fares. This inefficiency led to a GAM-wide steady decline in public transit ridership, resulting in a growing private car ownership-based transportation model.

The GAM's urban development model has negative externalities that undermine people's opportunities for socioeconomic development and quality of life, particularly in the peripheral cantons. The absence of attractive alternatives to the use of private vehicles causes pressing traffic congestion issues and has consequences in terms of increased greenhouse gas (GHG) emissions and air pollution. The loss of productivity due to travel time and the increasing number of road accidents impose heavy costs on society at large. The constraints in accessibility and the inequitable use of road space have perpetuated the segregation of some territories, mainly those in the city outskirts. Residents in these territories are cut off from public infrastructure and services, formal employment opportunities, and other benefits that compact and well-connected urban areas provide, such as quality public spaces and facilities for community interaction and development.

Immediate actions are required to steer urban growth and mobility toward a more efficient and inclusive model. Costa Rica made significant progress in territorial and mobility planning, although implementation challenges persist. Integrating urban planning with mobility by

undertaking transit-oriented development (TOD) projects; promoting an integrated, interconnected, and high-quality public transport system; further decarbonizing the transport sector and strengthening the institutional framework of the sector, are key opportunities to balance urban development in the GAM and enhance the connectivity of the South Corridor's cantons.

This chapter outlines the major barriers faced by the South Corridor cantons in connectivity and accessibility to the development opportunities provided by the GAM and proposes a series of recommendations to reverse them. First, it presents an analysis of the key mobility challenges faced by the GAM and in particular by the cantons along the South Corridor: Desamparados, Aserrí, and Alajuelita. These include (a) unplanned urban growth: mono-functional peripheral cantons heavily dependent on the capital city; (b) limited, unintegrated, and low-quality public transport service that fails to meet the demand; (c) prioritization of privately owned motorized mobility, with increasing motorization and an inadequate and precarious road network; and (d) absence of incentives to promote active mobility. The chapter then describes the negative externalities caused by the current urban and mobility model. After discussing some existing mobility strategies, plans, and projects for the area, the chapter points to a series of suggestions to improve the GAM's connectivity and enhance access to opportunities for the population living in the peripheral cantons.

This chapter considers primary and secondary sources of information. This chapter was developed by reviewing plans, regulations, technical documents, research, and other secondary sources, and by sharing information through interviews with municipal representatives from Desamparados, Aserrí, and Alajuelita. Furthermore, it presents findings based on innovative spatial and movement analyses, constructed by cross-referencing data from Mapbox, Quadrant, Facebook, cell phones, censuses, and other sources of information.

I. Challenges and Barriers to South Corridor Connectivity

A. Unplanned urban growth led to mono-functional peripheral districts, heavily dependent on San José

The GAM's urban development has not been accompanied by land-use planning, resulting in a large, scattered, and underserved urban sprawl. As introduced in Chapter 1, the GAM is the product of the coalescence of numerous rural towns and small cities. Influenced by its topographic conditions, the region has always been relatively dispersed, featuring different levels of functional and physical connectivity between the cantons. By 2021, the total urban area in this region had grown to twice what it was 24 years earlier, and over triple its size in 1979. This low-density urban sprawl encroached on agriculturally and environmentally valuable areas and brought high demand for basic services and transportation infrastructure that the government has been unable to meet.

The GAM is characterized by high dependence between the peripheral areas and the GAM city center. The fast demographic growth experienced by many GAM cantons, particularly Desamparados and Alajuelita,[46] consisted primarily of residential uses with limited opportunities for economic development (see Chapter 1). As a consequence, this model led to a constant need for the population to move to the different metropolitan hubs, especially San José, to meet their daily needs. The resulting traffic congestion causes mobility issues throughout the region.

The national government made some progress in land-use regulation in the GAM, but its implementation has been limited. The Greater Metropolitan Area Plan, or GAM Plan 2013–2030, seeks to establish adequate land-use planning, reverse expansive low-density growth, and regenerate canton capitals, which would have positive mobility impacts. The GAM Plan 2013–2030 proposes a development model based on a network of Integrated and Dense Centralities (CDI or *Centralidades Densas Integrales*), GAM sub-centers featuring mixed-use development, designed to revitalize neighborhoods and improve connectivity. Desamparados and Alajuelita are identified as cantonal CDIs, that is, they are urban hubs that serve as cantonal capital cities, and thus are vested with a municipal scope of influence. Despite its value, the GAM Plan has not been fully or comprehensively implemented due to a lack of political consensus[47] and weak local capacities. Moreover, several of the GAM cantons, including those along the South Corridor, do not have in place an updated regulatory land-use plan (as mentioned in previous chapters), which further undermines this integration.

46 In the 1980s and 1990s, the annual population growth rate in the South Corridor was higher than in the 1970s, at 4 percent a year, exceeding the GAM population growth rate (3 percent) or the national average (2.9 percent). This growth was even greater in Alajuelita canton, which went up from 31,390 to 70,297 inhabitants (5.2 percent annual rate), partly explained by the state's investment in low-income housing.

47 Some articles have been challenged by the Constitutional Chamber of the Supreme Court, particularly those concerning the environmental variable assessment approach.

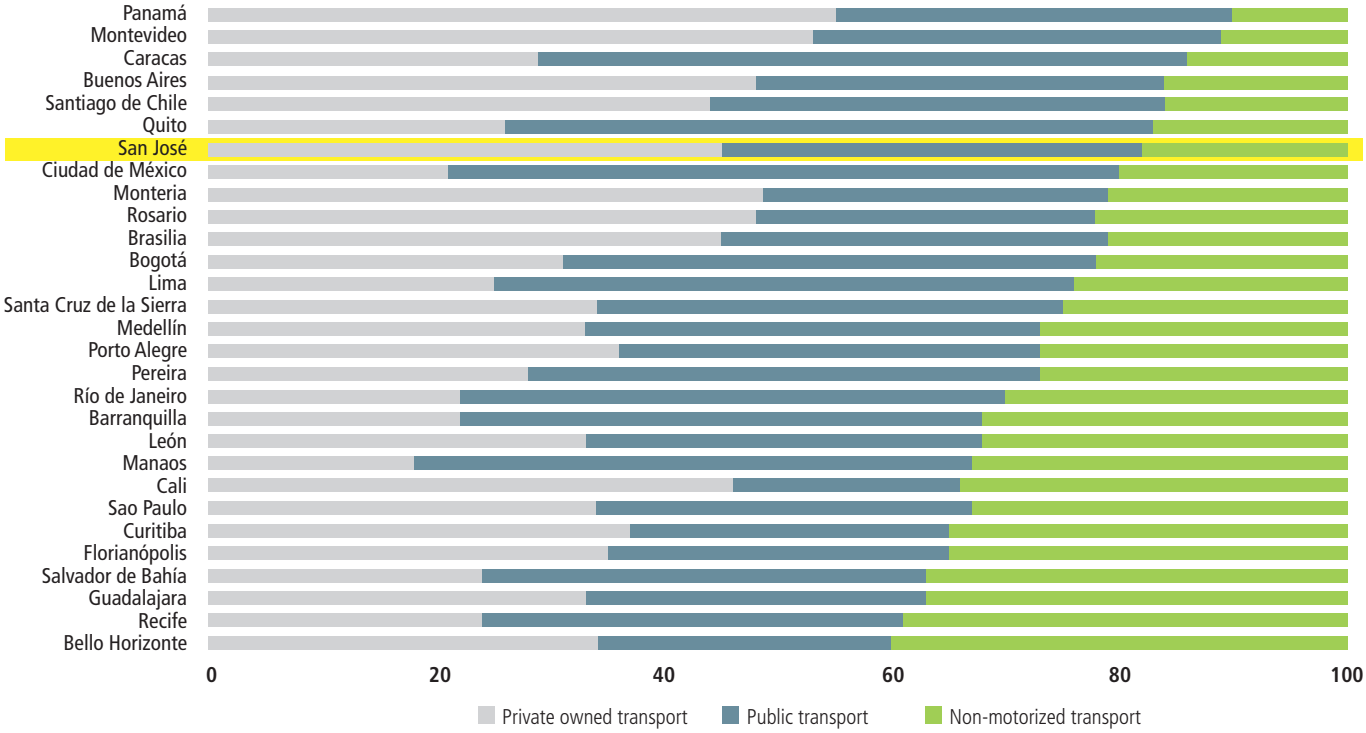
B. Limited, unintegrated, and low-quality public transport service

Over the last few years, public transit ridership lost ground to other options considered faster and more affordable by users. Compared to more populated Latin American cities, San José has a low modal share of public transport (Figure 1). In the 1990s this mode of transport was used by 70 percent of the population, while in 2007 it dropped to 53 percent.[48] This shift can be explained by a public transport service failing to meet real demand. Stagnation in investment has undermined the quality and coverage of a public transport service with physical and fare fragmentation.

The public transportation system, which relies on independent and competing operators, serves mostly the canton of San José, but it fails to meet the growing need for mobility in the peripheral areas, especially along the South Corridor cantons. The sparse, low-density urban growth pattern has hindered the implementation of a mass transit service that would cover the conurbations without compromising the public finances. Given its status as an economic hub, and because of its high population density and travel demand, the canton of San José hosts 39 percent of the country's public transport routes, many of which are redundant. In contrast, the recently developed peripheral areas are characterized by low density, and considerable train or bus stop gaps (Figure 2). Particularly noteworthy is the weak service offered in Alajuelita, which is served only by seven bus lines, each with five vehicles, operated by a single company (Transporte 205). In Desamparados there are five bus operators, while Aserrí has three.

The GAM's public transportation ridership is on the decline. From 2010 to 2018, the GAM population without accessibility to transit stops within a 10-minute walk is estimated to have jumped from 13 percent to 33 percent. For the South Corridor cantons, more than half of the

FIGURE 1. San José's modal share of public transport is lower than other Latin American major cities



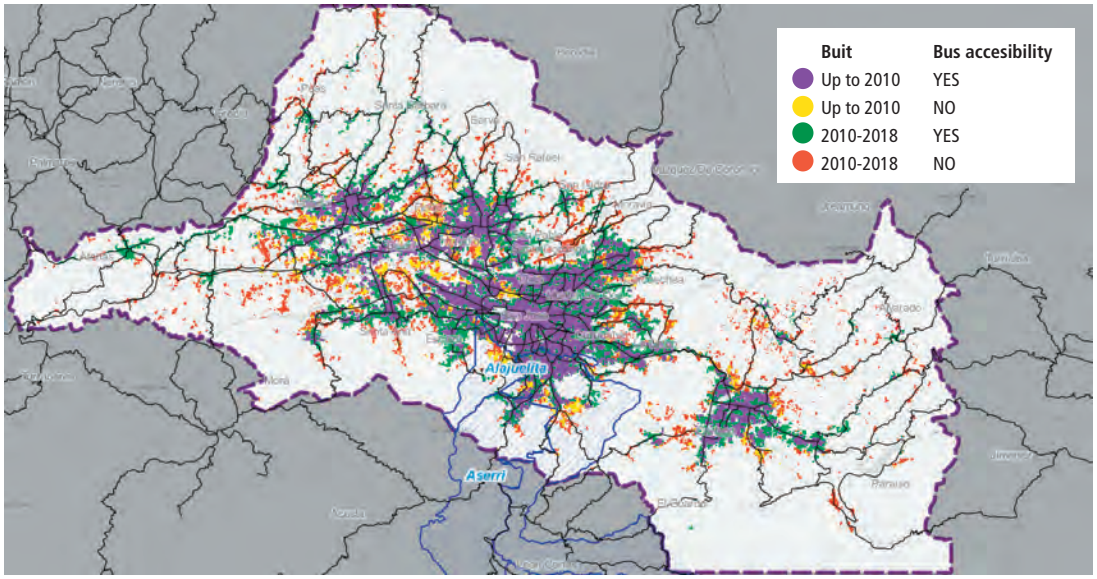
Source: Development Bank of Latin America (CAF) 2016.

48 2008 Regional Urban Plan of the Greater Metropolitan Area of Costa Rica (PRUGRAM) IADB, 2016.

FIGURE 2. San José concentrates the largest density of bus routes

Source: Regulatory Authority for Public Services (ARESEP) 2019.

FIGURE 3. Lack of access to public transportation in recently developed areas



Source: Developed by authors based on Ministry of Housing and Human Settlements - MIVAH 2010 and 2018 (urban sprawl) and OpenStreetMap and Google Places API (bus stops).

population in Alajuelita (57 percent) have to walk more than 10 minutes to a local public transport stop. This population share reaches 29 percent in Aserrí and 27 percent in Desamparados (Figure 3).[50]

This is a physically and fare-fragmented public transit service that penalizes the user with increased travel costs and times. Based on the Integrated Sustainable Urban Mobility Plan (*Plan de Movilidad Urbana Sostenible*, PIMUS) 2017,

50 Comparatively, San José's public transport ridership is slightly higher than other Latin American cities such as Xalapa, Managua, or Asunción, which are around 44 percent, 41 percent, and 52 percent, respectively.

the average travel time by bus commuters is 70 percent higher than the travel time by car, primarily due to transfers and wait times.[51] The different modes of transportation are operated independently in competition with each other, with no inter-route integration. It is estimated that 40 percent of public transport trips involve at least one transfer. The absence of fare integration means that every transfer may involve an additional fee, thereby increasing the travel fare for the user. Bus and train stops and terminals are scattered and disconnected, making it difficult to transfer between bus and rail lines or other modes such as bicycles.

The bus service has a concentric matrix, forcing many passengers to change between different bus routes in San José before reaching a neighboring canton. The current bus service follows radial patterns, spread over nine sectors: one central and eight peripheral sectors, with two of them covering the South Corridor. In addition, the system is complemented by just six intersectoral services. This concentric system provides precious few transfer options to destinations outside the central district, forcing transfers in San José (Figure 4).

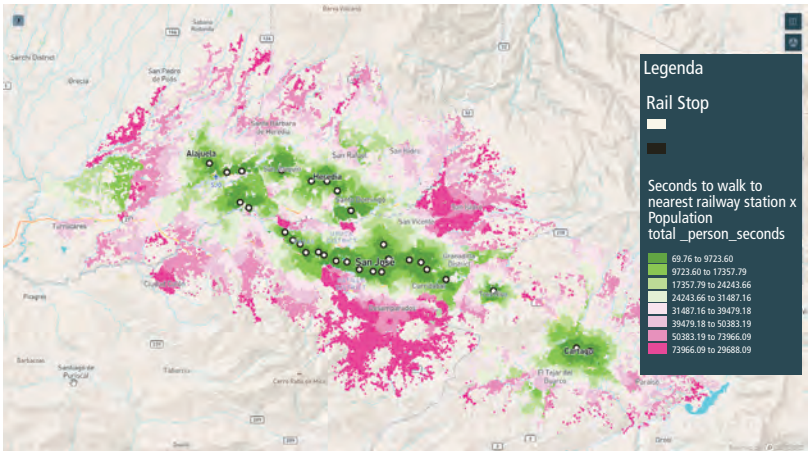
The interurban train only mobilizes 0.1 percent of public transport ridership. It currently provides commuter service between the provinces of Heredia, San José, Cartago, and Alajuela, offering low-frequency service (more than 30 minutes between trains). The train does not serve the South Corridor cantons, and the three closest stations are not integrated with the bus routes either physically or in terms of fares. The rail network currently offers limited coverage, low commercial speed, and low capacity to absorb demand (Figure 5). In addition, the train has sections in which private vehicles invade the railway tracks due to a lack of physical segregation, posing road safety problems, as well as service disruptions.

Women are the most frequent public transportation riders within the GAM (around 60 percent),[52] but they are also the most insecure. According to a gender-focused survey conducted by MiTransporte on San José Metropolitan Area (AMSJ) service user perceptions, 28.6 percent of women feel unsafe when traveling on public transit, compared to 23.4 percent of men. In addition, 54.2 percent of women perceive sexual harassment as a risk when riding public transportation.[53] According to the 2015 Actualidades Survey by the School of Statistics of the University of Costa Rica (UCR),[54] 61.7 percent of female respondents have suffered some street harassment, while 32.8 percent of men have experienced some form of sexual harassment. Out of the total number of women harassed, 4.2 percent did not use public transportation again. In 2019, 4,581 women filed sexual

FIGURE 4. The GAM bus network is radially distributed, mostly centered in San José

Source: PIMUS 2017.

FIGURE 5. Railway infrastructure coverage is very limited



Source: Developed by authors based on a High-Resolution Settlement Layer OpenStreetMap/Jaime Gutiérrez Alfaro, United States Geological Survey - USGS, Earth Explorer Shuttle Radar Topography Mission (SRTM) 1 Arc-Second Global and OpenTripPlanner.

51 PIMUS 2017.
52 INAMU. https://www.inamu.go.cr/impulsando-una-mejora-para-la-seguridad-de-las-mujeres-en-el-transporte-publico
53 MiTransporte 2018.
54 https://www.ucr.ac.cr/medios/documentos/2015/estadistica-encuesta-actualidades-2015.pdf

harassment complaints with the Misdemeanor Courts, while men filed only 1,905 complaints. Insecurity occurs not only on bus rides but also at bus stops and en route to such stops.

Many sectors are taking action to improve public transportation passenger security. The Street Harassment Prevention Act Nº 9877 was passed in 2020, setting forth measures to prevent and penalize this form of violence. This protects people when they use public transportation, hopefully making it a safer environment for women, the most vulnerable in this context. Another significant action that helps improve the safety of female riders in public transit is the Intervention Protocol for Sexual Harassment in Public Spaces or Public Access, developed by the Ministry of Public Security (MSP) and the National Women's Institute (INAMU) to guide officers to intervene in these cases. At the municipal level, Desamparados has launched the Safe Mobility for Women initiative (see Box 1).

BOX 1. The Safe Mobility for Women initiative, led by the Municipality of Desamparados, seeks to improve the safety of women during the entire journey

The Municipality of Desamparados jointly with INAMU, Ministry of Public Works and Transportation (MOPT), Costa Rica Road Safety Council (COSEVI), MSP, Mujeres en Movimiento, Fundación Crusa, and GIZ-supported MiTransporte Project launched the initiative, consisting of four pillars: an app, safe stops, bus driver training, and communications. A participatory process was carried out with the Desamparados community to review the gender-sensitive bus stop shelter design. Lighting was improved, benches were adapted, and physical barriers were removed. At present, a space for information on bus routes is being developed to improve safety. Under this initiative, training was also provided in collaboration with the company Autotransportes Desamparados (ATD). About 40 bus drivers, both male and female, and administrative personnel were trained. The training covered the following topics: gender and mobility, violence directed at women, laws, sexual street harassment, reporting protocols, and inclusive customer service, among others.

Given the low frequency, insufficient coverage, and perception of an unsafe public transportation system, South Corridor residents are opting to use alternative transportation services to travel to San José, including privately owned transportation, 'pirate taxis',[55] or Ride-Hailing. The perceived insecurity and the increased costs and travel times associated with public transportation have discouraged its ridership demand, and at the same time, the service operators are cutting down on service frequencies, resulting in a lower number of passengers. Faced with low coverage and frequency of public transit options, users seek cheaper alternatives with shorter travel times by riding in private vehicles, pirate taxis operating informal transportation routes, or ride-hailing services, such as Didi and Uber.

One of the main challenges faced by the sector is the division of roles and responsibility among multiple public entities, making public transportation management inefficient and costly (see Annex 2). The public transport structure has three key stakeholders, including the MOPT, the Public Transport Council (CTP), and the Regulatory Authority for Public Services (ARESEP). The MOPT administers, regulates, and oversees public infrastructure works and transport services; under the Ministry, the Vice-Ministry of Transport is in charge of the Sectorization Project. The CTP is the public transport governing entity, a body subordinated to the MOPT, and is responsible for modeling the operational public transport routes. ARESEP regulates public service fares, including bus routes, trains, and cabs. Meanwhile, municipalities are responsible for traffic affairs and bus depots.

The bus service quality and coverage are affected by the current public bus concession scheme and poor oversight. First, GAM-wide service is provided by multiple small and medium operators competing against each other for the most profitable routes (Box 2). The high-demand routes see an oversupply of vehicles, while less profitable routes are not covered at all or have such low frequencies that their use is discouraged. For example, in Alajuelita, the interlining routes used to run through Alajuelita and Periférica, but both were canceled due to their low profitability. In Desamparados, route overlapping undermines public transit, as the number of vehicles sharing the road space with mixed traffic makes it cumbersome and slow.[56] In addition, the fact that public bus concessions are renewable every seven years makes them unattractive, discouraging

55 According to a study by the Costa Rican Public Transportation Council, as of May 2018, there were 12,440 legal cabs and 3,800 illegal taxicabs.
56 Route Nº 162 is covered by 11 bus lines under Desamparados concession, as well as other concessions from other southern cantons, such as Aserrí, that circulate through Desamparados. As for Route Nº 209, the 15 concession routes of Desamparados increase to 31 when adding those from other municipalities.

bus operators from making large fleet upgrade investments and deterring new operators who need to amortize their investments. Finally, there is neither regular monitoring of the service rendered by bus lines nor any service quality assessment.

The operator's compensation calculation does not match the actual demand; instead, it is made on a route-by-route basis using an ex post estimation method, which makes it costly and inefficient. Public transit subsidies are not allowed under Costa Rican laws,[59] and the ARESEP's operator compensation calculation approach is inadequate, resulting in resources being invested only in vehicle operations and little or nothing in maintenance. This adds another layer to the operator's financial hurdle to invest in service delivery improvement, besides hindering the participation of new operators and investors. As a consequence, operators tend to engage in practices unsuitable for ensuring service: preventive maintenance is limited, fleet renewal plans are postponed, drivers' working hours are extended (declining working conditions which in turn mean fewer trained drivers available), and the size of service crew required per transport unit is downsized. This hurts passenger safety, resulting in poor service quality.

The national government has developed two noteworthy metropolitan-scale mobility projects: The Modernization and Sectorization of the Public Bus System and the Electric Train project; both will be connected through the Integration Nodes System.

On paper, the Modernization and Sectorization of the Public Bus System Project envisages the redesign of bus routes, to deliver efficient service following actual travel patterns. It proposes a trunk system, arranged in sectors and subsectors, supported by secondary and intersectoral feeder bus lines. The project also defines strategies for linking the system with other modes of transportation, mainly trains. The new system envisages the definition of corridors with up to 60 percent of exclusive bus lanes, which may reduce travel times and permit the use of larger-capacity buses. It also foresees electronic fare collection solutions, improved user costs, and overall operational efficiency.

BOX 2. GAM public bus concession arrangement

Public bus service is provided by private operators under seven-year term concession agreements. Concessions are awarded by the MOPT; operation planning is carried out by the CTP while fares are fixed by the ARESEP. There are 350 concessions and 5,200 buses nationwide. The GAM is served by 45 concessions operating 252 routes. San José itself is covered by 2,000 buses.[57] The supply of bus transit is fragmented across 41 small and medium operators under concession or permit granted by the CTP, totaling over 1 million trips a day. The current bus operators' concessions[58] expired in September 2021; however, a one-year extension was awarded through operating permits, to renegotiate the concessions based on a law amendment to extend their term from 7 to 15 years. This law reform may influence the domestic bus fleet electrification process, as financing often requires more than the seven-year term historically granted.

In practice, however, the poor coordination between sectoral government agencies and operators with a stake in maintaining the current system, in addition to technical weaknesses and the absence of political consensus, has delayed the project's implementation for decades. Although the proposal was developed in 1999, today only road signposting is in place in four pilot corridors. The implementation delays have many causes, including lack of support from the private sector—for a significant period, the project had no endorsement from the operators—technical constraints, coordination challenges between the different government agencies involved (MOPT, CTP, and ARESEP), and a lack of political will to advance this large-scale project (Grupo de Análisis sobre Sistemas de Transporte y Movilidad, 2018).

Meanwhile, the proposed transition of the interurban rail into a new rail-based system is under study and in the first quarter of 2023 there will be a definition of its future. The project, which stems from the Regional Urban Plan of the Greater Metropolitan Area of Costa Rica (*Plan Regional Urbano del Gran Área Metropolitana* de Costa Rica (PRUGRAM), PRUGRAM), and relaunched in 2016, aims to transform the infrastructure of the existing train into an interurban double-track electric train consisting of five lines (see Box 3). The new administration of President Rodrigo Chaves

57 Special service routes range between 12,000 and 15,000.
58 Operating concessions are awarded by decree.
59 A reform bill is currently in the pipeline. The Legislative Assembly is discussing a draft law to amend Law No. 3503 of May 10, 1965, to introduce public transportation subsidies.

has expressed interest in the project, although, based on concerns regarding passenger demand, announced new technical and financial studies to review the speed of the proposed system, its demand and its financial sustainability. [60]

Regardless of the mode of transport that is implemented, the electric train or another (for example, a Bus Rapid Transit [BRT] system), GAM requires a mass transit system that integrates with the other transport systems and provides an efficient and quality service.

Alajuelita and Desamparados can create feeder corridors to the mass transit system. Even though the electric train, or the mass transit system that would be implemented in this corridor, does not reach the municipalities in the Arco Sur, it would benefit greatly with feeder corridors from Alajuelita and Desamparados—the demand will increase and the residents of the South Corridor would be able to access a system that will get them in San José faster.

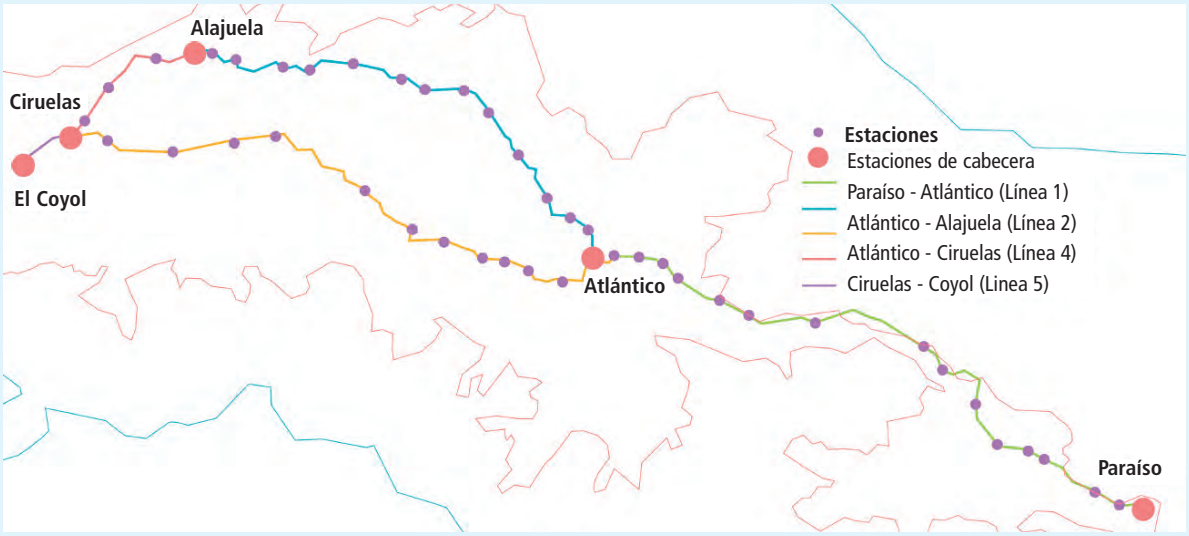
BOX 3. Electric Railway Lines

The studies of the Electric Railway Project that will be reviewed comprises a railway length of 84.9 km, consisting of 78 trains and 46 stations, including 10 intermodal integration nodes. The peak headway for lines 1, 2, and 3 would be 5 minutes; the off-peak headway would be 15 minutes on weekdays and 10 minutes and 20 minutes on weekends. Lines 4 and 5 would run every 10 minutes during peak hours and every 30 minutes during off-peak hours on weekdays and every 20 minutes and 40 minutes on weekends. The fare, which has not yet been fixed by ARESEP, would be independently set for each line; however, initial studies indicate an estimated average fare of 600 colones at off-peak hours and 800 colones at peak hours. The projected ridership is 200,000 passengers/day.

The total cost of the electric train is US$1.550 billion, of which the Central American Bank for Economic Integration (CABEI) approved a loan for US$550 million, including US$250 million from the Green Climate Fund (GCF), while US$1 billion would be mobilized by the concessionaire. As aforementioned, the current government is carrying out studies to review the technical and financial aspects of the project.

Construction is estimated to take between three and five years. The 35-year concession term would include design and construction (5 years) and operations (30 years). About 80 percent of the rail route is over existing interurban train tracks and 100 percent of the route has the necessary right-of-way for construction, which substantially reduces the electric train construction time. The studies that are currently being carried out evaluate the possibility of making the section elevated to increase the speed of the system and avoid road intersections. The GCF has allocated additional US$21 million to rail station infrastructure, which would help implement high-quality stations.

FIGURE 6. Electric Railway Lines



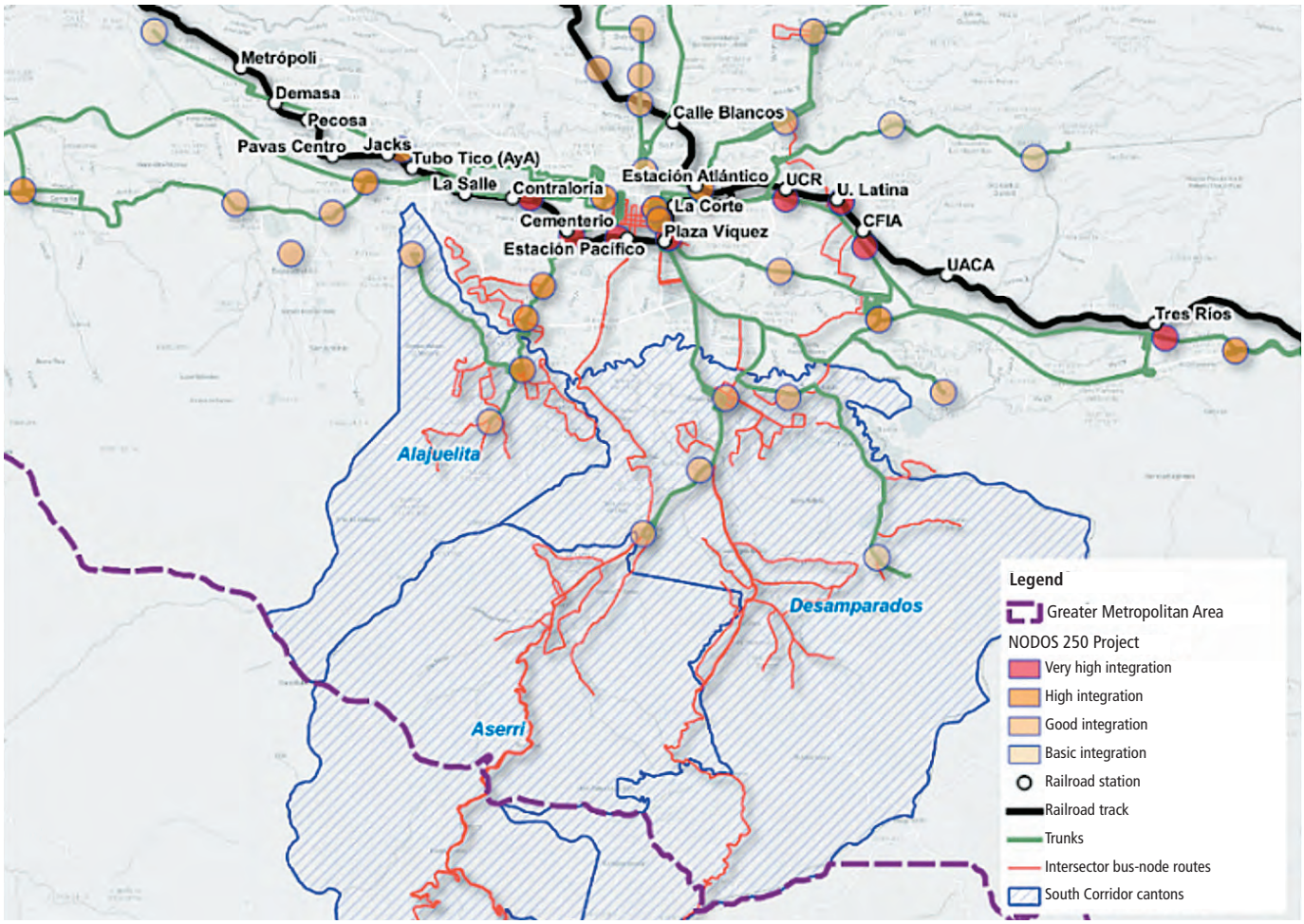
Source: Costa Rican Railroad Institute (INCOFER).

60 The Government Plan indicates that "every project must be based on a technical analysis to have a sustainable first world train. In the same way, it must contemplate the development of complementary infrastructure (bus stops, parking lots, commercial areas, among others) to enhance its impacts and benefits."

The MOPT has proposed an Integration Nodes System to promote the connection between bus routes with each other and with the train. The system has 53 intermodal integration nodes, of which 36 generate connectivity between trunk, feeder and intersectoral bus routes and the remaining 17 connect bus routes with train stations. Physical, operational, and fare interconnections would enhance the system's intermodality and boost ridership demand.

The Parque Central of Alajuelita and the Parque de Desamparados are nodes that stand out for their capacity for integration, urban development, and TOD potential. The MOPT characterizes the nodes according to their type and level of integration (quantity and levels of connected routes), vocation for urban development, densification priority (defined in the GAM 2013 Plan) and TOD potential. Out of the eight intermodal integration nodes along the South Corridor, Parque Central de Alajuelita is the only one rated with 'Very Good Integration', as it links the T6 and T17 trunk routes and a feeder route. The other nodes, namely La Cima, Aurora, Parque de Desamparados, Maxi Palí, San Rafael Arriba, and San Antonio, were rated as nodes with 'Good Integration', which implies that in addition to their entry to the trunk system, they also offer the possibility of accessing other secondary destinations. There are no prominent integration nodes in the Aserrí canton. Both Parque Central de Alajuelita and Parque de Desamparados are presented as priority nodes for densification and rank among the 15 GAM-wide nodes with the highest potential TOD value identified by the MOPT (MOPT 2019) (Box 4).

FIGURE 7. Eight intermodal integration nodes along the South Corridor



Source: Developed by authors based on MOPT data

BOX 4. Two South Corridor sites are suitable for interchange stations: Parque Desamparados and Parque Central de Alajuelita

The South Corridor's main urban interchange hub is Parque Desamparados, which hosts the highest residential and commercial densities. There is a considerable influx of people around Parque Desamparados owing to the amenities, including Desamparados City Hall, Joaquín García Mongea School, Nuestra Señora de los Desamparados Church, and Multicentro Desamparados Mall, as well as a wide array of commercial, institutional, and health care facilities. The area around Parque Desamparados is considered a central urban interchange node, since aside from meeting the urban conditions described above, it is also well integrated into the transit system. The San José - Desamparados - San Rafael Arriba bus trunk line converges there, fed by Desamparados - Moravia and San Rafael - San Juan de Dios - San Rafael Abajo - Calle Fallas-Desamparados feeder bus lines.

Parque Central de Alajuelita is the second interchange hub in the South Corridor. The institutional and commercial center of Alajuelita, situated in the vicinity of Parque Central, has a number of major amenities such as the City Hall, the Municipal Stadium, the National Bank, the Abraham Lincoln School, and the Santo Cristo de Esquipulas National Sanctuary. It does not have a high residential density, although it is the seat of multiple businesses, banks, and administrative buildings. In terms of mobility, it is very well connected, forming a node where the trunk routes San José-Hatillo - Alajuelita - La Cima and San José - Hatillo - Alajuelita - San Felipe - La Aurora coincide with the Escazú - Hatillo interline bus route

FIGURE 8. Bus routes crossing Desamparados downtown

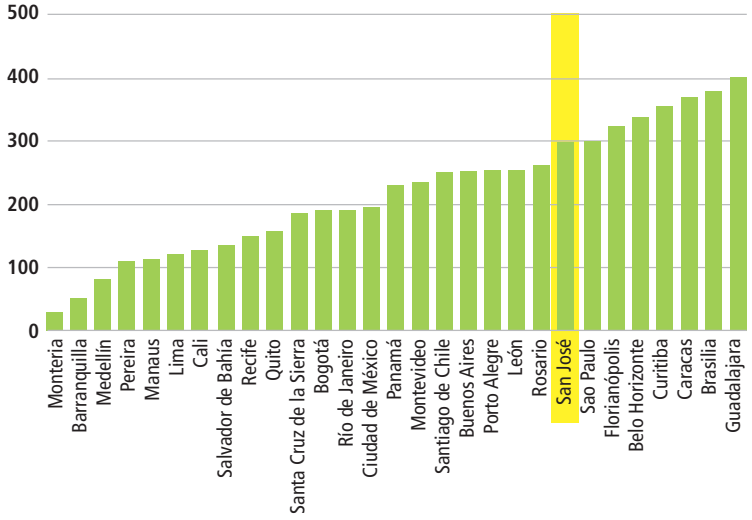
FIGURE 9. Bus routes crossing Alajuelita downtown

C. Prioritization of privately owned motorized mobility

1. Soaring motorization

Costa Rica has seen a rapid and sustained rise in the private vehicle fleet. Between 2000 and 2012, the number of vehicles registered in the country grew sevenfold, from 155,212 in 2000 to 1,134,373 vehicles in 2012. From 2007 to 2012, the vehicle motorization index (private vehicles per 1,000 population) has skyrocketed by 24 percent on average. However, the motorcycle fleet grew by far more, soaring by 187.3 percent between 2007 and 2016. At the city level, based on the Development Bank of America (CAF) Urban Mobility Observatory figures, San José's vehicle ownership in 2016 was close to 300 cars per 1,000 inhabitants, far above comparable cities in the region such as Bogota and Rio de Janeiro (Figure 10).

FIGURE 10. San José is one of the cities with the highest motorization rates in Latin America, well above cities such as Bogotá and Rio de Janeiro



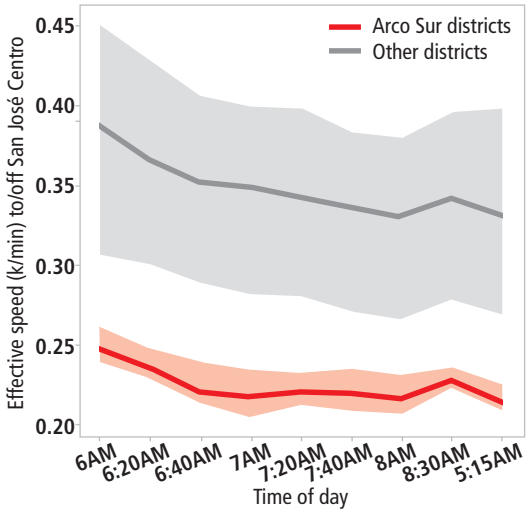
Source: CAF 2016.

2. An inadequate and precarious road network

The GAM road network is congested, especially the road network that connects the South Corridor with the canton of San José, slowing travel times in comparison with other cantons that are even more distant from San José. The GAM road network has remained virtually unchanged since the 1970s. A ring road encircles the center of the metropolitan area, without connecting it with the northern zone. Being a transit, economic, and job center, a major share of the GAM's traffic flows to the canton of San José through 13 main radial roads, which are also shared by bus services. The traffic jams on the roads connecting the South Corridor cantons with San José are especially dire, mainly due to the lack of connecting roads. Figure 11 shows how, despite being at a shorter distance from San José, South Corridor residents' have a far longer travel time than inhabitants of other cantons. Similarly, Figure 12 shows how travel times between the South Corridor and San José are higher than in other cantons.

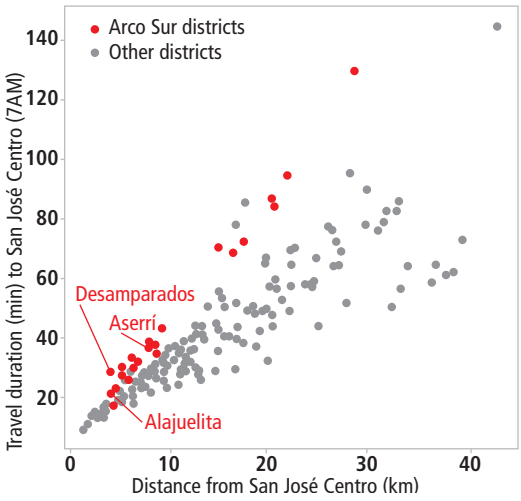
The South Corridor's Road infrastructure is in poor condition. Based on the 2012 cantonal road network update, Alajuelita has 112 linear kilometers of roads, Aserrí 265 kilometers, and Desamparados 519 kilometers. Aserrí has the lowest percentage of paved roads in kilometers, with only 22 percent. The South Corridor's cantonal infrastructure has fallen behind; as the population grows, road deterioration, as well as congestion and pollution, will worsen (Figure 13). According to the 2016 Desamparados Cantonal Road Network Diagnostics, 43 percent of roads are in poor condition, 38 percent are in fair condition, and only 19 percent are in good condition. The National Transport Plan 2011–2035 (PNT)

FIGURE 12. Compared to residents of other cantons, South Corridor residents have slower travel speeds to San José center, any time of day



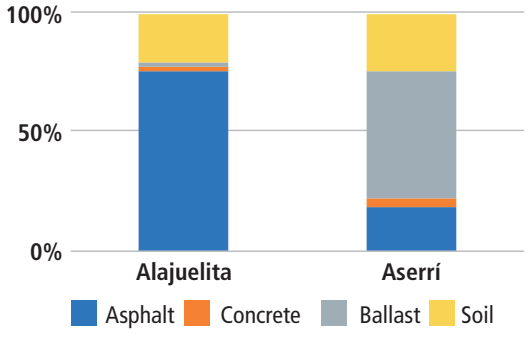
Source: Developed by authors based on Mapbox matrix API and Facebook.

FIGURE 11. South Corridor - San José's commuting times are longer than of other peripheral cantons



Source: Developed by authors based on Mapbox matrix API and Facebook.

FIGURE 13. South Corridor road infrastructure is in poor condition



Source: Developed by authors based on Desamparados Cantonal Road Network Diagnostics

estimates that Costa Rica should invest at least 3.66 percent of gross domestic product (GDP) every year in rebuilding and maintaining the current infrastructure 'stock', as well as in new projects to expand the system's capacity. However, the current level of investment is approximately 1 percent of GDP, resulting in an annual gap of at least 2.5 percent of GDP, or about US$1.5 billion.

D. Insufficient, discontinuous, and precarious active mobility infrastructure

1. Inadequate and unsafe biking infrastructure, and limited use by the population

Cycling as a mode of transport in the GAM is not currently well established in the population, mainly due to the scarcity of cycling infrastructure, road insecurity, and topography. It is estimated that less than 1 percent of the GAM population commutes by bicycle. A survey conducted by the City of San José revealed that 22 percent of respondents (of whom 80 percent are women) do not know how to ride a bicycle.[61]

One of the leading causes behind the limited cycling is the GAM-wide low coverage of cycling infrastructure, which is only 43 km.[62] So far, there are only four bike lanes in the GAM: Downtown San José, Hatillo, and San Pedro - La Sabana circuit and Montes de Oca-Curridabat cycle lane. All four have differentiated infrastructure and safety conditions (see Box 5). In addition to the absence of bicycle lanes, current regulations restrict cycling on fast roads, making it difficult to bike to and from areas distant from urban centers. In addition, the scarcity of bicycle parking facilities hampers the use of this mode of transport.

BOX 5. The four GAM cycle lanes

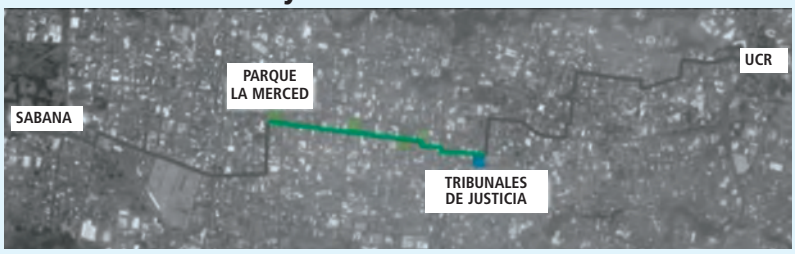
San José cycle lane

The bikeway is located between Parque de la Merced and the Courthouse, with a strip running along the Avenida 4 pedestrian street, used by a large number of pedestrians every day. This bikeway poses some risk to cyclists and pedestrians because it is a shared-use bike route, that is, there is no physical segregation separating the dedicated bike lanes. This has resulted in the bikeway being constantly encroached upon by pedestrians in certain crowded stretches, for example, Avenue 4 (Figure 14).

Hatillo cycle lane (San José)

The MOPT-run Hatillo bike lane was opened in 2009, financed by the Fédération Internationale de l'Automobile (Figure 15). The bicycle lane is segregated from vehicular road traffic by uneven lanes and a Circunvalación slope. However, the bikeway is substantially narrower than recommended by international standards, at only 1.5 m wide - 75 cm[63] in each direction. In addition, the road is disrupted by elements that may pose a cycling safety risk, such as non-relocated utility poles.

FIGURE 14. San José cycle lane



Source: MOPT 2016.

FIGURE 15. Hatillo cycle lane.

Source: Foundation for Urban Development (FUDEU) 2017.

Continues >

61 PIMUS.
Municipality of San José, 2018 – Report SBP. San José- Public Bicycle System.
62 Estimated by authors.
63 WRI- recommended two-way bicycle lane width is 2.5 m.

BOX 5. The four GAM cycle lanes (Continued)

FIGURE 16. San Pedro - La Sabana cycle lane

Source: MOPT 2016.

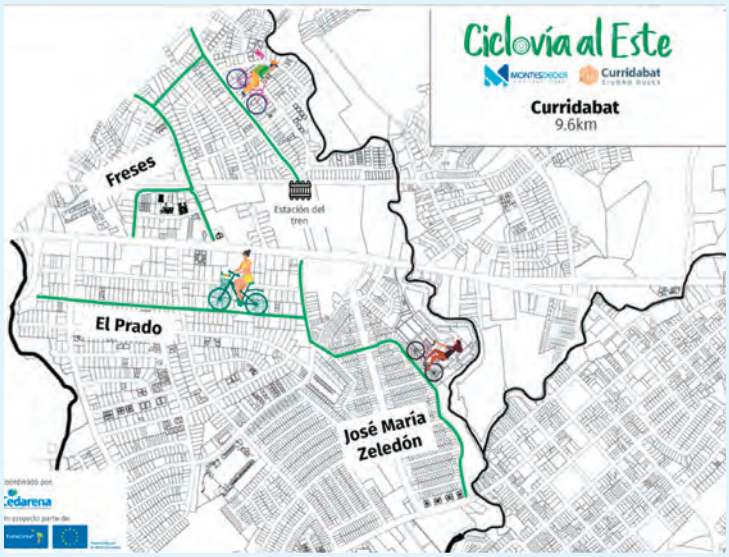
San Pedro - La Sabana cycle lane (San José)

San Pedro - La Sabana bike lane was opened in 2017 (Figure 16). The downtown project consists of a one-way 13-km circuit connecting the Law School of the UCR, San Pedro de Montes de Oca district with Parque Metropolitano La Sabana.

Montes de Oca and Curridabat cycle lane

The two cantons have inaugurated 21 km of cycle lanes, signs, and adaptations at the intersections in 2022. Along with the infrastructure, the project developed a series of participatory workshops to learn about the needs of the cycling population, communication, and awareness campaigns on active mobility, as well as the systematization of the process for its possible replication in other regions of Costa Rica (Figure 17).

FIGURE 17. Montes de Oca and Curridabat cycle lanes



Source: Euroclima 2020.

Poor road safety is another deterrent to bicycle use. In 2019, 964 riders were involved in traffic accidents in Costa Rica, including 33 deaths accounting, for about 7.5 percent of on-site fatalities reported by COSEVI (COSEVI 2019). In that year, no cyclist fatalities were reported in Desamparados, Alajuelita, or Aserrí, though 40 bike riders had been involved in road accidents. Based on PIMUS surveys, cyclists pinpointed as system failures the absence of traffic signaling and markings along the bike route and a significant shortage of cycling parking and storage facilities.

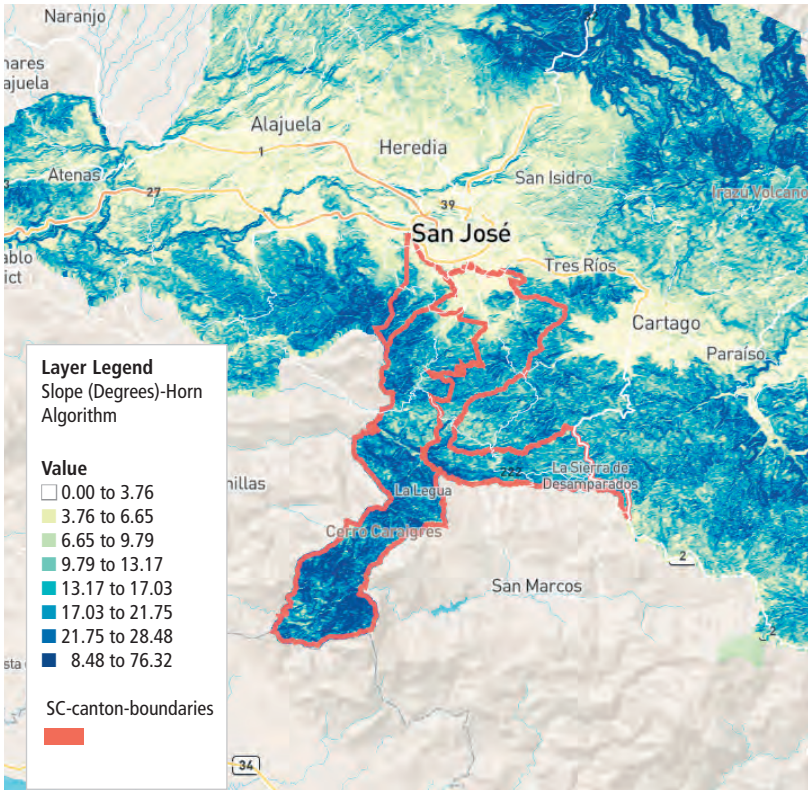
Similarly, long distances, adverse weather, and topographic conditions in the southern and northeastern areas of the GAM deter nonmotorized connectivity. The Aserrí canton has rugged topography, with steep urban streets reaching 14 degrees slope and even steeper rural areas close to San Gabriel, exceeding 26 degrees incline. This kind of landscape hinders cycling, as it requires considerable physical fitness in cyclists and the use of specialized cycling gear. Worse, the urban center of the canton is situated over 10 km from the Downtown San José area, and more than 6 km from Alajuelita and Desamparados

urban centers, distances longer than those recommended to encourage intermodality with other modes of transport.[64]

Although the cantons of Desamparados and Alajuelita also have roadways with significant inclines - over 17 degrees inclines in rural areas - their urban centers are situated in relatively plain areas and at distances shorter than 6 km from Downtown San José and between 3 and 4 km from Plaza Vizques and Cementerio train stations. This would facilitate cycling connections between the urban subcentralities and intermodalities (Figure 18).

The fragmentation of GAM-wide mobility management and the lack of an agency entrusted with specific competencies on active modes remains a challenge to the development of a holistic and effective metropolitan strategy. Under the current regulations, the MOPT and the municipalities are to foster cycling and develop integrated mobility plans, but it is unclear which agency is in charge of providing the cycling infrastructure and under what arrangements. On the other hand, the scattered road jurisdiction between cantonal and national roads makes it impossible to plan a continuous cycling network infrastructure without a consensus-based action (PIMUS 2015).

FIGURE 18. Aserrí's topography deters cycling



Source: Developed by authors based on USGS Earth Explorer SRTM 1 Arc-Second Global

The Mobility and Cycling Safety Act enacted in February 2019 comes as a great opportunity for the GAM to prioritize bicycle mobility. This Act is conceived to advance and regulate cycling as a means of transportation, commuting, and recreation through the following measures: (a) prioritize bicycles on roads with low motor traffic volumes and speeds not exceeding 30 km/h; (b) mandate any new road infrastructure work to incorporate bicycle lanes; (c) require public parking lots to allocate one bicycle slot for every ten car parking spaces; (d) include tax incentives for businesses to use bicycles as a means of transportation; (e) include corporate tax incentives for businesses promoting bicycle mobility; (f) establish road safety education from pre-school to high school; and (g) advocate the provision of cycling infrastructure suitable for bicycle intermodality (that is, bike parking near stations), the implementation of bicycle-sharing systems and their integration with public transportation. The latter is particularly relevant in the context of the electric train project and the ongoing bus transit system improvement. The implementation and advocacy of the Law fall under the responsibility of the MOPT and the municipalities. The Law provides that the resources for enforcing the Law will be financed by the fuel tax, international cooperation resources, non-refundable funds, loans and grants, and bicycle-sharing system agreements. Challenges to this plan include the division of resource management between the MOPT and the municipalities, as well as the delegation of integrated design and infrastructure to the cantons.

Since 2018 local governments and central government institutions have been working together to create and promote policies, plans, programs and projects for the implementation of active mobility. Through the signing of the Intermunicipal Agreement on Active Mobility, 11 local governments[65], together with the MOPT, the Costa Rica Road Safety Council (COSEVI), the Municipal Development and Advisory Institute

64 A 3-km range is a good estimate for cycling travel range from public transit stations (CROW 2007).
65 The public health nature of the indicator should be emphasized: septic tanks are among the wastewater treatment systems considered acceptable under the indicator but may cause groundwater contamination under certain physical and urban environment conditions

(IFAM), the National Housing and Urbanism Institute (*Instituto Nacional de Vivienda y Urbanismo*, INVU), the National Council for Persons with Disabilities (CONAPDIS), have formed a consolidated working group called the Intercantonal Active Mobility Network (RIMA, for its acronym in Spanish). This joint effort between local governments and central government institutions to improve the quality of life of citizens by promoting active mobility resulted in the definition of the Intermunicipal Territorial Plan for Active Mobility[66], which identifies more than 213 new linear kilometers of bike paths projected in the GAM, that is, almost five times the number of kilometers currently built (see Figure 19).

2. Fragmented and poorly accessible pedestrian infrastructure

Although walking is the most popular mode of transport, it may be unsafe given the risk of being hit by a vehicle. Over 36 percent of the GAM's population (more than 913,000 people) travel on foot. However, GAM streets generally have no continuous sidewalks and are poorly maintained. This compels pedestrians to run risks during their journeys, such as encroaching on the traffic road space. In 2019, some 1,081 pedestrians were injured in crashes nationwide, including 64 fatalities (14.2 percent of traffic deaths). In the South Corridor cantons that same year, 5 pedestrians were killed out of 110 victims involved in road incidents (COSEVI 2019).[67]

The lack of pedestrian-friendly infrastructure also discourages walking. On fast roads and avenues, grade crossings and overpasses are typically scarce while traffic light timing prioritizes motor vehicles, compromising the connectivity of adjacent areas and leaving the pedestrian a limited window of time to cross comfortably. In terms of accessibility, current regulations stipulate that the minimum sidewalk width is 1.20 m, falling short of international standards that define 1.80 m as the ideal minimum width to guarantee to turn space for persons with reduced mobility.[68]

Also, sidewalks and grade crossings generally do not have access ramps and feature several elements constraining the traffic space and hindering accessibility for persons with reduced mobility.[69] In Desamparados canton, for example, some infrastructure is poorly maintained, particularly in urban districts of Desamparados, San Rafael Arriba, and San Rafael Abajo. This issue worsens in the cantonal rural districts.[70] In Alajuelita and Aserrí, the sidewalks are almost nonexistent (Figure 20). This generates serious consequences in accessibility, road incidents, and safety, particularly for persons with reduced mobility, women, and children. The pedestrian walkability of GAM's center and the early progress in defining '30 km/h zones' in Desamparados can be considered good practices for replication in the South Corridor (Box 6).

The regulatory framework prior to March 2021[71] was a hurdle to maintaining sidewalks in good condition; a new regulation transfers this responsibility to the municipalities and provides funds to implement it. The Municipal Code (Law 7.794 of 1998) established that each property owner had to build and maintain the sidewalks in front of their properties, while the municipalities were responsible for enforcing compliance. Nevertheless, the lack of incentives and penalties for property owners resulted in systematic non-compliance with the existing regulations. The recent passing of the Pedestrian

FIGURE 19. Over 200 km of projected bicycle lanes will add to the existing 22.8 km

Source: Developed by authors based on MOPT 2020.

66 Territorial Plan for Active Mobility. https://changing-transport.org/wp-content/uploads/Plan-Interterritorial-Municipal-de-Movilidad-Activa.pdf
67 Desamparados: 90 pedestrians involved in injury crashes, including 4 fatalities. Aserrí: 16 pedestrians with road traffic injuries, 1 fatality.
68 https://www.boe.es/buscar/doc.php?id=BOE-A-2010-4057
69 PIMUS 2017.
70 Desamparados Road Plan.
71 Law 7.794 of 1998.

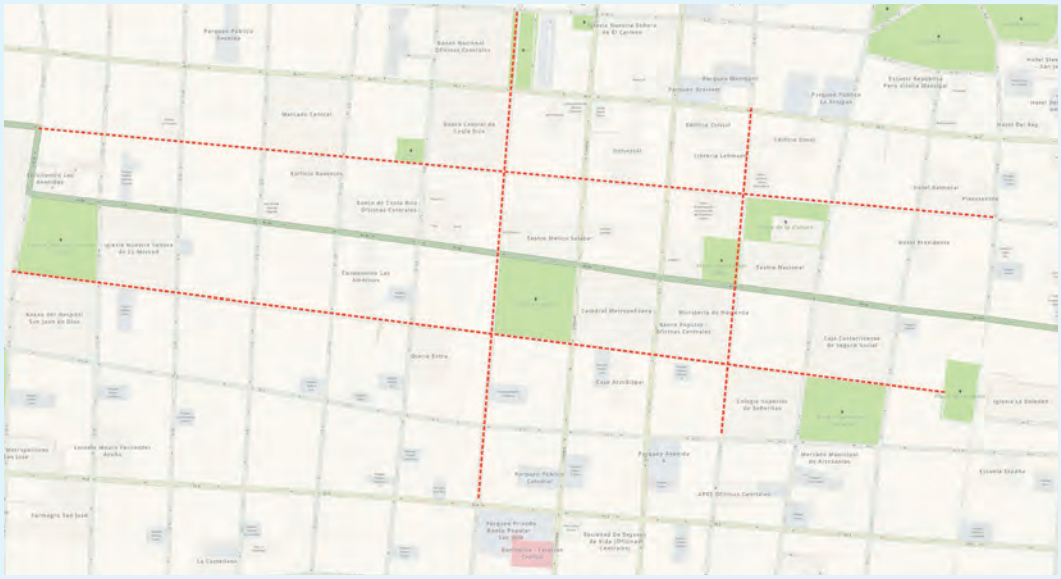
FIGURE 20. Street sidewalks in Aserrí pose physical barriers

Source: Municipality of Aserrí.

BOX 6. San José and Alajuela cantons have made significant progress toward pedestrian mobility prioritization

In Alajuela downtown, several street sections have been pedestrianized. The City of San José built a series of boulevards - Avenida Central, Paseo de los Estudiantes / Barrio Chino on Calle 9, Bulevar Ricardo Jiménez on Calle 17, Paseo de la Unión Europea on Avenida, Calle 2 and Calle 3 - and made progress in defining pedestrian walkway projects as part of the Underground Electrification Project undertaken by Compañía Nacional de Fuerza y Luz (Figure 21). In May 2021, the Municipality of Desamparados launched a canton-wide 30 km/h zone signing and marking process, starting with commercial zones downtown, as well as residential and school zones and those adjacent to cycling lanes.

FIGURE 21. Canton of San José is advancing toward pedestrian mobility prioritization



Source: Vargas Vargas, 2020.

Mobility Act (2020) transfers responsibility to municipalities to build, rehabilitate, and maintain pedestrian infrastructure and provides them with the necessary accessibility criteria compliance tools.[72] The new law defines financing instruments, including real estate tax revenues.

The promotion of new projects such as the Tiribí River recreational circuit and the creation of the Urban Mobility Unit offers an opportunity to boost walking, cycling, and other forms of non-motorized mobility. The Municipality of Desamparados and the Municipality of Alajuelita joined the Tiribí River Biological Corridor project, which aims to restore the biological corridor fauna and flora.[73] To date, 500 native trees have been planted along the Hatillo and Alajuelita areas.[74] At the same time, the Government of Costa Rica recently created the State Unit for Active Mobility. This highly skilled mobility planning agency will require strong technical expertise to fulfill the entrusted responsibilities.

72 Accessibility criteria are defined in Law 7600 thereunder.
The municipalities are given 18 months to enact the regulations of the law and 24 months to prepare the cantonal sustainable mobility plan, so the impacts on the pedestrian infrastructure improvements should be assessed over the next few years.
73 The activity was implemented by stakeholders including the Ministry of Public Works and Transport, Municipality of Desamparados, Municipality of Alajuelita, City of San José, the Public Force of Costa Rica, Hatillo Verde, Clean Rivers Initiative and Compañía Nacional de Fuerza y Luz.
74 Municipality of Desamparados. Website link: https://www.desamparados.go.cr/es/municipalidad/iniciativas-municipales/social/siembra-de-500-arboles-en-corredor-biologico-del-rio

II. The Lack of Connectivity in the South Corridor Undermines the Region's Competitiveness, Quality of Life, and Environmental Conditions

The low-density sprawling urban model and its poor connectivity generate negative social, economic, and environmental externalities that affect the GAM's development. The persistence of mono-functional peripheral areas and their relative isolation from the rest of the GAM hampers access to jobs, infrastructure, and development opportunities, segregating the most vulnerable population. This model, which is highly dependent on the privately owned vehicle, has a direct impact on soaring levels of congestion and road crashes, which undermine the region's competitiveness. It also results in significant GHG emissions and air pollution, among many other externalities that affect the city-wide quality of life.

The urban center of Desamparados is the most socially and economically attractive area of the South Corridor. Given its strategic location near Downtown San José and its multiple road accesses, the northern side of the Desamparados canton is closely connected to the capital district and benefits from the influx of people, which favors local commerce. Likewise, most of South Corridor's services, stores, and facilities are clustered in this area, particularly in the central district of Desamparados. Located in its historic district, as well as along the corridors of Routes 209 and 213, Desamparados has the largest density of a wide assortment of businesses across the South Corridor. This urban center attracts people from neighboring cantons and is also a must for commuters traveling from Aserrí to San José since most of the bus lines that connect the two cantons pass through this area. On the other hand, the southern area of the canton, predominantly rural and with virtually no public transportation available, has a closer relationship with the Los Santos region and the urban center of Cartago.

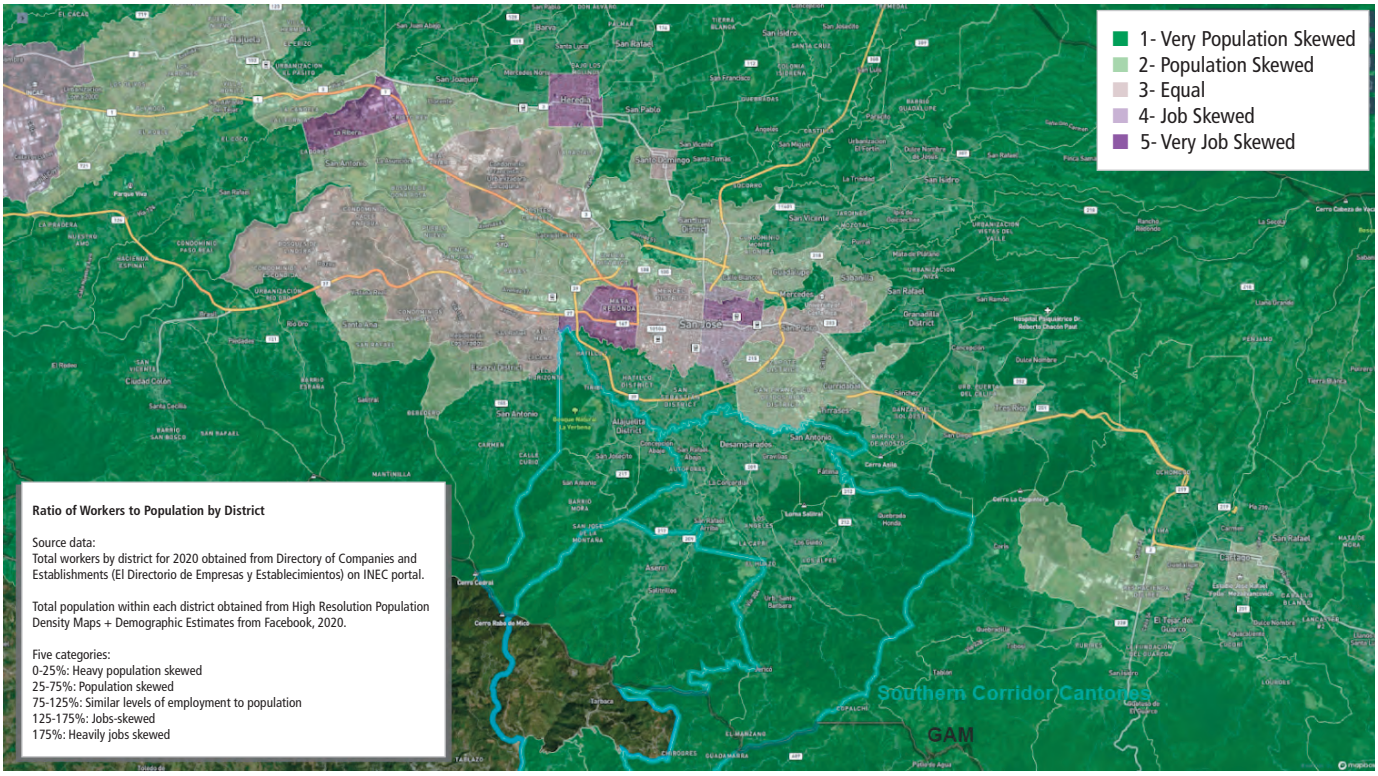
The residents of Alajuelita and Aserrí make long commutes to meet their daily needs. Due to the particularly scant supply of jobs, specialized businesses, and amenities, Alajuelita and Aserri do not attract the neighboring populations, and instead exhibit a high dependence on better-served adjacent cantons. In contrast, the Desamparados central district concentrates most of the services, businesses, and facilities in the South Corridor, and attracts the inhabitants of Aserri. The inhabitants of Alajuelita on the other hand tend to rely for commerce and other amenities on San José, to which it is better connected. Finally, although it is part of Desamparados canton (Figure 22), the residents of the southern districts, for example, Rosario, choose to meet their needs in San José, since there is a better connection through Route 222 and Route 209 passing through Aserrí.[75]

A.Limited access to employment

Jobs are concentrated in the central GAM, following the East-West axis, and in the northwest area, triggering significant commuting needs from other cantons. The primary GAM-wide commuting reason is

75 Plan Regulador de Desamparados, 2019.

FIGURE 22. South Corridor has more residents than jobs



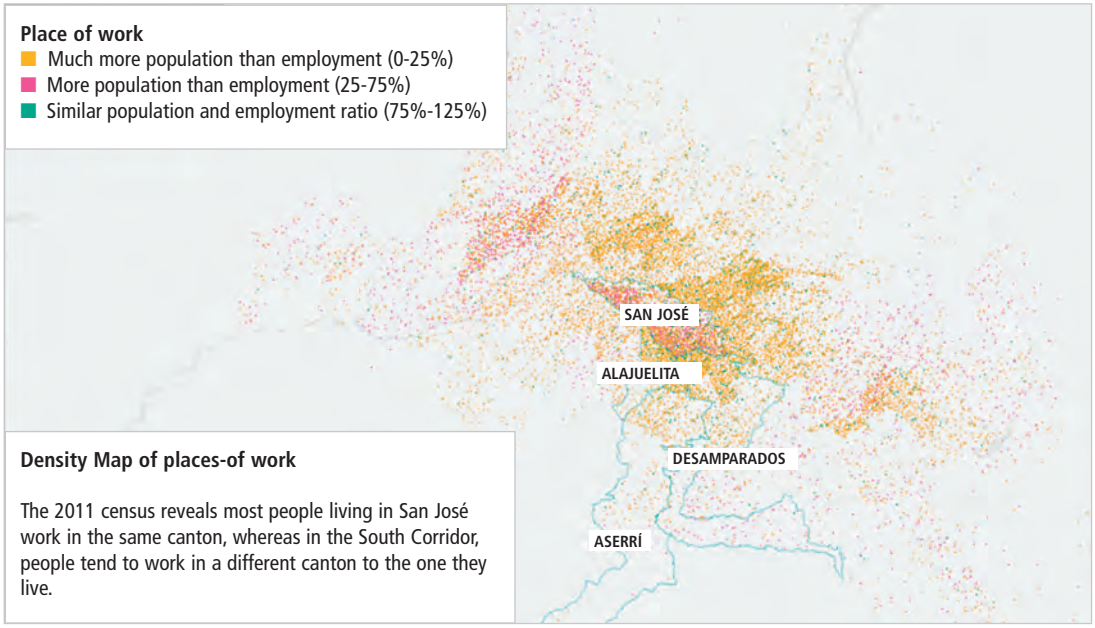
Source: Developed by authors based on National Institute of Statistics and Census of Costa Rica (INEC) 2020 and Facebook 2020[76]

employment, accounting for more than 730,000 trips a day, 29 percent of the total number of trips[77] (PIMUS 2015). The canton of San José attracts the most workers from other districts, receiving in total 236,784 commuters in this central area—representing more than 80 percent of its resident population[78] —in their journey to work. Based on 2012 data, 50 percent of all trips within the GAM have their origin or destination in San José and only 10 percent are intra-canton trips. Heredia ranks second in attracting workers (68,064), followed by Desamparados (47,320), Escazú (37,548), and Montes de Oca (35,121) (INEC 2011). On the other hand, note that most San José residents work in the same canton, and those who work outside the canton mostly commute to Escazú, Alajuela, Cartago, Heredia, and Desamparados. In contrast, South Corridor residents tend to work in other cantons (Figure 23).

South Corridor residents work mostly in San José, and to a lesser extent in Desamparados, thus creating massive commuting and congestion. As noted in the previous chapter, although the South Corridor accounted for 14.1 percent of the GAM's population in 2011, it represents only 7.4 percent of the region's employment. The scarcity of job opportunities within the cantons forces their inhabitants to commute every day to work. In particular, the residents of Desamparados work mostly in San José, while other important destinations are Curridabat and Heredia, as well as other cantons. Residents of Alajuelita have fewer options in terms of work destinations, commuting mainly to San José, Desamparados, and Alajuela. Finally, residents of Aserrí commute only and evenly to San José, Desamparados, and Curridabat (Figure 24).

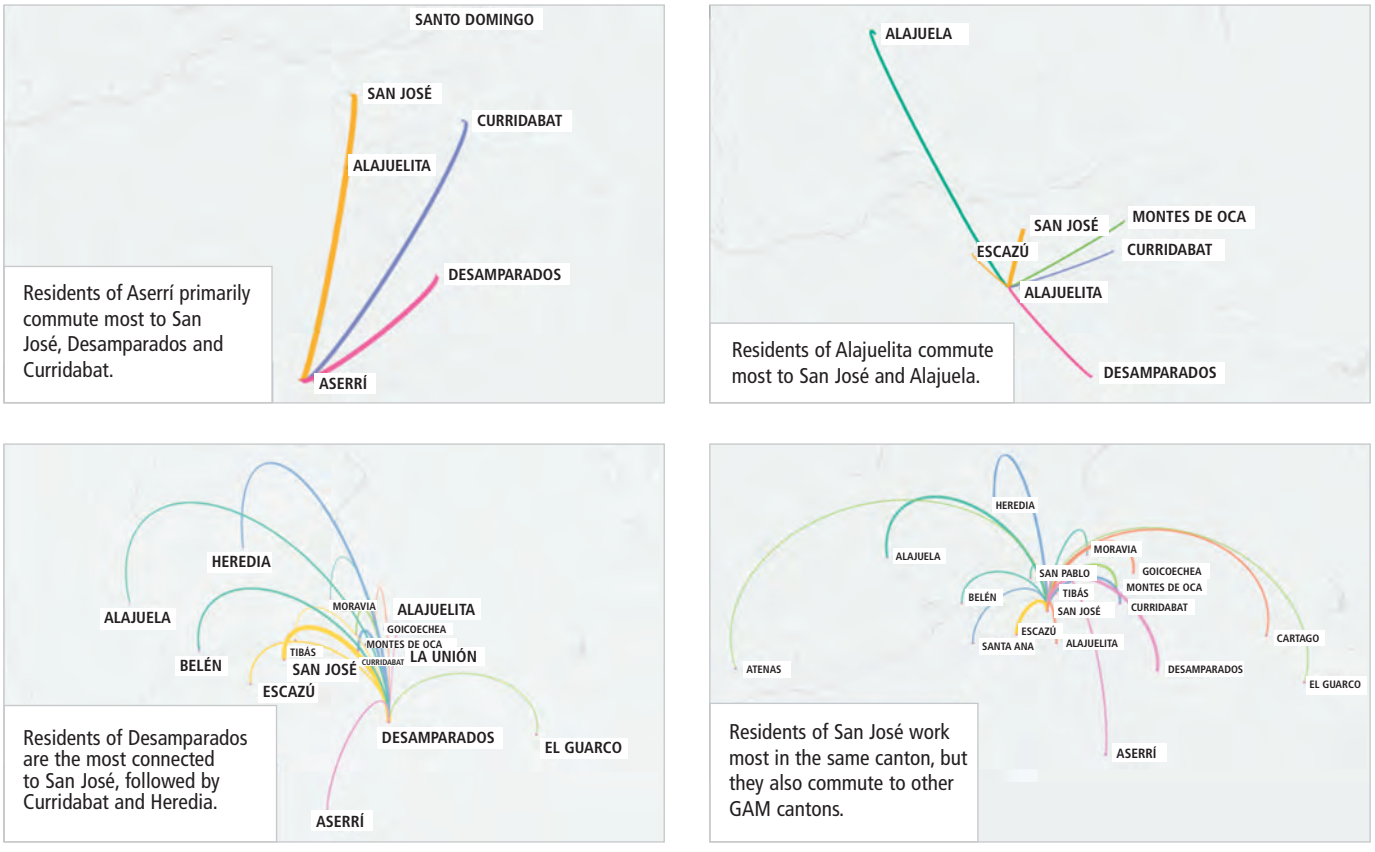
76 Employment to population ratio, by district (jobs/population*100).
77 Of these, 34 percent are by bus and 33 percent by car.
78 Based on the latest census, Canton of San José had a population of 288,054 inhabitants in 2011

FIGURE 23. The South Corridor population is not working in the same canton where it resides



Source: Developed by authors based on INEC 2011 and Quadrant 2021

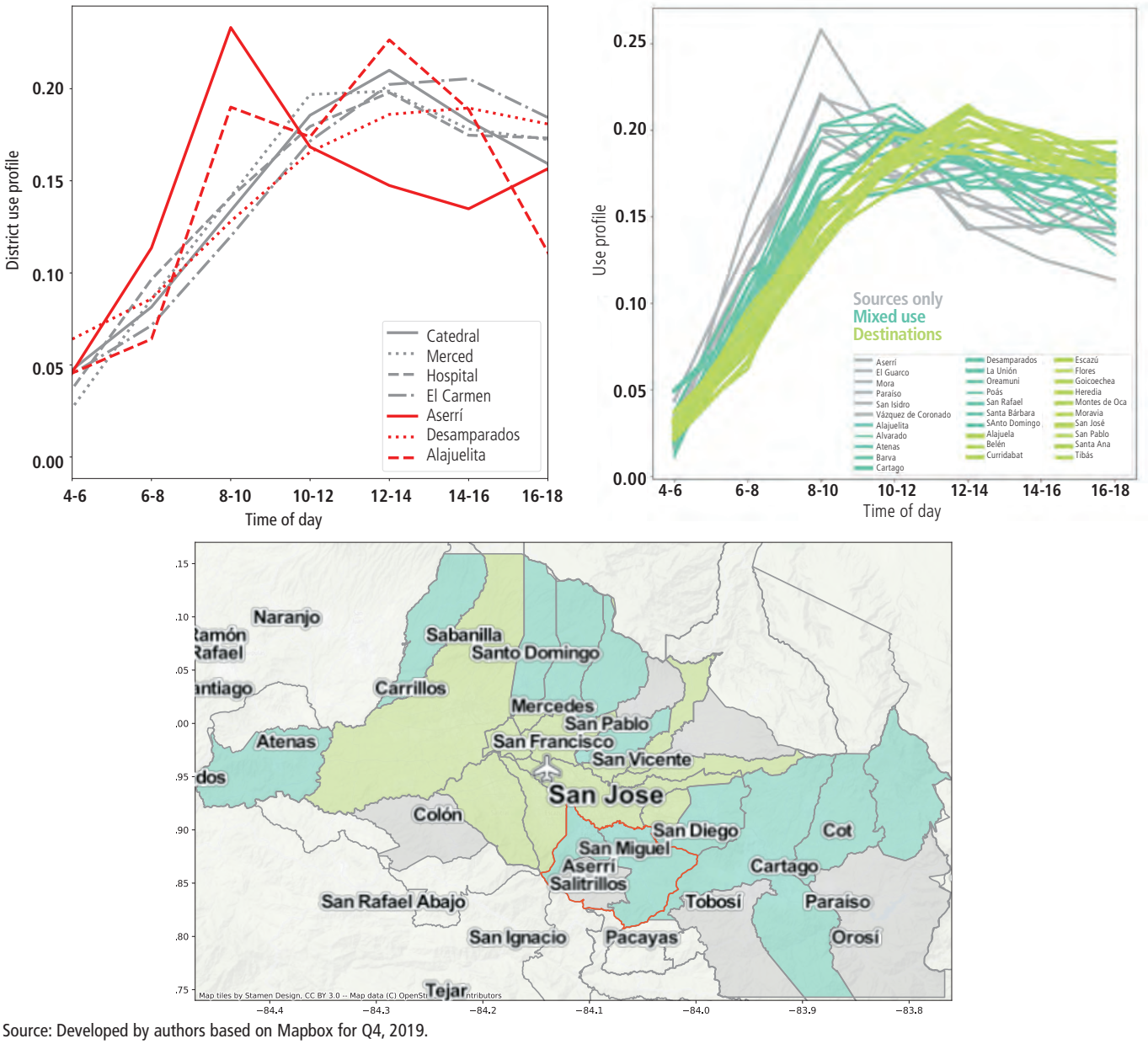
FIGURE 24. South Corridor residents work mostly in San José, and to a lesser extent in Desamparados



Source: Developed by authors based on INEC 2011 and Quadrant 2021

The residents of South Corridor cantons travel mostly in the early mornings, evidencing little activity during the rest of the day. The analysis of commuting based on different schedules, using cell phone data (Figure 25), clearly shows that peripheral cantons such as Aserrí, El Guarco, Mora, or Vázquez de Coronado became dormitory cantons, whose residents travel early in the morning to work. These cantons show greater movements during the first hours of the day, between 6 am and 11 am, with scarce activity within these cantons throughout the day. Findings for Alajuelita and Desamparados show intensive movement between 8 am and 12 pm, although their use profile is more heterogeneous, suggesting a greater balance in terms of commuting and staying in the cantons throughout the working hours. The concentrated travel flows from the South Corridor to San José at similar hours jams the National Routes 110, 175, 209, 210, and 214, particularly along the access roads to the central district (Figures 25 and 26).[79]

FIGURE 25. South Corridor cantons are busiest in the early morning hours



Source: Developed by authors based on Mapbox for Q4, 2019.

79 These commuting behaviors were affected by COVID-19 and its lockdowns (see section D), which is an opportunity to harmonize commuting patterns by strategies such as staggered work schedules or continued work from home for certain industries.

FIGURE 26. The roads connecting the South Corridor cantons with San José are often congested both in the morning rush hour (image a) and in the evening rush hour (image b)

Image a

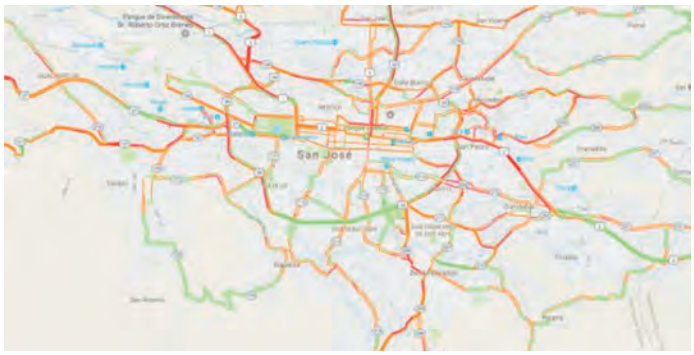
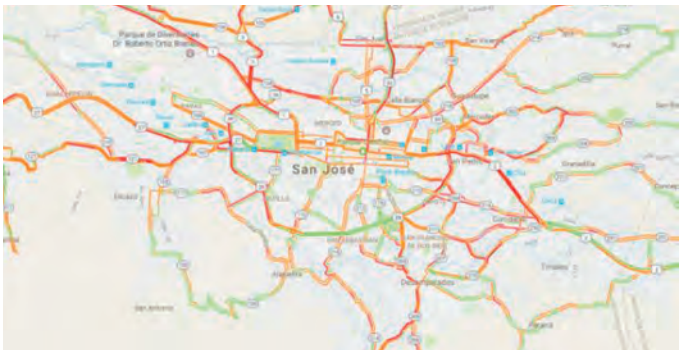


Image b

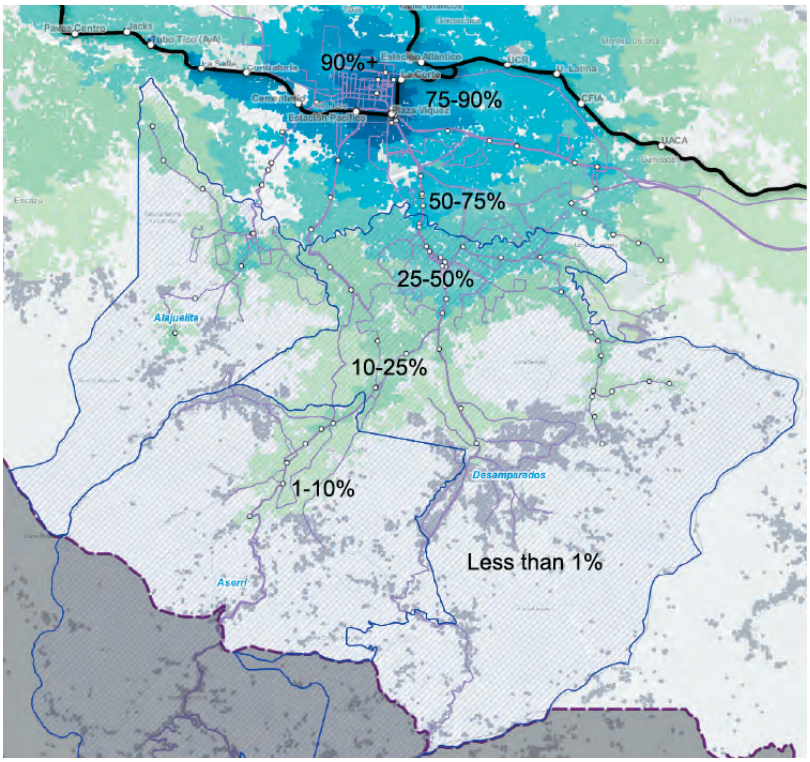


Source: PIMUS 2017.

Not only are jobs scarce in the South Corridor, they are also difficult to physically access. About 45 percent—or 22,000 people—of the population of Aserrí can access less than 1 percent of the jobs within the GAM in less than 60 minutes, either walking or using public transportation. In Desamparados, although it is a canton that generates a large number of jobs, this figure amounts to about 59,000 people or 26 percent of its population. Although in Alajuelita the total population without access to employment in less than 60 minutes is only 8 percent, this canton has an extremely weak economy, creating very few local jobs, and causing most of the population to commute to work in the neighboring canton of San José (Figure 27). Difficulties in accessing jobs by public transportation or on foot prevent part of the population living in the outlying cantons from capitalizing on the economic development opportunities offered by the GAM, thus perpetuating inequalities.

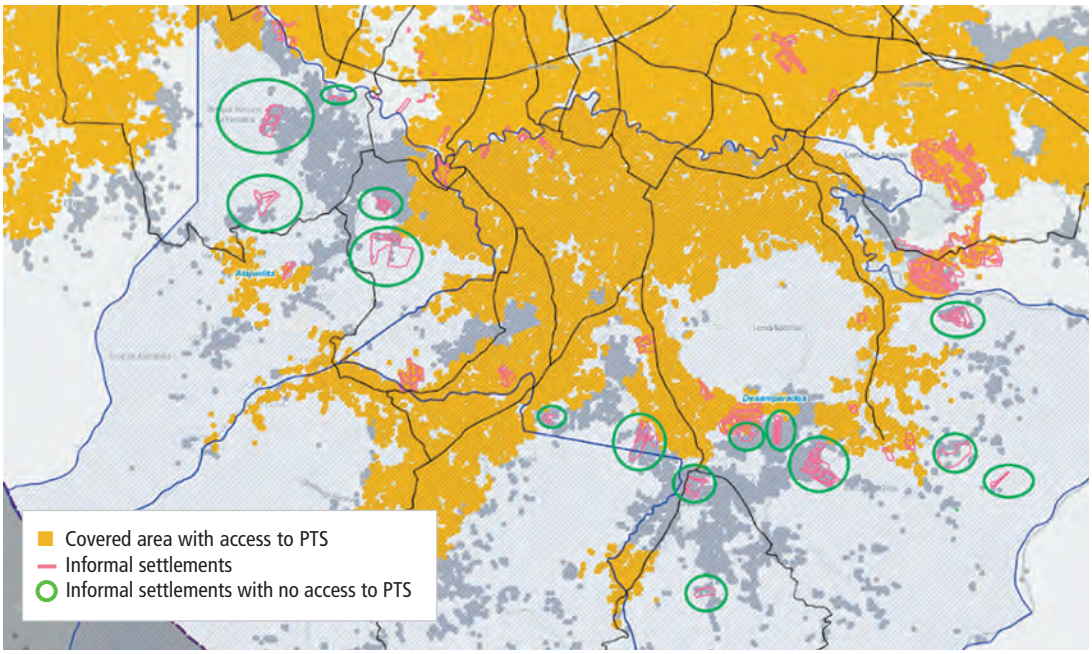
This limited accessibility to economic development opportunities perpetuated inequalities. Numerous informal settlements emerged (Figure 28) in the District of Los Guido, Desamparados, including Sectores Uno, Cuatro, Seis, Siete and Ocho, Las Mandarinas, 25 de Diciembre or Las Gardenias, totaling more than 2,700 households in 2011 (MIVAH 2021). In addition to the shortage in housing, infrastructure, and quality public spaces, most of the resident households do not have access to public transit. The District of Patarrá also has informal settlements, including Los Ángeles, Picacho, Niño Jesús de Praga, El Bosque, Calle Tirra, and El Guisaro, where more than 1,200 households with limited access to public

FIGURE 27. South Corridor cantons struggle to access the GAM-based jobs by foot, by bus, or by public transit in less than 60 minutes



Source: Developed by authors with data from INEC 2020 (jobs) and OpenStreetMap and Google Places API (bus and train stops).

FIGURE 28. Fourteen informal settlements with little or no access to public transportation are identified in the South Corridor



Source: Developed by authors based on MIVAH 2021 (informal settlements) and OpenStreetMap and Google Places API (bus stops).[80]

transportation reside. Available information[81] suggests that approximately 30 percent of the informal settlements in Desamparados do not have access to public transportation. In Alajuelita canton, the lack of access to public transportation persists in informal settlements, including Los Pinos and El Jazmin, District of San Felipe or Monte Alto, Concepcion, totaling more than 1,150 households (MIVAH 2021). In this canton, it is estimated that over 75 percent of the population living in informal settlements has limited access to bus stations. In addition, in many cases, the high population density in informal settlements implies a greater demand for public transportation in terms of frequency and capacity, which goes unmet. The lack of accessibility of public transit is also evident in mountainous and hilly settlements, for example, Las Lámparas, in Alajuelita, where road conditions and steep slopes prevent buses from entering.

B. Impacts of the urban and mobility model on the quality of life

1. Unequal access to public amenities and services

The South Corridor cantons suffer from a shortage of public amenities and specialized businesses, prompting residents to travel elsewhere to meet these needs. Although the majority of the population residing in the urban GAM has access to parks, health, and educational facilities in less than 30 minutes by walking or by riding on public transportation, some peripheral areas remain underserved, particularly in Aserrí.

Around 29 percent of GAM residents have a health care center within a 15-minute walking distance, a share that rises to 50 percent in Aserrí, and affects 19 percent of residents of Alajuelita and 15 percent of residents of Desamparados. In the latter canton, half of all health facilities are concentrated within its central district (*Plan Regulador* 2019). When reviewing

80 In the absence of a full official dataset, bus stop locations are supported by available information from OpenStreetMap and Google Places. This may not provide a exhaustive overview of bus stop available on the public transport network. Further analysis of individual sites should be done on a more detailed, case-by-case basis.
81 See the preceding note.

accessibility to hospitals, Aserrí again stands out, since 27 percent of its population is unable to even drive a private vehicle to one of these basic facilities within 15 minutes. Smaller shares are found in Desamparados (3 percent) and Alajuelita (1 percent) (Figure 29). The residents of the South Corridor cantons and, overall, of the entire GAM, have to travel to the central districts to access specialized health care in secondary and tertiary health care hospitals. In any case, the health care infrastructure strengthening process implemented since 2014 is noteworthy, as it led to the construction of public health care clinics (EBAIS) in Dos Cercas and Frailes, Desamparados, opened in 2018 and 2021, respectively.

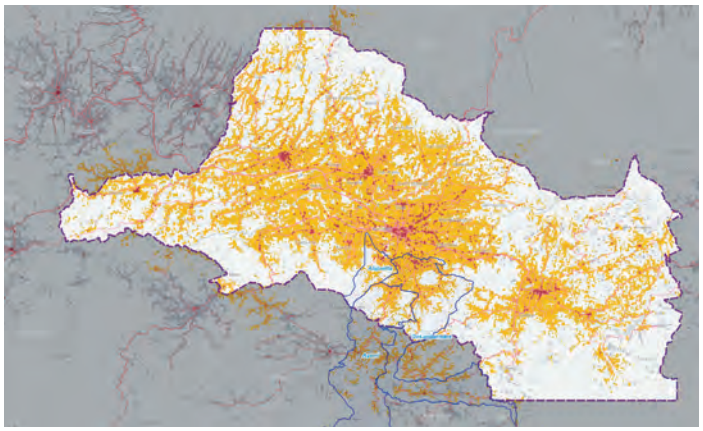
As for educational institutions, 15 percent of the Aserrí population within the GAM is unable to access them within a 30-minute walking distance. This percentage improves for Desamparados (3 percent) and Alajuelita (2 percent) (Figure 30). While several private universities and a campus of the Universidad Estatal a Distancia (UNED) are based in Desamparados, the majority of South Corridor students commute to San José to attend university. As for the distribution of kindergartens in Desamparados, these are only located in the central district and San Miguel, leaving the rest of the canton unserved (Plan Regulador 2019).

A large percentage of the population has no access to public green spaces within a 15-minute walking distance: 24 percent in Aserrí, 6 percent in Alajuelita, and 9 percent in Desamparados (Figure 31). In Desamparados canton, over half of the green spaces are concentrated in three districts: Damas (19.8 ha), Desamparados (11.8 ha), and San Miguel (11.1 ha) (Plan Regulador 2019). Although Alajuelita lacks green areas, the process of construction and improvement of parks undertaken in this canton over the past few years is noteworthy and may have positive impacts on the quality of life of its residents as well as on the mobility in this canton and its surroundings.

Unlike Desamparados, Alajuelita and Aserrí have a scarce assortment of specialized retailers. Their central areas do not have any significant commercial zones, and are dominated by bazaars, grocery stores, distributors, and hardware stores.[82]

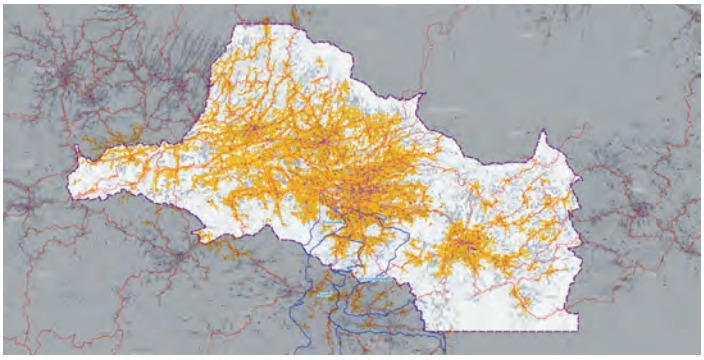
82 Canton of Alajuelita Conservation, Development and Road Safety Plan, 2016.

FIGURE 29. Nearly 1 in 3 people in the GAM do not have access to health care facilities (medical care, hospitals, clinics, pharmacies, and dental care) within a 15-minute walking distance



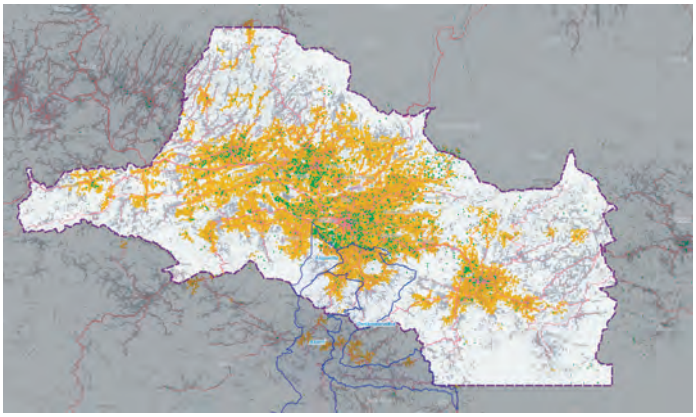
Source: High-Resolution Settlement Layer and USGS Earth Explorer SRTM 1 Arc-Second Global.

FIGURE 30. Six percent of the GAM population is unable to access educational establishments (preschools, schools, high schools, universities, colleges, and language schools) within a 30-minute walking distance)



Source: High-Resolution Settlement Layer and USGS Earth Explorer SRTM 1 Arc-Second Global.

FIGURE 31. Twelve percent of the GAM population is unable to access parks and green spaces within a 15-minute walking distance



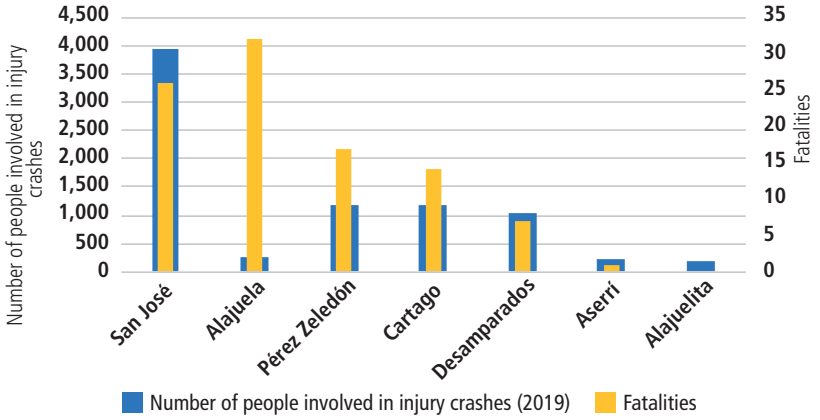
Source: High-Resolution Settlement Layer y USGS Earth Explorer SRTM 1 Arc-Second Global.

On the contrary, and due to its strategic position next to downtown San José and its multiple access roads, Desamparados boasts vibrant local commerce in both its historic district and along the corridors of National Routes 209 and 213. Also, this canton is home to large-scale commercial establishments, including Multicentro Mall in Desamparados, Maxi Palí in San Miguel, and Los Higuerones in San Rafael Abajo, which attract buyers from neighboring cantons.

2. Soaring indicators in road safety

The GAM has a growing number of road incidents, mostly concentrated in the canton of San José and the access roads to Avenida Circunvalación. Nationally, road incidents have risen year after year, with 50 percent more crashes being recorded in 2019 than in 2012. Based on COSEVI data, in 2019 Costa Rica reported 14,861 traffic collisions, with 2,176 of them resulting in fatalities or serious road traffic injuries. San José has the highest concentration of road accidents, both in absolute terms and per inhabitant, with 3,925 people involved in injury crashes in 2019. It is followed by the cantons of Alajuela, Pérez Zeledón, Heredia, Cartago, and Desamparados. Other South Corridor cantons report smaller statistics (COSEVI 2019) (Figure 32). As seen in Figures 33 and 34, the areas around the access roads to Avenida Circunvalación, one of the most important roads in the city, have high road accident rates. There are also a large number of crashes along Av. 2, which can be explained by its intensive use as the only East-West connection to the urban center.

FIGURE 32. Desamparados ranks fifth with the highest number of people involved in injury crashes nationwide

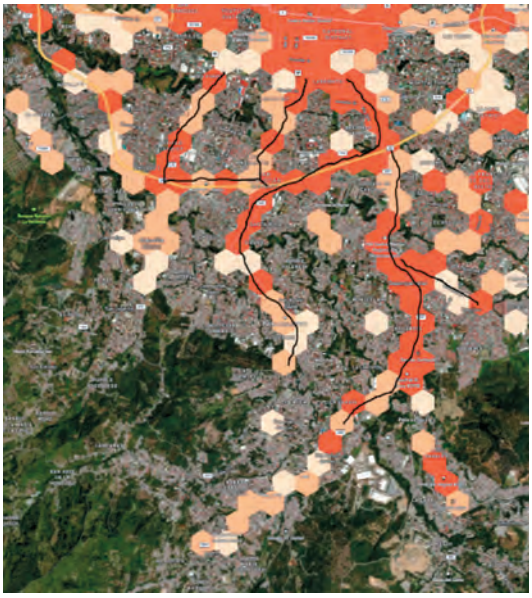


Source: Developed by authors based on COSEVI 2019.

FIGURE 33. Road accidents between 2013 and 2017 were particularly concentrated on Av. Circunvalación and Av. 2

Source: Developed by authors based on COSEVI 2013–2017.

FIGURE 34. A large number of road crashes along Routes 209 and 214 were reported southwards



Source: Developed by authors based on COSEVI 2013–2017.

Incidents involving motorcyclists are significantly higher across the South Corridor cantons. In Desamparados and Aserrí, over 35 percent of all car crashes reported in 2019 involved a motorcycle. This number is 9 percentage points higher than the national rate (26.2) and 8 percent higher than San José, suggesting that South Corridor cantons are home to a greater share of people riding motorcycles and that safety conditions are less adequate (Figure 35). Due to the COVID-19 pandemic motorcycle deliveries increased, which, according to COSEVI, increased the number of motorcyclists fatalities to 155 in 2021.

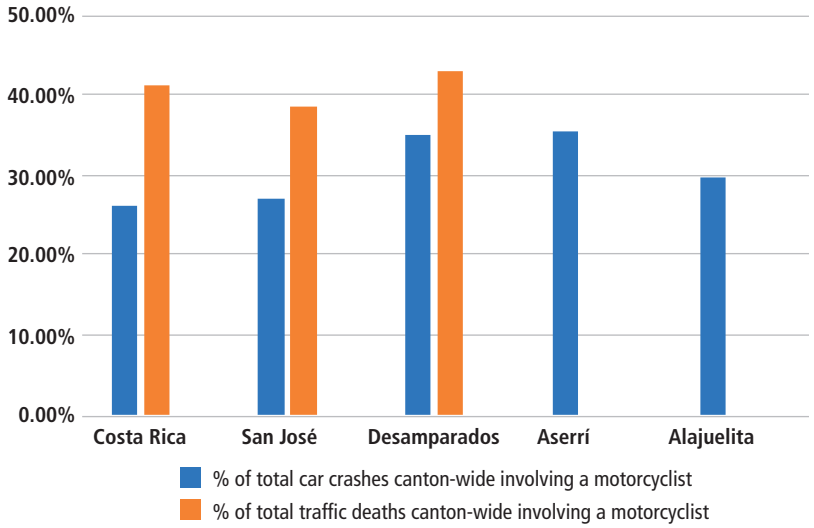
C. The Transport Sector's significant contribution to climate change and impact on air quality

From 2000 to 2014 Costa Rica generated the largest CO_2 emissions per capita from transportation in Latin America, surpassing Brazil, Argentina, and Mexico. [83]

The inventory of the GHG emissions from different sectors suggests that in 2015 transportation represented 23 percent of the total CO_2 emitted in the country (5,394.13 gigatons). In particular, land transportation contributes 17.4 percent of the total GHG emissions for Costa Rica. It is noteworthy that that diesel vehicles, which only represent one-fifth of the total fleet size (and a quarter of total annual vehicle miles traveled), account for over half of CO_2 emissions per year, over 3.4 million tons[84] (Figure 36).

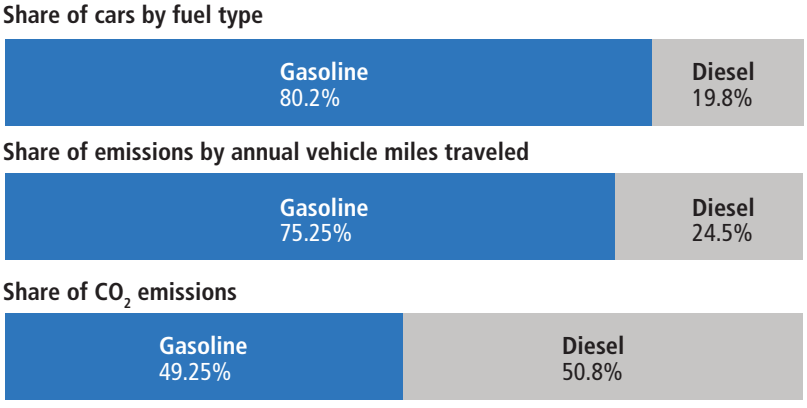
Nationally, health care costs due to air pollution are estimated at US$280 million yearly.[85] GAM-wide levels of harmful air pollutants and suspended particulate matter concentrations are above the limits recommended by the World Health Organization (WHO). The air quality index[86] of the canton of San José threatens an upward trend to 82/100, substantially higher than the values of cities with larger populations, such as Montevideo or Bucaramanga at 21 and 55, respectively (IDB 2014). While CO_2 emissions

FIGURE 35. In Desamparados and Aserrí, over 35 percent of all car crashes reported in 2019 involved at least a motorcycle



Source: Developed by authors based on COSEVI 2019.

FIGURE 36. Diesel vehicles account for a larger share of CO_2 in percent weight for the number of units and their contribution to the fleet cumulative miles traveled (2019)



Source: Fernández 2020, based on Riteve SyC 2020; INS 2020 and Sepse-Minae 2020a, b.

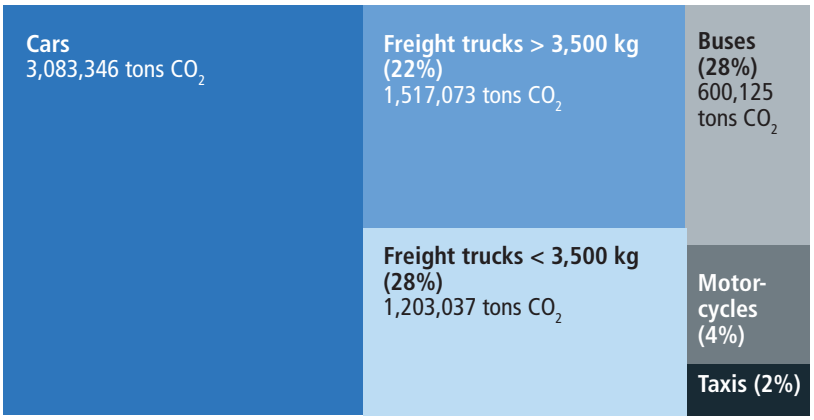
83 Sustainable Urban Transport in Latin America, Despacio, February 2020.
84 The emissions from diesel vehicles is 50.8 percent versus 49.2 percent of emissions from petrol vehicles.
85 Dobles 2011.This figure does not consider the quality of life and productivity loss.
86 Indicator that measures the concentration of harmful pollutants (tropospheric ozone, particulate matter, carbon monoxide, sulfur dioxide, and nitrogen dioxide) in the air.

are the leading cause of global warming, carbon monoxide and hydrocarbon concentrations have an impact on people's immune systems, as they may cause lung and heart diseases, whose treatment implies significant economic costs (Alfaro 2020). A study by the Centro Agronómico Tropical de Investigación y Enseñanza and Cepal-Euroclima showed that bringing pollution down to the recommended WHO levels would prevent the death of 229 people annually, as well as 563 cases of chronic bronchitis, and 4,508 asthma crises in adults and 2,571 in children (Alpízar et al. 2017).

Between 1980 and 2019, Costa Rica's vehicle fleet size increased almost 10 times, affecting health and the environment. One of the main causes of poor air quality in Costa Rica is vehicle congestion and an outdated and polluting vehicle fleet and public transportation fleet. Over the past 40 years, the vehicle fleet in Costa Rica has been growing at an uninterrupted yearly pace (Figure 37). Based on Sepse-Minae official statistics (2020a), between 1980 and 2019 the vehicle fleet jumped from 180,986 units to 1,752,813. On average, the annual growth rate has been 6 percent, in a country where the population growth rate has averaged 2 percent per year in four decades. The size of the vehicle fleet has a direct influence on overall emissions.[87]

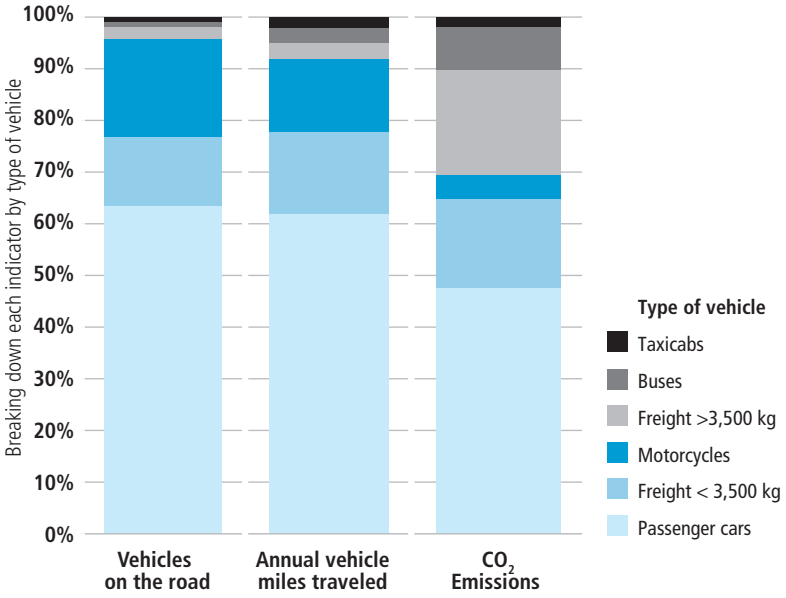
Heavy-duty vehicles make up only 2 percent of the total fleet size and 3 percent of annual vehicle miles traveled, but they account for 20 percent of total emissions. Out of total emissions generated by vehicles in 2019 in Costa Rica, passenger cars accounted for 45 percent, freight vehicles 40 percent (22 percent heavy-duty and 18 percent light-duty), public passenger transportation, including buses and cabs, 11 percent, and motorcycles the remaining 4 percent (Figure 38). In addition to trucks, buses also show an imbalance in number and use. In contrast, motorcycles account for 19 percent of the total fleet but contribute less than 5 percent of total CO_2 emissions. Automobiles, which account for 63 percent of the total fleet size, have a smaller relative share of CO_2 emissions, with 48 percent of total emissions.

FIGURE 37. Privately-owned cars are the largest contributor to CO_2 emissions



Source: Fernández 2020, based on Sepse-Minae 2020b; INS 2020.

FIGURE 38. The number of heavy-duty vehicles and buses mismatch their contribution to CO_2 emissions, 2019



Source: Fernández 2020, based on Riteve SyC 2020; INS 2020 and Sepse-Minae 2020a,b

The domestic public transit fleet remains very polluting, but the government is striving to decarbonize the sector. Although public transport is moving toward adopting EURO V and EURO VI standards, most of the fleet currently complies with EURO III[88], whose limits for PM10

87 State of the Nation Report 2020, based on the mandatory technical vehicle inspection (RTV) findings in Costa Rica, conducted by the firm Riteve SyC.

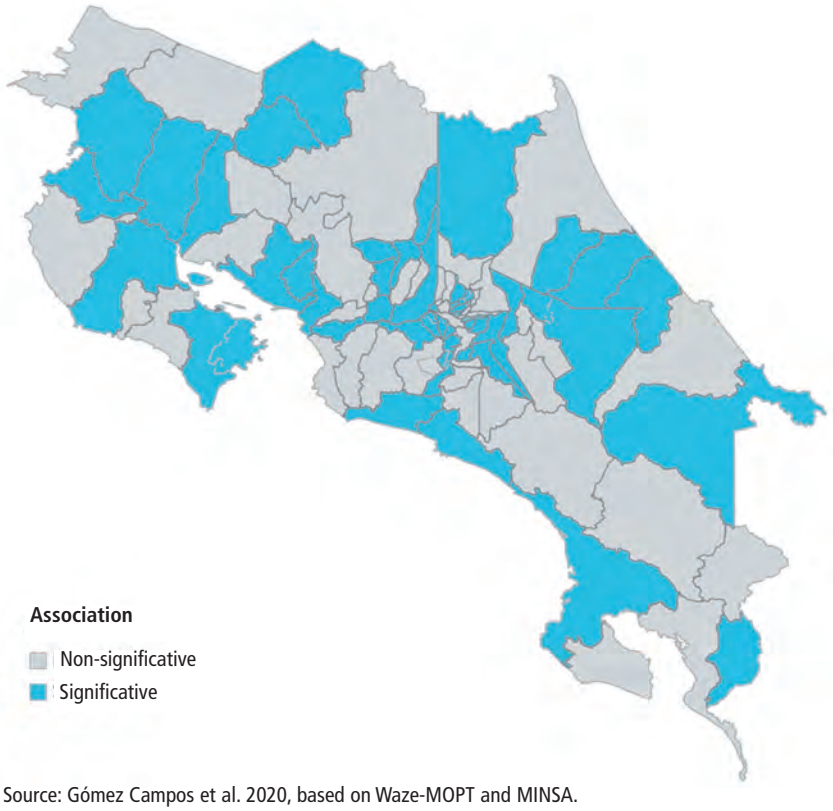
88 The European air pollutant emissions standards refer to staging the progressive introduction of increasingly stringent standards that regulate the permissible exhaust emission limits for new vehicles sold in the European Union member states. Standards for heavy-duty vehicles are denoted with Roman numerals instead of Arabic numerals (Euro I, Euro II, and so on).

and PM2.5 are high. Given the above situation, the government has prioritized accelerated vehicle replacement schemes, focusing on replacing the public transport fleet with low-emission vehicles.[89] However, legislation to formalize and mandate the scrapping of vehicles that are no longer in service remains inadequate.

Costa Rica is well known internationally for climate action leadership and ambitious targets for decarbonizing its economy. Drawing on the National Energy Plan (PNE), the National Decarbonization Plan (PND) 2018–2050, and the National Electric Transportation Plan (PNTE) 2018–2030, the country has sought to encourage more efficient mobility systems, proposing specific measures for privately owned vehicles, freight vehicles, and public transportation fleets. Likewise, the government incentivized active mobility through the Mobility and Cycling Safety Act Nº 9660 of 2019 and Legislative Decree Nº 9329. In the GAM, joint effort between some local governments, central government institutions, the German Cooperation (GIZ), and civil society stakeholders to develop the Intermunicipal Territorial Plan for Active Mobility stands out. The backbone of these plans and programs is the decarbonization effort nationwide, especially in the transportation sector (see Annex 1). The national reform plans in this sector are sophisticated and comprehensive, with ambitious goals and action plans; however, their implementation lags in regulations, approvals by the Legislative Assembly, or decrees by the ministries, and therefore their implementation is usually delayed.

Costa Rica is targeting a full transition to zero-emission buses. The PND of 2019 has the goal of reaching 30 percent of e-buses out of the total the public transport fleet by 2035, and 85 percent by 2050. Additionally, by 2035 it is expected that 70 percent of the taxis will be electric and 100 percent by 2050. In terms of modal shift, it is expected that 10 percent of the trips will be non-motorized (bicycle and walking).

FIGURE 39. Cantons with a significant association between road congestion and COVID-19 cases



Source: Gómez Campos et al. 2020, based on Waze-MOPT and MINSA.

D. COVID-19's impacts on mobility particularly affect South Corridor cantons

In general, there have been high levels of virus infection in high traffic congestion areas, such as Alajuelita and Aserrí. A study developed by *Estado de la Nación* shows that variables such as road congestion, population density, and the share of individuals who commute to work in cantons where they do not reside are positively associated with the transmission of the virus. These variables are linked to behaviors and social conditions that jeopardize compliance with social distance norms recommended by health authorities to prevent infection.[90] As observed in Figure 39, the

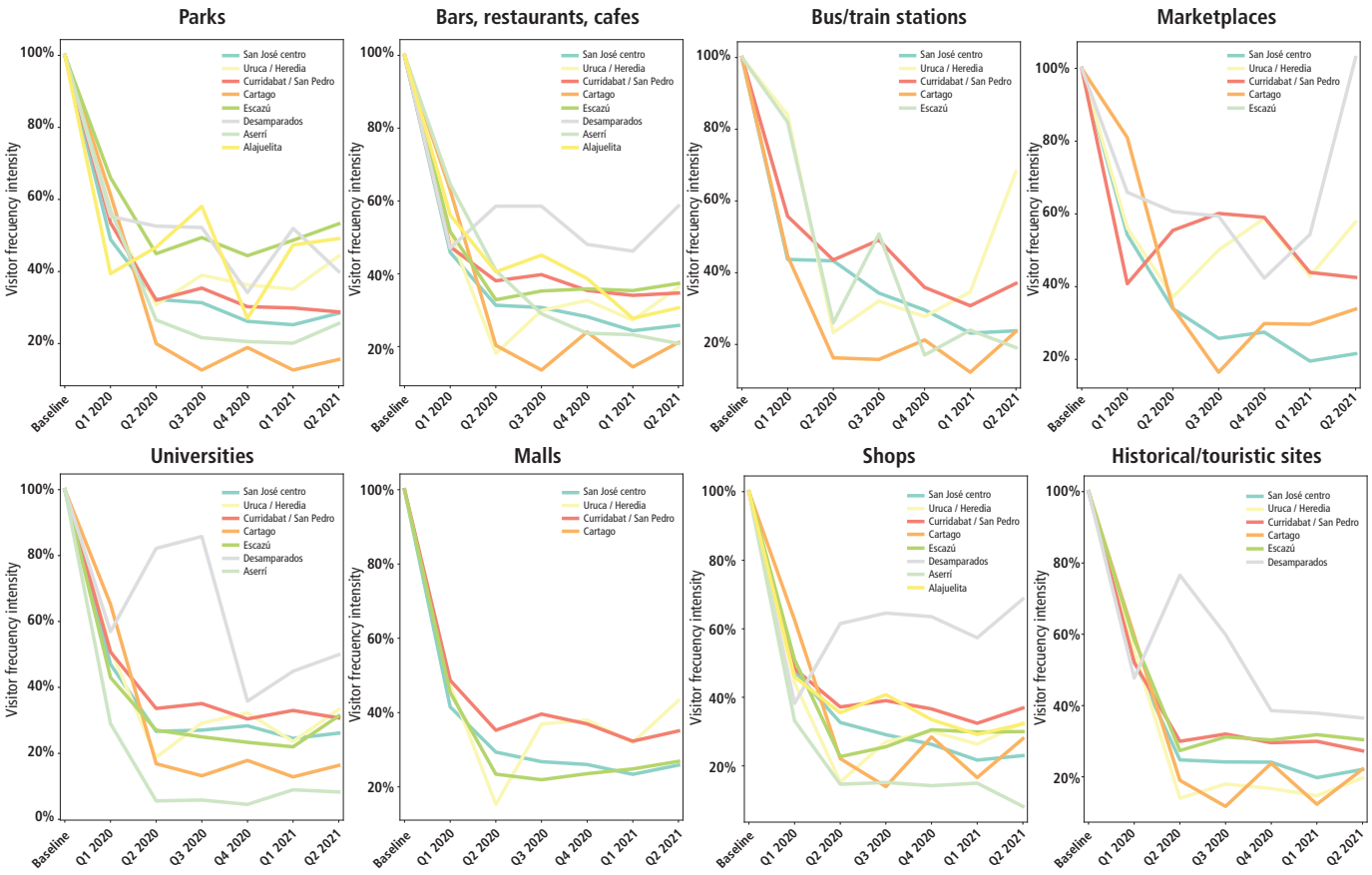
89 "Foundations for a Public Transport Low Emission Technologies Roadmap" prepared for the Ministry of Environment and Energy (MINAE) by UNDP, German, Austrian and European Union cooperation, in 2014.
The VII National Energy Plan set as a target to implement a public transit fleet scrapping program by July 2020.
The National Decarbonization Plan 2018–2050, also includes the creation of a pilot scrapping program as one of the activities to enhance combustion fleet efficiency, defining a roadmap for the implementation of a scrapping model and business scheme.
90 The increasing mobility of people, from areas with many workers who must commute to other cantons for work, as well as the receiving municipalities that also have high population densities and installed business premises may boost people's physical contact, thus creating more conducive conditions for mass transmission.

dormitory cantons of Aserrí and Alajuelita, which display high mobile congestion patterns due to a large share of individuals working in neighboring areas, also demonstrate a high level of virus infection.[91]

At the intra-canton level, most of the South Corridor's busiest areas[92] saw a fall in visitors in the second 4-month period of 2020; on some bus routes, ridership declined by up to 80 percent. The influx drop has resulted in reduced demand for public transit use and thus a decline in services delivered. The frequency of visits to stores, resorts, beaches, and parks in Costa Rica fell by 82–84 percent. This downturn was especially steep in the case of bars and restaurants, bus and train stations, markets, and tourist hot spots in downtown San José (Figure 40). This is quite understandable due to the high concentration of services, commerce, and the high density of public transportation stops and lines in this area. The South Corridor saw a decrease in activities at parks, bars, and restaurants located in Aserrí and Alajuelita.

In the face of reduced public transportation traffic, cycling boomed. The industry reported sales growth of up to 50 percent in the country, along with the demand for electric bike rental services.[94] In response, the government published the Recreational and Urban-Labor Cycling Protocol, containing guidelines to promote the use of cycling, including recommendations for visibility on public roads, periodic review of the condition of the bicycle, personal equipment, and cleaning and disinfection of the vehicle.[95]

FIGURE 40. Parks, bars, and restaurants in the South Corridor cantons saw a significant drop in visitors as of the second quarter of 2020



Source: Mapbox movement data[93]

91 Gómez Campos et al. 2020, based on Waze-MOPT and MINSA.
92 The concept of crowded spaces refers to places with a large concentration of people under normal conditions, such as parks, restaurants, bus or train stations, markets, universities, shopping malls, stores, and tourist areas.
93 https://www.mapbox.com/movement-data
94 La República. https://www.larepublica.net/noticia/ciclismo-vive-su-propia-pandemia
95 https://www.presidencia.go.cr/bicentenario/wp-content/uploads/2020/08/Protocolo-para-la-pr%C3%A1ctica-del-ciclismo-recreativo-y-urbano-laboral.pdf

III. Rebalancing Metropolitan Area Development and Improving the South Corridor's Connectivity

Given the challenges laid out, this section proposes four strategies to rebalance the development of the metropolitan area and improve the connectivity and accessibility of the South Corridor. These types of measures would cut down the current system's costs in economic, social, and environmental terms, and have a positive impact on people's quality of life by improving access to public services and infrastructure and health; the environment, by reducing GHG emissions; and economic activity, by connecting workers with employment opportunities and companies with one another.

A. Integrating urban with mobility planning: the opportunity of Transit-Oriented Development projects.

The integrated planning of urban and territorial development and mobility is fundamental to promoting the sustainable development of the GAM and undoing the effects of urban sprawl. The shape of the city directly affects the demand for mobility while the available supply of transportation infrastructure directly affects the socioeconomic opportunities that the city can—or cannot—provide. As a result, it is necessary to strengthen the integrated planning and management of the territory, mobility, and urban systems to guide the city's growth, consolidation, and densification processes, and to ensure that all people enjoy equal access to jobs, goods, and basic services.

Enhancing GAM sub-centralities through TOD contributes to compact development and reduces dependence on the central district. Implementing TOD projects around high-demand rail stations or bus stops may strengthen existing centralities or create new ones, favoring the consolidation of local economic development in medium- or high-density neighborhoods. TOD projects are based on building dynamic urban spaces through the promotion of mixed land uses, where residential, commercial, employment, and recreational activities coincide. They also encourage intermodality, integrating train and bus public transportation services, as well as active mobility infrastructure. The promotion of dense and dynamic urban centers, with a richness of well-connected economic and social activities, has the potential to attract investment; contribute to the generation of new economic opportunities for citizens; raise new revenues for local governments; and encourage the revaluation of land, rental income, and real estate values. In addition, the strengthening of existing centers, and the generation of new attractive poles where mixed uses and employment opportunities abound, can potentially reduce dependence on other economic centers and reduce travel times within the GAM.

Considering the strides made by the government in identifying sub-centers with potential for value addition and densification, the feasibility assessment and design of TOD projects in the areas of influence of Parque Central de Alajuelita and Parque de Desamparados nodes should move ahead. First, economic, demographic, urban, existing infrastructure, and projected demand factors should be evaluated to define the technical feasibility of densification in these areas. An economic assessment of the real estate market and development opportunities will help gain a better understanding of the development potential and the programs that could be implemented in these city areas. Next, a plot land and ownership analysis within the study area will reveal whether there is any vacant or underutilized land available,

preferably public land, in the vicinity of the most attractive areas. Using these definitions, it will be possible to design a sector plan that proposes uses and programs, projected densities, typologies, flows, and intervention strategies in the environs of the interchange hubs and public spaces, among other dimensions of the urban project. Finally, the financial model design will be critical both to create innovative financing tools and to evaluate the investment costs and potential revenues generated by the projects and ensure their sustainability (World Bank 2020) (Box 7).

University and college programs, master's degrees, and specializations in transportation policies and transportation planning,[96] especially TOD and active mobility models, need to be developed to build the necessary technical capacity within specialized national institutions. University training programs offered by the University of Costa Rica (UCR) and the Technological University of Costa Rica (TEC) are essentially focused on infrastructure, engineering, and road management (roads, pavements, and bridges). University curricula focused on sustainable gender-sensitive transportation, road safety, active mobility, electric mobility, and TOD are still rare.[97] Furthermore, the National Council of Rectors (CONARE) faces significant challenges in crediting undergraduate and graduate programs that are completed abroad but do not exist in Costa Rica, even when the degrees are issued by renowned universities. CONARE, jointly with professional associations, mainly those of engineers and architects, needs to facilitate the recognition of degrees obtained abroad in urban matters. Likewise, CONARE, universities, international donors, civil society, and others with specializations in the subject need to work as one to create the necessary academic supply for the urgent urban and transportation transformation that the country requires.

B. Foster an institutional and regulatory reform for more effective mobility management

It is critical to improve coordination among the agencies in charge of planning, regulating, and managing public transportation, road projects, and active mobility. The current fragmentation of these responsibilities undermines decision-making and prevents projects from progressing and being implemented expeditiously. A working group made up of the MOPT, the CTP, and ARESEP is proposed to improve coordination for planning, regulating, operating, and defining public transportation fares, and to progress toward the centralization of decisions and criteria in a single entity. Regarding the design and construction of pedestrian and bicycle infrastructure, a coordination mechanism needs to be developed to involve the national government and municipalities in the identification, implementation, operation, and monitoring of pedestrian, sidewalk, and bicycle path projects, thus ensuring consistency and avoiding unconnected and isolated projects developed by individual cantons. Other countries with similar institutional coordination challenges have successfully implemented similar reforms. Box 8 describes the case of the Dominican Republic.

The Legislative Assembly should adjust the concession term for transport operators. This will enable investors and operators from other countries in the region to enter the bidding process. The arrival of new public transportation players would be beneficial, not only for investment but also for knowledge transfer and best practices that would enhance service quality.

It is important to revise the current ARESEP fare calculation methodology and the operator's remuneration, which is determined by computing all costs plus profitability and divided by the number of passengers.

BOX 7.
The Case Study of Curitiba, a TOD model in Latin America

Since the 1960s, with the publication of its Master Plan, the city of Curitiba (Brazil) promoted holistic urban development and mobility planning through the implementation of a TOD model based on the Bus Rapid Transit (BRT) system. To guide its growth and consolidation, the city developed five structural corridors with exclusive BRT lanes, and promoted the concentration of high-density housing, stores, and services. The plan included the construction of social housing units adjacent to workplaces. The successful implementation of this project was marked by active government leadership. In addition to investments in transportation infrastructure and affordable housing, the project involved major changes in land-use regulation, densities, and heights (ITDP 2013).

96 Other than Transportation Engineering.
97 TEC has a program to train technicians in electric mobility, as well as undergraduate and master's degree programs in transportation and a few in road safety.

BOX 8.
INTRANT in the Dominican Republic

To rearrange coordination and decision-making in the Dominican Republic, Law Nº 63 of 2017 established the National Institute of Transit and Land Transportation (INTRANT), as the leading land transportation authority. The key areas under its purview are road safety, electronic collection and interoperability, and electric mobility for public transportation corridors with electric buses.

INTRANT is established as a national, sectorial, and decentralized governing body under the Ministry of Public Works and Communications. INTRANT absorbs the functions of the Land Development Fund (FONDET), the General Directorate of Road Transport (DGTT), the Technical Office of Land Transportation (OTTT), the Council of Administration and Regulation of Taxicabs (CART), and the Pension and Retirement Fund for Public Transportation Drivers.

Some of its primary functions comprise designing and implementing the national mobility and land transportation policy; exercising the sectoral planning; planning and designing the integrated public passenger transportation system, including routes, services, operation schemes, itineraries and any other interurban and urban aspect; and regulating the public transportation service and its infrastructure, including the direct provision of services by the state or the issuance of operating licenses to public and private operators. INTRANT also monitors service delivery quality; coordinates the actions and activities of the General Directorate of Transit Security and Land Transportation (DIGESETT) with the Ministry of Interior and Police and the General Directorate of the National Police; fixes service fees for the operation of the mobility system, land transportation, transit and road safety; regulates the fare of public passenger transportation; and develops, implements and promotes the use of Information and Communications Technology (ICT) arrangements.

The President of the Republic appoints the Director of INTRANT, with technicians in charge of the sub-directorates. In the current administration, negotiations have been advanced, by corridor, with the transport unions to formalize public transport by creating new transport companies made up of former individual operators.

The reform of the methodology, to reverse the fare lags that affect the operator's income, is presented as an incentive to attract greater investments, improve service quality, and even prevent the cessation of routes, as has already occurred. A benchmarking of remuneration calculation models for operators in the continent can provide Costa Rica with the tools and guidance to modify its model (Box 9).

C. Implement an integrated mass transit system

To improve accessibility to public transportation, the mobility model needs to be updated to include all GAM cantons and routes to prevent overlapping. To advance the Sectorization Program, a passenger demand-based prioritization of corridors is required. For this reason, the starting point for reorganizing routes requires updated demand data,[98] especially for Aserrí, Desamparados, and Alajuelita.

98 The most recent travel information is from 2008.

BOX 9.
Bogota, Colombia has implemented different public transit operator compensation schemes

Bogota has used different operator compensation calculations. In Phase 3 of the Integrated Transport System (SITP), the compensation has three components: fare per vehicle, fare per kilometer traveled, and fare per passenger. The vehicle fare covers the investment return, that is, the fleet cost; the fare per kilometer covers fixed and consumable costs, including fuel; the passenger fare compensates for the vehicle or vehicles that are decommissioned and replaced by new ones, and the operator's profit. The rate per kilometer is revised every four years to adjust for changes in costs, the most important of which are salaries and fuel. At the same time, the rate per vehicle is reviewed to update the costs of new vehicles that will join the fleet.

Continues >

BOX 9.
Bogota, Colombia has implemented different public transit operator compensation schemes (Continued)

In Phases 4 and 5, the procurement model was modified and the fleet procurement (supply) was segregated from operation and maintenance (O&M), that is, two separate bid processes and contracts were made, one for supply and the other for operations. This new scheme shared the risk and additionally attracted new investors and players who ended up benefiting from the process with increased competition. In the previous phases, there used to be a single operations contract that included the fleet purchase. In Phase 5, the fleet supplier is now remunerated a vehicle fee to cover the fleet cost and an administration fee to cover the yard construction costs. The operator is paid a vehicle operation fee, which includes fixed operating costs such as drivers, maintenance, and insurance, a variable fee that pays for energy and fuel consumption (electric vehicles [EVs] and natural gas vehicles), which depend on the number of kilometers traveled, and a passenger fee, which covers the operator's profit. The difference between Phases 4 and 5 is that Phase 4 does not include the fare per passenger because it is a BRT fleet: the profit is distributed between the other two (vehicle and kilometer traveled). The other difference is that Phase 5 includes an additional fare which consists of the yard service cost, which in some cases is paid to the provider and in others to the operator.

In the above cases, the bidder submits its payment proposal for each of the fares in the bidding process and the net present value of the concession is the one that decides the successful bidder. In other words, the investor and operator have an estimate of what their revenues will be.

Bus and train services can no longer function disconnectedly; they need to be integrated. First, an operational integration that optimizes the use of the fleet, reduces overlapping, and serves the South Corridor counties is needed. Then, fare and technological integration should follow to enable users to transfer from one bus to another, including the inter-city train and/or the mass transit system replacing it. Finally, there is a need for physical integration that should encompass transfer zones when needed, in particular to connect train stations and bus stops from feeder routes arriving from the South Corridor cantons.

Users need to be informed about the routes, itineraries, and frequencies of public transport services. Reliable information and trip planning encourage the use of public transport, which is why buses should be equipped with GPS systems enabling real-time route tracking, and this information should be centralized to provide the user with information on the different options and travel times. Information on bus routes and locations can then be processed and made available to the citizen by the MOPT. This data should be open, so that they can be used and made available to the user by private apps.

Enabling conditions to attract new investments to the transportation sector must be created, so as to provide new players with legal and regulatory certainty. As outlined in the previous recommendation, the transportation sector would benefit from attracting new investors that not only bring in additional resources, but also knowledge of operating public transit in other countries. The participation of new private sector investors would build confidence in project financing by mobilizing new capital that may help bridge pandemic-related funding gaps.

Upgrading the available infrastructure will enhance the overall system's efficiency. More investment in developing strategic road interconnection projects, exclusive public transport lanes, logistics platforms, and technology incorporation could reduce travel times and build up capacity, making the existing public transport infrastructure more productive and efficient. It is also recommended to assess the feasibility of developing investment projects focused on complementary means of public transportation, such as cable car systems, which, in conjunction with comprehensive urban renewal interventions, have been very successful in cities like Medellin (Box 10).

In this regard, it is necessary to create the planning, pre-investment, and institutional assessment mechanisms to ensure that available resources are invested cost-effectively and for the greatest public benefit. Possible financing arrangements may include public-private partnerships, concession contracts, multilateral financing, or a national budget, as the case may be (Box 11).[99]

GAM-wide commuting usually involves multimodal combinations, meaning that adequate urban environments and 'last-mile' solutions are prerequisites for intermodality. Public space interventions in the station and stop environments have the potential to support mass transit systems, especially bus systems. In this respect, one of the most important components for ensuring the efficient performance of the public transport system and enhancing intermodality is having adequate complementary infrastructure associated with transport: comfortable stops, signage, and safe and adequate access for passengers to transfer or complete the last leg of the journey on foot.

In modal interchange nodes and particularly in areas with TOD potential, it is recommended to carry out urban interventions in the vicinity of stops to enhance the pedestrian-centered experience and improve accessibility. In this sense, it will be critical to think of interventions that ensure the safety of both pedestrians and cyclists. Some measures may include bus stop renovations with full-fledged amenities (benches, trash cans, signage), calming and/or pedestrianization of adjacent streets, sidewalk widening and placement of ramps, physical markings of bike lanes and parking areas, adequate public lighting, and tree planting and other urban landscape elements (Box 12).

To enhance public transit riders' safety, it is imperative to incorporate measures enabling the effective implementation of the Street Harassment Prevention Act Nº 9877. To raise the public transport ridership, especially among women, it is necessary to improve safety and eradicate gender-based violence in transportation. To do this, it is essential to first understand women's

BOX 10.
The Santo Domingo Metrocable (Line K, Medellín) and its complementary urban interventions: the Integrated Urban Projects (PUIs)

The Santo Domingo Metrocable, which started commercial operations in 2004, was the first urban passenger gondola lift system in the world. Integrated physically and fare-wise with an existing metro line, this mode transports some 46,000 passengers daily and benefits about 240,000 residents of communes 1 and 2 of the city (Metro de Medellín 2019).

The Medellín Metrocable project has become an example of sustainable and inclusive mobility, not only because it was engineered as a solution to connect the city's marginalized hillside settlements, but also because it included a series of large-scale urban regeneration interventions across nine neighborhoods in the area of influence of the Metrocable stations. These so-called Integrated Urban Projects (PUIs) are characterized by spatially focused social, environmental, and urban interventions in neighborhoods with critical deficiencies, aimed at attaining the integrated development and transformation of these communities. The IUPs were administered by *Empresa de Desarrollo Urbano*, an autonomous municipal entity (World Bank 2020).

It should be noted that the Metrocable and the associated PUIs have contributed to reshaping spatial and social structures fragmented by inequalities and tensions related to crime and violence, providing inclusiveness benefits that extended to both users and non-users of the transport system (Dávila and Brand, 2012). Cities such as Bogota, La Paz, Caracas, and Rio de Janeiro, among others, have begun to replicate this experience.

BOX 11.
The private sector may finance public transport infrastructure for the benefit of users and generate a financial return

In Guatemala City, the government worked jointly with the private sector to build the BRT infrastructure system, known as Transmetro; two different groups of investors paid for the construction of 13 stations as well as a transfer terminal and some access pedestrian bridges. In return, corporations were allowed to market advertisements at the stations and in other designated areas along the corridor. Private developers built a tunnel connecting an existing shopping mall to a BRT station. Small shops were installed along the underground runway. In 2022, following 15 years of operation, these stores will be conveyed to the municipality for commercial operations.

99 Strategic Infrastructure and Transport Sector Plan, 2019–2024.

BOX 12.

Modal interchanges enhance commuting transfers; private investment may help build quality infrastructure profitable for the investor

In Ciudad Azteca, State of Mexico, there was a modal interchange in a messy, unpaved public space with poor facilities for transfers between different services that connected metropolitan area municipalities with Mexico City. New government regulation and private investment led to the construction of a transfer station, which now saves passengers two hours a day (before there was no integration of services, nor the necessary infrastructure for parking vehicles). Today, the area offers additional services which include a hospital that also became a travel attraction. The 72,000 m^2 intermodal station has 180,000 movements per day. The US$68 million infrastructure built entirely by the private sector under a 30-year concession benefited public transport riders as well as the neighborhood where the station was built.

The alignment of the stakeholders was critical to the success of this project. The government came up with the regulations that provided the right incentives for the private sector to invest. The transport operators were also involved to provide better service. These investments did not result in additional user fees.

Before

After

mobility patterns, and then diagnose the root causes of unsafe public transport. Based on this information, it will be possible to develop an action plan to reverse the situation. Mainstreaming a gender approach in urban public transit requires addressing infrastructure design (for example, ensuring proper lighting and visibility at public transport stops or providing safety and warning systems); training of public transport personnel, including security personnel trained in intervention protocols; and communication strategies to raise awareness among the wider public. Some cities have also experimented with the use of mobile applications dedicated to improving security, for example, Safetipin.

D. The Decarbonization Plan may trigger public transportation improvements

Reducing dependence on motorized vehicles, favoring intermodality in the public transport system, upgrading fleets, and advancing technological transformation will be key to cutting transportation emissions. To achieve a more sustainable mobility model, one that reduces dependence on fossil fuels, Costa Rica and the GAM in particular must scale down the widespread reliance on private vehicles and shift toward a greater role for public transportation and active mobility. This transformation will

only be possible by upgrading public transit service in general and linking it with urban growth patterns. It is necessary to promote a mass, interconnected system that meets expectations with regard to regularity, proximity, efficiency, quality, and safety. At the same time, the state should promote the scaling down and greater control of privately owned combustion vehicles, rush-hour private driving restrictions, as well as a modal shift to large-scale active mobility. Coupling these policies with technological transformation, fleet modernization, and greater investment-boosting incentives for operators will help decrease the contribution of public transport GHG emissions.

A. Jump-starting to Zero-emission Mobility

There is a need to replace obsolete public transit vehicle fleets with low-emission vehicles. The *MiTransporte* program implemented by the GIZ between 2017 and 2021, whose objective was to promote the electrification of public transport, supported the definition of a regulatory framework, inter-institutional coordination, and the implementation of a pilot test in San José. This project has produced valuable information for the operation and the business model as well as the necessary actions to incentivize its scalability and progress in the replacement of the combustion of the entire bus fleet with a fleet powered by clean sources. The current government has set the goal of putting into service 250 e-buses by 2024. Additionally, it is necessary to amend the Electric Mobility Law to extend the concession years for those operators who acquire e-buses to convey trust in the investment return. Another option is to define a more profitable public transport operator compensation rate, encouraging investment by small and medium operators. Tax exemption for electric bus spare parts and charging systems would also prompt the adoption of this type of technology. Finally, it would be important to identify measures that encourage fleet-owning concession holders to prioritize scrapping and reuse of parts rather than selling old buses. These scrapping processes must be strictly controlled and monitored; otherwise, operators will likely find ways to keep substandard or unsafe vehicles on the road, and scrapping will not be effective.

It is also advisable to review the vehicle age and permissible emission parameters. Diesel vehicles account for a larger share of CO_2 emissions than petrol-powered vehicles, in part because emission control standards in current legislation are not as stringent for diesel vehicles as for petrol vehicles (Fernandez 2020).[100] For example, in Spain, newer units (after July 2008) are required to have opacity levels of 1.5 or 0.7 m−1, while in Costa Rica the strictest limits are 2.15 and 2.18, depending on the type of vehicle.

The GAM should implement measures discouraging the use of privately owned automobiles. During rush hours, car use should be curtailed, either by restricting circulation by license number or by imposing a congestion charge. On-street parking restrictions would also be advisable. Congestion charge revenues may finance a pool fund for public transit improvement. These measures can also stimulate the conversion to EVs by creating exemptions for EVs, by offering reduced circulation charges and/or exclusive parking spaces for zero-emission vehicles.

Establishing GAM-wide freight vehicle circulation schedules will help reduce congestion and emissions. Preventing light and heavy freight vehicles from circulating at peak hours will enable public transport to reduce travel times. The introduction of electric light-duty vehicles will allow them to circulate within the densest areas without emitting GHGs. Introducing heavy-duty hydrogen cell vehicles will also help considerably. Costa Rica is already working on the installation of a hydrogen production and storage plant.

B. Promoting active mobility

Promoting active mobility as an integral part of city mobility could reduce emissions and vehicular congestion while revitalizing downtown areas. Many GAM municipalities, such as Desamparados, San José, Alajuela, and Montes de Oca, are advancing toward the construction of bicycle lanes, the pedestrianization of their downtown areas, or the definition of 30-km/h zones.[101] While these improvements are crucial to rebalancing the use of public space in a more

100 According to experts, the permitted values have not changed for diesel vehicles from models 1999 onwards. In addition, mechanical injection is allowed, which is subject to manipulation for emissions testing purposes, making it a loophole that affects testing effectiveness..

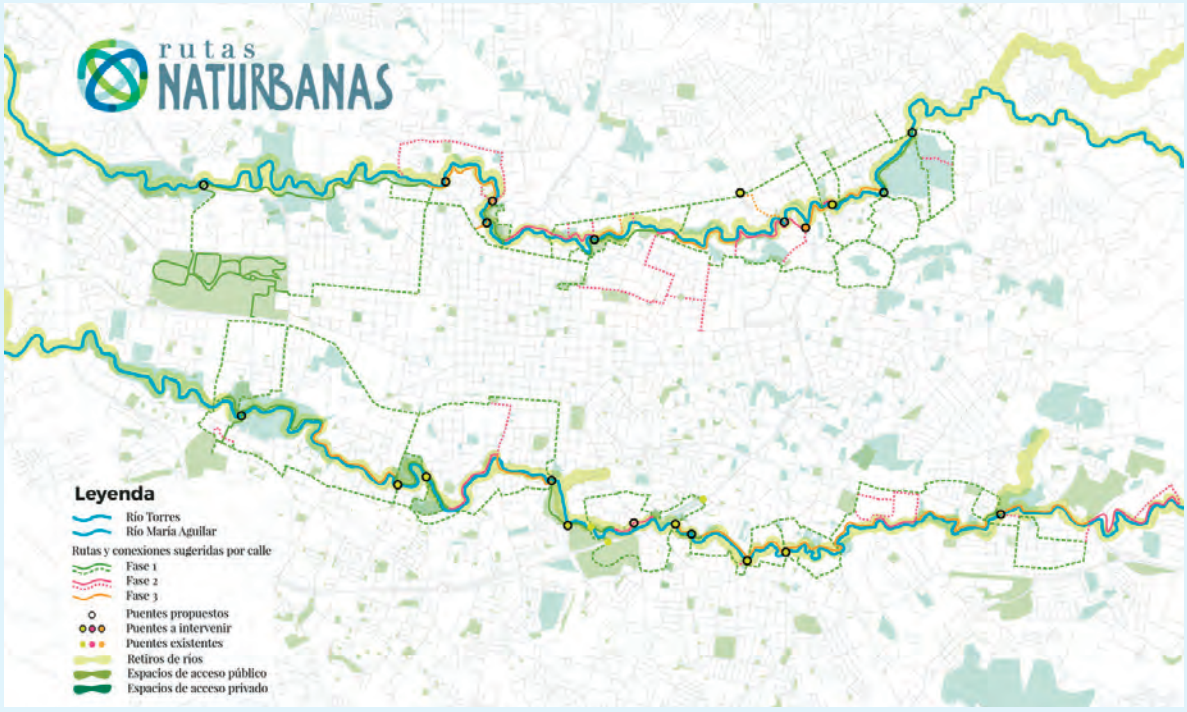
101 The 30-km/h zones are mixed-use streets where pedestrians are prioritized over vehicles and where speeds are limited to 30 km/h.

equitable and demand-driven manner and to invigorate downtown economic activity, it is necessary to coordinate these projects across the different cantons through the development of a GAM Active Mobility Master Plan.

A GAM Active Mobility Master Plan would identify priority corridors or areas for metro-wide interventions and develop traffic and use patterns to preclude partial interventions. Drawing on the Intermunicipal Territorial Plan for Active Mobility, the Plan should consider a common vision among the stakeholders involved, especially the municipalities, and establish the principles and guidelines to operationalize a joint vision. Ensuring continuity across routes requires establishing metropolitan cycling and pedestrian infrastructure design criteria that pinpoint barriers and opportunities for promoting this type of mobility. It may, for example, propose downtown vehicle restraint interventions in priority urban sub-centers, implement 30 km/h zone traffic calming strategies, and reduce demand for parking, based on integrated land-use planning. On the other hand, urban rivers and waterbodies provide opportunities for connectivity enhancement and the improvement of public space (see Box 13).

BOX 13.
The GAM's urban rivers afford opportunities for inter-cantonal connectivity and the development of recreational and tourist circuits

Scenic trails could link the principal landmarks of the central districts to form a cultural recreational circuit. One initiative of interest is the Naturbanas Routes Project,[102] which proposes to create active and safe mobility infrastructure along the rivers Torres and Maria Aguilar while promoting the recovery of natural settings of urban rivers. In the South Corridor, rivers Tiribí, Cañas and Jorco could provide important inter-district connections. Today, Phase 1 of the Tiribí River Interurban Biological Corridor Project is being implemented by planting 300 native trees. The development of low-impact bicycle and pedestrian infrastructure along the Tiribí River could connect the urban centers of Alajuelita and Desamparados. Some hotspots near the Tiribí River include the Central Park and the Alajuelita Municipal Stadium, the Centenario Park and Nuestra Señora de los Desamparados Church, the Libertad Park in Patarrá, and the Olympic Village in Damas. Similarly, the Cañas River could link Alajuelita with San Juan de Dios and further downstream with the downtown of Aserrí.



Source: Rutas Naturbanas.

102 https://rutasnaturbanas.org/

The implementation of a GAM-wide Bike Sharing System (BSS) could increase the public transport system's ridership, favor modal shift, and lessen vehicular congestion by replacing motorized trips. The inclusion of BSS e-bikes would expand the range of coverage and the demand for public transit. Considering that the urban centers of Desamparados and Alajuelita are less than 6 km from downtown San José, these trips can be made by bicycle, if the appropriate infrastructure is available. For journeys longer than 6 km, the bicycle can complement public transportation, covering the 'last mile' of the trip, thus improving overall travel times. Some cantons in the GAM have several completed and planned bikeways, but these are sparse and disconnected from each other.[103] The BSS should be integrated into the city's mobility plan and be an integral part of the cycling infrastructure strategy and master plan. To ensure that users prioritize this mode of transport, the BSS infrastructure must comply with a series of minimum technical, safety,[104] and comfort[105] standards, and should be supported by a cyclist and driver advocacy and awareness program (Box 14).[106]

BOX 14.

Mexico City implemented the public bike-sharing system ECOBICI in 2010.

Mexico City, through the Ministry of Environment, implemented ECOBICI, to date the largest public bike sharing system in Latin America. It started operating with 84 stations and 1,200 bicycles, growing in 2018 to 480 stations and 6,800 bicycles.[107] ECOBICI's original goal was to provide public transport users with last-mile rides and short rides. Bikes are procured by the city and the user pays only a portion of the price of the service, the rest is a public subsidy paid by advertising (similar to Vélib in Paris). The bike design is unique with a small front tire (20 inches) and a larger rear tire (24 inches), aimed at preventing theft and fencing; additionally, they are equipped with a GPS device for tracking in case of theft. Since its opening until 2018, cumulative statistics show 45 million rides and 200,000 users, covering an area of 38 km^2. In 2018, the system included 340 pedal-assisted electric bikes and 28 recharging stations. One aspect that stands out is that the same card used for Metrobus, the BRT system is also good for ECOBICI bike ride payment. Users can purchase annual plans, which can be for 1 year, 1 day, 3 days or one week. All plans include unlimited 45-minute trips; in case of exceeding this time, each rate applies per extra hour or fraction. The system has a control center that, based on open data, monitors and tracks the use and location of each bicycle.[108]

103 BID 2016; IDB 2016.
104 Some measures to increase cyclist safety include improving crossings, avoiding road conflicts, or ensuring standardized traffic conditions.
105 PIMUS mentions as a requirement that the geometric design of the roads should help minimize rolling resistance, through the use of smooth and non-porous materials, have a free section of at least 0.75 m per the direction of circulation and consider minimum radii for curves or various strategies to ensure visibility. In addition to basic infrastructure for the circulation and arrival of bicycles in the vicinity of the train or bus station, safe parking spaces are required.
106 It is recommended that the suggestions presented by the PIMUS in its Active Modes Promotion Campaigns action be taken up again.
107 www.ecobici.cdmx.gob.mx
108 Bicycle sharing system planning guidelines. Institute for Transportation & Development Policy, 2018.

References

AC&C y Gensler. "Plan Integral de Movilidad Urbana Sostenible para el Área Metropolitana de San José, Costa Rica." BID.

Alianza por el Hidrógeno. s.f. "Advancing the Hydrogen Ecosystem in Costa Rica."

Alianza por el Hidrógeno. s.f. "Hydrogen Ecosystem in Costa Rica."

Asesores para el Desarrollo Territorial . 2019. *Estudio de Vialidad y Circulación Desamparados*. Desamparados: Municipalidad de Desamparados.

Asesores para el Desarrollo Territorial. 2019. *Política de Desarrollo y Estrategia de Seguimiento y Evaluación. Actualización Plan Regulador del Cantón de Desamparados*. Desamparados: Municipalidad de Desamparados.

Asesores para el Desarrollo Territorial. 2019. *Diagnóstico Territorial. Actualización Plan Regulador del Cantón de Desamparados*. Desamparados: Municipalidad de Desamparados.

Banco Interamericano de Desarrollo. 2013. *Guía para la Integración de la Perspectiva de Género en los Sistemas de Transporte Urbano que Optimizan la Movilidad*. Washington DC: BID.

Banco Interamericano de Desarrollo. 2016. *San José. De la Acción Local a la Sostenibilidad Metropolitana*. San José: BID.

BID, BASE. . "Comparación de supuestos y metodologías de estudios relacionados al costo total de propiedad (TCO) de buses eléctricos."

Dávila, J.; Brand, P. 2012. *La gobernanza del transporte público: Indagaciones alrededor de los Metrocables de Medellín*. Bitácora 21. Bogotá: Universidad Nacional de Colombia.

Consejo Nacional de Planificación Urbana. 2013. *Plan GAM 2013*. San José: Gobierno de Costa Rica.

COSEVI. 2019. *Anuario Estadístico de Accidentes de Tránsito con Víctimas en Costa Rica 2019*. San José: COSEVI.

COSEVI. 2019. *Estadísticas de tramos de alta accidentabilidad en rutas nacionales de Costa Rica. Periodo 2015-2019*. San José: COSEVI.

Creara. s.f. *Factibilidad Técnico-Financiera para Inversiones en Tecnología de Electromovilidad en Costa Rica*. BCIE.

Dirección de Cambio Climático, MINAE, Gobierno de Costa Rica. s.f. "Plan Nacional de Descarbonización 2018 – 2030."

Estado de la Nación. 2020. *Informe Estado de la Nación 2020*. San José: Programa Estado de la Nación, Consejo Nacional de Rectores.

Fernández, D. 2020. Análisis del aporte de la flota vehicular a las emisiones que afectan la salud y el ambiente. Ponencia preparada para el Informe Estado de la Nación 2020. San José: PEN, Conare.

Fundación Promotora de Vivienda. 2014. *Alajuelita: Informe Cantonal de Población y Vivienda*. San José: FUPROVI.

Fundación Rutas Naturbanas. 2016. *Plan Maestro Rutas Naturbanas*. San José: Fundación Rutas Naturbanas.

GIZ. s.f. "Electromovilidad para Carga Liviana."

Gobierno de Colombia. 2019. "II Informe Bienal de Actualización ante la Convención Marco de Naciones Unidas sobre Cambio Climático (CMNUCC)."

Gobierno de Costa Rica. 2018. "Capítulo 6: Transporte y Movilidad: Retos en Favor del Desarrollo Humano, Informe Estado de la Nación, 2018."

Gobierno de Costa Rica. s.f. «Ley de Incentivos y Promoción para el Transporte Eléctrico (Ley 9518 de 2018).»

Gobierno de Costa Rica. s.f. "Ley de Movilidad y Seguridad Ciclística (Ley 9660)."

Gobierno de Costa Rica. s.f. "Ley de Tránsito por Vías Públicas Terrestres y Seguridad Vial (Ley 9078 de 2012)."

Gobierno de Costa Rica. s.f. "Oficialización del Plan Nacional de Transporte Eléctrico (Decreto 41579-MINAE-MOPT)."

Gobierno de Costa Rica. s.f. "Primera Ley Especial para la Transferencia de Competencias: Atención Plena y Exclusiva de la Red Vial Cantonal (Decreto Legislativo 9329)."

Gobierno de Costa Rica. s.f. "Reglamento de incentivos para el transporte eléctrico y modificaciones (Decreto 41092-MINAE-H-MOPT)."

Gobierno de Costa Rica. s.f. "Tarifa aplicable en los centros de recarga rápida para vehículos eléctricos (RE-0056-IE-2019)."

Grupo de Análisis sobre Sistemas de Transporte y Movilidad. 2018. "Costa Rica: Una propuesta para superar la crisis de movilidad actual (2018-2022)." San José.

Hernandez, Henry. 2014. "Ausencia de la bicicleta en las políticas nacionales de transporte." *Ambientico* 240-241, Febrero-Marzo: 17-24.

IDOM. s.f. Estudios de Factibilidad del Tren Eléctrico. BCIE.

IFC. s.f. "San José recibe inversión y asesoría de IFC para la renovación de infraestructura urbana."

INCOFER, IDOM. s.f. Estudio del Tren Eléctrico, BCIE, INCOFER, IDOM. BCIE.

Intraca. 2020. *Estudios de Evaluación de la Situación Actual Vial del Cantón de Desamparados y Recomendaciones Generales y Específicas*. Desamparados: Municipalidad de Desamparados.

ITDP. 2013. *Desarrollo Orientado al Transporte. Regenerar las ciudades mexicanas para mejorar la movilidad*. Ciudad de México: ITDP.

ITDP. 2015. *Guía de Planeación del Sistema de Bicicleta Pública*. New York: ITDP.

Mi Transporte, GIZ. 2021. *Plan Territorial Intermunicipal de Movilidad Activa 2020-2030.* San José: GIZ.

MIDEPLAN. 2019. *Plan Estratégico Municipal 2018 - 2023- Municipalidad de Alajuelita*. Alajuelita: MIDEPLAN.

MIDEPLAN. 2019. *Plan Estratégico Municipal 2018 - 2023- Municipalidad de Aserrí*. San José: MIDEPLAN.

MINAE, MIVAS, MIDEPLAN. 2017. Plan Integral de Movilidad Urbana Sostenible para el Área Metropolitana de San José de Costa Rica. San José: BID, GEF.

Ministerio de Planificación Nacional y Política Económica, Gobierno de Costa Rica. 2019. "Plan Nacional de Desarrollo y de Inversión Pública del Bicentenario 2019-2022." San José.

Ministerio de Vivienda y Asentamientos Humanos, Gobierno de Costa Rica. s.f. "Plan Nacional de Desarrollo Urbano para la GAM, 2013."

MiTransporte, Costa Rica, GIZ. s.f. "Mitigación de Emisiones en el Sector Transporte."

MOPT. 2021. "Ciclovías existentes y proyectadas." San José: MOPT.

MOPT. 2020. *Evaluación de aceras en nodos de integración de la primera etapa del proyecto de sectorización y modernización del transporte público modalidad autobús del AMSJ*. San José: MOPT.

MOPT, Gobierno de Costa Rica. 2011. *Plan Nacional de Transportes de Costa Rica 2011-2035*. San José: MOPT.

MOPT, Gobierno de Costa Rica. 2020. *Programa para un Sistema Integrado de Transporte Público Masico para la GAM*. San José: MOPT.

MOPT, Gobierno de Costa Rica. 2020. *Proyecto Nodos. Definición y caracterización de las zonas de influencia del Proyecto de Modernización del Transporte Público Masivo Modalidad autobús del AMSJ*. San José: MOPT.

Municipalidad de Alajuelita. 2016. *Plan de Conservación, Desarrollo y Seguridad Vial Cantonal. Período 2018-2023. Cantón Alajuelita.* Alajuelita: Municipalidad de Alajuelita.

Municipalidad de Desamparados. 2007. *Plan de Ordenamiento Territorial del Cantón de Desamparados*. Desamparados: Municipalidad de Desaparados.

Municipalidad de Desamparados. 2020. *Presentación Movilidad Sostenible*. Desamparados: Municipalidad de Desamparados.

Municipalidad de San José. 2015. *Ciclovía de San José, ficha técnica*. San José: Municipalidad de San José.

Municipalidad de San José, A-01. 2018. *San José: Sistema de Bicicletas Públicas*. Informe Final. San José: Municipalidad de San José.

PNUMA. s.f. "Especificaciones técnicas para buses eléctricos y sus sistemas de carga en el Área Metropolitana de San José, Costa Rica."

PNUMA. s.f. "Análisis y mitigación de barreras para el despliegue de autobuses eléctricos en Costa Rica."

Pujol, Rosendo M., and y Eduardo M. Pérez. 2012. *Crecimiento urbano en la región metropolitana de San José, Costa Rica. Una exploración espacial y temporal de los determinantes del cambio de uso del suelo, 1986-2010.* San José: Lincoln Institute of Land Policy.

SEPSE, BID, PNUD, GIZ. s.f. "Plan Nacional de Transporte Eléctrico (PNTE) 2018–2030."

SIGMA. 2016. "Programa de Movilidad Urbana Sostenible para San José de Costa Rica." Mejoras Tecnológicas en la Flota Vehicular. BID.

Transformativa Mobility Initiative, GIZ. 2020. *COVID-19 y la Movilidad Sostenible. Observaciones y documentación de los primeros avances*. Bonn: GIZ.

Vargas Vargas, Bryan Roberto. 2020. "Micro-situaciones en el espacio público. Estudio de bulevares peatonales en San José, Costa Rica." Arquitectura y Urbanismo, Febrero: 76–85.

World Bank, 2020. Desarrollo Orientado al Transporte Sostenible (DOTS). Guía de implementación de proyectos. Buenos Aires: Banco Mundial.

CHAPTER 4

Institutions, Capacities, and Financing in the South Corridor

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Introduction

The rapid urbanization process over the past 40 years, coupled with poor planning and inadequate local capacities, posed significant challenges for the South Corridor's municipalities. Responsibilities for urban planning in Costa Rica are defined under a complex legal, planning, and land-use planning system. Several national and subnational actors are involved in this system, with unclear roles and interdependencies, hampering coordination in realizing urban and regional development in the country. In addition, municipalities have limited capacities and financial resources to meet their responsibilities. Specifically, the South Corridor municipalities - Aserrí, Alajuelita, and Desamparados - lack the technical, financial, and organizational resources to consolidate an efficient urban development system.

This chapter provides an overview of the opportunitiesand challenges related to urban development in the South Corridor, bearing in mind local and national land-use planning policies. To this end, a desk review of the literature, interviews with local governments, and the definition of municipal competencies based on organizational and management capacities were carried out.

The chapter contains (a) a description of the institutional, regulatory, and financial arrangements governing Costa Rican urban development; (b) an identification of the key institutional and coordination challenges, as well as an analysis of municipal competencies in development, urban planning, and financial management, with emphasis on the South Corridor local governments - Aserrí, Alajuelita, and Desamparados; and (c) recommendations related to strengthening urban planning and management in these three Costa Rican cantons.

I. Municipalities in Costa Rica are responsible for key urban infrastructure services

Local governments play a key role in the provision of urban infrastructure services. Under Costa Rican law, the municipal government is responsible for (a) land-use planning; (b) development planning; (c) provision of services;[109] and (d) regulation of commercial and economic activity.[110] Unlike some other countries in the region such as Brazil or Colombia, for example, local governments in Costa Rica do not play any role in providing education or public health services. Moreover, some of the public services are provided by both the local government and the central government: for example, the provision of potable water (aqueduct) and sewerage is mostly provided by the Costa Rican Institute of Aqueducts and Sewerage (AYA), but in cantons such as Aserrí, by the municipality.

The legal framework grants substantial autonomy to local governments. The Costa Rican Municipal Code (Law Nº 7794), as amended in 1998, establishes, in general terms, the legal status, functional responsibilities, and revenues of the municipalities, along with the mayoral and council election procedures, municipal budget preparation and utilization, and the municipal personnel regulations. According to the Costa Rican Municipal Code, the municipality is a legal entity vested with assets, and full authority to enact bylaws and sign agreements as appropriate to perform its duties. In other words, each municipality defines how it is organized internally, prepares and promulgates its regulations, and charges fees and rates for services it provides, while the central government has no authority over these decisions as long as they are not in conflict with the existing national legal framework.

Complementary to the Municipal Code, additional laws and regulations define the competencies of both local governments and other public agencies with local jurisdiction. This normative body establishes the working conditions, coordination, management, planning, and the relationship between national and local public bodies. In general terms, instruments of national jurisdiction set out the framework for processes such as decentralization and transfer of powers, planning, provision of services, and municipal financial management. The most important of them are highlighted in Table 1. (See Annex for a more exhaustive list.)

TABLE 1. Key legal and regulatory instruments by local scope

Local Government Organization
• The **Código Municipal** (Ley 7794/1998 with subsequent amendments) sets out, in broad terms, the legal status, functional responsibilities, and revenues of municipalities, along with the procedures for the election of mayors and council members, the preparation and execution of municipal budgets and the regulations governing municipal personnel.

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109 A municipality provides services for the collection, disposal, and treatment of solid waste; storm and sewer drainage; aqueducts; public street lighting; municipal police; parks and green areas maintenance; cantonal road network maintenance; road and public area clean-up; administration of markets, squares, and fairs; cemeteries; and any other urban or non-urban services within the canton.
110 The canton is a tax administrator of the property tax, fees, and rates for public services, licenses (tax), permits, and fines. Elaborated in more detail in the rest of the chapter.

TABLE 1. Key legal and regulatory instruments by local scope (Continued)

Planning
• The **Urban Planning Act N° 4240** establishes the criteria for the preparation, approval, and implementation of cantonal regulatory plans (also known as land-use plans).[111] The National Housing and Urbanism Institute (*Instituto Nacional de Vivienda y Urbanismo*, INVU)[112] and the Ministry of National Planning and Economic Policy (MIDEPLAN) provide guidance, coordination, and technical advice to municipalities in this matter.
• In the case of the cantons along the coastal zone, the **Maritime Terrestrial Zone Act N° 6043**[113] defines the administration, control, and protection of the maritime-terrestrial zone[114]. Due to the touristic nature of these zones, the Costa Rican Tourism Institute has the mandate to approve the coastal regulatory plans in collaboration with the INVU.[115]
Provision of services
• The **Integrated Solid Waste Management (ISWM) Act N° 8839** states that municipalities are responsible for the integrated management of waste generated in their canton.
• Solid Waste Management in Costa Rica is a social co-responsibility. Each municipality implements its collection methodology and decides on the implementation process (for example, in-house trucks, subcontracting private service suppliers). The Spotlight on Solid Waste Management elaborates on this responsibility.
• The Public Roads Act N° 5060 transfers the cantonal road network administration to municipalities.
• The Special Law for the Transfer of Functions: Full and Exclusive Management of the Cantonal Road Network and Decree 40137-MOPT confer to the municipalities the exclusive responsibility for maintaining the cantonal road network. The management of the cantonal road network falls under the full and exclusive responsibility of local governments.
• Article 137 of the Municipal Code established a Cantonal Sports and Recreation Committee in each municipality. This committee has been vested with legal rights to build, manage and maintain the sports facilities owned or managed.
• Other administrative jurisdictional instruments detail how local governments administer municipal public cemeteries, and municipal facilities, among others.
Revenue Collection[117]
• **Law N° 7509, passed in 1995 and amended over time**, confers powers to municipalities to administer and collect property taxes. It does not, however, permit municipalities to set the rate of the property tax or determine exemption policies.
• **Law 7794** (referred to above) specifically authorizes municipalities to impose certain taxes on businesses as well as fees for municipal services. The list of municipal taxes must be approved by the Legislative Assembly. According to the law, municipalities are permitted to set the rates of services charges, provided they are based on the cost of providing each service.
• **Tax Simplification and Efficiency Act N° 8114** provides cantonal road maintenance funds to the municipalities, under a participatory approach to implement works (Cantonal Road Board, Municipal Council). Of the total revenue from fuel tax sales, the central government allocates 22.25% for cantonal road network maintenance, distributed among the cantons as follows: 50% based on the length of the cantonal road network in each canton, as surveyed by the local governments and duly recorded at the Ministry of Public Works and Transportation (MOPT); 35% based on the MIDEPLAN Social Development Index (IDS), and the remaining 15% distributed equally to each municipality. (Requirements to be submitted by local governments to manage fund transfers in conformance with Law N° 8114, Decree N° 41550-MOPT.)

111 The Regulatory Plan is the local planning instrument that defines in a set of plans, maps, regulations, and any other document, graphic, or supplement, the development policy and plans for population distribution, land use, roads, utilities, and community facilities.
112 The INVU has authority to issue urban development regulations as long as the municipal governments have not issued specific urban planning regulations within the limits of their territorial jurisdiction, or to supplement them in the absence, omission, or lack of clarity of the provisions established in the Regulatory Plans.
113 In Costa Rica, the maritime-terrestrial zone comprises two sections: the PUBLIC AREA, which is the 50-meter wide strip measured from ordinary high tide, and the areas that are left uncovered during low tide; and the RESTRICTED AREA, consisting of the strip of the remaining 150 meters, or the remaining land in the case of islands.
114 The maritime-terrestrial zone is inalienable, no private party may take possession of this land, so its use and enjoyment are regulated through permits and concessions granted by the respective municipality.
115 Under Article 31 of the Maritime Terrestrial Zone Act, all urban or tourism development plans that affect the maritime-terrestrial zone require approval by the National Institute of Housing and Urbanism and the Costa Rican Tourism Institute, as well as by other official agencies with jurisdiction to intervene for this purpose as provided by law.
Any change in the soil use of the maritime-terrestrial zone requires amending the law due to the nationwide impact that this would have (for example, ports). In case the maritime-terrestrial Zone is a natural heritage, hence, not subject to exploitation (for instance, reserves or national parks), then the Ministry of Environment and Energy (MINAE) intervenes and the National System of Conservation Areas acts managing jointly the zone.
116 Local governments will be responsible for planning, programming, designing, managing, financing, executing, and monitoring their construction, conservation, signage, demarcation, rehabilitation, reinforcement, reconstruction, concession, and operation, in accordance with each municipality's (five-year) road maintenance and development plan.
117 In Costa Rica, a law is required to introduce a new local tax, while regulations are required to implement a fee (for services rendered). For example, to collect a municipal permit tax, each municipality has a specific law.

A. The municipality's role in urban planning and land-use planning in Costa Rica

The Urban Planning Act sets out the objectives of urban planning in Costa Rica, namely to ensure the safety, health, comfort, and welfare of the community (Urban Planning Act Nº 4240). As an administrative process, land-use planning takes place at the national, regional, and local levels. The relationship between national, regional, and local plans is cascaded, in line with the guidelines outlined in the national plan, according to current regulations, and consistent with the local level's detailed territorial perspective (see Figure 1).[118] At the national level, central government mandates for matters such as environmental impact, conservation, or water management are established. At the regional level, for example, the 2013–2030 GAM Plan (corresponding to the Central region of the country) details criteria for the development specific to the region, based on technical criteria and competencies. And at the local level, municipalities exercise jurisdiction through urban planning and regulatory plans.

FIGURE 1. Urban planning is a multilevel process and structure, as is the case of the GAM Central Region

Source: Developed by authors.

Urban planning at the national and regional levels is coordinated by the central government through the Ministry of Housing and Human Settlements (MIVAH) and the INVU, which exercise technical and advisory functions in national and regional territorial planning[119]. Costa Rica does not have a medium level of organization and administration, that is, regional plans are part of the tasks carried out by MIVAH and INVU. The land-use planning instrument in effect at the national level is the National Land-Use Planning Policy (PNOT) which incorporates climate change and risk management, as cross-cutting themes in the country's planning. At the regional level, and in the case of the GAM, the Urban Development Plan for the Greater Metropolitan Area 2013–2030 is in effect. It aims to improve the quality of life of the population through the competitive economic development of urban centers in equilibrium with the natural, agro-productive, and urban environment.

Local governments[120] exercise urban planning at the local level; the main instrument for local land-use planning is the regulatory land-use plan (*Plan Regulador*). Regulatory land-use plans are instruments of negotiation, coordination, consensus, and decision-making involving all social, public, and private stakeholders linked to a canton.[122] These plans are fundamental for municipal autonomy since they give the municipality the exclusive power to administer the territory. Central government institutions may only intervene in a complementary fashion or if national regulations are contravened.[122] These plans are subject to modification and updating every five years following a five-year monitoring and evaluation exercise. The municipalities have the power to invalidate, in full or in part, the Regulatory Plan and/or the Urban Development Regulations in force.

118 Regulatory Plan Preparation Handbook as a land-use planning instrument, INVU 2017.
119 Reforms pursued by the government in 2022/2023 may lead to the merging of the two entities.
120 ARTICLE 169 of the Constitution acknowledges the competence and authority of the municipalities to plan and control urban development within the boundaries of their jurisdictional territory.
121 In this context of autonomy, the municipalities plan and control the urban development of their territory pursuant to Article 169 of the Constitution; Article 13 paragraph p) of the Municipal Code, and Articles 10 paragraph 1); 15-19 of the Urban Planning Act; the National Planning Act; the Organic Environmental Act; and its regulations thereunder concerning soil use, management and conservation, roads, construction, mining, emergencies and risk, cadaster, and patrimony, among others.
122 By constitutional ruling 5445-99 of the Constitutional Chamber of the Costa Rican Supreme Court.

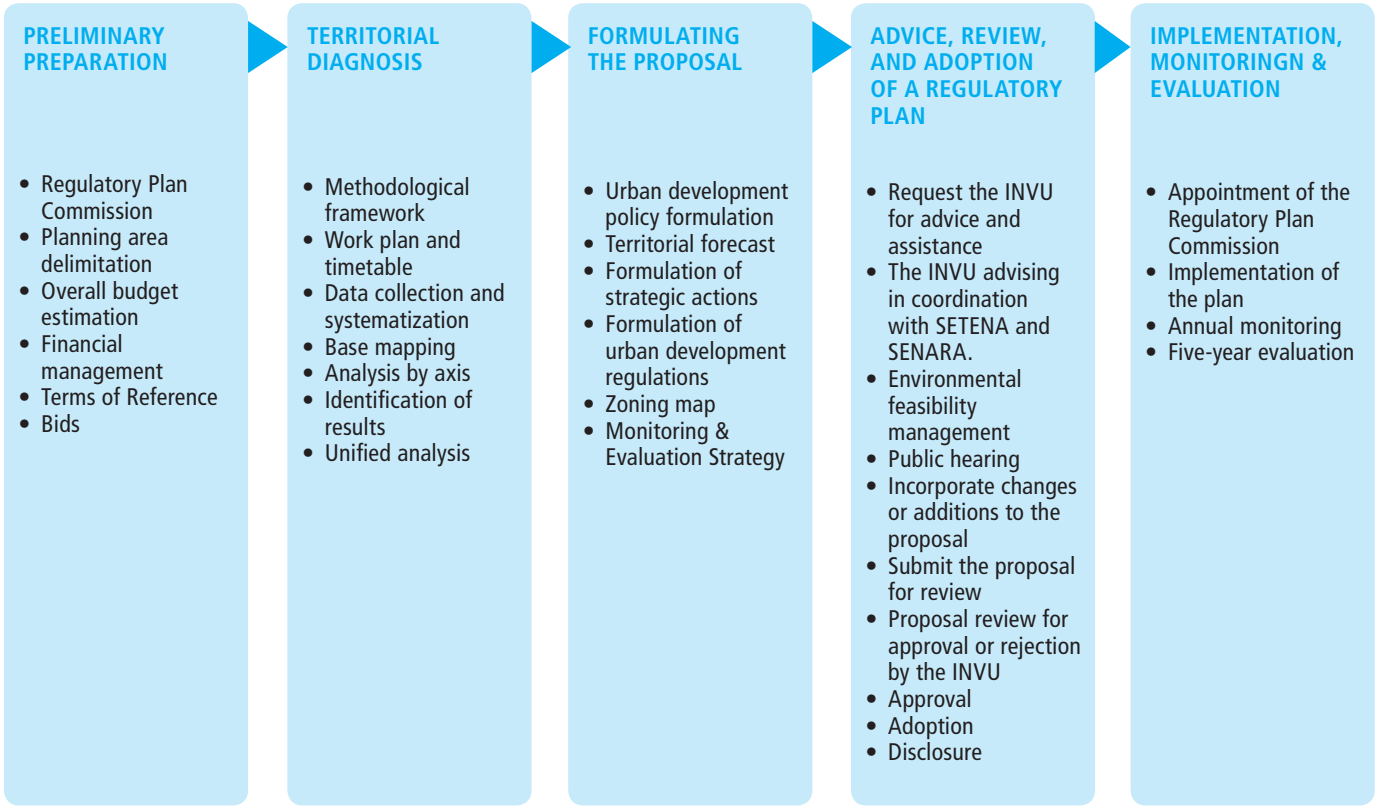
The regulatory land-use plan covers five basic urban and territorial management areas and requires integration with other regional and national planning instruments (see Figure 2). The regulatory land-use plan has five basic urban development regulations: (a) zoning, (b) subdivision and urbanization, (c) official map, (d) urban renewal, and (e) construction. In addition, it is complemented by planning instruments to regulate local roads, mobility, public areas, landscape, urban form, outdoor billboards, land management instruments, and architectural and intangible heritage.

B. Inter-institutional coordination and decentralization

The relationship between the central government and the municipalities is complex and at times unclear. Municipalities are called upon to coordinate with national entities in the exercise of their land-use planning functions. Depending on the competence and scope of work, there are different central government agencies with whom the local governments are to coordinate. For example, the stewardship for land-use planning lies with the MIVAH, while technical control and oversight are carried out by the INVU.

The Cantonal Institutional Coordination Councils (CCCIs) were established to spearhead the coordination of public policy with local impact. The Transfer of Powers from the Executive Branch to the Municipalities Act Nº 8811 established the CCCIs to design, coordinate, implement and oversee public policy with local impact, as well as mechanisms such as agreements or partnerships leading to inter-institutional coordination. The CCCIs are coordinated by the municipal government, and include a representative of each central government institution operating in the canton, a representative of the municipal federation to which the municipality is affiliated, members of the District Councils, representatives of associations, and civil society groups that promote the enforcement and implementation of public and cantonal policies.

FIGURE 2. The Regulatory Land-Use Plan Preparation Handbook defines five working phases



Source: Regulatory Plan Preparation Handbook as a land-use planning instrument (2017).

Parallel to this figure, the Regional Coordination Councils (CRCs) were established in 2010 as regional coordination bodies to implement supra-cantonal plans and programs, funded by budgets from municipalities, ministries, and decentralized agencies. The regulation requires the central overnment to design budgets based on the performance of cantonal programs.[124] Both the CRCs and the CCCIs were established to coordinate development strategies, policies, and projects, defined in local and national planning instruments by central government institutions, municipalities, and cantonal stakeholders.

Municipalities may also join federations and confederations[125] under duly regulated organizational, administrative, and operational arrangements. An example of these associations is the Metropolitan Federation of Municipalities of San José (FEMETRON), in the GAM of Costa Rica, which has been working since 2004 on urban development projects in solid waste management, water resources, road infrastructure and the metropolitan regulatory plan for the member cantons. FEMETRON is currently made up of the following municipalities: Alajuelita, Aserrí, Curridabat, Escazú, Goicoechea, Mora, Moravia, San José, Santa Ana, and Tibás.[126]

In 2010, the concept of Mixed Private-Public Ownership Companies[127] was introduced to help local governments build strategic partnerships with public and private sector institutions. These companies may be established for the creation, implementation, installation, and operation of infrastructure required for community and regional development, as well as municipal utility management. The objective is to satisfy, in a timely and adequate manner, the public interest, sound administration, planning, and maximization of public funds and services. Mixed Private-Public Ownership Companies represent an opportunity to spur local development with private investment and inter-institutional coordination for example for intermunicipal mobility addressed in Chapter 3 of this Review.

Local government partnership agreements are also management and intermunicipal working tools. For example, in 2021, the Intermunicipal Active Mobility Agreement was entered into between the municipalities of Desamparados, Escazú, Belén, Curridabat, Montes de Oca, and San José. The purpose of this agreement is to devise strategies to address mobility issues comprehensively and foster knowledge and best practices exchange among the most experienced entities. The agreement's technical support is provided by central government agencies such as the MOPT, the Costa Rica Road Safety Council (COSEVI), the INVU, the Municipal Development and Advisory Institute (IFAM), the National Council for Persons with Disabilities (CONAPDIS), and the German Development Cooperation (GDC).

In the long run, government efforts to decentralize will affect the relationship between the central and local government. In 2001, Costa Rica embarked on a gradual decentralization process of transferring responsibilities and resources from the central government to the municipalities. This decentralization kicked off with the amendment to Article 170 of the Costa Rican Constitution in 2001 (Law Nº 8106/2001). As amended, all responsibilities of the Executive Branch financed by national budget programs that are (a) susceptible to being exercised locally and (b) not specifically assigned to the Executive Branch by the Constitution, will be transferable, except for matters related to health and education. The amendment specified that a separate law, or series of laws, would determine which powers would be transferred from the Executive Branch to the municipalities and how the corresponding resource allocations would be apportioned among them.

In 2010, the Transfer of Powers from the Executive Branch to the Municipalities Act[128] was passed, establishing the regulatory framework for decentralization. This overarching law set the tone for a series of special laws that would be established to decentralize each jurisdiction

124 Regulations for the establishment of the Cantonal Institutional Coordination Councils (CCCIs) and the Regional Coordination Councils Nº 34804-PLAN.
125 Article 10 of the Costa Rican Municipal Code, Law Nº 7794.
126 Concerning land-use planning, the preparation and approval of a metropolitan regulatory plan to improve the quality of life of the region's residents is being prepared. The intermunicipal agreement for processing cantonal regulatory plans and the Metropolitan Regulatory Plan, as well as the street infrastructure agreement, are currently being discussed. To enhance the quality of water resources and environmental sanitation, a feasibility study is being conducted for a West Region wastewater treatment plant projected to generate 300 tons of sludge. The Road Infrastructure and Urban Mobility are intended to consolidate a high-level technological management model. The project is gathering information from four cantons and the GAM financial projection is being developed.
127Mixed Private-Public Ownership Company Regulation Act Nº 8828.
128 Law Nº 8801, passed in 2010.

and its corresponding resources. The law stated that any function not explicitly conferred on central authorities would be subject to 'decentralization', with the notable exceptions of education and health. These functions would be financed through a gradual increase in the percentage of revenues transferred from the central government to the municipal level.

The purpose of implementing the general law, and other successive special laws,[129] is to embark on the gradual decentralization of competencies, the transfer of economic resources to the municipalities, and a capacity-building agenda. The gradual decentralization of competencies must be approved by the Legislative Assembly of Costa Rica, which evaluates the conditions, resources, and implementation capacity of the activity to be decentralized. The decision is based on dialogue and compromise between the representatives of local governments, the citizenry, and the national institution related to the subject matter being discussed. General Law Nº 8801 states that the central government is mandated to transfer 10 percent of the ordinary revenues calculated for the fiscal year in a progressive and regulated manner. Likewise, a multi-sectoral agenda for institutional capacity building is proposed to enable municipalities to assume new competencies.

However, in the more than 10 years since the general law was enacted, progress has been made in only one special law, which decentralizes the cantonal road network maintenance. Since the Transfer of Powers from the Executive Branch to the Municipalities Act was enacted in 2010, Costa Rica managed to decentralize the cantonal road network preservation and maintenance, through the Special Law for the Transfer of Functions: *Full and Exclusive Management of the Cantonal Road Network Nº 9329* (approved and in force).

The possibility of transferring full and exclusive responsibility for educational equipment and infrastructure (not educational services) to local governments is under discussion—it is currently carried out by the Education Boards and Administrative Boards.[130] Municipalities are encouraged to manage and execute resources from the National Budget and other financial sources to meet the needs of schools and the welfare of students.

FIGURE 3. In 20 years, Costa Rica has decentralized only one competence

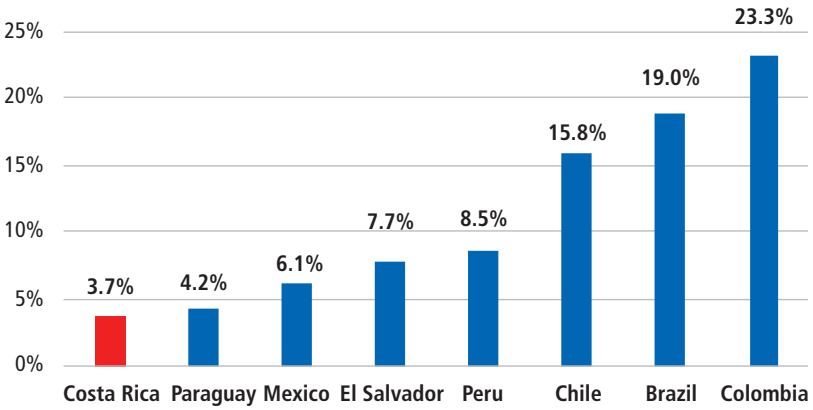
2001 Amendment to Article 170 of the Constitution of Costa Rica in 2001 (Law Nº 8106)

2010 Passing of Transfer of Powers from the Executive Branch to the Municipalities Act Nº 8801

2015 Passing of the Special Law for the Transfer of Functions: *Full and Exclusive Management of the Cantonal Road Network N°9329* (approved and in force).

2021 Legislative Assembly is discussing (August 2021) the possibility of transferring full and exclusive responsibility for educational equipment and infrastructure.

FIGURE 4. Local spending as a share of total government expenditure



Source: IMF. Government Finance Statistics 2020.

The decentralization process has not been fully implemented, a fact also reflected in local government expenditure as a share of total national public spending. Local government spending accounts for only about 4 percent of total government expenditure in Costa Rica, roughly equivalent to the proportion seen in Paraguay and Mexico, but much lower than in Chile, Brazil, or Colombia (see Figure 4).[131]

129 Special laws are used to decentralize each particular competence, framed in the general law.
130 General Regulations for Education Boards and Administrative Boards Nº 38249-MEP.
131 Municipal Police Strengthening Act Nº 9542.

II. Challenges of cantonal planning and land use in the South Corridor

A. Urban planning instruments are few and obsolete

The development of a regulatory land-use plan implies a significant investment of financial and technical resources, not available in all cantons. The preparation of a regulatory land-use plan requires technical specialists, as well as staff in charge of complementary tasks. The inter-institutional coordination and management of the agencies responsible for urban planning and land-use planning require resources, new technologies, and extensive stakeholder engagement that are not always available in the canton.

In addition, national institutions tasked with supporting the cantons in this process do not have the staff or budget to do so. For example, the INVU's resources are insufficient to effectively serve the 84 local governments. Institutions such as SENARA or the MOPT have technically sound data and studies, but they are not carried out at local or district scales, thus not completely fulfilling the needs of local governments. In general, the central government and the municipalities share the responsibility to effectively accomplish the land-use planning and management of the country's territory.[132]

According to the INVU, only 40 out of the 84 cantons nationwide have a regulatory land-use plan, half of which are outdated and/or are partial plans. About 51 percent of the regulatory plans were approved before 2000. In addition, 21 of the 40 fail to consider the entire canton's territory, thus being partial plans. Only half of the existing plans—21 of them—have the environmental viability approval of the SETENA, and only 4 out of the 40 existing plans have a hydrogeological vulnerability matrix. There are 15 cantons throughout the country that have not initiated any land-use planning process. In the GAM, for example, only 8 of 31 municipalities have issued all the urban planning regulations required by law.[133] As seen in previous chapters, the absence of regulatory plans increases the likelihood that development takes place on land that is highly vulnerable to natural hazards (see Chapter 2).

In the South Corridor cantons, Aserrí and Alajuelita lack a cantonal regulatory land-use plan, so they rely on national land-use planning instruments. To date, there is no land regularization and land-use planning project (regulatory plan) in the canton of Aserrí, while in Alajuelita, the regulatory land-use plan is in the preliminary preparation stage. Both municipalities report organizational and management weaknesses, as well as insufficient resources for adequate urban management and implementation of the municipal cadaster. In practice, these municipalities use the general regulations issued by the INVU for building permits, subdivisions, urbanizations, and other urban development-related processes.

The update of the regulatory land-use plan in Desamparados is advanced. The hydrological, environmental, and vulnerability studies are completed, and so have the public consultations on the diagnostic. A special feature of the plan is

132 The Government Plan indicates that "every project must be based on a technical analysis to have a sustainable first world train. In the same way, it must contemplate the development of complementary infrastructure (bus stops, parking lots, commercial areas, among others) to enhance its impacts and benefits."

133 According to Articles 5 and 6 of the Municipal Code, municipalities shall encourage the informed and democratic participation of the people in local government decision-making. Public institutions are obliged to collaborate so that these decisions are duly complied with.

the preparation of an inventory of urban needs by district. The relevant mapping, zoning, and studies must be approved by the INVU. A process of public consultation and stakeholder engagement within the municipality for final approval is also required.

In the absence of a regulatory land-use plan, the municipality can appropriate existing national-level regulations and laws. For example, in 2020, a regulation was passed nationally that establishes certain requirements regarding access to public roads, subdivisions, assignment of public use areas, easements, and minimum standards for street, sidewalk, and roadway construction, among other provisions. These Subdivision and Urbanization Regulations are relevant for municipalities lacking a regulatory land-use plan, or those that do have one but lack specificity.

The central government is responsible for verifying that the regulatory land-use plans are in compliance with the regulatory framework and that they meet the urban planning technical criteria. Public agencies are bound to work together and must coordinate the execution of works and projects in the canton.[134]

However, land-use planning and urban development decision-making require discussion among multiple stakeholders within a complex regulatory framework. From an institutional perspective, at least 28 public agencies have been identified with whom local governments must coordinate (see Table 2). In addition to these agencies, the National Commission for Risk Prevention and Emergency Attention (*Comision Nacional de Emergencia*, CNE) and the Comptroller General of the Republic (CGR) are also involved in monitoring and controlling disaster risk management—the CNE actively participates by providing criteria for land use and planning of highly vulnerable areas (volcanic, flooding, seismic activity, and so on).

Approval for the creation or modification of municipal regulations is burdensome. Currently, the processes required to create or modify municipal regulations must be approved by two national institutions in Costa Rica: SETENA (which reviews environmental aspects) and INVU (which focuses on urban matters). These approval processes focus on defining the studies needed to justify the regulation, instead of the regulation itself. Relaxing and simplifying them represents a good opportunity for improvement, in such a way that municipal regulations are easier to adopt and update.

TABLE 2. Institutional urban planning competencies and their relationship with local governments

CENTRAL GOVERNMENT AGENCY	RELATIONSHIP WITH THE LOCAL GOVERNMENT
Ministry of National Planning and Economic Policy	Coordinate the National Planning System and regional planning instruments
84 local governments with financial, political, and administrative autonomy	Administration of cantonal interests and services
Comptroller General of the Republic (oversight)	Superior budget oversight
National Housing and Urbanism Institute	Plan the development and growth of cities Coordinate activities relating to urban planning with all state agencies Provide advice and assistance to municipalities Review and approve Regulatory Plans
Ministry of Environment and Energy **National System of Conservation Areas** **National Forestry Office** **National Environmental Technical Secretariat** **National Groundwater, Irrigation, and Drainage Service Ministry of Agriculture and Livestock**	Inter-institutional coordination to promote quality of life and environmental conservation. Public water use permits Environmental impact assessments

Continues >

134 Comptroller General of the Republic, 2021.

TABLE 2. Institutional urban planning competencies and their relationship with local governments (Continued)

CENTRAL GOVERNMENT AGENCY	RELATIONSHIP WITH THE LOCAL GOVERNMENT
Ministry of Financing	National road network administration.
Ministry of Public Works and Transport **National Public Transportation Council** **National Road Council** **National Road Safety Council** **Federated College of Engineers and Architects of Costa Rica**	Transfer of the fuel tax (22.25%) in favor of the municipalities, for cantonal road network maintenance. Technical support and coordination with local governments in road affairs.
National Cadastre	Maintain cadastral information permanently updated and accessible to municipalities
Costa Rican Tourism Institute	Superior and general surveillance of the maritime-terrestrial zone. Approval of urban and tourist development plans in the maritime-terrestrial zone.
National Emergency Commission	Link instruments, programs, and public resources with ordinary and extraordinary institutional and sectoral actions to prevent the occurrence of disasters and emergency response in all its phases.
National Museum **Ministry of Culture, Youth and Sports, Department of Historical Heritage**	Administration, designation of historical and architectural heritage. Conservation advisory services.
Ministry of Environment and Energy **Aqueducts and Sewerage (public water supply) and utilities**	Make decisions and settle on the ownership, exploitation, use, governance, or surveillance of public domain water resources.
Department of Geology and Mines **Ministry of Environment and Energy**	Absolute ownership of mineral resources. Award concessions for prospecting, exploring, exploiting, and processing mineral resources, in conformity with the law in effect.
National Commission on Indigenous Affairs	
Technical Council of Civil Aviation and the General Directorate of Civil Aviation, Ministry of Public Works and Transportation	Aircraft operation permits and licenses.

Source: Developed by authors.

The establishment of the CCCIs would likely reconcile the programs and budgets of public entities toward a more effective and efficient local public administration; however, in most of the cantons, the local governments struggle to exert a leading coordination role. Coordination processes entail a significant investment of time and resources by public institution personnel who are deployed in various workspaces and different cantons. The timeframe and implementation of projects and budgets between the institutions and the municipalities are also not aligned. In most cases, public institutions program and budget activities according to the planning framework at the national level and do not necessarily respond to a regional or local need. In the pandemic context, during 2019 and 2020, the working sessions in these spaces were focused on emergency response, which was appropriate. But the long-standing problems related to investment coordination demonstrate the need to enhance effective coordination, the use of updated information, and communication between the central government and the municipalities.

In addition, the legal character of the Mixed Private-Public Ownership Companies, as well as their complex establishment and regulation procedure, have curtailed their proliferation. Some companies were established in the province of Guanacaste (Tilarán, Cañas, Bagaces, Abangares) and others in the province of Puntarenas (Golfito) for sanitary landfill management, as well as for

road maintenance in the canton of San José, but all of these were unsuccessful. A proposal to work with Mixed Private-Public Ownership Companies is now being discussed among municipal authorities[135] so that this structure can be used for asphalt processing; the goal is to enable the private sector to sustainably manage asphalt supplies, warehouses, and materials that the MOPT assigns them to the local governments.

B. Uncontrolled urban sprawl persists despite building and development regulation efforts

Municipalities are responsible for building permits or construction licenses. These permits are awarded in line with the regulatory land-use plan zoning regulations. Construction site inspections and the proper issuance of municipal permits are vital for disaster risk reduction and adequate urban development. Permit management requires consolidated regulations and procedures within the municipality, as well as technical information platforms allowing for adequate inspection and control.

Municipalities with fragile administrations and meager resources lack adequate controls and technical criteria to manage construction and sprawl. Building permits are an important tool to ensure the quality of construction works and their safe location. Nevertheless, in 2020, 35 percent of all construction in Costa Rica was carried out in the absence of municipal permits. That is, they are works that were neither registered nor compliant with the building requirements, corresponding land use, and payment of municipal permits or licenses, among others.

Weak municipal institutional capacities have consequences on urban development and land-use planning: first, constructions are carried out illegally, failing to meet the minimum safety requirements and in inadequate spaces or areas; second, the projects, urban amenities, and the overall urban system are not consistent with the development dynamics; and third, the municipality fails to collect revenues from those non-compliant construction works even when the municipality continues to provide utility services. In South Corridor cantons, a total of 5,089 m^2 of construction took place in 2020 without building permits (see Table 3), precluding the local government from generating important revenues. Desamparados has the largest area under construction with no municipal licensing or certification, however, this municipality has, overall, more institutional controls and capacities than the neighboring cantons of Aserrí and Alajuelita. The City of Desamparados is staffed with over 500 employees, with streamlined processes in place. Meanwhile, Aserri and Alajuelita have low technical and administrative capacities to effectively manage and steer urban development in their territories.

The size of Desamparados and Aserrí cantons make effective inspection and oversight costly and burdensome. More than half of the canton of Aserrí is considered rural, and districts such as Frailes, Patarrá, and San Cristóbal de Desamparados require long trips along roads that are in poor condition or very busy. This condition requires greater investment by the local government for municipal supervision and inspection, not only for construction works but also business activities.

TABLE 3 Areas under construction, by canton, without municipal licensing, in the second half of 2020

Canton	Areas under construction without municipal licensing (m^2)	The estimated cost of works without municipal licensing (CRC)	Estimated revenue foregone by municipalities (1%) (CRC)
Desamparados	2,666	853,120,000	8,531,200
Alajuelita	1,532	490,240,000	4,902,400
Aserrí	891	285,120,000	2,851,000

Source: Special report: Construction works without licensing or certifications, the second half of 2020.

135 Bill: Law for the transfer of inputs and collaboration between the MOPT and municipalities for the improvement of road infrastructure, September 2021.xws

The digitalization of construction licensing results in improved transparency, traceability, quality, safety, and reliability in the process. The regularization of procedures through a standardized set of requirements and efficient user communication allows the local government to invest in new information technologies, update databases, and establish working regulations. However, the effective implementation of this system also requires significant financial and human resources on the part of the municipality. As of 2019, sixty-two cantons enabled automated licensing systems (47 in 2018), including Desamparados and Aserrí.

Nevertheless, this did not necessarily translate into effective services (Table 4). For example, in Alajuelita, building permitting and licensing are 100 percent digital; however, effectiveness is 58 percent given the lead time between the application and final approval, the complexity of the process, and the number of projects received by the municipality. In comparative terms, the most effective municipality in automated permit processing is 20 points lower than 100 percent—Perez Zeledon, which scores 78.6 percent (CFIA 2020).[136]

C. Institutional capacities for effective urban management in the South Corridor

The technical, political, and administrative capacities of each municipality define the efficacy and effectiveness of urban planning instruments. Technical staff, information systems and technologies, monitoring and inspection processes, citizen participation, and financial resources are essential to an effective land-use planning process. Likewise, the local institutional management capacity and provision of services depend on the financial resources and human capital at their disposal, as well as the political proposal that defines the strategy and roadmap to be followed by the municipality every four years.

The GAM municipalities display a wide spectrum in their technical and administrative capacity. In 2021, the Comptroller General of the Republic conducted a specific review of the GAM-wide local governments' capacity for urban and land-use planning.[139] The study assessed the managerial capacities of 31 cantons throughout the GAM to promote inter-institutional or intermunicipal coordination and good practices in

TABLE 4 Municipal digital effectiveness ranking, 2019–2020 reports

Date of measurement	Position	Modality	Municipality	Indicator
1-2020[137]	35	100% automated	Alajuelita	53.3 (–11)
2-2020[138]	53	100% automated	Alajuelita	59.6 (–1)
1-2020	66	Mixed (automated and in-person)	Desamparados	51.9
2-2020	71	Mixed (automated and in-person)	Desamparados	52.9 (–5)
1-2020	78	Mixed (automated and in-person)	Aserrí	33.8
2-2020	77	Mixed (automated and in-person)	Aserrí	46.0 (+1)

Source: Municipal digital effectiveness ranking, automated building permitting 2019–2020.

Note: For 2019, the measurement was only conducted in municipalities with 100 percent automated processing, that is, Alajuelita; and in 2020, a mixed modality was incorporated, including municipalities such as Desamparados and Aserrí, which offer both possibilities.

136 This specific data contrasts with the total number of inspections and illegal constructions in this same canton, one of the highest nationally, that is, it is an efficient municipality in permitting and licensing, but it also has one of the highest numbers of permits omitted.

137 57 municipalities were measured (no comparative analysis of the mixed scheme).

138 82 municipalities are included in the ranking, mixed and automated.

139 The report on GAM local governments' capacity to carry out urban planning and land-use planning used an instrument to individually and cooperatively determine the capacity of local governments to assume their land-use planning role, defining three categories: low, medium, and high.

urban management. Specifically, 10 municipalities show strong urban management and planning capacity, 8 demonstrate moderate capacity, and the remaining 13 show poor capacity to carry out this task. According to this report, Desamparados was found to be highly capable of carrying out urban planning and land-use planning in its territory, but Alajuelita and Aserrí were not.

Based on the 2018 Municipal Management Index,[140] South Corridor municipalities have varying degrees of capacity and performance versus the 31 GAM cantons and the national average (see Table 5). This index, also prepared by the Comptroller General of the Republic, awards 81 municipalities evaluated in 2018 an average score of 65.47 points (out of 100), by evaluating 61 indicators in 5 key management areas. On average, South Corridor municipalities scored 71.5 above the national average; however, this average score is skewed by the high performance showcased by Desamparados.

The municipality of Desamparados is one of the municipalities with the best capacities nationwide. Based on this index, Desamparados scored 86.09, on a scale of 0 to 100 points. Desamparados ranks 10 out of 81 municipalities evaluated. The index specifically measures Institutional Development and Management; Planning, Citizen Participation, and Accountability; Environmental Development; Economic Services; and Social Services. The key performance challenge in Desamparados lies in Citizen Participation given the absence of arrangements and instruments for fostering stakeholder dialogue and local governance.

Aserrí reflects a significant improvement in management quality in 2018. The municipality scored 66.06, with incipient development in institutional management and environment and social services, as well as in internal planning and citizen participation. Urban upgrading, park maintenance, road and public areas clean-up, and waste collection services are deficient, scoring between 0 and 35.51 points. Despite these failings, from 2017 to 2018, the municipality of Aserrí saw an increase of 23.04 points, improving on issues such as internal control, administrative procurement, accountability, and social works and services.

The municipality of Alajuelita is a local government with limited capacities pertaining to urban service management, parks, urban upgrades, internal control, and road and public areas clean-up. The municipality scored 62.35 points. However, Alajuelita outperformed Aserrí in economic and social service management, environmental management, planning, and institutional management.

TABLE 5 Results of the 2018 Municipal Management Index for South Corridor Local Governments

Area of evaluation (61 Indicators)	National Average	GAM (31 cantons)	Alajuelita	Aserrí	Desamparados
Institutional Development and Management	77.29	84.04	64.99	88.02	87.25
Planning, Citizen Participation, and Accountability	66.77	77.16	57.96	70.18	82.88
Environmental Development Management	52.54	65.22	69.53	44.43	86.93
Economic Services Management	69.77	73.11	76.10	81.00	82.80
Social Services Management	55.58	65.65	33.75	32.25	91.10

Source: Developed by authors based on the 2018 Municipal Management Index, CGR.
Note: In green, those scores are over 80 and higher than the national average and the GAM average. In orange, those scores below the national average and the GAM average.

140 This index was established by the Comptroller General of the Republic of Costa Rica. However, it was discontinued in 2019, and superseded by a more overarching instrument applicable to all governmental institutions across the country, not only municipalities.

D. The South Corridor's economic competitiveness is below average on several counts

The economic competitiveness of each of Costa Rica's cantons is tracked by a Cantonal Competitiveness Index. This reviews institutional performance (for example, transparency) along with infrastructure, health, labor force characteristics (for example, skills and competencies) and overall economic conditions, classifying the cantons as Exceptional, Competent, Emerging, Limited, or Deficient. (Several of these measures—including those referring to health, labor force characteristics, and overall economic conditions, are largely beyond the control of municipalities and thus do not reflect on the competence of individual municipal governments.)

Overall, the 2021 Cantonal Competitiveness Index ranks the South Corridor's cantons as average (see Table 6; Annex 3 contains a datasheet by canton). As shown in Table 6, the major challenges lie in the areas of education and economy, where the South Corridor municipalities fall below 50 points. However, challenges differ from canton to canton.

Desamparados ranks 29/82, positioning itself as a canton with optimal performance in most of the dimensions. Municipal transparency, social capital, and access to public services are the best-performing dimensions. Educational coverage, connectivity, and road infrastructure are the principal challenges faced by the canton.

Aserrí is ranked 44/82, being a canton with an 'emerging' performance in most of the dimensions. The municipality displays high standards in short- and medium-term planning, as well as in sustainable and environmentally friendly development actions and strategies. The canton is in proximity to ports and airports and has low levels of traffic congestion. The main challenge lies in the provision of municipal public services and infrastructure relating to social works and services, while the cantonal road network is in poor condition.

Alajuelita is ranked 59/82, with an 'emerging' performance, with major challenges in economic, educational, and connectivity dimensions. Similar to the municipality of Aserrí, municipal resources are underinvested in public service-related infrastructure. Low crime rates provide a safe environment for businesses. In addition, Alajuelita is located close to ports and airports, and has low levels of traffic congestion, and a large proportion of students complete their secondary education.

TABLE 6 South Corridor municipalities, performance by 2021 Cantonal Competitiveness Index Pillar

Cantonal Competitiveness, Dimension Reviewed	Score (1–100 scale)				
	National Average	GAM	Alajuelita	Aserrí	Desamparados
Institutions	58.8	65.9	52.1	65.1	73.3
Infrastructure	63.3	70.0	58.4	57.7	64.9
Information and Communications Technology (ICT) Adoption	59.4	64.9	58.0	60.2	64.2
Health	70.2	76.6	67.2	74.5	68.6
Skills and Competencies	46.7	54.7	40.8	44.4	46.0
Economy	**34.5**	42.3	30.9	25.3	37.9
Average	**55.5**	62.4	51.2	54.5	59.2

Source: 2021 Cantonal Competitiveness Index.[141]
Note: In orange, those indicators with scores below the national average for each municipality.

141 https://icn.cr/indice/

III. The South Corridor faces significant challenges in adequate financial management

A. Local governments raise their revenues from three primary sources

Each local government raises its financial resources from three major sources: capital grants from the central government, municipal/local taxes, and service fees. Unlike most countries in Latin America (and the rest of the world), Costa Rica does not have a system of recurring and unconditional (unrestricted use)[142] transfers from the central government to the local level. While such schemes were envisioned in previous legislation they have never been implemented.

B. Capital grants

The capital grants made by the central government to the municipalities consist mainly of the transfer of resources for cantonal road maintenance and project-specific capital grants. The transfer of funds for the cantonal road network is ruled by Law Nº 8114, as discussed in Table 1. The transfer scheme for capital works is regulated by the Control of Specific Budget Lines from the National Budget Act Nº 7755. The law establishes the terms for transferring resources from the national government to meet local or regional public needs, "expressed in investment projects or programs of social interest."[143] According to the law, the total amount of transfers for specific budget lines must be determined by the national legislature, based on the national budget request submitted by the Executive Branch. As a result, the total amount earmarked for this type of transfer may vary from year to year.

According to the law, these capital grants are apportioned among the cantons based on population, land area, and poverty; specifically, the headcount as defined by the National Directorate of Statistics and Census; the canton's land area data certified by the Geographic Institute of Costa Rica; and the Multidimensional Poverty Index (MPI) determined by the Ministry of Planning and Economic Policy. Each municipality must, in turn, apportion the amounts received among its respective districts, again based on population, land area, and poverty. The allocation of funds to specific projects must be based on a list prepared by each District Council.

Central government capital grants are focused on community development, sports facilities, and minor road works. The 2020 central government budget allocation for capital grants to municipalities was CRC 1.5 billion (US$2.4 million). Of this total, almost half went to community development (National Budget Act Nº 3120), a category that consists largely of urban planning and does not include cantonal works,[144] 15 percent was allocated to 'recreation and sports' (code 3310), and about 10 percent to road transportation (Economic Activity 2151). The remaining 25 percent was allocated to a wide range of investments, none of them exceeding 3 percent

142 Resources allocated by the central government may be used at the discretion of each municipality. All transfers from the central government to the municipalities are earmarked for a specific purpose.
143 These capital subventions do not necessarily have to be transferred to the budgets of individual municipalities. Alternatively, the works financed by the subventions may be executed through contracts or agreements with other governmental or nongovernmental bodies. Funds can also be transferred to community development associations and other private entities that promote community, local, regional, and national development.
144 According to the Ministry of Finance website.

of the total. In the three South Corridor municipalities, the only significant-sized project listed in the 2020 budget was a pedestrian bridge, costing CRC 24.5 million (US$40,000). Other projects consisted of a road improvement project in Aserrí (CRC 2.7 million, US$4,350) and the construction of a multi-purpose meeting room in Desamparados (CRC 2.6 million, US$4,200). Excluding the pedestrian bridge, the average project size in the three municipalities was CRC 1.33 million (US$2,100).[145]

C. Taxes

Municipalities levy two broad-based local taxes. The first is the property tax. Under Costa Rican law,[146] property tax applies to all real estate, urban and rural, both plots of land and buildings, except for land owned by government entities (including schools and hospitals), religious organizations, and international organizations.[147] Tax liability does not depend on the legal title: any person in beneficial occupation of a property, whether legal or not, is tax liable.[148] See more detail on this tax in Box 1.

The second tax is a business license tax, termed the *patente.* Law Nº 7794 gives municipalities the power to impose an annual tax on businesses as a condition of granting an operating license.[151] The so-called patente is levied on all commercial business activities, including sales of goods and services. The specific articles regulating business and issuance of operating permits (Articles 88 to 92) provide no information on how the value of the taxable base should be measured or what the tax rate should be: this is done through the publication and definition of specific regulations in each municipality.

Municipalities also have other local taxes. The Municipal Code enables municipalities to impose a capital gains tax on selling real estate. The tax rate is set by law at 0.002 percent of the property value, as determined by the transacting parties or a higher value established in the municipality.

BOX 1.
How does the property tax work in Costa Rica?

By law, property owners or holders are required to file property tax returns with tax authorities every five years, and if they fail to do so, the tax administration (municipality) determines the tax bases either ex officio or administratively. In practice, the three South Corridor municipalities maintain their payer registry and update property appraisals regularly.

The municipal cadaster provides data on the physical characteristics of each property required for appraisal purposes (for example, square meters of land and buildings) and these are updated periodically, based on building permit data and owners' returns. To update the taxpayer registry, the municipality of Desamparados, for example, relies on a private company to perform this task. In Aserrí, the tax office tracks down owners who have not submitted their revised property tax returns within the five years required by law.

Individual properties are appraised following a methodology proposed by the National Tax Valuation Entity - *Órgano de Normalización Técnica* (Technical Standardization Agency), attached to the Ministry of Finance.[149] The methodology establishes a standard mass appraisal approach, whereby valuation values, expressed in colones, are attached to specific property characteristics. For example, each canton is characterized by homogeneous zones, based on land values prevailing in various areas of its jurisdiction. A value per square meter is assigned to the properties in each homogeneous zone, and the land value for each property is calculated by multiplying the square meters of the property by the per square meter value of land in its homogeneous zone. A similar approach is used to assign values to buildings, taking into account the building's size, age, condition, and other factors.[150]

The property tax rate is 0.25 percent of the total value of the property, and is applicable throughout Costa Rica; it cannot be altered by the municipality. A residential property with a value below 45 minimum wages is tax exempted in full, as long as it is the only homestead owned by the taxpayer and he/she applies the respective tax exemption to the municipal tax administration.

145 Source: https://www.hacienda.go.cr/docs/5de51bb0b030f_Ley232.pdf
146 Property Tax Act Nº 7509.
147 Under 2.2. Law for Special Regulations on the application of Law 7509 (Decree 9071), agricultural lands are exempted.
148 According to Article 6 of the law, 'occupants or possessors with a title, whether registrable or not in the Public Registry, with over a year and meeting the following conditions: holders, agricultural entrepreneurs, beneficial owner, rural sharecroppers, esquilmos (agricultural waste pickers), gratuitous land borrowers and precarious occupants. In the latter case, the owner or original possessor of the property may request the Municipality to transfer the tax liability to the current possessor, as of the tax period following the request, following the procedure established by the Regulations of this Law.
149 In conformity with Article 16 of the Property Tax Act, taxpayers are responsible for filing the value of their properties.
150 Each appraisal—either the voluntary filing made by the property owner or the ex officio appraisal managed by the municipality—is valid for five years, except for cases automatically triggered by, among others, the sale, mortgage, merger, or subdivision of the property, new construction or filing by the taxpayer (if higher than the existing value). Appraisals may also be modified to reflect road construction or other public works that boost the property's value, or actions beyond the taxpayer's control that lower it. In addition, municipalities may adjust appraisals each quarter to consider inflation.
151 Article 88: To conduct any profit-making activity, the interested parties must hold the respective municipal license, obtainable by paying a tax. Said tax shall be paid during the entire time the profit-making activity has been exercised or for the time the license has been held, though the business was not carried out.

However, the tax rate is low and the tax does not generate significant revenue. The law also establishes that municipalities are responsible for urban planning and authorizes them to impose a long list of licenses and related fees. These include fees for segregating property (for sale purposes) and for the construction itself. In addition, Law Nº 424 authorizes municipalities to impose a tax on new construction up to one percent of its value.

D. Service charges and fees

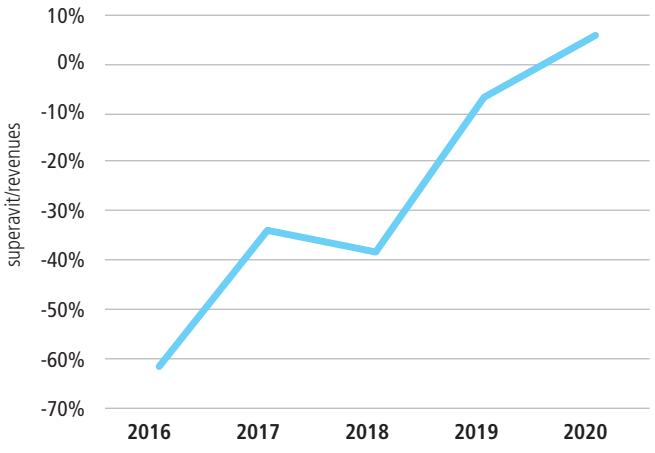
Local governments are permitted to impose charges and fees for certain services that they provide. According to Article 81 of the Costa Rican Municipal Code, the municipality can charge fees and rates for its services calculated based on the actual service cost plus a 10 percent surcharge to deploy said service.[152] Services include (a) solid waste collection and disposal, (b) sidewalk construction and maintenance, (c) public street lighting, (d) street clean-up, and (e) park maintenance. The law states that municipalities may impose charges for any other urban or rural municipal service provided by law or internal regulations, as long as they are effectively rendered. If a service does not exist or cannot be provided, the municipality may coordinate with regional or national agencies under the central government to allow them to participate cooperatively in meeting the needs of the canton.

To charge solid waste collection and sidewalk construction fees, the Municipal Code enables municipalities to set fees based on the original construction cost or service rendered (*the actual cost invested*) plus a 10 percent profit.[153] The resulting fees will be imposed on the residents of each municipality according to the value of their property, with a 50 percent discount for buildings that are fully owned by the taxpayer and have a value below 45 minimum wages.[154]

The Municipal Code also establishes the obligations of property owners to reduce municipal institutions' costs in rendering these services.[155] These include regulations requiring households to sort solid waste for recycling purposes and developers to construct sidewalks in the case of new buildings. Failure to comply with the former is penalized with a fine of CRC 100 (US$0.16 by August 2021 exchange rate) per square meter. The law provides for yearly penalty increases based on minimum wage changes.

The Municipal Code gives municipalities the power to recover investment costs by charging the beneficiaries of the investments. Article 86 of the Municipal Code on special contributions and Mixed Private-Public Ownership Companies state that municipalities in Costa Rica are entitled to charge special contributions for the works they undertake that benefit future neighbors. This power is a type of capital gain recovery and is contained in the Urban Planning Law and the Municipal Code. Special contributions may arise when works that are conducive to such purpose and that maintain an appropriate relationship with the benefit yielded are carried out. These contributions would be at the expense of the owners or possessors of the benefited property and would be fixed under the constitutional principles ruling the subject matter. These contributions represent a possibility available to the municipalities as a result of their autonomy; however, to collect these contributions, a regulation must be drafted which, by constitutional mandate, first has to be passed by the Legislative Assembly.

FIGURE 5. Fiscal trend in Alajuelita



Source: Sistema de Información sobre Planes y Presupuestos (SIPP)
Note: The reader is reminded that these trends do not necessarily reflect actual changes in the municipality's financial position during this period, given the combination of revenues and balances carried forward between years.

152 Article 83, Law Nº 7794.
153 Article 83.
154 In the case of real estate that is the sole property of the taxpayers (individuals) and has a maximum value equivalent to 45 base salaries as provided for in Article 2 of Law 7337 of May 5, 1993, 50 percent of this rate shall be charged.
155 Article 85.

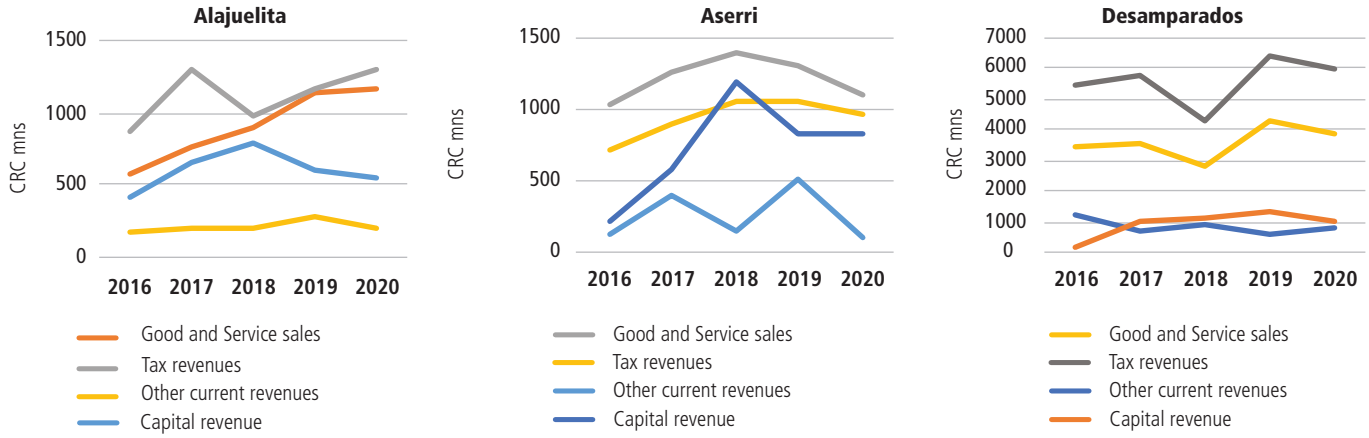
The three local governments in the South Corridor are the poorest municipalities in the GAM in terms of per capita revenues. Based on the 2020 Information System on Plans and Budgets (SIPP), total revenues per capita in Aserrí and Desamparados were US$78 while Alajuelita reported US$55. Most of this revenue was allocated to current expenditures (see Figure 8), while capital investment amounted to only US$6.50 per capita in Alajuelita and Desamparados, and US$14 per capita in Aserrí. For example, the accounts in Aserrí suggest that municipalities rely on balances brought forward from previous periods to bridge deficits during tough years, and on cash reserves to repay them in surplus years.

Although in 2020 municipalities were able to meet their financial obligations, financial performance can vary considerably from year to year. Figure 5 illustrates the trends in Alajuelita's financial performance over the past four years. As shown, the municipality of Alajuelita had a deficit equal to 60 percent of revenue in 2016. Deficits followed in consecutive years, before shrinking to 7 percent of revenue in 2019 and moving to a 6 percent surplus in 2020.

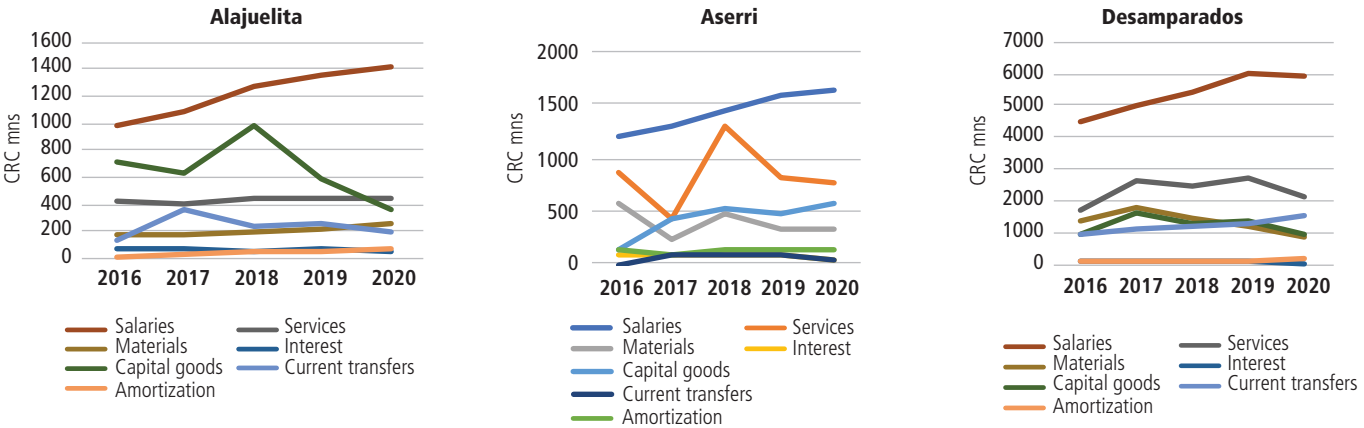
Reviewing revenue and expenditure trends for South Corridor municipalities, high volatility is seen.[156] Figure 6 illustrates the trends across the major revenue and expenditure components for

FIGURE 6.

a. Trends in municipal revenues 2016–2020



b. Trends in municipal expenditures 2016–2020



Source: SIPP. Archive: revenues by account.

156 This analysis employed only data available in SIPP rather than debt settlements.

the three municipalities. Substantial volatility can be observed in all major revenue categories: taxes (tax revenues), charges for services (sale of goods), other recurring revenues, and capital grants.

While the overall downward trend in most categories between 2019 and 2020 reflects the impact of COVID-19, the volatility in earlier years is harder to explain. As shown in Figure 6a, municipal tax revenues dropped sharply in Alajeuelita and Desamparados in 2018. This presumably reflects a fall in revenues from those municipalities' principal tax, the *patente*. The *patente* is imposed on an ad valorem basis and would be expected to vary with economic conditions. But the Costa Rican economy was still growing in 2018, falling sharply only in 2020.[157]

Property tax revenue would be expected to be less volatile, as (a) property values do not necessarily change in parallel with changes in short-term economic conditions and (b) properties are not necessarily reappraised for tax purposes each year. In contrast, changes in service revenues may follow changes in gross domestic product (GDP) as they are fixed at the discretion of each local government. During good economic times, a local government might be inclined to increase the rates of such charges. Likewise, revenues from the central government's capital grants would also expected to be volatile, presumably due to the fluctuations in fuel tax revenues on which cantonal road network transfers are based and fluctuations in the amounts that the central government chooses to allocate to specific appropriations.

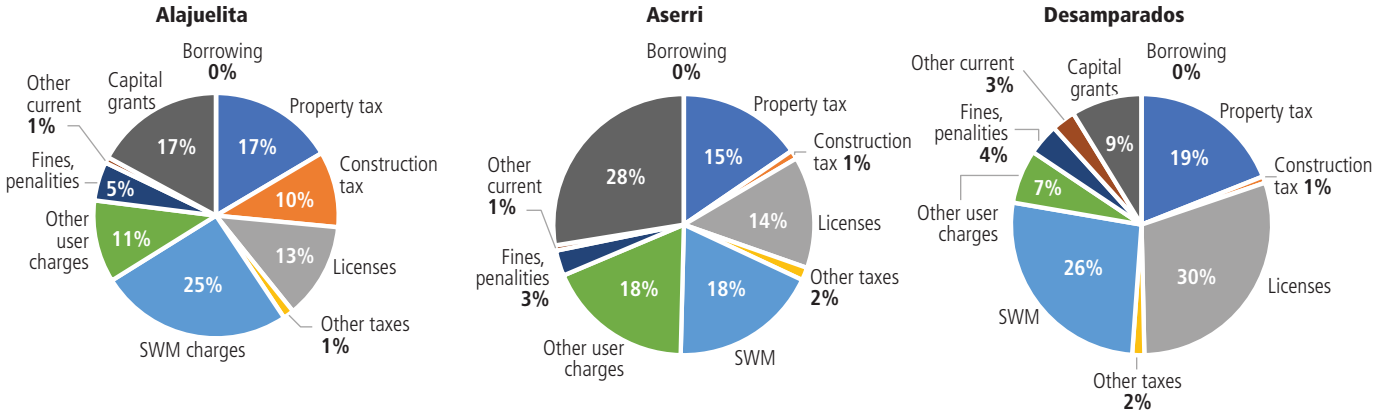
On the expenditure side, there is also volatility. In Alajuelita, capital work expenditures soared by 60 percent between 2017 and 2018 and then decreased. This can be explained, as previously stated, by the volatility in transfers from the central government (for cantonal road works expenditure and those allocated by specific appropriations). In Aserrí, spending on goods and services tripled between 2017 and 2018 and then dropped drastically. Only Desamparados shows relative stability in these expenditure categories over the last five years (see Figure 3. b).

Payroll expenditure, on the other hand, has grown at an accelerated pace between 2016 and 2020 in all three municipalities. In Alajuelita, the payroll soared by 45 percent (38 percent in real terms) during the five years, with little annual fluctuation. In Aserrí, the payroll grew 35 percent; in Desamparados, it grew 30 percent; with little year-on-year fluctuation. As mentioned earlier in this chapter, the three municipalities in the South Corridor had poor scores in the 2018 Municipal Management Index because administrative expenses were higher than expected.

E. Local revenue collection is weak

Revenue in the South Corridor municipalities comes mainly from locally collected revenues, making their adequate collection and management more relevant. As shown in Figure 7, the revenue structure in the three municipalities is very diverse. In general, property taxes account for 15 to 20 percent of the total; business licenses

FIGURE 7. Municipal revenue sources, 2020



Source: SIPP. Archive. Revenues by account : https://cgrweb.cgr.go.cr/apex/f?p=150210:15:10215661579216::NO:::

157 Costa Rica's economy grew 7 percent between 2016 and 5 and 4 percent in the following two years, respectively. That rate shrunk by 4 percent between 2019 and 2020.

TABLE 7. 2020 Tax Revenue Collection, Municipality of Aserrí

Revenue	A. Pending tax collection brought forward	B. Tax billed in 2020	C. Tax to be collected in 2020	D. Actual collected in 2020	E. Total delinquency as at 31/12/2020	F= D/C
Property tax	208,073,464	480,697,735	688,771,199	506,620,473	182,150,725	74%
Municipal patente	242,337,798	466,608,695	708,946,493	407,243,029	301,703,464	57%
Solid waste collection service	337,285,585	597,158,328	934,443,914	561,341,642	373,102,272	60%
Street and public place clean-up	10,551,247	52,097,921	62,649,168	44,773,359	17,875,810	71%

Source: Information System on Public Budgets, CGR.

(operating permits) make up 15 to 30 percent; solid waste collection service fees account for 20 to 25 percent, and other user fees account for 10 to 20 percent.[158] Capital grants from the central government account for 10 to 30 percent.[159]

Collecting business license tax (operating permits) revenues in the South Corridor municipalities poses various challenges. First, tax rates imposed in these municipalities are very low. As noted earlier the tax is levied ad valorem on the business's gross income and/or earnings. In Alajuelita, the tax rate is 0.1 percent of the value of sales, plus two percent of profits.[160] In Desamparados, it is 0.35 percent of sales; in Aserrí, 0.4 percent.

The second challenge is tax evasion, either by businesses that do not formally register or by underreporting of revenue/income. In Costa Rica, businesses must be registered with municipal authorities to obtain an annual business license. However, in Alajuelita and Desamparados, small 'informal' businesses often fail to do so. In addition, both informal and formal businesses tend to underreport their taxable income. On the one hand, informal companies fail to keep accurate accounting records. On the other hand, the larger, 'formal' companies either claim to be non-profit organizations or state that most of their earnings originate in other cantons and are therefore tax-exempt. While all three municipalities rely on central government income tax records to determine taxable income in their jurisdictions, they still have a collection issue (Table 7 in the case of Aserrí).

TABLE 8. Solid Waste Management Fees in Aserrí (existing and proposed)

Service users	Current quarterly rate (CRC)	Proposed quarterly rate (CRC)	Increase (CRC)
Residential	9,102.92	12,160.00	3,057.08
Commercial 1	18,208.85	24,320.00	6,111.15
Commercial 2	27,308.77	36,470.00	9,161.23
Commercial 3	31,860.23	42,550.00	10,689.77
Events	63,720.46	85,100.00	21,379.54
Industrial A	54,617.54	72,940.00	18,322.46
Industrial B	63,720.46	85,100.00	21,379.54

Source: Provided by the Municipality.

The solid waste collection fee is not significant in Aserrí and negligible in Alajuelita. In Aserrí, the service charge is imposed at a flat rate, with different rates for residential, business, and industrial customers (see Table 8). The existing residential tariff is equivalent to US$58 per year. In Alajuelita, the tariff is charged as a percentage of the appraised value of each property. However, the rate is extremely low: 0.0025 percent of the appraised value. In addition, residents in informal settlements do not pay the fee. Given that Alajuelita is the fourth canton nationwide with the highest number of informal dwellings (see Chapter 2), this condition is particularly noteworthy. Despite this, both jurisdictions report that solid waste management revenues are sufficient to cover the service costs (see *Spotlight: Circular Economy and Solid Waste Management in Costa Rica* for more details on these two municipalities,

158 The unusually large contribution of 'other user fees' in Aserrí stems from the municipality's water utility revenues. The other target municipalities do not own water utility companies.
159 The SIPP archives do not provide details on capital subsidies. A special Aserrí archive suggests that most of the capital grants are earmarked for communal roads under Law Nº8114.
160 In the event that taxpayers do not earn net taxable income, regardless of whether they are income tax filers, or when they cannot estimate such income because they are non-filers, the factor corresponding to gross sales or gross income will be applied.

and Desamparados). As seen in Figure 7, solid waste management fees accounted for approximately a quarter of total revenues in Alajuelita and Desamparados and 18 percent in Aserrí in 2020.[161]

Finally, property tax revenue collection is inadequate in the South Corridor municipalities. As seen in Table 7, 2020 property tax revenue in Aserrí amounted to CRC 688.8 million (column C). Of this total, 70 percent corresponds to payments due for the current fiscal period (column B) and the remainder was unpaid tax assessments brought forward from previous periods (column A). While 2020 property tax revenues totaling CRC 506 million (column D) are higher than tax payments receivable for 2020 (column B), actual collected revenue accounts for only 74 percent of total tax billed. If this performance is typical of previous years, it suggests that most property tax bills are eventually paid, albeit late. However, if it is atypical, it suggests that Aserrí has a delinquent taxpayer problem. In Desamparados, the collection rate (revenue as a share of billing) is similarly reported at 75 percent. Alajuelita municipality's collection performance is slightly lower. Based on the CGR's Information System on Public Budgets data, Alajuelita's property[162] tax turnover amounted to CRC 1,470 million in 2020. Of this, CRC 802 million pertained to tax payments due for the current period and the remainder accounted for unpaid tax billing brought forward from previous periods. Revenues amounted to CRC 798 million, just 54 percent of total tax billing.

F. Delayed disbursement of specific budget appropriations poses further challenges to municipal financial management

An additional challenge encountered by all municipalities in Costa Rica is that the central government generally fails to disburse the appropriations for specific budget lines until the end of the budget year. As a result, municipalities are denied the time to procure and implement the works before the end of the budget year. For this reason, municipalities tend to pay their outstanding obligations up to six months after the end of the budget year. As a result, February reports may be incomplete. Full figures are reported in a separate report, called 'liquidation'.

One of the biggest challenges to proper municipal financial management is the need to carry forward resources/debt from one year to the next, reporting the balances from previous years as revenues in the liquidation reports (surpluses/deficits). In these liquidation reports, amounts that should have been settled, but were not paid in 2019 (for example), are entered as revenue in 2020. These represent cash balances accrued in 2019 but earmarked to pay the 2019 unliquidated obligations in 2020. The 2020 outlay figures include payment of prior year obligations plus new outlay obligations incurred in 2020. See the sample liquidation report for Aserrí in Box 2.

BOX 2.
Costa Rica's social housing program

As seen in the table, revenues amount to approximately CRC 4,157 million. But this figure includes balances brought forward from 2019, consisting of (a) CRC 216 million deficit in unrestricted balances (free revenues) and (b) a CRC 1,147 million surplus in allocated balances. As a result, Aserrí's real revenues in 2020 totaled only CRC 3,227 million.

Similarly, outlays are CRC 3,528 million. But this figure includes payments for obligations incurred in 2019 and excludes CRC 532 million in unpaid obligations incurred in 2020. If those payments are excluded, it would appear that the total outlay in 2020 would be much closer to revenues; that is, CRC 3,227 million. However, accurate figures are not available. Thus, it is not known whether those obligations were paid or not.

The Liquidation Report includes a final balance, referred to as the free surplus. This is calculated as the difference between (a) total revenues (including brought forward balances) and (b) total expenditure (including payments on obligations incurred in prior years, settlements on obligations incurred in the current year, and new unpaid obligations incurred in the current year. In 2020, Aserrí's free surplus was CRC 97.6 million. This was equivalent to 3.8 percent of revenues (excluding brought forward balances) and is the best overall indicator available of the municipality's fiscal status.

TABLE 9. Aserrí's 2020 Liquidation Report

Residential	9,102.92
REVENUE	4,157,783,860
MINUS: OUTLAY	3,528,333,176
=SURPLUS/DEFICIT	629,450,684
Minus: Earmarked balances*	531,819,917
FREE SURPLUS/DEFICIT	97,630,767

Note: *The breakdown of the Aserrí 2020 spending by program, shown earlier in the chapter, excludes these obligations.

161 In Aserrí, revenues from the municipal aqueduct service (water utility) accounted for most of the 'other revenues'.
162 Source: SIPP 2020 electronic model annex2- delinquency.

Recommendations

Local governments need stronger, more durable institutions and governance. South Corridor municipalities must consolidate an internal working strategy, supported by the central government, to (a) update land-use regulations, in particular regulatory land-use plans and cadasters; (b) invest in technical and professional resources to improve land-use control and management (that is, information systems, inspections, and overall processing); (c) identify and strengthen strategic partnerships with central government agencies, the private sector, and other municipalities to develop infrastructure projects and urban services; and (d) improve the financing of local services and investment.

Strengthening local planning capacities

The national regulatory framework concerning land-use planning and urban management needs to be updated. It is crucial to adjust the regulatory framework that governs the powers and resources available to local governments, especially those related to urban management and planning. The urban planning law is over 60 years old. Although adjustments have been made, it is imperative to define with greater clarity the relationship between national, regional, and local planning. In the case of the South Corridor, the alignment of the 2013–2030 GAM Plan and municipal planning and investments has been inadequate. Despite the robust technical studies and high-quality information available in the GAM Plan, the implementation arrangements to steer the development of densely populated areas such as Desamparados or multi-risk cantons such as Alajuelita are not in place.

At the local level, it is important that municipalities work to update or develop regulatory land-use plans. Preparing a regulatory land-use plan enables the municipality to consolidate capacities and resources, and is the basis for an effective territorial management of the South Corridor. Technical studies such as those prepared for the GAM Plan could be used as inputs for the municipalities planning process. The experience of Desamparados might set an example for the rest of the GAM municipalities. In the absence of a regulatory land-use plan, national-level frameworks such as regulations issued by the INVU, which provide general criteria and controls for building construction, zoning, and development should be applied. Furthermore, urban planning controls such as building permits, licensing procedures, and penalty collection, among others, are key to manage urban growth and need to be strengthened and updated at the municipal level. It is also critical that local governments integrate and prioritize the approval of hazard and vulnerability identification and mitigation plans. The preparation of regulatory land-use plans must be based on updated risk and vulnerability maps. In the absence of local technical and financial capacities, the support of central government agencies in this regard is crucial. In addition, an effective tax administration by local governments also calls for updating the taxpayer registry and the municipal cadaster.

Given their limited resources and institutional capacities, the municipalities of Alajuelita and Aserrí require greater support from central government agencies and regional cooperation bodies. Strengthening of cooperation agreements, the Municipal Federation, or the Regional

Inter-Institutional Coordination Councils could be a first step to provide needed capacities to these municipalities. The CCCI in particular could be an effective forum for information exchange, coordination, and management of common projects that affect inter-cantonal development. The creation of regional technical offices funded by the municipal federations could support the preparation of regulatory land-use plans in under-resourced, institutionally weak cantons. The municipal federation could play a greater role in regional land-use planning by adopting an integrated regional development vision, and generating studies and regional information that can inform urban development planning at the municipal level.

Improving local financing is key to providing high-quality municipal services

Four measures are suggested to improve municipal finances and thus provide better services to the South Corridor cantons.

First, local revenues have to rise. To increase local tax and fee revenues, municipal governments might increase the rate of the *patente,* as well as the rates of their various services, including solid waste management fees. All of these measures fall within the legal authority of local governments. The central government, on the other hand, might increase the property tax rate. As noted above, the current property tax is a modest 0.25 percent of the appraised value, subject to numerous exemptions. For example, a residential property appraised at less than 45 minimum wages is entirely tax exempt, provided it is the home of the taxpayer and he/she files the relevant application with the municipal tax administration. This particularly affects South Corridor municipalities because of the high proportion of social housing in these cantons.

These measures could, of course, increase the burden on taxpayers, some of whom are already among the poorest in the metropolitan region. This would be particularly true for those taxes and fees that do not capture individual household's ability to pay. However, the impact resulting from a property tax rate rise is mitigated by existing tax exemption policies, for example, regarding social housing. In Aserrí, the solid waste management charge is levied as a per-customer flat fee, rather than as a percentage of the appraised value of the property being serviced. Shifting to the latter approach, as is done in Alajuelita, would lessen the impact of any solid waste management fee increase on lower-income ratepayers.

A second measure would consist of optimizing the collection and management of local taxes and tariffs. In the case of property tax, the problem does not lie in the property appraisal phase. The property valuation methodology for tax purposes seems to be sound (considering the example of Aserrí). Similarly, when assessing operating permits, municipalities have embraced cross-referencing opportunities; that is, using central government income tax records to calculate the taxation of local businesses. But there may be room to improve tax collection rates, bridging the gap between tax billing and collections, and figuring out more effective tax collection processes for all taxpayers, including the enforcement of penalties.

The third measure would be the introduction of an effective revenue-sharing arrangement, apportioning part of the central government's tax income to local governments using a straightforward formula. Costa Rica remains an outlier in not having such a system. As noted earlier, it has taken some steps in this direction. The existing law on decentralization of functions requires revenue sharing, although this is contingent on the decentralization of central functions, and has not been implemented yet. Similarly, appropriations for specific budget lines come from the central government and are allocated to municipalities based on a formula; however, the amounts are small, vary from one year to the next, and depend on congressional decisions. Cantonal road transfers, on the other hand, are financed by a relatively minor tax whose revenue also fluctuates from year to year.

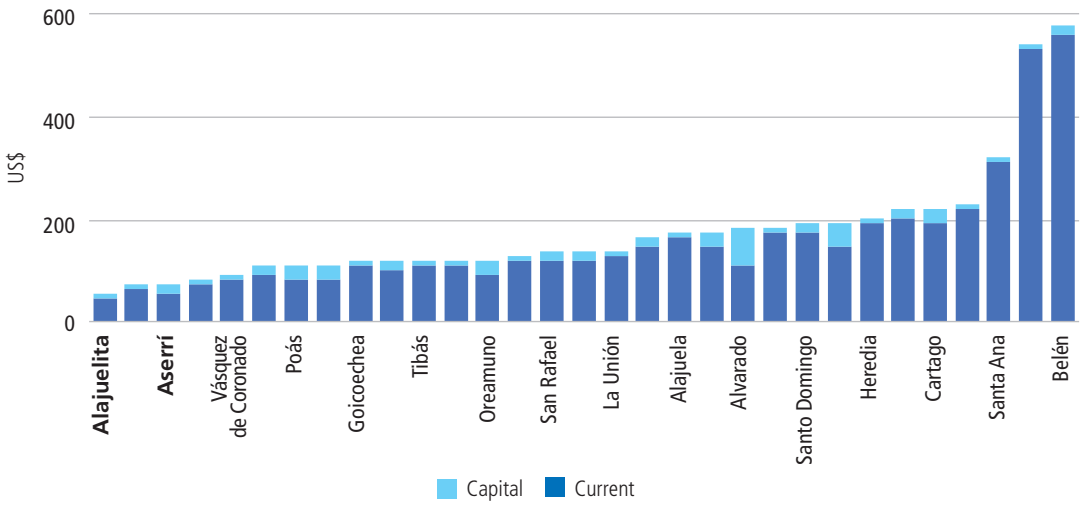
Costa Rica could complement or replace these existing transfers with a general revenue sharing system, that is (a) not dependent on further decentralization of functions; (b) based on a fixed share of central government's tax revenues; and (c) unconditional, that is, not earmarked for any specific function or economic category of expenditure. Such an arrangement would provide a source of funding that is not contingent on congressional decisions or the revenue of a particular tax. In addition, it would give local governments predictable income streams and allow them to ramp up spending on local priorities. Such funds would

be distributed using a baseline formula, which, in turn, is based on easily verifiable needs assessment indicators, such as population or poverty levels. In that sense, Costa Rica can draw on the examples of its existing transfer formulas (described above) and avoid the complex, arbitrary, and internally conflicting formulas often used elsewhere around the world.

Such a transfer would enable municipalities with weak tax bases to share in the revenues of richer ones within the GAM and in Costa Rica as a whole. Based on SIPP data, variations in per capita revenue among municipalities are significant. Figure 8 shows the per capita revenue in the 31 municipalities comprising the GAM. Per capita revenue ranged from US$55 to US$325 in 2020, even after excluding the top two outliers (Escazú and Belén). This range of variation is not surprising. In the absence of any equalization transfer, each municipality depends on its revenue base: the value of properties and the scale of commercial activity in its jurisdiction, and the residents' willingness and ability to pay for services. The transfer sharing formulas would expectedly offset these disparities, particularly when taking into account poverty variables. But the overall level of transfers is too small to make any impact on variations in total revenues. While the level of capital grants per capita allocated to each municipality is negatively correlated with its own-source revenue per capita ($r = -0.034$, excluding the two outliers), the relationship is weak. Alajuelita, Aserrí, and Desamparados, along with San José, are among the poorest jurisdictions (in terms of revenues) in the GAM.

A fourth additional source of funding could come from freeing up resources by improving public expenditure efficiency. This report did not assess the expenditure efficiency in South Corridor municipalities, and this recommendation does not imply the existence of those issues. However, the experience in other countries suggests that municipalities are often vulnerable to overstaffing and inefficient or ineffective contracting and procurement practices. Additional research may uncover opportunities to raise additional revenue by addressing problems in these areas. For example, improvements in the urban landscape (public infrastructure), accessibility, provision of services and improvement of existing ones, as well as the strengthening of socio-cultural programs that promote participation and social cohesion, educational programs and/or citizen security within the canton.

FIGURE 8. Variations in GAM Per Capita Revenue, 2020 (SIPP)



Sistema de Información sobre Planes y Presupuestos (SIPP)

References

CFIA. 2021. "Ranking de Efectividad Municipalidad Digital, tramite digital de permisos de construcción, diciembre 2020."

CFIA. 2020. "Ranking de Efectividad Municipal Digital 2019."

Colegio Federado de Ingenieros y Arquitectos. 2021. "Inspecciones del Segundo Semestre del 2020."

Ley De Planificación Urbana. http://www.dgsc.go.cr/documentos/desarrollo/RECTORIA_POLITICA_EMPLEO_PUBLICO.pdf

Índice de Capacidad de Gestión, Municipalidad de Aserrí, 2021

Índice de Capacidad de Gestión, Municipalidad de Alajuelita 2021

Índice de Capacidad de Gestión, Municipalidad de Desamparados, 2021

Sistema Información Integrada Municipal, Aserrí, 2019 – 2018/ Alajuelita 2018/ Desamparados 2018-2019-2020

SPOTLIGHT

Circular Economy and Solid Waste Management in Costa Rica

Author

Carolina Rodríguez

A. Context

Costa Rica is recognized internationally as a leader for its strong agenda on biodiversity protection and management.[163] This has been possible owing to the design of innovative financial mechanisms that contributed to the recovery and sustainability of the current forest cover, which accounts for 59 percent of its territory, as well as to the vision of positioning natural wealth as one of Costa Rica's main tourism products. Despite a relatively small land area of 51,180 km^2 [164], Costa Rica is home to 6 percent of the planet's biodiversity, and approximately 25.5 percent of that land area and 2.5 percent of territorial sea are in some category of protected area.[165] For more information on Costa Rica's approach to address climate change see Annex 1.

In 2018, the monetary contribution of national parks and biological reserves to the economy was US$1.9 billion. The activities that benefit most from protected wilderness areas are tourism and hydropower generation; these protected areas also contribute significantly to scientific research, environmental education, and local development through the generation of direct jobs. This economic contribution increased by 8.58 percent between 2016 and 2018.[166]

However, national conservation gains have not yet been conveyed to the Integrated Solid Waste Management (ISWM) sector. The 2015 Greenhouse Gas (GHG) Inventory identifies the waste sector as the second-largest

163 Payment for environmental services program (PSA) is a financial mechanism where landowners of forest plantations, agroforestry systems, natural regeneration, or forest protection projects receive direct payments from the government for the environmental services that their land generates. For further information, see https://www.fonafifo.go.cr/es/servicios/pago-de-servicios-ambientales/

164 Costa Rica National Register. 2021. "Update on the Calculation of the Continental and Insular Areas of Costa Rica. Retrieved from http://files.snitcr.go.cr/boletines/ACTUALIZACION_DE_LAS_AREAS_CONTINENTAL_E_INSULAR_DE_COSTA_RICA_02_07_2021.pdf

165 This data were reported in the Annual Statistical Report of the National System of Conservation Areas (2019–2020). It is important to clarify that these percentages have increased due to the expansion and creation of new protected wildlife areas. For further information: https://www.presidencia.go.cr/comunicados/2022/04/costa-rica-aumento-la-proteccion-de-sus-ecosistemas-en-mas-de-16-millones-de-hectareas/

166 Soto, Michelle. 2020. "National Parks and Biological Reserves yield benefits of $1.9 billion. Ojo al Clima" November 11. Retrieved from https://ojoalclima.com/parques-nacionales-y-reservas-biologicas-brindan-beneficios-calculados-en-1-900-millones/

source of emissions in the country. These emissions have grown by 58 percent since 2005 and are largely caused by the organic material sent to landfills, which under anoxic conditions produces methane, with potent GHG effects.[167]

The country is on the verge of a solid waste disposal crisis, as six of the seven landfills where 91 percent of Costa Rica's waste is deposited are in the process of closing down.[168] In 2019, Costa Rica had seven active landfills, including six under technical closure since 2016 (Soto 2019). In 2021, the Ministry of Health extended for the second time the capacity limit of the Uruca Landfill, which is responsible for the waste of approximately 610,000 inhabitants. There are also 16 semi-controlled landfills, of which 10 have already started their closing process. This is particularly critical as it is estimated that by 2050,[170] the waste generation of the municipalities in Costa Rica will increase by 62 percent when compared with the waste tonnage in 2020.

The absence of a system to collect and manage detailed waste management information hinders decision-making and timely response to the situation. The National Information System for Integrated Management of Wastes (SINIGIR) was established by law over a decade ago to collect statistical information on the national waste status. The system is not operational yet, and the scarce information generated is scattered across different institutions, which impedes monitoring and planning, as well as the establishment of goals and objectives for waste recovery and valuation.

Improving access to information is crucial for the effective participation and involvement of stakeholders. Access to consolidated information on the amount of waste generated countrywide, its composition, and waste valorization possibilities is essential to implementing education and awareness campaigns to change existing consumption and production patterns, as well as creating new waste management business models.

B. The ISWM regulatory and public policy framework in Costa Rica made progress in the past 50 years

Since the 1970s, domestic solid waste management-related regulations, focused on the collection and disposal of waste, emerged. For the first time, the General Health Law (1973) required local governments to collect, transport, and properly dispose solid waste and prevent or reduce pollution. Waste management focused on the collection and final disposal of waste, as well as on the creation of dumping grounds and landfills to meet the growing demand for waste disposal. (Figure 1 shows the evolution of the legal framework and current public waste management policies.)

In 1995, with the promulgation of the Organic Environmental Law, environmental considerations were introduced in the sector. This law set forth environmental protection and improvement criteria, and required the central government, municipalities, and public institutions to prioritize the establishment of waste collection and management services as an activity to control and prevent environmental pollution. The purpose of this new vision was to advocate for adequate waste recovery and treatment to obtain other products or by-products.

The Integrated Solid Waste Management Law (ISWM Law, 2010) assigns stewardship of waste to the Ministry of Health while imposing obligations on both municipalities and waste generators. This law for the first time articulates a classification system for waste and seeks to encourage cultural changes through citizen participation, education, and awareness on topics related to cleaner production and sustainable consumption. It also promotes (a) the search for regional waste management solutions, (b) the need to create and improve public and private related infrastructure, and (c) the development of a market for recoverable materials. The law

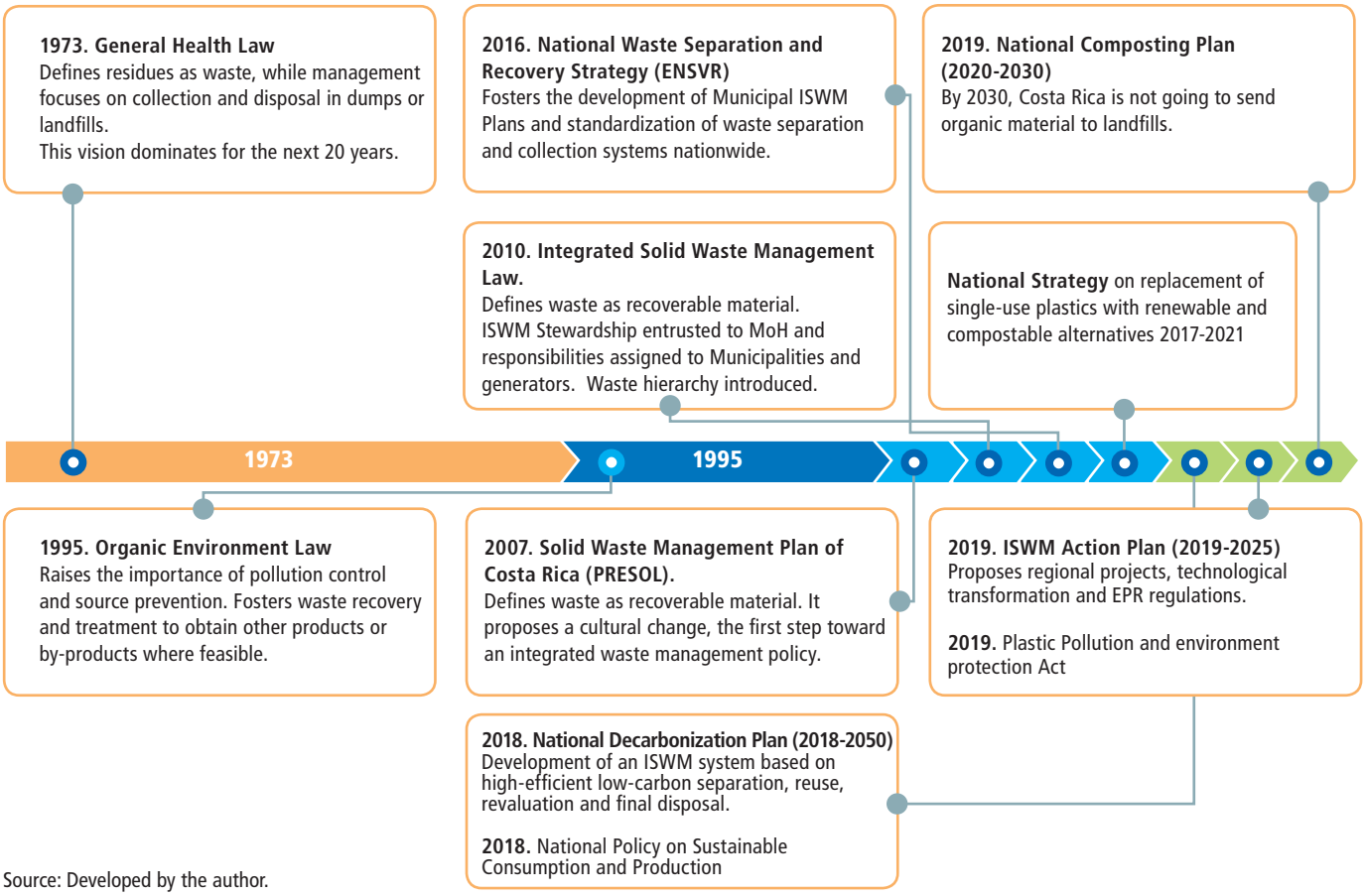
167 Ministry of Environment and Energy, National Meteorological Institute. 2019. "National Greenhouse Gas Inventory and Carbon Sequestration 2015." Retrieved from: http://cglobal.imn.ac.cr/documentos/publicaciones/InventariosGEI/InventarioGEI-2015/offline/NIR-2015-InventarioGEI.pdf.
168 Based on What a Waste 2.0, World Bank, 2018.
169 Soto 2019.
170 Based on What a Waste 2.0, World Bank, 2018.

also streamlines the regulatory process on specific issues such as Extended Producer Responsibility (EPR), the operation of recycling facilities for recoverable materials, and special management waste, among others.

The incorporation of Costa Rica into the Organisation for Economic Co-operation and Development (OECD) (2015–2021) propelled a review and update of ISWM legislation and policy. Some of the recommendations given by the OECD Council to member countries include the creation of policies for (a) source reduction, (b) promoting recycling and waste recovery, (c) using economic instruments to improve waste management, and (d) ensuring waste data collection and access to information.

In recent years, three public policies have changed the way solid waste management is understood, focusing on revaluation and circular economy. The National Decarbonization Plan (2018–2050),[171] the Action Plan for Integrated Solid Waste Management (PAGIR, by its initials in Spanish) (2019–2025)[172] and the National Composting Plan (2020–2050)[173] propose waste classification targets aiming at the implementation of a system based on valorization and efficient final disposal and low emissions, all under a circular economy model. These proposals represent a roadmap that can make it easier for the country to successfully achieve waste management and economic transformation.

FIGURE 1. Timeline of National Solid Waste Management Regulatory and Planning Instruments



Source: Developed by the author.

171 The National Decarbonization Plan (2018–2050) guides the process to establish the roadmap between the current targets and 2050, consistent with the achievement of 2030 Agenda and Paris Agreement goals. https://minae.go.cr/images/pdf/Plan-de-Descarbonizacion-1.pdf.

172 The Action Plan for Integrated Waste Management (2019–2025) promotes a local approach for integrated waste management, strengthening the articulation with local governments, responsible institutions, the private sector and the communities. https://www.ministeriodesalud.go.cr/index.php/biblioteca-de-archivos/sobre-el-ministerio/politcas-y-planes-en-salud/planes-en-salud/5076-plan-de-accion-para-la-gestion-integral-de-residuos-2019-2025/file

173 The National Composting Plan (2020–2050) contributes to the decarbonization of the country, involving society in the treatment of organic waste, diverting it from landfill. https://www.tec.ac.cr/documentos/plan-nacional-compostaje.

C. Municipalities are pivotal for integrated waste management

The ISWM Law (2010) establishes that municipalities are responsible for the integrated management of wastes generated in the canton (see Figure 2). Thus, they are required to develop a municipal integrated waste management plan; issue regulations on waste classification, selection, collection, and final disposal; and fix garbage collection fees to provide all residents of the canton with selective, accessible, regular, and efficient garbage collection service. Additionally, they must provide their territories with waste collection services and build waste recovery facilities. To achieve this, the ISWM Law (2010) and Municipal Code (1998) empower municipalities to sign agreements with microenterprises, cooperatives, organizations, and local businesses to participate in the ISWM and activities along with the recycling or composting value chains.

Municipalities enjoy autonomy to set their fees to finance this service and ensure the ISWM sustainability. To deliver and develop this service, the Municipal Code stipulates that garbage fee may cover the full cost of service plus 10 percent profit. These fees must be updated on an annual basis and may consist of differentiated amounts according to the type and amount of waste that is being generated. These garbage fees must cover waste segregation, collection, transportation, valorization, treatment, and final disposal, taking into account the obligations derived from the ISWM Law thereunder.

Nonetheless, many municipalities lack the technical and financial capacities to meet these obligations required by law. In 2020, 18 percent of the municipalities still did not have their Municipal Integrated Waste Management Plan, and 28 percent had not regulated the service. This institutional lag is aggravated by a high rate of missing payments of the garbage collection and disposal service, which reaches 42 percent nationwide. In addition, more than 70 percent of the municipalities have outdated garbage fees and 25 percent face deficits in garbage service delivery.[174]

Local governments capacities affect the efficiency and quality of the service provided. In Costa Rica, those local governments with greater capacity do have an updated Municipal Integrated Waste Management Plan, regulations, and fees. They also provide ordinary and recoverable waste collection services and coverage, use landfills, and conduct educational and public awareness campaigns to encourage best practices for waste segregation and engage citizens in integrated waste management.

The collection of ordinary garbage reaches 88 percent of Costa Rican territory, while collection of recoverable waste covers 58 percent of the territory.[175] Even though the national average of waste collection is above the percentage of garbage collection in upper-middle-income countries, significant challenges still prevail locally. Commonly shared challenges refer to the design of garbage collection routes and trucks which are either out of service or not suitable for segregated garbage collection. In addition, municipalities in rural areas or far from the Greater Metropolitan Area (GAM) have to deal with excessive costs associated with the transportation of waste for final disposal. In the canton of Osa, the waste is hauled over 260 km to be disposed of in the landfill located in Aserrí.

D. Challenges in the South Corridor

The three municipalities in the South Corridor share common challenges that can be addressed through inter-cantonal efforts. The challenges shared by the three municipalities are explained below in further detail, including various aspects relating to organic material diverted from landfills, increased volumes of recoverable waste collected, and incorporation of climate considerations into waste management.

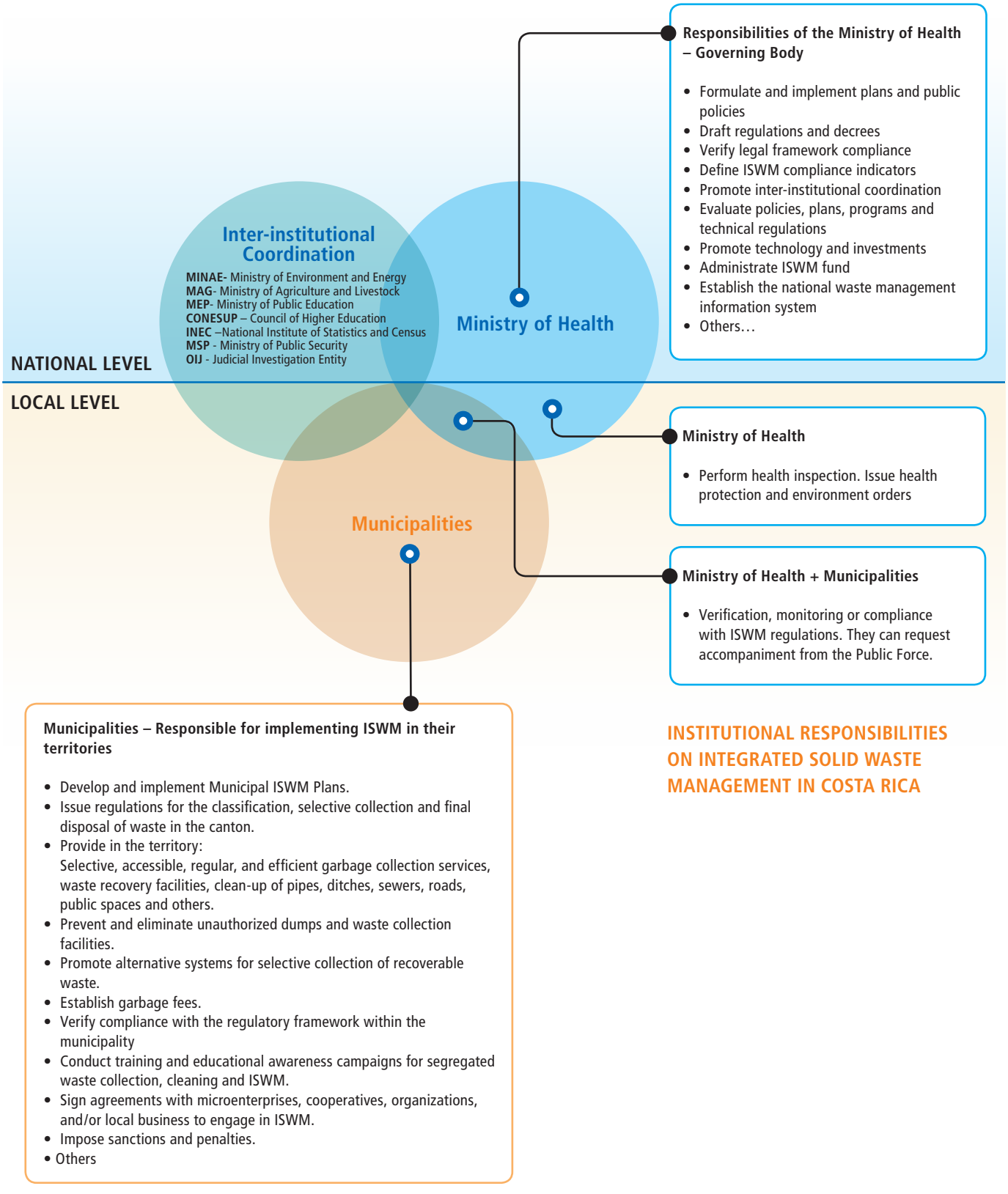
Waste generation and composition

One of the major challenges for local governments is generating and systematizing technical information to inform the solid waste management service and planning. In the South Corridor, only the canton of Desamparados

174 Office of the Comptroller General of the Republic of Costa Rica (2021) Municipal Service Management Index. Retrieved from: https://www.cgr.go.cr/03-documentos/publicaciones/indice-gestion-serv-mun.html

175 Office of the Comptroller General of the Republic of Costa Rica (2021) Municipal Service Management Index. Retrieved from: https://www.cgr.go.cr/03-documentos/publicaciones/indice-gestion-serv-mun.html

FIGURE 2. Institutional ISWM Responsibilities in Costa Rica



Source: Developed by the author.

conducted a study on waste generation and composition in 2011. This study provides information on the amount of waste generated in the territory, as well as the type and share of materials found.

Desamparados and Aserrí's average waste generation is below the national average; while Alajuelita is above (see Table 1). The GAM's average waste generation is 0.77 kg/person/day,[176] while the national average is 0.86 kg/person/day[177]. South Corridor cantons, including Desamparados and Aserrí, generate less waste than the average registered by GAM cantons, and they fall within the waste generation standard for upper-middle-income countries worldwide. In Alajuelita, the waste generation index is noticeably higher than those reported nationwide, but it is within the waste generation average expected for Latin American countries.

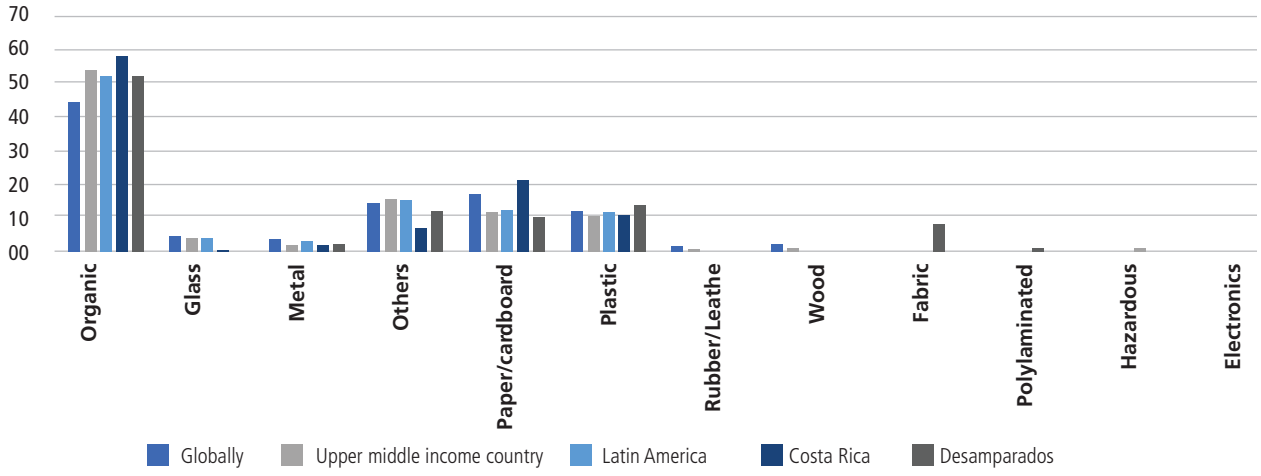
The composition of waste in Desamparados matches with national and global data reported by upper-middle-income countries (see Figure 3). It should be noted that the waste composition data are directly affected by socioeconomic conditions, clearly reflecting production and consumption patterns. Globally, the higher the income, the lower the amount of organic waste. Therefore, low-income countries generate 56 percent of organic waste, while in high-income countries this share shrinks to 32 percent, and the production of dry waste increases. Another economic fact affecting the data is the capacities of high-income countries to generate detailed information on the waste they generate and its composition, managing to analyze a larger number of materials.[178]

TABLE 1 Waste generation kg/person/day in cantons in the South Corridor, national, regional, and worldwide data

Desamparados	Aserrí	Alajuelita	GAM	Costa Rica	Latin America	Worldwide	Upper-middle income
0.67	0,65	0.98	0.77	0.86	0.99	0.74	0.69

Source: Waste generation indices taken from Rudin, Soto, and Linnenberg (2019).

FIGURE 3 Comparison of waste composition in Desamparados vs nationwide, regionally, and worldwide



Source: Developed by the author.[179]

176 Waste generation indices taken from Rudin, Soto, and Linnenberg 2019.
177 Data from What a Waste Report 2.0.
178 Data from What a Waste Report 2.0.
179 Sources included the Ordinary Waste Generation and Composition Study for the Canton of Desamparados (2011) and What a Waste Report 2.0.

Desamparados' upper-income strata report a rise in their organic waste generation, which would contradict global trends. Based on study results (CEGESTI 2011), there is a lower percentage of organic waste in the lower-income strata, where there is greater awareness about saving food. In the same way, in rural areas of the canton organic waste is used to feed pets and farm animals or as garden fertilizer. On the other hand, upper-income strata are less aware of food waste, and pets are fed with dry food instead of kitchen waste.[180]

Garbage collection service and waste treatment

Regarding the *waste collection* service, all three municipalities in the South Corridor show *an intermediate* level of maturity,[181] on par with the national average and comparable with upper-middle- and high-income countries.[182] The share of garbage collection in upper-middle-income countries is 82 percent; it is 96 percent in high-income countries. This means that Alajuelita and Desamparados are above the average for high-income countries, and all three municipalities are above the average for upper-middle-income countries (see Table 2).

All cantons of the GAM dispose of their waste in landfills. Regarding the waste collection and treatment service, Desamparados has reached the same maturity level as the national average (intermediate), while Alajuelita and Aserrí are at the *lower* level.[183]

While there are a lot of opportunities for improvement, waste management is a priority issue that has only just begun to receive special commitment from local governments. The 31 municipalities under the GAM have an Environmental Management Unit, and conduct educational and public awareness campaigns to encourage waste segregation practices of recoverable waste. As of 2022, 64 percent of the cantons have both a Municipal Integrated Solid Waste Management Plan and municipal regulations on integrated solid waste management.

It is worth noting that the Municipality of Desamparados has adopted key steps toward waste management. The municipality has in place regulations and a Municipal Integrated Solid Waste Management Plan, as well as an updated fee structure for waste collection. Despite reporting a 44.27 percent delinquency rate in garbage fees, the collection of ordinary and recoverable waste reaches 100 percent of the territory. This is possible as the municipality is the direct service provider in 70 percent of the territory, while the remaining 30 percent, that is, remote areas, are served by another provider at a lower cost. In addition, the municipality has in place environmental education programs (see Box 1).

In 2018, the Municipality of Desamparados signed the Global Covenant of Mayors for Climate and Energy, pledging to implement policies and measures to reduce or curtail GHG emissions, and a year later it became part of the Carbon Neutral Country Programme 2.0

TABLE 2 The South Corridor municipalities have opportunities to continue progressing on waste collection

Residue recolection service	Service provided	With regulatory framework	With Municipal Plan	Environmental Management Unit	Educational Campaigns	Ordinary Coverage	Recoverable Coverage	Waste is dumped in:
Alajuelita	Yes	Yes	Yes	Yes	Yes	100%	2.25%	Landfills
Aserrí	Yes	Yes	Yes	Yes	Yes	94%	94%	
Desamparados	Yes	Yes	Yes	Yes	Yes	100%	100%	
GAM Average	Yes	72%	84%	100%	100%	96%	74%	**100%**

180 CEGESTI (November 2011). Final Report. Ordinary Waste Generation and Composition Study for the Canton of Desamparados.
181 IGSM 2021 (CGR) has 14 indicators relating to "Waste Collection". See details of each indicator in this link: https://cgrfiles.cgr.go.cr/publico/docsweb/documentos/publicaciones-cgr/igsm/2021/fichas-indicadores-IGSM.pdf
182 Data from What a Waste Report 2.0.
183 IGSM Data 2021 (CGR).
184 According to the Emissions Inventory 2015, the sources of emissions in decreasing order were: energy, waste, industrial processes, and agriculture.

BOX 1.
Environmental education in the Municipality of Desamparados

The Program 'I Am a Responsible Generator' developed by the Municipality of Desamparados aims to raise public awareness of responsible consumption and the importance of waste valorization. Education and public awareness campaigns target different audiences of all ages, training materials, and video clips with information on source separation of waste, responsible consumption, and awareness of climate change, among other topics. Children's puppet shows have been conducted in schools and community centers around the canton.

The efforts in environmental education have paid off. With the support of the municipal garbage collection staff, door-to-door educational tasks are conducted to improve the proper separation of recoverable waste. When collectors identify incorrect separation practices, a written notice is issued, clarifying the mistakes and providing recommendations. This practice reduced the amount of ordinary municipal solid waste that was mixed with recoverable material in the municipal collection facility, which went from 50 percent to only 10 percent of ordinary MSW.

The Municipality of Desamparados is striving to divert the amounts of organic waste from landfills. It has conducted campaigns to deliver rotating compost tumblers, training in different composting techniques, as well as virtual courses on home garden management, care, and planting. More than 3,000 families in the canton are currently involved in the municipal composting program.

As a result of an inter-cantonal work process held with municipalities of Curridabat, La Unión, Montes de Oca, and San José, the website www.composteros.go.cr was launched—a virtual community of composters where users can access online courses and training workshops.

in its Cantonal category (PPCNC). The result of the final GHG inventory concludes that solid wastes are responsible for 29.7 percent of the cantonal emissions and similar to the last national GHG inventories, solid waste ranked the second-largest source of GHG emissions.[184]

In 2020, the municipality recovered 1,500 tons of recoverable material amounting to CRC 90 million (about US$140,000).[185] Out of that total volume recovered, 1,400 tons were processed onsite, that is, at the municipal collection facility, and the remaining 100 tons were delivered to a recycling facility by a women's organization, thus promoting canton-wide community participation in the integrated management of waste.

The Municipality of Aserrí provides MSW collection service autonomously, covering 94 percent of the canton territory. The recoverable waste is collected twice a month,[186] and taken to a collection facility where it is then sold. In addition, waste collection campaigns are conducted with the support of 'Ambientados' program, and as part of the activities carried out by the Ecologic Blue Flag Program.

Education and public awareness campaigns in Aserrí are conducted jointly with the cantons of Desamparados and Acosta, through the Territorial Council for Rural Development Caraigres. Virtual workshops have been held on composting, eco-block manufacturing, and waste management, among other topics. The local government promotes multiple spaces for citizen participation and currently has more than 80 registered volunteers. The volunteer program leads river and creek clean-up days, as well as nursery maintenance.

The Aczarrí Environmental Technology Park is located in the cantons of Aserrí and Desamparados, and receives solid waste generated by 34 cantons of the country (Environmental Comptroller's Office 2021).[187] Landfills pose additional challenges in the prevention and control of MSW pollution as many municipalities wherein the landfills are situated

185 In that same year, the canton of Desamparados sent to landfill approximately 57,000 tons of MSW. Thus, 2.63 percent of the recoverable waste generated in the canton was actually recovered.
186 The average garbage collection frequency nationwide is twice a week for ordinary MSW and twice a month for recoverable waste.
187 Environmental Comptroller's Office 2021.

lack legal tools and the economic resources to oversee their operation. For example, in 2020, 583,033 tons of solid waste were disposed of at the Aczarrí landfill, out of which only 12.2 percent came from Desamparados and Aserrí.

The canton of Alajuelita is participating in the pilot 'Project Plan A: Territories Resilient to Climate Change' (2021), supported by the Climate Change Directorate of the Ministry of Environment and Energy (MINAE). This project focuses on identifying climate risks and incorporating adaptation measures within different local planning instruments. In Alajuelita, it was found out that the Tiribí River carries waste generated by other cantons; to capture litter and debris in stormwater runoff and prevent flooding, they plan to install trash trap netting systems.

Alajuelita autonomously provides MSW collection services, covering the canton's entire territory; however, the collection of recoverable waste reaches less than 3 percent of the canton territory, since it only covers a few organized communities that have requested the service. Alajuelita also has a waste transfer station, where the users of the canton take their recoverable waste, then it is selected and transferred to a private community-run waste collection facility. To reduce the occurrence of uncontrolled dumps, clean-up campaigns are conducted in sites identified as problematic, as well as non-traditional waste collection campaigns. In 2021, two campaigns resulted in the collection of 500 tons of waste, amounting to over 31 collection trucks.[188]

The public-private partnership between the Municipality of Alajuelita and its private waste collection facility is an example of how municipalities can encourage the formalization of the recycling sector and the creation of green jobs. This waste collection facility has a gender-sensitive approach, as it provides childcare, allowing for much higher recruitment of women.

E. A circular economy provides great opportunities in the future

With the launch of the Decarbonization Plan in 2019, Costa Rica begun its transition to a circular economy. This is seen as an arrangement to improve the quality of life in both urban and rural areas, promote the creation of green jobs, extend the life cycle of materials, formalize the contribution of a marginalized sector of the population, and foster business actions. Future efforts should strengthen the work based on a regional approach, encourage the incorporation of innovative technologies, and promote the creation of a market for recoverable materials.

Low carbon waste management

The National Composting Plan proposes a vision for the country of organics-free landfills by 2030. To achieve this, capacities of municipalities, and other institutions and private initiatives linked to organic waste management need to be strengthened. The Nationally Determined Contribution (NDC 2020) commits Costa Rica by 2025 to support at least 10 municipalities to implement the National Composting Plan and launch the Circular Economy Promotion Policy. Currently, 28 municipalities are already developing composting programs in their territories.

To implement this plan, it is necessary to promote intermunicipal partnerships and composting networks to generate economies of scale, as well as technical solutions for organic waste treatment. In addition, efforts to disseminate different existing composting techniques and change consumption patterns for organic waste source reduction are needed.

Strengthening a market for recovered materials

The formulation of a circular economy strategy, as well as appropriate financing sources, are essential to streamline the domestic recycling market. The Action Plan for Integrated Solid Waste Management (PAGIR 2019) identifies the need to generate and strengthen recycling organizations or businesses, increase the recovery ratio of recoverable materials, and use innovative technologies to recover and transform recyclable waste. To make it happen, financing for more efficient equipment and technology must be made available.

188 Garbage trucks used as reference are 16-ton dump trucks.

Access to up-to-date information is a requirement for the design of the different business models that can be established around waste recovery. To achieve this, it is also essential to know the current flow of different recoverable materials, as well as the players in each link of the value chains. With this, the identification of investment opportunities and training needs will be possible, with the aim of enhancing the recycling processes for each material.
Extended Producer Responsibility

Enforcing EPR is one of the commitments assumed by the country during its incorporation into the OECD. The regulatory framework must be revised and updated to include products such as medicines and cigarette butts to the list of special waste.

The country has enjoyed considerable success relating to EPR. One of these success stories is 'Fundellantas' a non-profit organization founded by producers, importers, and distributors of tires in the country. This foundation collects tires at the end of their life cycle, recycles and packs them in waste tire bales (consisting of about 100 passenger tires interwoven and compressed in a cubic bundle), diverting them from landfill, dumps, or open spaces. This demonstrates clearly that the promotion of sectoral solutions can solve an environmental issue and create business opportunities at the same time.

At the international level, Green Point, an EPR scheme designed for the recovery of packaging in the European Union, is considered a successful model. It consists of a label trademark on the packaging, indicating that the manufacturing company is part of an integrated waste system that takes care of the cost of recycling the packaging. The green dot can be found in plastic containers, metals, Tetra Pak, cardboard, paper, and glass. Replicating this initiative in Costa Rica would bring together a diverse group of companies, benefit informal recycling organizations, and create green jobs and new markets.

Regional waste management

Costa Rica's commitment to transform its economy requires solutions that go beyond the cantonal territory. The Action Plan for Integrated Solid Waste Management (PAGIR 2019) addresses the need for the different stakeholders involved in regional projects to coordinate much more closely, and thus prevent 35 percent of the recoverable material currently being sent to landfills from following that path in the future.

The current final waste disposal model fails to provide operational, economic, and environmental solutions in line with the circular economy model. Waste management under the circular economy approach, implies that 58 percent of organic waste produced countrywide will be treated through composting, and 35 percent of recoverable materials will be recycled and reincorporated as raw material in the life cycle of new products. However, the final disposal method for the remaining 7 percent of the unrecoverable waste has not been identified yet.

Planning these small-scale final disposal sites under a regional approach would reduce emissions generated by the transportation of waste to final disposal sites. Following the proposed scheme, these would be organics-banned sites used exclusively for the disposal of non-recyclable materials, operated by low-cost local companies.

Region-wide innovative waste management projects are currently in the pipeline. An example is Komunitas, an inter-cantonal proposal for the development of an integrated management system (*Hacia Basura Cero*), with the involvement of the cantons of Curridabat, Montes de Oca, Desamparados, La Unión and San José. The first joint regulatory framework for Integrated Waste Management was recently drafted as a result of the joint work between Komunitas and the Municipal Development and Advisory Institute (IFAM). On the other hand, the Institute of Rural Development (INDER) supports the development of projects such as the *Parque Temático Ambiental Municipal*, Canton of Grecia, which uses the Takakura composting method for organic waste, as well as set up a waste plastic building block plant in Canton of Mora. Simultaneously, the National Directorate of Community Development (DINADECO) has been promoting the project called *Ecomunidades* since 2020, which creates materials recovery facilities (MRFs) in coordination with Integral Development Associations (*Asociaciones de Desarrollo Integral* in Spanish), and already has an innovative MRF is in La Fortuna, San Carlos.

References

Artavia, S. 2018. "Costa Rica desecha 564 toneladas de plástico al día. La Nación. June 5. Retrieved from https://www.nacion.com/ciencia/medio-ambiente/costa-rica-desecha-564- toneladas-de-plastico-al/PT4ISJT7QFC6ZDZJB5LR3M2TRA/story/.

CEGESTI. November 2011. Informe Final. Estudio de generación y composición de residuos ordinarios para el cantón de Desamparados.

Municipal Code. Law Nº 7794. Published in the Official Gazette No 94 dated May 18, 1998. Retrieved from http://www.pgrweb.go.cr/scij/Busqueda/Normativa/Normas/nrm_texto_completo.aspx?nValor1=1&nValor2=40197

Environmental Comptroller's Office. Ministry of Environment and Energy, Costa Rica. 2020. Residuos ordinarios dispuestos en los parques de tecnología ambiental de EBI (Rellenos Sanitarios). Informe Anual 2020. Retrieved from: https://www.contraloriaambiental.go.cr/doc_/doc_1619447942.pdf

Comptroller General of the Republic of Costa Rica. 2016. "Auditoria Operativa recolección de residuos sólidos." Retrieved from https://cgrfiles.cgr.go.cr/publico/docs_cgr/2016/SIGYD_D_2016002526.pdf

Comptroller General of the Republic of Costa Rica. 2021 "Índice de gestión de servicios municipales." Retrieved from https://www.cgr.go.cr/03-documentos/publicaciones/indice-gestion-serv-mun.html

Climate Change Directorate, Costa Rica. 2021. "20 cantones fortalecen su planificación para adaptarse ante los impactos del cambio climático." August 9. Retrieved from https://cambioclimatico.go.cr/20-cantones-fortalecen-su-planificacion-para-adaptarse-ante-los-impactos-del-cambio-climatico/

Garza, J. 2018a. "Reciclaje y tratamiento de residuos reactivarían la economía de comunidades. La República." July 8. Retrieved from https://www.larepublica.net/noticia/reciclaje-y-tratamiento-de-residuos-reactivarian-economia-de-comunidades

Garza, J. 2018b. "Ecoturismo deja 809 mil millones anuales a la economía. La República." November 7. Retrieved from https://www.larepublica.net/noticia/ecoturismo-deja-809-mil-millones-anuales-a-la-economia

Government of the Republic of Costa Rica. 2019. National Decarbonization Plan (2018-2050). Retrieved from https://minae.go.cr/images/pdf/Plan-de-Descarbonizacion-1.pdf

Government of the Republic of Costa Rica. Action Plan for Integrated Waste Management (2019-2025). Retrieved from https://www.ministeriodesalud.go.cr/index.php/biblioteca-de-archivos/sobre-el-ministerio/politcas-y-planes-en-salud/planes-en-salud/5076-plan-de-accion-para-la-gestion-integral-de-residuos-2019-2025/file

Government of the Republic of Costa Rica. National Composting Plan (2020-2050). Retrieved from https://www.tec.ac.cr/documentos/plan-nacional-compostaje

Government of the Republic of Costa Rica. Nationally Determined Contribution 2020. Retrieved from: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Costa%20Rica%20First/Contribución%20Nacionalmente%20Determinada%20de%20Costa%20Rica%202020%20-%20Versión%20Completa.pdf

National Meteorological Institute. 2019. "National Greenhouse Gas Inventory and Carbon Sequestration 2015." Retrieved from http://cglobal.imn.ac.cr/documentos/publicaciones/InventariosGEI/InventarioGEI-2015/offline/NIR-2015-InventarioGEI.pdf

Kaza, Silpa, Lisa Yao, Perinaz Bhada-Tata, and Frank Van Woerden. 2018. "What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050." Urban Development Series. Washington. Retrieved from https://openknowledge.worldbank.org/handle/10986/30317

Lara, Juan Fernando. 2021. "Salud alarga vida de relleno sanitario en La Carpio a falta de opciones. La Nación." August 25. Retrieved from https://www.nacion.com/el-pais/salud/salud-alarga-vida-de-relleno-sanitario-en-la/66522HZ2WVBXNPQR5EC52CDN2A/story/

General Health Law No. 5395. Published in the Official Gazette 222 dated November 24, 1973. Retrieved from http://www.pgrweb.go.cr/scij/Busqueda/Normativa/Normas/nrm_texto_completo.aspx?param1=NRTC&nValor1=1&nValor2=6581&nValor3=96425&strTipM=TC

Integrated Solid Waste Management Act No. 8830. Published in the Official Gazette No 135 del 13 de July 2010. Retrieved from https://www.pgrweb.go.cr/scij/Busqueda/Normativa/Normas/nrm_texto_completo.aspx?nValor1=1&nValor2=68300

Ley para la prohibición del poliestireno expandido, reforma Ley para la Gestión Integral de Residuos. Ley No. 9703. Published in the Official Gazette 147 del 7 de August 2019. Recuperada de http://www.pgrweb.go.cr/scij/Busqueda/Normativa/Normas/nrm_texto_completo.aspx?param1=NRTC&nValor1=1&nValor2=89355&nValor3=0&strTipM=TC

Ley para combatir la contaminación por plástico y proteger el ambiente. Ley 9786. Published in the Official Gazette 233 del 6 de December 2019. Retrieved from http://www.pgrweb.go.cr/scij/Busqueda/Normativa/Normas/nrm_texto_completo.aspx?param1=NRTC&nValor1=1&nValor2=90187&nValor3=0&strTipM=TC

Ministry of Health. "National Waste Separation and Recovery Strategy (2016–2021)." Retrieved from https://www.ministeriodesalud.go.cr/index.php/biblioteca-de-archivos/sobre-el-ministerio/politcas-y-planes-en-salud/estrategias/3026-estrategia-nacional-de-reciclaje-2016-2021/file

Ministry of Health. "Plan Nacional para la Gestión Integral de Residuos (2016–2022)." Retrieved from https://www.ministeriodesalud.go.cr/index.php/biblioteca-de-archivos/sobre-el-ministerio/politcas-y-planes-en-salud/planes-en-salud/3025-plan-nacional-para-la-gestion-integral-de-residuos-2016-2021/file

Ministry of Health, Costa Rica. 2017. "Costa Rica reduce depósito de residuos en los vertederos en un 5%." May 17. Retrieved from: https://www.ministeriodesalud.go.cr/index.php/noticias/noticias-2017/1147-costa-rica-reduce-deposito-de-residuos-en-los-vertederos-en-un-5

Ministry of Health, Costa Rica. 2019. "Ticos generaron 21 estadios nacionales de residuos sólidos en el 2018." December 6. Retrieved from https://www.ministeriodesalud.go.cr/index.php/noticias/noticias-2019/1515-ticos-generaron-21-estadios-nacionales-de-residuos-en-el-2018

Municipality of Desamparados. 2018. "90 toneladas de residuos orgánicos no irán más a los rellenos sanitarios." December 14. Retrieved from https://www.desamparados.go.cr/es/el-canton/noticias/ecologia/90-toneladas-de-residuos-organicos-no-iran-mas-los-rellenos-sanitarios

Municipality of Aserrí. 2020. Municipal Integrated Waste Management Plan. Retrieved from https://aserri.go.cr/wp-content/uploads/2021/04/Plan-Municipal-Gestion-Integral-Residuos-Solidos-Aserri-2021-2025-.pdf

Obando, M. 2021. "Costa Rica recicla seis veces menos que los países de la OCDE. La República." August 2. Retrieved from https://www.larepublica.net/noticia/costa-rica-recicla-seis-veces-menos-que-los-paises-de-la-ocde-2021-08-07-07-52-47

OECD (Organization for Economic Cooperation and Development). 2020. "Examen del proceso de adhesión de Costa Rica a la OCDE en las áreas de medio ambiente y residuos." Informe Resumido. April 10. Retrieved from https://www.comex.go.cr/media/8085/vf-es-informe-evaluación-ambiental.pdf

Presidencia de la República, Costa Rica. 21 abril 2022. "Costa Rica aumentó la protección de sus ecosistemas en más de 16 millones de hectáreas." Retrieved from https://www.presidencia.go.cr/comunicados/2022/04/costa-rica-aumento-la-proteccion-de-sus-ecosistemas-en-mas-de-16-millones-de-hectareas/

Reforma a la Ley para la gestión integral de residuos sólidos, Ley orgánica del ambiente y el Código Municipal. Ley 9825. Published in the Official Gazette No 265 del 4 de November 2020. Retrieved from http://www.pgrweb.go.cr/scij/Busqueda/Normativa/Normas/nrm_texto_completo.aspx?param1=NRTC&nValor1=1&nValor2=92853&nValor3=0&strTipM=TC

Rudin, V., S. Soto, and C. Linnenberg, C. 2019. First Solid Waste Management Status Report for Determination of Waste NAMA Costa Rica. Project Acción Clima II.

Soto, S. 2019. "Gestión de los residuos sólidos en Costa Rica. Ponencia preparada para el Informe Estado de la Nación 2019." San José: PEN. Retrieved from https://repositorio.conare.ac.cr/handle/20.500.12337/7818

Sistema Nacional de Áreas de Conservación. Informe Anual Estadísticas SEMEC 2019-2020: SINAC en números. 2021. Retrieved from https://www.sinac.go.cr/ES/transprncia/Informe%20SEMEC/Informe%20SEMEC%202019-2020.pdf

Annexes

Annex 1: The institutional approach to climate change in Costa Rica

Costa Rica has a climate agenda aligned with internationally agreed objectives. One of the commitments in this agenda is to improve urban and territorial planning processes to have a development model that contributes to limiting the increase in global average temperature to 1.5°C (MINAE 2020). Its normative reference framework is based on the constitutional level, protected in Article 50 and in the Organic Law of the Environment. This general mandate is detailed in the National Policy for Adaptation to Climate Change 2018–2030 and the National Decarbonization Plan 2018–2050. The country has also signed and promoted, nationally and internationally, the main international agreements on the subject, such as the United Nations Framework Convention on Climate Change, the Kyoto Protocol, the Copenhagen Accord, the Paris Agreement, and the Marrakech Alliance.

The country has stood out internationally as a pioneer in mitigation (Table 1). The conservation and reforestation policy, which the country has been promoting since the 1980s, positioned it as one of the first international references in carbon sequestration. Its scheme of payments for environmental services, developed in the 1990s, has been an international example (Sánchez and Navarrete 2017). Due to the size of the country and its global contribution in terms of emissions (Figure 1), Costa Rica has reinterpreted the mitigation agenda as an opportunity to develop more efficient development practices oriented toward the use of more sustainable energy sources and the exploitation of high value-added business activities, linked to the green, orange, and blue economy.

The operational framework proposed by the National Decarbonization Plan (MINAE 2018b) organizes its efforts in five pillars: (a) The transformation of public transportation; (b) Accelerating and scaling up actions to transform the agricultural sector activities that produce the most emissions; (c) Laying the groundwork for the electrification of the economy, not only in transportation but also in industry; (d) Avoiding technological routes in energy and transportation that are limited to partially reducing emissions, but are not aimed at a zero emissions transition; and (e) Strengthening green tax reform.

TABLE 1. Costa Rica establishes four goals in its NDC, both in adaptation and mitigation

Adaptation Goals	Mitigation Goals
• Costa Rica is committed to strengthening the country's social, economic, and environmental resilience to the effects of climate change through capacity building and information for decision-making, the inclusion of adaptation criteria in financing and planning instruments, the adaptation of public services, productive systems and infrastructure, and the implementation of nature-based solutions.	• Costa Rica commits to an absolute maximum of net emissions in 2030 of 9.11 million tons of carbon dioxide equivalent (CO_2e) including all emissions and all sectors covered by the corresponding National Greenhouse Gas Emissions Inventory.
• Based on Article 7.11 of the Paris Agreement, and following the indications of Decision 9/CMA.1 of the United Nations Framework Convention on Climate Change, Costa Rica has decided to submit its Adaptation Communication as part of this NDC.	• Costa Rica commits to an absolute maximum net emissions budget for the period 2021–2030 of 106.53 million tons of CO_2e including all emissions and all sectors covered by the corresponding National Greenhouse Gas Emissions Inventory.

FIGURE 1. If no action is taken, Costa Rica's emissions will increase by 2.4 percent annually

Figure 1a. Total absolute emissions by sector (2017)

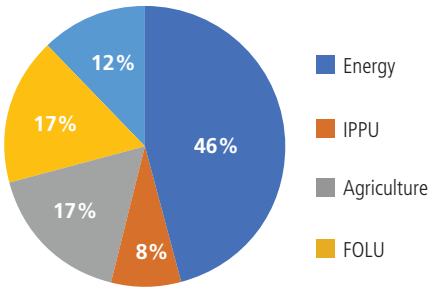
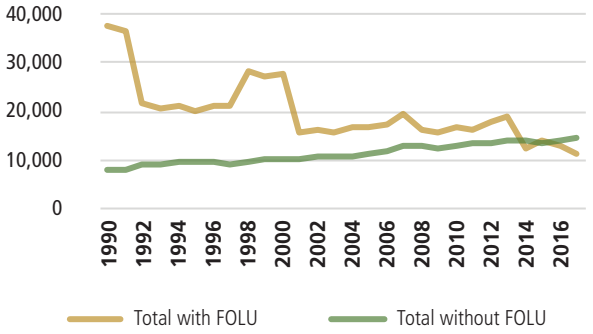


Figure 1b. Costa Rica. Total emissions (Gg CO_2e) (1990–2017)



Source: Own elaboration with data from Sistema Nacional de Métrica de Cambio Climático.

Costa Rica's governance system has been strengthened in recent years, moving from a sectoral to a comprehensive model. In the past, its climate change governance system relied mainly on the environmental sector. Gradually, the model evolved toward a systemic one, which recognizes climate change as a problem derived from the development model and, consequently, must be addressed from different sectoral, institutional, and territorial fronts (Corrales 2014).

Currently, climate action processes are coordinated by the Climate Change Directorate (DCC), which according to the Organic Regulations of the Ministry of Environment and Energy (Presidency of the Republic 2011) has, among others, the following functions: (a) Coordinate and manage public policy on climate change, promoting the integration of an intra-ministerial climate change agenda in its different dimensions; (b) Exercise the focal point of the Framework Convention on Climate Change in its different areas and support the governing body in the negotiation process under the Convention and its instruments; (c) Act as Technical Secretariat of the Domestic Carbon Market and its structures; (d) Coordinate and promote the implementation of the Carbon Neutral Country Program with the various actors and sectors of national activities and other programs that may be generated to consolidate the implementation of climate action; and (e) Promote multi-sectoral participation spaces that encourage the involvement of the private sector, public sector, academia, and civil society in climate action.

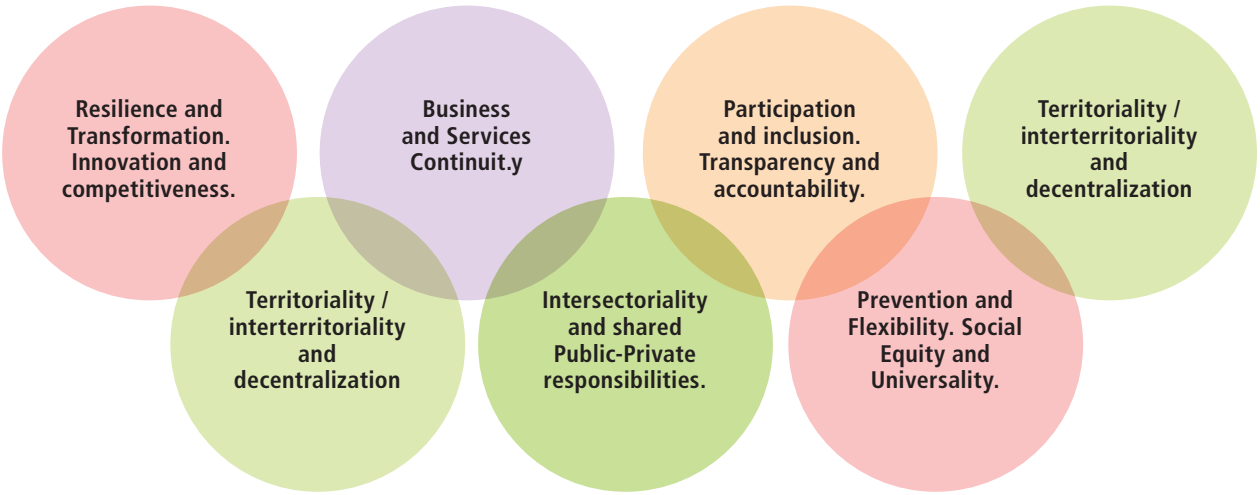
In parallel, the DCC coordinates complementary efforts carried out by other institutional systems, such as the National System for Disaster Risk Management and Territory or the National Land Management Council. It also monitors citizen governance structures, such as the Citizen Advisory Council on Climate Change and the Scientific Council on Climate Change, created by executive decrees 40616 and 40615, respectively.

According to the National Policy on Adaptation to Climate Change, the country intends to move toward a resilient development model—A model that avoids human losses and mitigates material damages generated by the adverse effects of climate change. This should contribute to the quality of life of the most vulnerable populations and take advantage of opportunities to innovate and transform productive sectors and ensure the continuity of public services (MINAE 2018a).

The country's main challenge in the face of the climate crisis lies in increasing its capacity to adapt its socioeconomic development model to the transformations identified under different scenarios. According to the most recent technical information, the country faces imminent challenges that would have to be considered in this new resilient development model. According to the Fourth National Communication 2021 (MINAE 2020), in the short and long term, temperatures could be warmer, with an increase in the average temperature that could be between 1°C and 2°C. In terms of ecosystem and biodiversity transformation, it is estimated that the country could experience a reduction in the number of biodiversity zones, going from 11 to 6 by 2040 (Birkel et al. 2019), with the implications this would have in terms of species loss. On the other hand, the incidence of climate change would have a direct effect on disaster risk levels in the country. Considering the country's current vulnerability conditions and trends in the number of hydrometeorological events per year, the Comptroller General of the Republic (CGR) projects that the costs that the country would have to face would be between 1.05 and 2.5 percent of the annual gross domestic product (GDP) (CGR 2019).

Costa Rica has a two-pronged approach to adaptation: one in which it generates resilience in the face of negative effects and another in which it seeks to develop capacities to take advantage of opportunities derived from global warming. This is driven by three specific objectives: (a) Strengthen resilience capacities, (b) Reduce damages and losses, and (c) Take advantage of opportunities. These orbits of action are governed by guiding principles which correspond to current constitutional precepts that enable the processes defined in the policy (Figure 9).

FIGURE 2. Costa Rica's adaptation approach contemplates principles that seek to implement actions that benefit as many productive sectors, territories, population groups, and institutions as possible



Source: MINAE 2018a.

References

Birkel, C., Dehaspe, J., Chavarría-Palma, A., Venegas-Cordero, N., Capell, R., & Durán-Quesada, A. M. 2022. Projected climate change impacts on tropical life zones in Costa Rica. Progress in Physical Geography: Earth and Environment, 46(2), 180–200.

CGR. 2019. Presión sobre la Hacienda Pública en un contexto de variabilidad y cambio climático: desafíos para mejorar las condiciones presentes y reducir impactos futuros. https://cgrfiles.cgr.go.cr/publico/docs_cgr/2017/SIGYD_D_2017015617.pdf

Corrales, L. 2014. Cambio climático: impactos y desafíos para Costa Rica. San José: CONARE.

MINAE (Ministry of Environment and Energy). 2018. Política Nacional de Adaptación al Cambio Climático. San José: Government of Costa Rica.

MINAE (Ministry of Environment and Energy). 2020a. Costa Rica. Cuarta Comunicación Nacional. San José: Government of Costa Rica.

MINAE. 2020b. Contribución Nacionalmente Determinada de Costa Rica. San José: Government of Costa Rica.

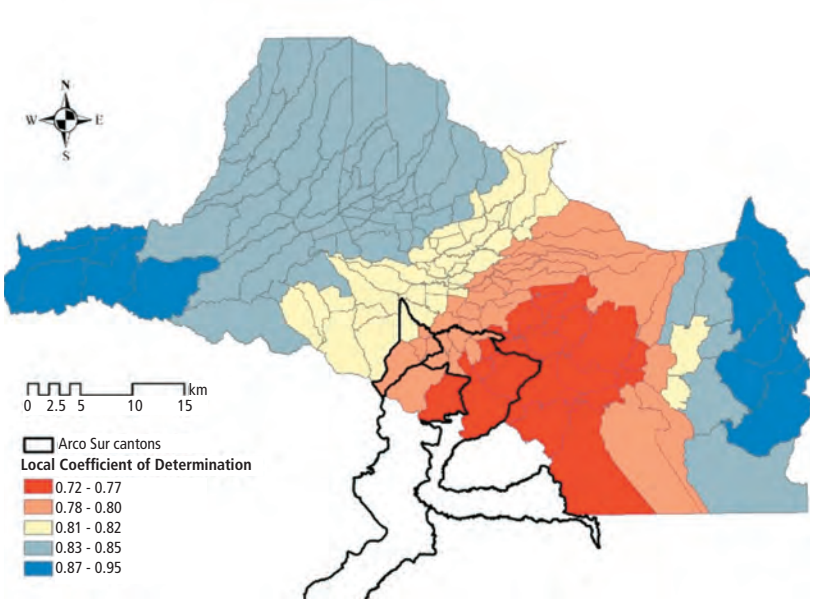
Sánchez-Chaves, O., & Navarrete-Chacón, G. 2017. La experiencia de Costa Rica en el pago por servicios ambientales: 20 años de lecciones aprendidas. Revista De Ciencias Ambientales, 51(2), 195-214. https://doi.org/10.15359/rca.51-2.11

Annex 2: Results of the Econometric Analysis of the Spatial Distribution of COVID-19

The geographically weighted regression (GWR) method was applied to explore spatial distribution of COVID-19: for each spatial unit in the database, a linear regression centered on that unit is estimated; the weight of data corresponding to other units is determined by proximity to this unit. In this way, it is possible to estimate how the regression coefficients vary (that is, how the relationships between the dependent variable and each of its determinants vary) in space, as well as the goodness of fit of the model (Fotheringham et al. 2002).

The GWR model explains between 72 and 95 percent of the variation in the number of COVID-19 cases identified - see Figure 1. The local R2 coefficients of determination are higher in the GAM's peripheral districts but also have great power in the center of the region (the central areas of San José, Alajuela, and Heredia). Their performance is poorer in Cartago districts, but R2 values vary between 72 and 77 percent even there. The determinants selected in this model to explain the incidence of COVID-19 in the GAM were exogenous data (2011 census): total density (population divided by district area), percentage of immigrants of foreign origin, average years of schooling, percentage of workers living and working in different cantons, and percentage of the substandard, slum, or shanty homes. In general, the hypothesis is that poorer households live in denser areas (population-wise) and have more run-down housing, forcing a closer interaction among household members, while workers from poorer households are forced to commute to work. This implies additional exposure by interacting with more people.

FIGURE 1. The GWR model of COVID-19 incidence in the GAM fits the data better in Alajuela, Heredia, and Cartago than in San Jose



Source: Prepared by authors based on data from the Ministry of Health updated by September 5, 2021, and the 2011 Census.

COVID-19 incidence increases with exposure (commuting workers), with total density and with the percentage of foreigners, and decreases for the population with higher schooling levels. Table 1 shows the ranges of local regression coefficients with their respective standard errors. The number of people working away from the canton where they live has positive and significant coefficients: the more they are forced to commute, the higher the incidence of COVID-19 in their districts (due to greater exposure). When

analyzing other variables, (a) they are generally significant, that is, their standard errors are relatively low and (b) some coefficients (close to the maximum or minimum) do not have the expected sign (although the median does, except in one case). Both total density (which may be an indication of overcrowding) and the percentage of the foreign-born population (mostly Nicaraguan low-income households, that is, an indication of poverty) are generally positive determinants, although total density has slightly larger standard errors. The only variable with a sign opposite to what is expected is the percentage of housing in slums, shantytowns, or precarious settlements, which is generally negative despite signaling extreme poverty, which would be expected to correlate with a higher incidence of COVID-19. However, the mechanism is overcrowding, whose effect may already be captured by total density.

TABLE 3 GWR Model Regression Coefficients[189]

Variable	Min	Median	Max
Population density	–4.78 (10.9)	5.44 (2.28)	33.6 (23.3)
Share of persons working away from the canton where they live	0.19 (0.048)	0.24 (0.045)	0.53 (0.14)
Percentage of housing in slums, shantytowns, or substandard settlements	–1.39 (0.41)	–0.95 (0.61)	2.21 (1.11)
Percentage of the foreign-born population	–0.23 (0.24)	0.66 (0.076)	0.75 (0.082)
Average years of education	–256.9 (103.9)	–137.8 (46.9)	87.1 (147.9)

189 In parentheses: standard error of the regression coefficient (does not correspond to the minimum, median, and maximum standard error values but the error associated with the minimum, median, and maximum coefficients).

Annex 3: Plans and regulations regarding the decarbonization of transportation.

PRUGAM Project 2005–2007. This project represents a shift in the urban development model to make cities denser, increase the supply of public transportation, and build roads to remove freight transportation from the city.

National Transportation Plan 2011–2035. This plan provides the basis for the modernization of the public transportation fleet to minimize the impact of transportation systems on the environment and promote intermodality, coverage, and capacity of the system.

National Energy Plan (PNE) 2015–2030. The plan seeks to promote energy efficiency and the renewal of the vehicle fleet by creating favorable fiscal and financial conditions, developing urban planning programs that optimize routes, and encouraging the adoption of clean technologies for the replacement of at least 5 percent of fossil fuels with renewables.[190]

Decarbonization Plan 2018–2050. The plan has three pillars focused on transportation and mobility: (a) Development of a mobility system based on safe, efficient, and renewable public transit, and active and shared mobility schemes; (b) Transformation of the light vehicle fleet to zero emissions, supplied with renewable energy; and (c) Advocacy of freight transportation that adopts low- or no-emission modalities, technologies, and energy sources.

National Electric Transportation Plan 2018–2030. This plan promotes fleet modernization and transformation, including electric fleet incentives.

Intermunicipal Territorial Plan for Active Mobility (ITPAM). The ITPAM was born from the efforts of local governments and central government institutions of Costa Rica with an aim to improve the quality of life of citizens by promoting active mobility. The plan has been built to organize all these efforts and create a common vision. This document compiles in each of its sections the different stages of the process and presents the results that have been validated by the different parties (https://changing-transport.org/publication/plan-interterritorial-municipal-de-movilidad-activa/).

Law 9518 of 2018. It establishes the regulatory framework for the promotion of electric transportation and policies to incentivize its use. It provides the guidelines for electric mobility governance, institutional competencies, as well as exemptions and incentives for zero-emission mobility.

Executive Decree 41092, Regulations - Electric Transportation Incentives. This regulates the institutional competencies for electric vehicle (EV) fleet with economic and non-economic incentives.

Executive Decree 41426, Incentives for Used EVs. This establishes the benefits for used EVs and creates blue parking lots exclusively for EVs.

Executive Decree 41427, Promotion of Sustainable Mobility in Central Government Institutions. This promotes sustainable mobility by (a) modernizing transportation, (b) increasing the

190 The VII National Energy Plan 2015–2030 is prior to the National Decarbonization Plan, which is why the target of the Energy Plan is lower when compared to that set out under the Decarbonization Plan.

productivity of public servants; (c) increasing the use of public transportation, (d) reducing air pollution and greenhouse gases, (e) saving public resources, and (f) reducing road congestion and fuel use.

The Bicentennial National Development and Public Investment Plan 2019–2022. One of this plan's primary objectives is to reduce CO_2 emissions by replacing fuels in the transportation sector through (a) the rational use of renewable energies, (b) the construction of national electric recharging infrastructure, (c) the increase of the EV fleet, and (d) the development of low-emission fuel studies.

Law 9366 of 2016, Strengthening of the Costa Rican Railroad Institute (INCOFER) and the Greater Metropolitan Area Interurban Electric Railway Promotion. The law grants INCOFER responsibility over the electric train project.

Urban Development Plan 2018–2023. The plan promotes sustainable urban planning, proposing an urban infrastructure construction framework for sustainable mobility and modal integration.
Mobility and Cycling Safety Act 9660 of 2019. The law prioritizes bicycle mobility and its integration with the electric train and a bus-based transit system.

Legislative Decree 9329. The First Special Law on Transfer of Powers: Full and Exclusive Attention to the Cantonal Road Network establishes that cantons are responsible for the construction of sidewalks. There is a bill in the pipeline to have the canton accomplish the build and then charge the private sector for it. In principle, this would enable substantial improvements in the municipalities' sidewalks, which in turn would result in increased pedestrian mobility.

Annex 4: Existing land-use planning institutions, competencies, and instruments in Costa Rica

URBAN PLANNING AND LAND-USE PLANNING NATIONAL AND MUNICIPAL COMPETENCIES AND INSTRUMENTS				
DEFINING/ NORMATIVE REGULATION, LAW, OR RULE	**GOVERNING BODY or Coordinating State Agency**	**Responsibilities of Governing Body or State Agency**	**Management INSTRUMENTS RELATING to Municipal Competence**	**Municipal Management INSTRUMENT**
National Planning Act N° 5525	Ministry of National Planning and Economic Policy	Coordinate the National Planning System and regional planning instruments	2019–2022 National Development Plan and Public Investment Plan (in effect) Development Plan - Central Region (Desamparados, Aserrí, and Alajuelita)	Cantonal Human Development Plan Local Cantonal Plan Municipal Strategic Plan Annual Plans of Operations
Costa Rican Municipal Code, Law N° 7794 **Reforms to the legal framework that assign competencies to the Comptroller General of the Republic under the Municipal Regime Act N° 8494**	84 local governments with financial, political, and administrative autonomy. Comptroller General of the Republic (oversight)	Administration of cantonal interests and services Superior budgetary oversight	General Guidelines on Local Development Planning (L-1-2009-CO-DFOE) Guidelines for Preparation and Submission of the Institutional Budget to the Comptroller General of the Republic	Cantonal Human Development Plan Local Cantonal Plan Municipal Strategic Plan Annual Plans of Operations
LAND-USE PLANNING				
INVU Organic Act N° 1788 **Urban Planning Act N° 4240**	National Housing and Urbanism Institute	• Plan the development and growth of cities • Coordinate activities relating to urban planning with all state agencies • Provide advice and assistance to municipalities • Review and approve Regulatory Plans	National Land-use Planning Policy 2030 GAM Plan Regulatory Plan Preparation Handbook as a land-use planning instrument	Regulatory Plan and Related Urban Development Regulations
Organic Environment Act N° 7554 **SENARA Act N° 6877** **Biodiversity Act N° 7788** **Forest Act N° 7575**	Ministry of Environment and Energy • National System of Conservation Areas • National Forestry Office	• Inter-institutional coordination for promoting harmony between the well-being of the population and environmental conservation. • Public water use permits	Manual on Technical Instruments for the Environmental Impact Assessment Process (EIA Manual)	Regulatory Plan and Related Urban Development Regulations

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URBAN PLANNING AND LAND-USE PLANNING NATIONAL AND MUNICIPAL COMPETENCIES AND INSTRUMENTS				
DEFINING/ NORMATIVE REGULATION, LAW, OR RULE	**GOVERNING BODY or Coordinating State Agency**	**Responsibilities of Governing Body or State Agency**	**Management INSTRUMENTS RELATING to Municipal Competence**	**Municipal Management INSTRUMENT**
Soil Use, Management, and Conservation Act N° 7779 **General Regulations on Environmental Impact Assessment Procedures of Costa Rica (Executive Decree N° 31849 - MINAE - S - MOPT - MAG - MEIC)**	• National Environmental Technical Secretariat • National Groundwater, Irrigation, and Drainage Service (IDA and MAG as appropriate) • Ministry of Agriculture and Livestock	• Environmental impact assessments	Technical Procedure for the Introduction of the Environmental Variable in Regulatory Plans or other Land-Use Planning General Methodology to Prepare Hydrogeological Studies for Regulatory Plans Land Capacity Analysis Methodology for Costa Rica General Protected Wildlife Areas Management Plan Soil Management, Conservation, and Recovery Plan by Area Soil Use, Management, and Conservation Plan in Management Areas	(Environmental variable)
General Public Roads Act N° 5060 **Tax Simplification and Efficiency Act N° 8114 (Decrees 30263-MOPT of 2002, and 34624-MOPT of 2008, and Decree 40138-MOPT)** **Special Law for the Transfer of Functions: Full and Exclusive Managementmari of the Cantonal Road Network N° 9329 and its Regulations thereunder (Decree 40137-MOPT)** **Pedestrian Mobility Act N° 9676**	Financing Ministry of Public Works and Transportation • National Public Transportation Council • National Road Council • National Road Safety Council Federated College of Engineers and Architects of Costa Rica	National road network administration Transfer of the fuel tax (22.25%) to the municipalities, for cantonal road network maintenance Technical support and coordination with local governments in road affairs	Regulations on Functional Classification of Public Roads National Transportation Plan 2011–2035 (in effect) 2018–2022 Five-Year Strategic Plan of National Road Council (in effect) Five-Year Road Maintenance and Development Plans: Formulation and Monitoring Guidelines	Cantonal Road Maintenance and Development Plan
National Cadastre Act N° 6545 and its Regulations thereunder **Establishment of the National Territorial Information System, Executive Decree No. 37773-JP-H-MINAE-MICITT of July 12, 2013**	National Cadastre	Keep cadastral information up to date and accessible to municipalities	Guide on Requirements for Submission of Plans and Documents to the One-Stop-Shop of the Directorate of Urban Development	Municipal Cadastre

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URBAN PLANNING AND LAND-USE PLANNING NATIONAL AND MUNICIPAL COMPETENCIES AND INSTRUMENTS				
DEFINING/ NORMATIVE REGULATION, LAW, OR RULE	**GOVERNING BODY or Coordinating State Agency**	**Responsibilities of Governing Body or State Agency**	**Management INSTRUMENTS RELATING to Municipal Competence**	**Municipal Management INSTRUMENT**
Maritime Terrestrial Zone Act N° 6043 and its Regulations thereunder **Framework Law for Declaration of Urban Coastal Zone and Territorial Use and Development Regime N° 9221**	Costa Rican Tourism Institute	Superior and general surveillance of the maritime-terrestrial zone Approval of urban and tourist development plans in the maritime-terrestrial zone	2017–2021 Tourism Development Plan	Coastal Regulatory Plans
Ley National Emergency and Risk Prevention Act N° 8488 and its Regulations thereunder	National Emergency Commission	Link instruments, programs, and public resources with ordinary and extraordinary institutional and sectoral actions to prevent the occurrence of disasters and emergency response in all its phases	National Risk Management Policy National Risk Management Plan National Risk Management System	Cantonal Risk Management Plan
SPECIAL REGIME ZONES				
Costa Rican Historical and Architectural Heritage Act N° 7555 **Archaeological Heritage Act N° 6703**	National Museum Ministry of Culture, Youth and Sports, Department of Historical Heritage	Administration and designation of historical and architectural heritage Conservation advisory services	Historical and architectural heritage declaration Public Registry of National Archaeological Heritage	Regulatory Plan and Related Urban Development Regulations
Water Act N° 2796	Ministry of Environment and Energy Aqueducts and Sewerage (public water supply) and utilities	Adjudicate the ownership, exploitation, use, governance, or surveillance of public domain water resources	Municipal aqueducts Inventory of water concessions	
Mining Code N° 6797	Department of Geology and Mines Ministry of Environment and Energy	Absolute ownership of mineral resources Award concessions for prospecting, exploring, exploiting, and processing mineral resources, in conformity with the law in effect	Permit and concession to mine materials from public domain waterways	
Costa Rican Indigenous Peoples Act N° 6172	National Commission on Indigenous Affairs		Indigenous territories are administratively autonomous	
General Civil Aviation Act N° 5150	Technical Council of Civil Aviation and the General Directorate of Civil Aviation, Ministry of Public Works and Transportation	Aircraft operation permits and licenses		

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URBAN PLANNING AND LAND-USE PLANNING NATIONAL AND MUNICIPAL COMPETENCIES AND INSTRUMENTS				
DEFINING/ NORMATIVE REGULATION, LAW, OR RULE	GOVERNING BODY or Coordinating State Agency	Responsibilities of Governing Body or State Agency	Management INSTRUMENTS RELATING to Municipal Competence	Municipal Management INSTRUMENT
URBAN DEVELOPMENT REGULATIONS				
Condominium Property Regulatory Law N° 7933				
Regulations for National Subdivision and Urbanization Control				
Building Act N° 833 Building Regulations				
Urban Renewal Regulations				
Greater Metropolitan Area Industrial Zoning Regulations				

Source: Developed by authors.

Annex 5: Municipal revenues have different sources and applications

MUNICIPAL REVENUE	TRANSFER PERCENTAGE, OR ESTIMATED AMOUNT	INTENDED PURPOSE, AND APPLICATION OF FUNDS
Property Tax Act N° 7509/ N° 7729	0.25% of the appraised value of the property registered in the tax administration	10% Education Boards 3% National Cadaster Administrative Board 8% Municipal Development Fund 3% IFAM (% training and assistance, 2% for credit) 1% Ministry of Financing 10% Administrative expenses 66% Provision of services or investment projects
Specific taxes on the exploitation of natural and mineral resources, Law N° 6797 - Mining Code	10% of the market value per cubic meter of extracted materials (sand, stone, ballast, and so on)	NOT earmarked for a specific purpose, and only the municipalities endowed with the resource collect it
Tax on construction, building licenses, or permits, Law N° 4240 and its regulations		NOT earmarked for a specific purpose, unrestricted use
Live Entertainment Tax Act N° 3/7097-88	6% levied on all public amusement events Not collected by the GAM municipalities because it is collected by the National Theater	50% on cultural events 50% of sports events
Specific taxes on the production and consumption of services, Law N° 190, Law N° 6844, Law N° 6890	% of all admission fees, tickets, or entrance of all non-free public shows or amusement and minimum consumption	NOT earmarked for a specific purpose
Municipal operating permits, special laws on profit-making activities by profession, trade, industry, commerce, arts, or any secondary or tertiary profit-making activity	One and a half per thousand (1.5 × 1,000) on sales or gross income Eight per thousand (8 × 1,000) on the net taxable income	NOT earmarked for a specific purpose
Municipal tax stamps (for mortgages and mortgage bonds) Law N° 7794	2 × 1000, two colones per thousand of the value of the property	Unrestricted application
Tax stamps for National Parks, Article 43 of Biodiversity Act N° 7788	Tax stamp 2% on municipal operating permit revenue, tax stamp of CRC 5,000 levied for social clubs, bars, liquor stores, restaurants	10% to National Commission for Biodiversity Management (CONAGEBIO) 3% on the formulation and implementation of local sustainable development strategies 70% National Parks Fund
Sale of other goods		Sale of recycled materials
Market Rent Act N° 2428	Depending on the size of leased premises, cost of living, economic condition	10% for administrative costs 90% service delivery
Cemetery maintenance service, General Cemetery Regulations, and Law N° 7794	Annual service cost and profit percentage	10% Administrative costs 90% service delivery
Sale of other services	Issuance of municipal and public registry certifications	Unrestricted application

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MUNICIPAL REVENUE	TRANSFER PERCENTAGE, OR ESTIMATED AMOUNT	INTENDED PURPOSE, AND APPLICATION OF FUNDS
Maritime mile land lease, Law N° 6043	Annual concession fees, as appraised 2% Agricultural and livestock use 3% Residential use 4% Hotel, tourist, and recreational use 5% Commercial, industrial, mining, or extractive use	20% Improvement in payments 40% Tourist zone improvement works 40% Cantonal improvement works
Building Act violation penalties/other penalties and late filing penalty interests		Unrestricted application
Road Safety Council's contribution under the Road Traffic Law Act N° 7331	10% total traffic violation revenue to all municipalities based on population and geographic area parameters	Earmarked to finance road safety projects
National Council on Public Policy for Youth, Law N° 8261		Cantonal Youth Committees
Liquor Law	50% of total revenues allocated to municipalities	50% to the municipal urban development plan (Law N° 6796, reforms Law N° 6282)
Land sales, Notice plan, Law N° 6282		Land sales and subdivision fund, land concessional financing for residents of the canton
Liquor operating permit, Law N° 9047		Each municipality has its regulations
Banana export duties paid to banana producing municipalities	CRC 4,224,000 million in 2020	CRC 4,224,000 million in 2020
Land freight export tariffs	CRC 1,025,000 million in 2020	For cantons of La Cruz, Corredores, Talamanca, Coto Brus, Los Chiles, and 5 ministries
Land transport export duties		Only 5 municipalities and 6 ministries
Departing for foreign territory duties		Departing for foreign territory duties

Source: Budgetary Classifier by Object of Expenditure of generalized use for the public. Decree N° 34325. Municipal Code and related regulations. Municipal Budget Structure.

Annex 6. Datasheet by South Corridor Municipality

Desamparados

The canton of Desamparados is the best performer in municipal transparency, social capital, and access to services. Its primary challenge lies in cantonal road network investments.

The canton of Desamparados has 13 districts and a total population of 245,208 inhabitants, of whom 21 percent are between 0 and 14 years old, 71 percent are between 15 and 64 years old, and 9 percent of the population is over 65 years old. It ranks 29/82 in the Cantonal Competitiveness Index (2021),[191] implying optimal performance in most social, institutional, economic, health, education, and services dimensions. Municipal transparency, social capital, and access to public services are the best-performing dimensions. Educational coverage, connectivity, and road infrastructure are the biggest challenges that affect the canton of Desamparados.

TABLE 1. Municipality of Desamparados, performance by pillars reviewed under the 2021 Cantonal Competitiveness Index

Cantonal Competitiveness, Dimension Reviewed	Score (1–100 scale)
Institutions	73.3 pts
Infrastructure	64.9 pts
ICT adoption	64.2pts
Health	68.6 pts
Skills and competence	46.0 pts
Economy	37.9 pts

Source: 2021 Cantonal Competitiveness Index.

TABLE 2. Municipality of Desamparados, 2021 Cantonal Competitiveness Index, indicators reviewed

Dimension	Indicator	Baseline data[192]	Score[193]
Social Capital	Structural participation in municipal elections	83.1%	100
	Current participation in municipal elections (in percentage points)	10.4	68.1
	Fostering citizen participation promotion	100%	100
Municipal Strengthening	E-Municipality	83.8%	81.7
	Municipal self-monitoring	**36%**	**20**
	Risk self-assessment	100%	100
	Strength of planning	92.5%	91.6

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191 The Cantonal Competitiveness Index reviews institutional conditions, infrastructure, health, skills and competencies, and economy and markets (6 Pillars), classifying the cantons as Exceptional, Competent, Emerging, Limited, or Deficient.
192 Baseline data is the original value in the indicator measurement (not applicable to dimension or pillar). Indicators have different units of measurement (colones, percentages, km, KwH, among others) according to the ICC, 2021.
193 According to ICC, on a 1–100 scale.

TABLE 2. Table 2. Municipality of Desamparados, 2021 Cantonal Competitiveness Index, indicators reviewed (Continued)

Dimension	Indicator	Baseline data[192]	Score[193]
Municipal Transparency	Citizen budget transparency	100%	100
	Information access	76.8%	78.9
	Accounts	77.9%	100
	Citizen participation	70.5%	100
	Open government data	**54.9%**	**64.5**
Budgetary administration	Per capita investment in community services	¢25 861	17.0
	Per capita capital investment	¢11 034	**1.4**
	Financial dependency on state transfers	11.9%	90.4
Transport Infrastructure	Cantonal road network condition	59.7%	**46.6**
	Average road network and traffic safety investment per km	¢4,591,654	**27.3**
	Other transport infrastructure	No	0
	Service stations every 100 km of the road network	1.4	**19.3**
Road connectivity	Distance to airport (in km)	14.2	96.6
	Distance to port (in km)	85.7	49.1
	Average traffic delay (seconds per 100 m)	138	83.2
	Highway congestion (annual traffic jams per 100 m)	2,139,855	62.6
Municipal public services	Coverage of parks and beautification works	100%	100
	Road and public areas clean-up service coverage	100%	100
	Social infrastructure investment per capita	¢438	1.4
Built-up area growth	Expansion of constructions	0.3%	5.2
	Growth in housing built-up areas	0.2%	20.2
	Growth in commercial built-up areas	−0.3%	4.9
	Growth in an industrial built-up areas	−0.9%	0.1
	Growth in service built-up areas	−0.6%	1.1

Source: Developed by authors, based on 2021 Cantonal Competitiveness Index.

The municipality has in place adequate arrangements, including accountability, legitimacy of citizen participation, great respect for democracy and its institutions, as well as building trust and cooperation. The canton has a strong provision of basic public services to the citizens.

Based on the institutional analysis, the municipality excels in transparency and risk assessment. Weaknesses include open government data management and municipal self-monitoring.

The municipality has a basic organizational structure, a tax administration service, a general administration department, an urban planning department (Department of Urban and Rural Management), and the Environmental Management Directorate, designed to provide Solid Waste Management (SWM) collection, municipal water supply, cemetery, clean-up, and beautification services. There are about 22 working processes, staffed by 506 employees working in the institution.

In a more specific municipal institutional performance review, Municipal Management Index (2018), Desamparados scored 86.09, putting it in Group A among the municipalities with the largest budgets. The highest scoring axis is Social Services Management at 91.10 and the lowest scoring axis is Economic Services Management at 82.80. The areas of improvement include citizen participation, road, and public area clean-up, and SWM collection. The Municipality of Desamparados improved its performance regarding the IGM-2017; it increased 13.86

points, becoming a partially compliant municipality (2/3) against its planned improvement of the 2017 Municipal Management Index.

By 2021, and according to the provision of urban services,[194] the Municipality of Desamparados is a local government that functions as follows:

ROAD CLEAN-UP SERVICE	Service delivered	Regulations in place	Service fees Updated	Average coverage	% Delinquency	Resource investment percentage	Service quality evaluation
	Yes	Yes	Yes	100.00%	39.56%	0.00%	No

SOCIAL AND COMPLEMENTARY SERVICES	Service delivered	Regulations in place	Application of funds	Communication channels updated	Beneficiary update	Population served by social programs	Service quality evaluation
	Yes	Yes	Yes	100.00%	39.56%	0.00%	No

EDUCATIONAL, CULTURAL, AND SPORTS SERVICES	Service delivered	Regulations in place	Population served by education, social, and sports programs	Application of funds	Communication channels updated	Service quality evaluation
	Yes	Yes	Data not available	68.33%	Yes	No

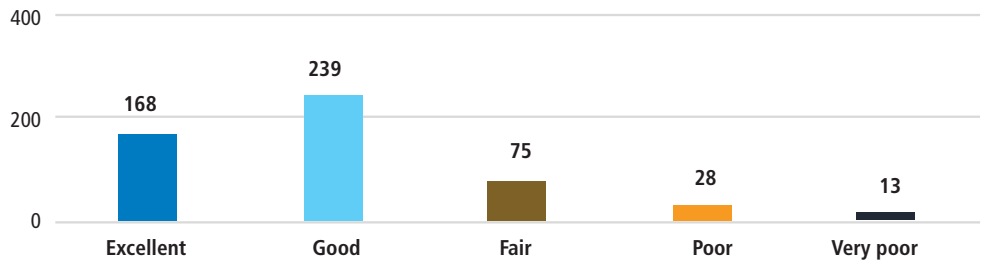
URBAN PLANNING SERVICES	Service delivered	Regulating Plan	Simplified application process officer	Fully automated land-use permitting	Fully automated building permitting	Fully automated business licensing	Service quality evaluation
	Yes	PARTIAL	Yes	Yes	Yes	Yes	No

In 2020, the municipality of Desamparados issued 15 building permits, within 10 calendar days on average. Business license processing time is one day.

Based on municipal data, the road network serviced by the municipality is 524 km, while 50 percent of the total number of bridges are in fair condition.

CANTONAL ROAD NETWORK	Service delivered	Regulations in place	5-year plan in place	Multi-year projections	Works completed with supervision	Works completed with quality assurance	Service quality evaluation
	Yes	No	No	Yes	100.00%	100.00%	No

GRAPH 1. Large share of the road network in Desamparados is in excellent or good condition



Source: 2021 Municipal Service Management Index, Comptroller General of the Republic.

194 2021 Municipal Service Management Index, Comptroller General of the Republic.

Aserrí

Aserrí has potential for growth and improved performance. The Municipality of Aserrí needs to strengthen information access, accountability, and citizen participation.

The canton of Aserrí has 7 districts and a total population of 63, 529 inhabitants, of whom 21 percent are between 0 and 14 years old, 71 percent are between 15 and 64 years old, and 8 percent of the population is over 65 years old. It ranks 44/82 in the Cantonal Competitiveness Index (2021),[195] implying emerging performance in most of the social, institutional, economic, health, education, and services dimensions. The municipality displays high standards in short- and medium-term planning, as well as in sustainable and environmentally friendly development actions and strategies. The canton is in proximity to ports and airports and has low levels of traffic congestion. The main challenge lies in the provision of municipal public services and infrastructure relating to social works and services, while the cantonal road network is in poor condition.

Based on the institutional analysis, the municipality excels in transparency and risk assessment. Weaknesses include information access, accountability, citizen participation, and open government data management.

TABLE 3. Municipality of Aserrí, performance by pillars reviewed under the 2021 Cantonal Competitiveness Index

Cantonal Competitiveness, Dimension Reviewed	Score (1–100 scale)
Institutions	65.1
Infrastructure	57.7
ICT adoption	60.2
Health	74.5
Skills and competence	44.4
Economy	25.3

Source: 2021 Cantonal Competitiveness Index.

TABLE 4. Municipality of Aserrí, 2021 Cantonal Competitiveness Index, indicators reviewed

Dimension	Indicator	Baseline data[196]	Score[197]
Social Capital	Structural participation in municipal elections	74.2%	86.3
	Current participation in municipal elections (in percentage points)	3.9	38.9
	Fostering citizen participation promotion	66.7%	66.7
Municipal Strengthening	E-Municipality	97.5%	97.2
	Municipal self-monitoring	60.0%	50.0
	Risk self-assessment	100%	100.0
	Strength of planning	100%	100.0
Municipal Transparency	Citizen budget transparency	100%	100.0
	Information access	48.5%	49.9
	Accounts	11.2%	14.4
	Citizen participation	24.2%	34.4
	Open government data	9.3%	10.9
Budgetary administration	Per capita investment in community services	¢24,313	15.7
	Per capita capital investment	¢24,424	8.1
	Financial dependency on state transfers	30.5%	71.4
Transport Infrastructure	Cantonal road network condition	57.1%	42.8
	Average road network and traffic safety investment per km	¢4,479.723	26.5
	Other transport infrastructure	No	0.0
	Service stations every 100 km of the road network	1.5	21.0

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195 The Cantonal Competitiveness Index reviews institutional conditions, infrastructure, health, skills and competencies, and economy and markets (6 Pillars), classifying the cantons as Exceptional, Competent, Emerging, Limited, or Deficient.
196 Baseline data is the original value in the indicator measurement (not applicable to dimension or pillar). Indicators have different units of measurement (colones, percentages, km, KwH, among others) according to the ICC, 2021.
197 According to ICC on a 1–100 scale.

TABLE 4. Municipality of Aserrí, 2021 Cantonal Competitiveness Index, indicators reviewed (Continued)

Dimension	Indicator	Baseline data[196]	Score[197]
Road connectivity	Distance to airport (in km)	16.1	96.0
	Distance to port (in km)	88.7	47.3
	Average traffic delay (seconds per 100 m)	148	77.5
	Highway congestion (annual traffic jams per 100 m)	176,163	97.0
Municipal public services	Coverage of parks and beautification works	0.0%	0
	Road and public areas clean-up service coverage	100%	100
	Social infrastructure investment per capita	1 593	5.0
Built-up area growth	Expansion of constructions	0.1%	1.5
	Growth in housing built-up areas	–0.4%	9.9
	Growth in commercial built-up areas	3.5	33.3
	Growth in an industrial built-up areas	–1.0%	0.0
	Growth in service built-up areas	–1.0%	0.0

Source: Developed by authors, based on 2021 Cantonal Competitiveness Index.

The municipality has a basic organizational structure, a tax administration service, a financial management area, a general administration department, an urban planning department (Department of Urban and Rural Management), and the Environmental Management Directorate, designed to provide SWM collection, municipal water supply, cemetery, clean-up, and beautification services. There are about 22 working processes, staffed by 158 employees working in the institution.

In the Municipal Management Index (2018) Aserrí scored 66.06, putting it in Group C among the municipalities with the smallest budgets. The highest scoring axis is Institutional Development and Management at 88.02 and the lowest scoring axis is Social Services Management at 32.25. The areas of improvement include coverage of parks and beautification works, road and public area clean-up, and road management. The Municipality of Aserrí significantly improved its performance regarding the IGM-2017; it grew 23.04 points, being the municipality that has made great strides in the assessment of IGM-2018.

The measurement of management capacity (Management Capacity Index [ICG], 2021) indicates weaknesses in the identification and definition of financial resources in the short, medium, and long term according to the internal and external municipal institutional context. This circumstance poses a risk to Aserrí's strategic planning and financial management. Areas relating to the use of ICTs, human capital, and asset management are performing satisfactorily (category 'Novice' according to ICG, 2021), but it is still important to strengthen risk identification, as well as medium- and long-term planning (Management Capacity Index, Municipality of Aserrí, 2021). Leadership and Institutional Culture, as well as Competencies and Municipal Team in general, are key challenges requiring further improvement.

Concerning the provision of urban services, the Municipality of Aserrí is characterized by:

ROAD CLEAN-UP SERVICE	Service delivered	Regulations in place	Service fees Updated	Average coverage	% Delinquency	Resource investment percentage	Service quality evaluation
	Yes	Yes	No	100.00%	34.31%	10.00%	No

SOCIAL AND COMPLEMENTARY SERVICES	Service delivered	Regulations in place	Application of funds	Communication channels updated	Beneficiary update	Population served by social programs	Service quality evaluation
	Yes	Yes	93.17%	Yes	No	Plans overachieved	No

EDUCATIONAL, CULTURAL, AND SPORTS SERVICES	Service delivered	Regulations in place	Population served by education, social, and sports programs	Application of funds	Communication channels updated	Service quality evaluation
	Yes	No	Plans overachieved	93.17%	No	No

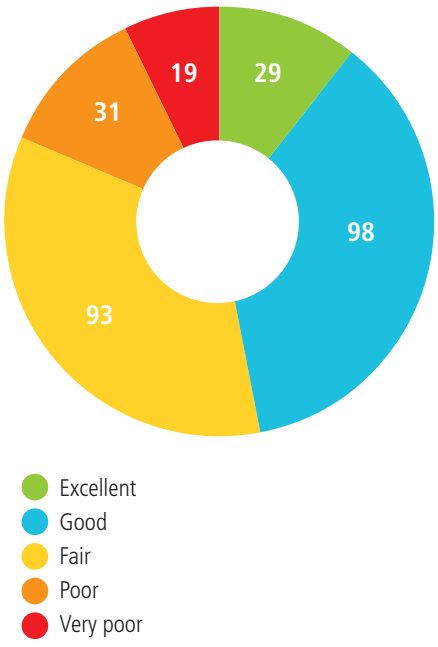
URBAN PLANNING SERVICES	Service delivered	Regulating Plan	Simplified application process officer	Fully automated land-use permitting	Fully automated building permitting	Fully automated business licensing	Service quality evaluation
	Yes	No	Yes	No	No	No	No

CANTONAL ROAD NETWORK	Service delivered	Regulations in place	5-year plan in place	Multi-year projections	Works completed with supervision	Works completed with quality assurance	Service quality evaluation
	Yes	Yes	Yes	Yes	100.00%	52.17%	No

It is estimated that the Municipality of Aserrí processes building permits approximately within 15 calendar days, issuing 252 in 2020.

In the South Corridor, the Municipality of Aserrí is the only one that provides municipal water supply services; it has water service regulations in place, but water rates are outdated and do not include service evaluation systems.

GRAPH 2. Aserrí's cantonal roads are in fair or good condition



Source: 2021 Municipal Service Management Index, Comptroller General of the Republic.

Alajuelita

Alajuelita offers a safe environment for business, and low levels of traffic congestion, while a large proportion of students complete their secondary education. Alajuelita has low investments in infrastructure related to social works and services.

The canton of Alajuelita has 5 districts and a total population of 94,548 inhabitants, of whom 23 percent are between 0 and 14 years old, 70 percent are between 15 and 64 years old, and 7 percent is over 65 years old. It ranks 59/82 in the Cantonal Competitiveness Index (2021),[198] implying emerging performance, affected by major challenges in economic, educational, and connectivity dimensions. Similar to the Municipality of Aserrí, municipal resources are underinvested in public service infrastructure. Declining crime rates provide a safe environment for business, while it is located close to ports and airports, has low traffic congestion levels, and a high proportion of students complete their high school education.

The municipality has no accountability arrangements, poor citizen participation, and inadequate access to information.

TABLE 5. Municipality of Alajuelita performance by pillars reviewed under the 2021 Cantonal Competitiveness Index

Cantonal Competitiveness, Dimension Reviewed	Score (1–100 scale)
Institutions	65.1
Infrastructure	57.7
ICT adoption	60.2
Health	74.5
Skills and competence	44.4
Economy	25.3

Source: 2021 Cantonal Competitiveness Index.

TABLE 6. Municipality of Alajuelita, 2021 Cantonal Competitiveness Index, indicators reviewed

Dimension	Indicator	Baseline data[199]	Score[200]
Social Capital	Structural participation in municipal elections	80%	95.3
	Current participation in municipal elections (in percentage points)	12.2	75.9
	Fostering citizen participation promotion	66.7%	66.7
Municipal Strengthening	E-Municipality	60.8%	55.8
	Municipal self-monitoring	**40.0%**	**25.0**
	Risk self-assessment	**25.0%**	**0**
	Strength of planning	100%	100
Municipal Transparency	Citizen budget transparency	100%	100.0
	Information access	25.9%	26.6
	Accounts	0.0%	0.0
	Citizen participation	12.0%	17.0
	Open government data	**0.0%%**	**0.0**
Budgetary administration	Per capita investment in community services	¢11 100	**4.8**
	Per capita capital investment	¢13 388	2.5
	Financial dependency on state transfers	28.2%	**73.7**
Transport Infrastructure	Cantonal road network condition	43.6%	**23.5**
	Average road network and traffic safety investment per km	¢10,089,260	**67.2**
	Other transport infrastructure	No	0.0
	Service stations every 100 km of the road network	2	**28.0**

Continues >

198 The Cantonal Competitiveness Index reviews institutional conditions, infrastructure, health, skills and competencies, and economy and markets (6 Pillars), classifying the cantons as Exceptional, Competent, Emerging, Limited, or Deficient.
199 Baseline data is the original value in the indicator measurement (not applicable to dimension or pillar). Indicators have different units of measurement (colones, percentages, km, KwH, among others) according to the ICC, 2021.
200 According to ICC on a 1–100 scale.

TABLE 4. TABLE 6. Municipality of Alajuelita, 2021 Cantonal Competitiveness Index, indicators reviewed (Continued)

Dimension	Indicator	Baseline data[196]	Score[197]
Road connectivity	Distance to airport (in km)	9.9	97.9
	Distance to port (in km)	81.4	51.7
	Average traffic delay (seconds per 100 m)	139	82.8
	Highway congestion (annual traffic jams per 100 m)	717,358	87.5
Municipal public services	Coverage of parks and beautification works	0.0%	0.0
	Road and public areas clean-up service coverage	93.7%	93.7
	Social infrastructure investment per capita	¢1,105	3.5
Built-up area growth	Expansion of constructions	0.9%	18.3
	Growth in housing built-up areas	–0.3%	10.9
	Growth in commercial built-up areas	–0.8%	1.1
	Growth in an industrial built-up areas	–1.0%	0.0
	Growth in service built-up areas	3.0%	12.2

Source: Developed by authors, based on 2021 Cantonal Competitiveness Index.

The Municipality of Alajuelita is a middle-development local government, ranked among the municipalities with the smallest budgets nationwide (Group D as defined by the Comptroller General of the Republic). This municipality has made significant progress in economic service management, scoring 76.10 points on a 1 to 100 scale.

In general, the municipality is an institution that scored 62.35 out of 100, whose areas of improvement include parks and beautification, internal control, and road and public areas clean-up. From 2017 to 2018, based on the Municipal Management Index, the municipality had a slight improvement in comparison to the IGM-2017; it reflects a 2.09-point increase and has become a partially compliant municipality (2/3) against its planned improvement outlined in the 2017 Municipal Management Index.

By 2021, and according to the provision of urban services,[201] the Municipality of Alajuelita is a local government that functions as follows:

ROAD CLEAN-UP SERVICE	Service delivered	Regulations in place	Service fees Updated	Average coverage	% Delinquency	Resource investment percentage	Service quality evaluation
	Yes	NO	NO	100.00%	41.38%	11.37%	Yes

SOCIAL AND COMPLEMENTARY SERVICES	Service delivered	Regulations in place	Application of funds	Communication channels updated	Beneficiary update	Population served by social programs	Service quality evaluation
	Yes	Yes	89.29%	Yes	NO	Achieved as planned	Yes

EDUCATIONAL, CULTURAL, AND SPORTS SERVICES	Service delivered	Regulations in place	Population served by education, social, and sports programs	Application of funds	Communication channels updated	Service quality evaluation
	Yes	Yes	Achieved as planned	89.29%	Yes	Yes

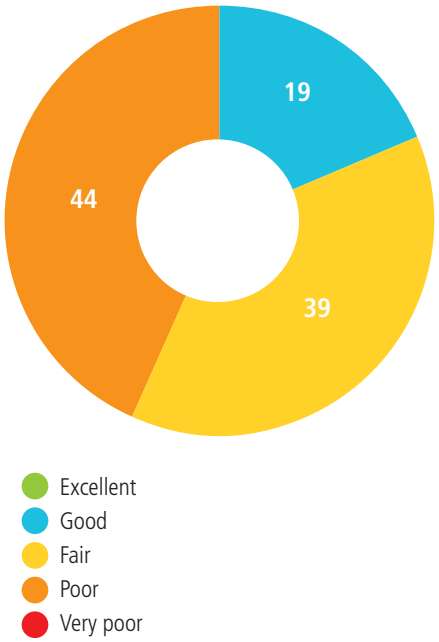
201 2021 Municipal Service Management Index, Comptroller General of the Republic.

URBAN PLANNING SERVICES	Service delivered	Regulating Plan	Simplified application process officer	Fully automated land-use permitting	Fully automated building permitting	Fully automated business licensing	Service quality evaluation
	Yes	No	No	Yes	Yes	Yes	No

CANTONAL ROAD NETWORK	Service delivered	Regulations in place	5-year plan in place	Multi-year projections	Works completed with supervision	Works completed with quality assurance	Service quality evaluation
	Yes	No	Yes	Yes	100.00%	33.33%	Yes

In 2020, the municipality of Alajuelita issued 147 building permits, within one calendar day on average. Business license processing time is two days. Based on municipal data, the road network serviced by the municipality is 524 km.

GRAPH 3. 44% of the road network in Alajuelita is in fair condition



Source: 2021 Municipal Service Management Index, Comptroller General of the Republic.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