

## RESEARCH ARTICLE

# Urban Shrinkage and Suburbanization in Mexico: A View Based on the Last Census Data

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The management of Latin American urbanization processes requires constant monitoring of urban dynamics and their particular characteristics. The aim of this work is to provide a macro-view of the dynamics of urbanization in Mexico through the analysis of urban shrinkage and suburbanization processes. The applied methodology is based on the identification of demographic variations at the municipal level using as sources the census data produced by the National Institute of Statistics and Geography (INEGI) from 1990 to 2020. Although the main causes and the differences between urban dynamics remain to be investigated more specifically, it is concluded that urban shrinkage and suburbanization are both decreasing phenomena in Mexico. Twenty-nine shrinking cities of Mexico are identified in the thirty-year period 1990–2020 and the ten-year demographic variations of the metropolitan municipalities are analyzed, detecting an ongoing catch-up trend among the growth rates of the central and peripheral metropolitan municipalities. This last is unlikely to occur; however, the trend indicates an ongoing stabilization of urbanization processes in Mexico after the boom of the 1990s.

**Keywords:** Urban Shrinkage; Suburbanization; Urban Dynamics; Depopulation; Mexico

La gestión de los procesos de urbanización latinoamericanos requiere un seguimiento constante de la dinámica urbana y sus características particulares. El objetivo de este trabajo es brindar una visión macro de la dinámica de la urbanización en México a través del análisis de los procesos de declive urbano y suburbanización urbanas. La metodología aplicada se basa en la identificación de variaciones demográficas a nivel municipal utilizando como fuentes los datos censales elaborados por el Instituto Nacional de Estadística y Geografía (INEGI) de 1990 a 2020. Si bien las principales causas y las diferencias entre las dinámicas urbanas siguen sin resolverse, al ser investigado más específicamente, se concluye que los fenómenos de declive urbano y la suburbanización son ambos fenómenos decrecientes en México. Se identifican las 29 ciudades en declive de México en el período de treinta años 1990–2020 y se analizan las variaciones demográficas decenales de los municipios metropolitanos, detectando una tendencia de recuperación en curso entre las tasas de crecimiento de los municipios metropolitanos centrales y periféricos. Es poco probable que esto último ocurra, sin embargo, los datos indican una tendencia de estabilización en curso de los procesos de urbanización en México después del boom de la década de 1990.

**Palabras clave:** Declive Urbano; Suburbanización; Dinámica Urbana; Despoblación; México

## Introduction

The accelerated patterns of urbanization around the world are highly heterogenous both within and across countries. Mexico's urban dynamics are embedded in a complex regional and historical context that has over time created transformative urban hierarchies in the national and regional system. According to the World Bank (2020), as an effect of the decline in the regional fertility rate, Latin America faces an imminent new reality of aging and

shrinking cities, which will manifest itself especially after the population peaks expected around 2050. In the context of consolidated urbanization, city-to-city migration will gain in importance and younger generations will be attracted by the vibrant and dense environments of urban life. In accordance with this trend, new urban layouts are creating pressures on suburbs: the recent movements out of the megacities are accompanied by movements from the historic centers to the peripheries, producing suburbanization (González et al., 2016), whereas older generations seem to be more inclined to stay in urban centers. The phenomenon of urban decline must be read care-

fully, since according to the theoretical lens of differential urbanization (Geyer, Kontuly 1993), intermediate and small cities go through successive periods of fast and slow growth in a continuum of development that spans the evolution of urban systems. In these terms, counterurbanization could be seen as the final phase of a first cycle of urban development, followed by a secondary cycle of urbanization and spatial concentration.

The aim of this work is to provide a macro-view of the dynamics of urbanization in Mexico through the analysis of urban shrinkage and suburbanization processes. The structure of the article includes a historical and regional background of the context of urban dynamics with particular emphasis on Mexico; the results section focuses on the geostatistical analysis of the spatial phenomena of urban shrinkage and suburbanization. Finally, the results are discussed with the support of relevant literature contributions.

### **Background**

Understand the actual urban morphology of Latin American cities require considering the direct line between the first indigenous imperial cities and subsequent colonial and modern cities. Urban planning in Latin America was carried out since pre-colonial era by the different civilizations that inhabited these places, creating important headquarters for their institutions and ruling theocracy. Pre-colonial cities were born as a consequence of the accumulation of resources and functions in favorable points of the territory, creating a territorial and functional primacy that in many instances lasted for centuries. Urban planning was a public activity decided by the state identified in the ruling elite (Hardoy, 1978) and implemented through large-scale infrastructures: aqueducts were destined to contain floods and to facilitate intensive agricultural production; large systems of roads served to connect the empire and allow the transport of resources mainly to the capital. After the conquest, the colonizing powers implemented architectural styles, building techniques and land uses that reflected their previous experiences: Spain produced in America a city model easily recognizable by the simplicity of the layout, and by the location of the hierarchical elements (the cathedral and the house of government) located around a principal square. The quadricular/linear plane was replicated, while the absence of the concentric radio plane (convergence of all streets in a center of attraction) is notable (Hardoy, 1975). Although the new overseas authorities legislated to introduce a norm in the spatial organization of the new Spanish cities in America, many times in practice the preexisting form was taken advantage of, meaning cities were drawn up and churches built on pre-Hispanic settlements and temples, involuntarily preserving that millenary tradition that today we can still recognize in some Mexican cities (Galindo, 2013).

Although many colonial cities were built on top of the ancient indigenous cities, others were born for the extraction of raw materials, or as places of transit to the port cities, which became the most important centers of commerce, concentrating the highest population growth rates in the region. Still today, most of the largest Latin

American metropolises are the result of these demographic concentration processes linked to commercial traffic established since the colonial period. From a conceptual point of view, modernity was imposed in America, as part of a deliberate policy to lead to modernization (Gorelik, 2003). At the end of 19<sup>th</sup> century, the city was thought as the inventor of a modern society, so that urban planning activities increased the importance of the State and technicians. A model of the modern Latin American City proposed by Griffin and Ford (1980) seeks to combine traditional elements of urban structure with modernizing processes: it's characterized by a downtown area, a commercial spine and associated elite residential sector and a series of concentric zones in which quality decreases with distance from the city center (Pacione 2005). Certainly, different urban processes and dynamics coexist in Latin American cities and the presence of shanty towns or *villas miserias* indicates that an antiurban sensibility still remains (Hardoy, 1978).

Currently, Latin America is considered the most urbanized region in the world, with 633 million people, of which 80% live in urban centers (UNEP, 2018). Despite including six of the 17 megadiverse countries of the planet and the highest bio-capacity per capita in the world, the material intensity rate in Latin America is also greater than the global average and 4.5 times greater than in North America (UNEP, 2018), which indicates that the economy is still based on the exploitation and exportation of primary resources, in the so-called "unequal exchange". The processes of late industrialization, despite being propelled by the import substitution policies promoted by Economic Commission for Latin America and the Caribbean since the 1960s, have not always led to the desired results, leading the countries to implement new measures for economic growth based on new neoliberal re-openings.

This was also the case for Mexico, which adopted import substitution policies until the 1980s, creating subsidies for local industries in sectors dependent on foreign goods and imposing strong barriers to their importation. The effect was to generate a decline in agricultural commodities and therefore an exodus from rural to urban areas. The failure of ISI policies and the new neoliberal opening, including strong participation in international trade agreements, produced a new shock in rural areas forced to adapt rapidly to the challenges of competition in a globalized environment (Arroyo, 2010).

Urban and territorial planning in Mexico, as well as in the United States (Pallagst et al., 2017), can be labelled as market-oriented and based on the intensive exploitation of a large amount of materials, energy and land resources. The problem of shrinking cities has to be distinguished from the suburbanization process, as both have the result of creating vacant spaces in the historic centers of major cities. Both are two sides of a land occupation model of unlimited growth, which, in Latin America, has been accompanied by an impressive waste of land. In economic terms, the new modes of production demand high-quality urban spaces and tend to be located mainly in consolidated peripheral areas where there are already nodes of shops and services that have the largest supply

of infrastructure and equipment; these poles, since the moment of their appearance, made the historic centers less attractive, contributing to their abandonment and decline (Pérez & Mínguez, 2014). Emerging high-quality urban spaces are located in the consolidated peripheral areas so that new urban centralities arise around major shopping or business centers.

The dynamics of Mexican cities have shown processes of physical expansion, concentration of urban facilities and population that account for the formation of an eminently urban country. In Mexico, 92.6 million people reside in urban areas, representing 74.2% of the national population. The process of continuous urbanization is due to the transfer of resources from primary to secondary and tertiary activities (SEDATU, 2018). The population of the country of Mexico residing in urban locations grew at a faster rate than the population as a whole; therefore, the degree of urbanization increased in 70 years from 37% in 1940 to 77% in 2010. It should be noted that the 1970s marked the formal start of regulations to influence territorial planning (Sousa, 2013). Urban planning in Mexico has been influenced by race-based criteria promoted by the Athens Charter,<sup>1</sup> favoring, since 1970, the realization of large-scale plans (Gutiérrez, 2017). The regulatory plan and zoning have prevailed for decades as normative and control instruments for land use, evidently surpassed by the reality that characterizes Mexican cities.

According to Baños and Cardenas (2014), the Mexican federal system has a solid structure for urban planning based on articles 27, 73 and 115 of the Constitution of Mexico (1917), but it is not applied for three reasons: intergovernmental relations conditioned by Mexican federalism; lack of clarity regarding the competences and attributions of the different government orders in the matter of urban planning; and due to the social and political context, especially the municipality which prevents urban control and planning. As a result, urbanization processes are driven by the real estate market to the detriment of community and collective values, which among other effects manifests itself in the progressive deterioration and reduction of the system of communal land ownership, which in Mexico is referred to as the *Ejidos* system (Schumacher et al., 2019).

Reform of government housing finance agencies in Mexico in the early 1990s led to an explosion of credit for housing. A majority of houses are now built by private companies on speculation and purchased with mortgages, rather than through the incremental process that previously governed urban development (Monkkonen, 2011).

### Methodology

The methodology applied focuses on geostatistical analysis through the use of quantitative methods in order to determine which Mexican municipalities have entered the shrinkage process and to measure the suburbanization phenomenon in the period 1990–2020.

Currently, there are 401 cities that are part of the Urban National System in Mexico (SEDATU, 2018): 74 metropolitan areas, 132 conurbations and 195 urban centers. Metropolitan areas are groupings of municipalities that

share a central city and are highly functionally interrelated. Conurbation is defined as an urban structure resulting from the physical continuity between two or more geostatistical localities or urban centers, constituting a single urban unit of 15,000 inhabitants. They can be inter-municipal and inter-state when their population ranges between 15,000 and 50,000 inhabitants, or intra-municipal even exceeding this population range. Urban centers are cities with 15,000 or more inhabitants that do not meet the characteristics of a conurbation or metropolitan area (SEDATU, 2018). The methodology applied is based on the analysis of demographic changes of municipal residents identified through the ten-year census from 1990 to 2020 using, as sources, the census data produced by the National Institute of Statistics and Geography (INEGI, 2021) from 1990 to 2020. Municipalities are identified in three categories: growing, shrinking or extreme shrinking. Although the term most used in literature is that of long-term shrinkage, the term extreme shrinkage is preferred as it highlights the magnitude of the process. The established threshold of extreme shrinkage is 20% in 30 years, adapted from the Adelaja (2010) statement of extreme shrinking cities as those cities which have lost more than 25% of their population during last 40 years. On the other hand, to measure the phenomena of suburbanization, an average of the demographic percentage variations in the central metropolitan municipalities was calculated and compared with the average of the demographic percentage variations of the peripheral metropolitan municipalities. The results are explained with a focus on areas considered as urban; an attempt is made to identify the main determinants of urban shrinking using specific information search, on the one hand, and to establish the proportions of the phenomenon of suburbanization on the other. In both aspects, development trends are also established.

## Results and Discussion

### *Urban Shrinkage in Mexico*

Urban shrinkage is a relatively new theoretical concept especially developed by academics in northern countries. As for its translation into Spanish, there is no consensus: Agueda and Cunningham Sabot (2018) translate it as *declive urbano*, that is to say urban decline. Silverman (2018) carries out the exercise of analyzing urban decline by taking up Wallerstein's (2004) theory of dependency in the world economic system: the most important sectors in the "new post-industrial economy" are progressively based on advanced knowledges that reproduce themselves through their geographical proximity, thus favoring demographic concentration in metropolitan or global cities. Socio-spatial realities of shrinking cities become part of economically peripheral regions, viewed as the counterpart to the accumulation of wealth, capital, knowledge and infrastructure in global or metropolitan cities. Peripheral or shrinking cities are situated in a subordinate situation, representing places of dispossession of the resources necessary to sustain the constant growth in global cities.

Regarding the conceptualization of urban shrinking, there is controversy regarding the indicators to be considered (Strijakiewicz & Jaroweszka, 2016); different schools

of thought are arising that try to explain the phenomenon of urban shrinking (Haase et al. 2014) and the different types of shrinking cities (Branislav et al 2019).

The most recognized and cited definition sees the shrinking city as “a densely populated urban area that has on the one hand faced a population loss in large parts of it (for at least 5 years, more than 0.15% annually), and is on the other hand undergoing economic transformation with some symptoms of a structural crisis” (Wiechmann, 2007). In the case of this research, given the unavailability of data on GDP variations for all Mexican municipalities, the simplified methodology was to focus on the demographic aspect.

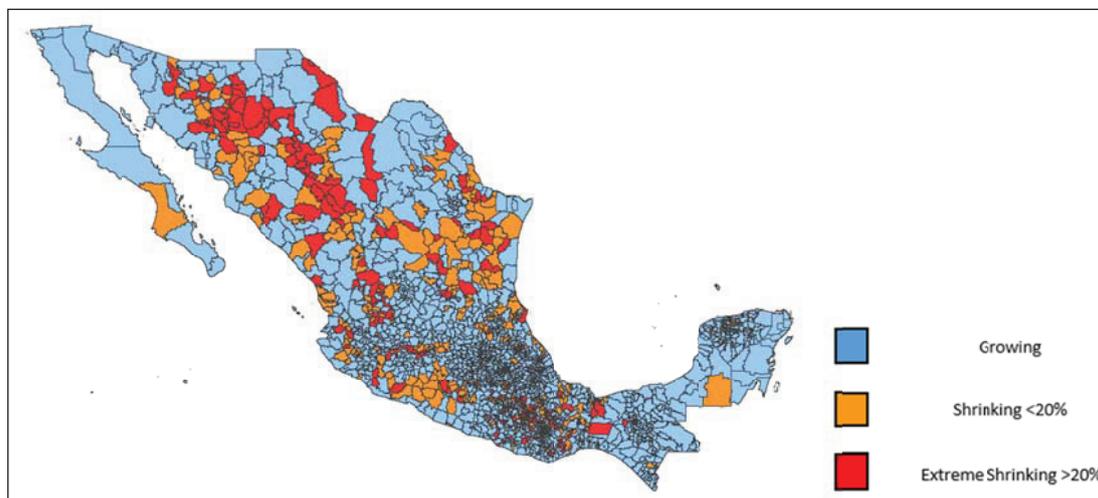
In the case of Mexico, urban shrinking is an under-explored phenomenon, even when treated as a depopulation process. Rural depopulation was approached from a geographical perspective by Segundo and Bocco (2012), identifying the state of Michoacán as one of the most affected by this phenomenon. Vargas Hernández (2009) and Martínez Fernández et al. (2012) correctly identified post-mining abandonment as one of the main determinants of shrinkage in small urban centers in Mexico, the economy of which fluctuates in tandem with mining levels. This is the case, for example, of localities such as Cerro San Pedro (San Luis Potosí) or Chalchihuites (Zacatecas), where foreign mining companies with modern capital and technologies try to relieve the extraction cycles, reproducing a local economy not aimed at sustain local development and creating long-term environmental damages. Other post-mining centers in Mexico, after decades of neglect, are managing to revitalize the local economy by transforming old mining infrastructures into tourist attractions and redeeming urban architectural heritage, as is the case in the town of Mineral de Pozos (Guanajuato), which benefited from being included in the national program Pueblos Mágicos de México.

However, according to Arroyo (2010), who analyzed urban shrinking in the central western region of Mexico, it is not likely that Latin America’s cities will be replicating the shrinking trend in the United States or Europe, especially when it comes to the magnitude of population

loss. Certainly, two factors play against urban shrinking in Mexico: higher fertility rates and late industrialization processes. The so-called second demographic transition does not seem to include developing nations for the time being, in particular in the case of Mexico, where the total fertility rate is 2.22 (Center for Strategic and International Studies, 2017), compared to 1.53 in Europe (EUROSTAT, 2021); for this reason, the differential growth of the cities of Mexico is not due to notable inequalities in birth or mortality rates, or to the age profile, but to the mobility of the population, mainly due to migration (Garrocho, 2013).

In Mexico, although there are processes of post-Fordist transition, as in the automotive industry sector (Lima, 1994), the lack of specialization of the working population and the following availability of low-cost work leads to a weak relationship with processes of eventual urban shrinking derived by post-Fordist transitions, on the other side strengthening the phenomenon of informality in service sectors. It is possible to see a relationship between the late motorization and the typical characteristics of the dispersed Latin American city: while in developing countries the growth of car parking spaces has notably slowed or decreased as cities transition to being post-industrial and characterized by higher demand for environmental protection, in developing countries these are increasing without apparent signs of slowing. This is also shown by the fact that between 2002 and 2007 the vehicle fleet in the Latin American region increased by around 50% compared to 20% in the Asia-Pacific area, 2.6% in the European area and 2.9% in North America (Covarrubias, 2013). In this way, the economies and cities of developing countries become escape valves, as well as repositories of some of the grossest dysfunctionality of the industrial age.

The results of this work show that in the last thirty years, as many as 27.7% of Mexican municipalities have had negative demographic changes, or processes of depopulation. This indicates that development processes in Mexico are extremely heterogeneous in the context of an extremely differentiated territorial morphology, which is also a condition of an unequal distribution of resources. **Figure 1**



**Figure 1:** Thirty-year (1990–2020) demographic variation by municipality in Mexico. Figure author’s own, data source: INEGI.

indicates, in red, the municipalities affected by extreme urban shrinkage (>20%); in orange, shrinkage (<20%); and in blue, the growing municipalities. Most of the affected territories are located in the north-central area of the country, partly semi-desert areas, also characterized by the presence of activities linked to organized crime, but above all closer to the border with the United States, an aspect that facilitates international migration.

In total, 684 of the 2,468 Mexican municipalities show population loss over the 1990–2020 period. Among them, 200 have a population greater than 10,000 inhabitants, while 340 had a population loss of over 20%, and can therefore be considered to have undergone extreme shrinkage.

Most of the shrinking municipalities show high rates of vulnerability, extreme poverty and lack of access to basic services such as water, electricity and sanitation systems (datamexico.org).

**Figure 2** indicates the decreasing trend of the number of shrinking municipalities during the three analyzed decades, showing that the phenomenon of urban shrinkage is decreasing.

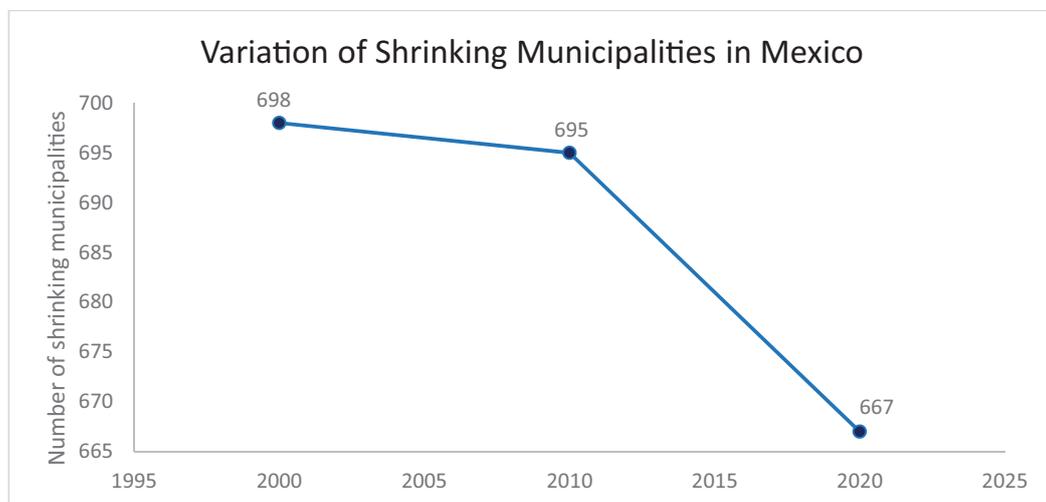
Of all the shrinking municipalities, only 29 are part of the National Urban System, which means that the phenomenon is primarily affecting rural areas. **Table 1** describes the situation of the 29 shrinking cities belonging to the 401 cities included in the National Urban System (SEDATU, 2018); shrinking cities thus represent 7.2% of all cities in Mexico. The possible determinants are reported on the basis of a literature review and specific information search; based on the results obtained, some cases of Mexican shrinking cities have as major determinants the economic crisis of certain sectors that have lost competitiveness in the globalized market, such as textiles, the production of sugar and tobacco. However, more generally, situations of violence due to the presence of organized crime and the structural lack of economic opportunities seem to be the major determinants.

There does not seem to exist a direct relationship between levels of extreme poverty and rates of

depopulation; this is probably also due to the observation made in the Human Development Report (UNDP, 2009) that groups with higher levels of incomes and human development seem to be more prone to migrate.

The shrinking cities considered metropolitan (category 1) are Moreleón and Minatitlán. Moreleón, in Guanajuato, had a flourishing textile industry concentrated in small, medium and large workshops (Vangstrup, 1995). The disappearance of micro and small textile companies was linked to competition from imported products (Tinoco & Gúzman, 2009), in particular from Chinese piracy (Torres, 2007). The depopulation of Minatitlán is probably related to the decrease in operations of the oil and gas refinery, which operates at 29% capacity compared to the 1980s (Sosa, 2019). Most other shrinking cities are considered conurbations (category 2) and small urban centers (category 3).

At least three branches of reasons that push people to leave cities can be identified: end of economic cycles in particular sectors, repeated migratory flows and public insecurity. The presence of migratory flows towards the United States in Mexico is very strong and widespread, also guaranteeing the possibility of developing the territory through international remittances. This could also be a strategy for local development in some shrinking cities, especially in the state of Guanajuato. In the case of Puente de Ixtla (Morelos), the city has not yet managed to recover after the strong 2018 earthquake, so in this case a natural disaster proves to be a particular determinant of urban shrinkage. Based on these initial results, the main determinants of urban shrinking in Mexico should be investigated more specifically, focusing on the following areas: structural economic marginalization, international migration, end of the extractive cycles, natural disasters and presence of criminal activities. A case study approach seems to be the most appropriate methodology, with the aim of identifying the main drivers of shrinkage, local impacts related to depopulation such as infrastructure disuse and possible recovery strategies.



**Figure 2:** Variation of shrinking municipalities in Mexico. Figure author's own, data source: INEGI Censos de Población y vivienda 1990–2020.

**Table 1:** Shrinking Cities in Mexico 1990–2020. Layout author's own, data source: INEGI Censos de Población y vivienda 1990–2020.

City	Federal state	Population (2020)	Rate of shrinkage (1990–2020)	Possible shrinkage determinant	Extreme poverty <sup>2</sup>	Category <sup>3</sup>
Moroleón	Guanajuato	47,261	1.9%	Crisis of the textile industry	3.32%	1
Minatitlan	Veracruz	144,766	26%	Decrease in L. Cardenas refinery operations/ Environmental contamination	10.1%	1
Salvatierra	Guanajuato	94,126	3.6%	Structural trend of migration to US	7.07%	2
Tamazula de Gordiano	Jalisco	38,955	7.8%	Mechanization of sugar cane cutting (“Tamazula Ingenio” company)	2.96%	2
Jiquilpan de Juárez	Michoacán	36,158	1.5%	Structural trend of migration to US (Aguilar Ortega, 2011)	7.16%	2
Tuxpan	Nayarit	30,064	12.3%	Tobacco workers migration to US (Madera & Hernández, 2016)	4.67%	2
Matias Romero Avendano	Oaxaca	38,183	1.5%	Decrease in rail system operations	17.7%	2
Tamazunchale	San Luis Potosi	95,037	5.2%	Contamination by mining	22.4%	2
Cerro Azul	Veracruz	25,011	11.1%	Decrease in oil production	8.22%	2
Cosamaloapan de Carpio	Veracruz	54,737	28.7%	Sugar industry crisis	8.45%	2
Agua Dulce	Veracruz	44,104	6.6%	Decrease in oil production	7.6%	2
Madera	Chihuahua	25,144	29.9%	Presence of organized crime activities	9.2%	3
Acámbaro	Guanajuato	108,697	3.3%	Structural trend of migration to US	4.8%	3
Yuriria	Guanajuato	68,741	11%	Structural trend of migration to US	8.59%	3
Teloloapan	Guerrero	53,817	3%	Presence of organized crime activities	21.4%	3
Huetamo	Michoacan	41,973	4.6%	Structural trend of migration to US/ Public insecurity	17.7%	3
Puruandiro	Michoacán	69,260	2.3%	Structural trend of migration (Garcia & Delfin, 2012)	16.8%	3
Tepalcatepec	Michoacán	24,074	4.1%	Structural trend of migration /Public insecurity	9.03%	3
Puente de Ixtla	Morelos	40,018	8.9%	Natural disaster, earthquake 2018	18.4%	3
Santiago Ixcuintla	Nayarit	93,981	5.2%	Productive reconversion of tobacco (Madera & Hernández, 2017)	5.67%	3
Tecuala	Nayarit	37,135	18.9%	Presence of organized crime activities (Meza et al. 2012)	4.27%	3
Loma Bonita	Oaxaca	40,934	2.4%	Structural trend of migration to US	11.5%	3
Cardenas	San Luis Potosi	38,317	3.8%	Decrease in rail system operations	8.4%	3
Cerritos	San Luis Potosi	22,075	2.7%	Lack of economic opportunities	7.46%	3
Escuinapa	Sinaloa	59,988	30.3%	Public insecurity	4.87%	3
Benito Juarez	Sonora	21,692	0.6%	Public insecurity	5.1%	3
El Mante	Tamaulipas	106,144	8.6%	Sugar industry crisis	3.9%	3
San Fernando	Tamaulipas	51,405	5.6%	Public insecurity	12.8%	3
Lerdo de Tejada	Veracruz	19,123	6.8%	Sugar industry crisis	5.03%	3
Nochistlán de Mejía	Zacatecas	27,945	13.6%	Structural trend of migration to US	4.96%	3

### Suburbanization in Mexico

Suburbanization processes can be linked with problems of environmental unsustainability, social polarization, abandonment of historic centers and decay of heritage and historical architectural devaluation, creation of vacant lands and a discontinuous and irregular urban landscape.

Rapid and intense urbanization is an integral part of very deep changes in the Mexican territory, which have been taking place especially in the last three decades. Urbanization is accompanied by the widening of territorial inequalities in terms of income, infrastructure and connectivity; particularly worrying is the lag in the south of the country. The profound transformation of rural Mexico also stands out, where urban and rural areas become more similar in the context of so-called rur-urbanization or peri-urbanization (Luiselli, 2018). In third world cities, there is both the phenomenon of urban sprawl with closed condominiums and two cars per family and that of the periphery. If there is urban sprawl, the per capita income (and thus the consumption of water, energy and material resources) in the rich suburbs is higher than in the city center, while the opposite occurs in the peripheral suburbs. Rich suburbs can even improve their environmental quality, exporting their pollution (Martinez Alier, 2002).

As an effect of suburbanization in some of the historic centers of Latin America, housing use weakened. For example, between the years 1990 and 2000 the historic center of Quito lost 31.4% of its inhabitants (Carrión, 1999), while in Buenos Aires the percentage was 20% (Clichevsky, 1999). In Mexico City, just one area of the city center lost 2,320 housing units between 1990 and 1995 (Delgadillo, 2008), while in 2000 Guadalajara had 2,478 vacant lots with services and 4,000 wasted hectares (26.6% of the municipal area) (Rábago, 2001). Irregular and unplanned urbanization processes produce large portions of vacant land in Latin America cities.

In Latin American metropolises, the percentage of vacant land varies from less than 5% to 44% of the urbanized area (Clichevsky, 1999). Carrión (1999) identifies six

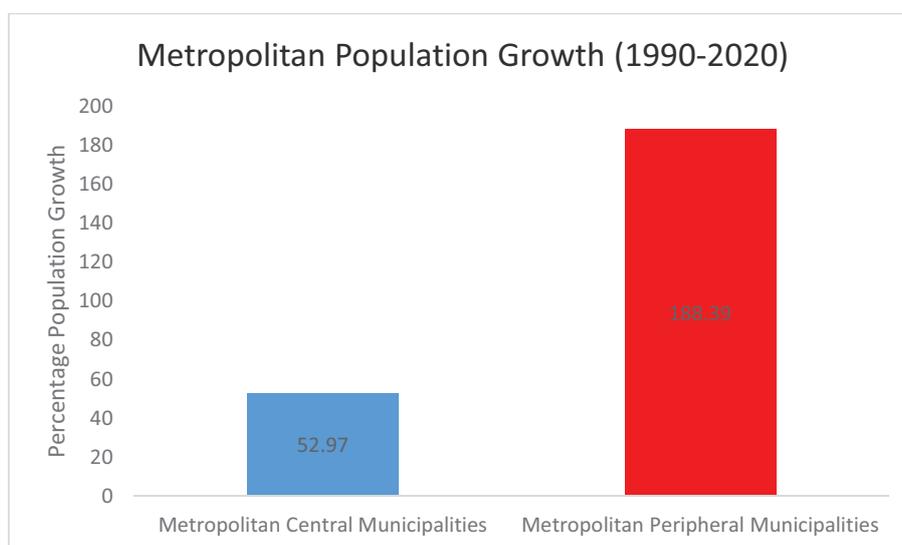
types of vacant lands: lands which are the result of speculative processes; semi-agricultural lands that have been absorbed by urban expansion; those that constitute family savings reserves or that have not been developed due to lack of resources; communal lands, the property regimes of which present restrictions for sale; lands affected by norms that restrict construction; and lands owned by public institutions. In Mexico, since 1990, population growth in large metropolitan areas has decreased in favor of urban localities located in their area of influence. On the other hand, medium or intermediate cities are characterized by being the new urban centers, with the highest demographic growth (Alvarez de la Torre, 2011).

Figures 3 and 4 show the thirty-year population growth trends of the 74 central metropolitan municipalities and 282 peripheral metropolitan municipalities.

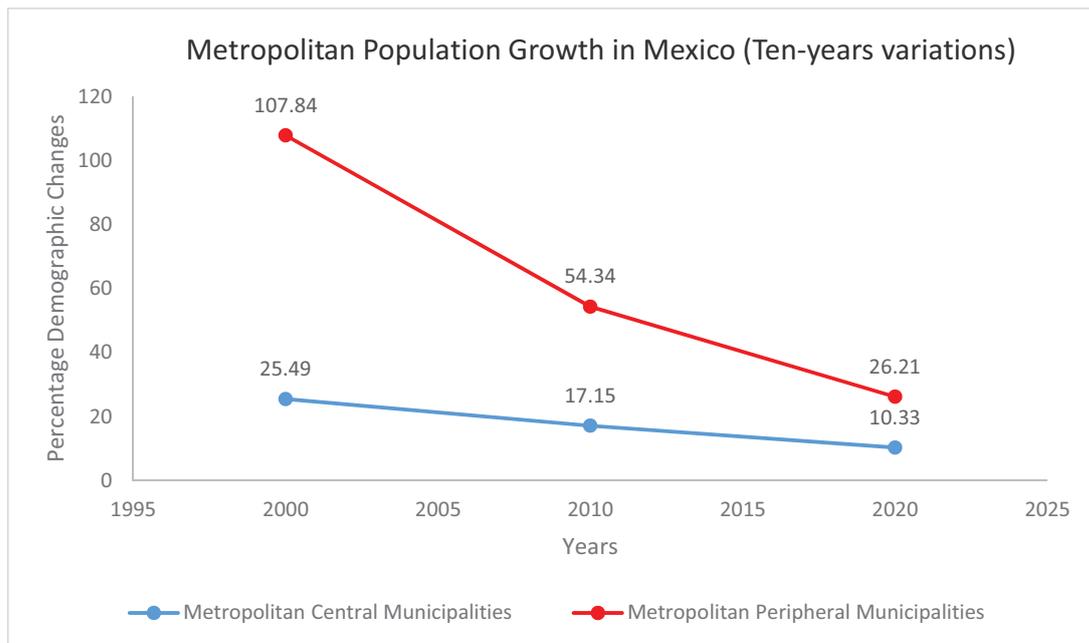
In addition to Moroleón and Minatitlán, the central metropolitan municipalities that show negative demographic variation in the thirty years are Coyoacán (−4%), Yuriria (−11%) and Guadalajara (−16%). The third largest metropolitan area, Monterrey, grew only 6.9% in its central municipality and only 0.7% in the last decade. This means that the three largest cities in Mexico have in common the progressive abandonment of central areas for residential purposes.

In Guadalajara, Mexico City and Monterrey, suburbanization is particularly evident, where the historic centers suffer progressive abandonment, similarly to other Latin American central metropolises. This is probably due to less space being available, advancement of the service sector to the detriment of residency, real estate speculations and regulations for the preservation of colonial architectural heritage. However, the younger generations appear to be the main actors in the abandonment of historic centers and displacement is inversely proportional to the age of the population, according to Sousa (2007).

The most pronounced case is Guadalajara, the depopulation of which can at least in part be explained by the commercialization of the central areas. According to Arroyo



**Figure 3:** Suburbanization in Mexico, Metropolitan population growth 1990–2020. Figure author's own, data source: INEGI Censos de Población y vivienda 1990–2020.



**Figure 4:** Suburbanization in Mexico, Metropolitan population growth trend for decades. Figure author's own, data source: INEGI Censos de Población y vivienda 1990–2020.

(2010), Guadalajara has no more space to grow and has become a commercial area rather than a residential one: people arriving prefer to live in other municipalities, but they work in Guadalajara. The uncontrolled suburbanization of the metropolitan area of Guadalajara has contributed to the reduction of the quality of life of the inhabitants in several aspects, by increasing the distances traveled by large sectors of the population, impacting vehicular traffic, environmental pollution, urban infrastructure coverage (water, drainage, electricity, communications), public transport and even in public health, by increasing physical inactivity, obesity, traffic accidents, residential energy use, emergency response and destruction of social networks or social capital (Ewing and Hamidi, 2014).

One of the effects with the greatest impact is the change in land use, namely the occupation of the most productive peripheral lands, and with this the eminent transformation of the ecosystem and consequent environmental deterioration. Orozco and Ávila Ramírez (2013) state that unsustainability in this series of environmental changes on a regional scale is evident, given by the growing consumption of resources and the eminent loss of natural resources as a source of electricity, water and territory suitable for urbanization. On the other hand, large areas of urbanized land have been left empty: forgotten important buildings, underutilized lots, small areas of empty land in the center of blocks and disused office buildings. These spaces become urban voids over time. In the municipality of Guadalajara alone, which has an approximate area of 15,037 hectares and is practically fully urbanized, the Municipal Development Plan of Guadalajara 2000 indicates 4,000 hectares as wasted, which would comprise 516 of urban reserves and more than 2,478 vacant lots that have services; that is, 27% of the municipal area including 3,106 unused industrial hectares with basic infrastructure, located in the Guadalajara Metropolitan Area or in

neighboring municipalities (Ruelas-Reyes, 2014). For the municipality of Guadalajara, as remote and fractional closed urbanizations increased, residential dynamics have been the main factor generating segregation and reinforcing social disparity.

In Morelia, the metropolitan administrative division has only one municipality, which means the progressive abandonment of the historic center for residential use described by Ettinger & Mercado (2019) cannot be observed using this methodology.

Similarly, in the case of the historic center of Puebla, depopulation is documented (Ortíz Rodríguez, 2005), but cannot be effectively appreciated through the data analysis described in this paper.

According to Herrera, (2014) Ciudad Juárez shows processes of abandonment in central areas, which is a product of the territorial extension and creation of new areas; this is due to dynamics of commercial, industrial and housing movement. Data results show that growth stopped abruptly in Ciudad Juárez, dropping from 53% in the period 1990–2000, to 9% in 2000–2010.

**Figure 4** shows the relationship, in ten-year increments, between the population growth trends of the 74 metropolitan municipalities considered central and 282 metropolitan municipalities considered peripheral.

Analyzing the demographic variations of the metropolitan municipalities shows an ongoing catch-up trend among the growth rates of the central and peripheral metropolitan municipalities, although the latter still grow at more a rate more than double that of the former. Although the growth rates will never become equal, the approaching trend lines indicates an ongoing stabilization of urbanization processes in Mexico after the boom of the 1990s. This means that the phenomenon of suburbanization, like that of urban shrinking, is present but in a decreasing phase. This is probably due to stabilization

following the strong suburbanizing wave of the 1970–90s caused by real estate speculation.

### Conclusions

If, by adopting dependency theory, developing countries are defined as peripheries of the world economic system, then the shrinking cities within developing countries can be seen as 'peripheries of the peripheries'. Studying them can be important in order to understand their problems, possible adaptation strategies and the need for resources to support long-term local growth and, thus, to support new processes of homogeneous growth on a national scale, capable of optimizing the use of local resources.

In accordance with the objectives of this paper, the results show that there are 29 small- and medium-sized urban centers that have entered the process of depopulation; these are identified here, creating new research possibilities that could be based on case study methodologies aimed at describing local dynamics regarding the causes and effects of depopulation processes in urban Mexico. While the causes can initially be found in the areas of structural economic marginalization, international migration, end of the extractive cycles, natural disasters and presence of criminal activities, the effects or impacts are to be assessed *in situ*, in order to establish possible actions to undertake new paths for sustainable local development.

Urban shrinkage is expected to become more widespread in the coming decades in Latin America, but is currently showing a downward trend in Mexico, to the detriment of rural areas. Moreover, the phenomenon of suburbanization in Mexico seems to have entered a stabilization phase: while in 1990, the ratio of suburban growth to central municipalities was greater than 5:1, in 2020 it is slightly greater than 2:1, indicating that the phenomenon in general is progressively slowing down.

Mexico faces several problems related to climate change, in particular a lack of water availability, to which is added decreasing soil fertility due to drought and excessive use of chemicals. Different stages of metropolitanization exist among Mexican metropolises, and they should be understood in order to plan the use of available resources. Urban shrinkage and suburbanization in Mexico are two sides of a land occupation model characterized by accelerated occupation, for the most part carried out under illegal practices (informal settlements) producing low densities and urban sprawl; recurring periods of instability or economic crisis that, in addition to affecting real estate dynamics, position the land as a form of investment for small and large amounts of capital, even of illicit origin, as a money laundering strategy; wide disparity (polarization) of economic income between social groups (segregation); multiplicity of agents that intervene formally and informally in the production of spaces (patrimonial norms); coexistence of different land ownership regimes (for example "los ejidos" in Mexico: the regime of communal lands), notably social or collective properties; the erratic and diminishing participation of the state in urban and social policies (lack of governability); little or no regulation of the authorities in the processes of occupation of space (Pérez & Mínguez, 2014). The Ejido system based on communal land in

Mexico was partly transformed to private ownership due to neoliberal trends since the 1990s (Schumacher et al., 2019), giving more resources to the perpetration of this culture of ungoverned planning, where the free forces of the real estate market, which is made up of individuals seeking personal benefit, do not consider equilibrium in urban development.

Although the results indicate that the rate of growth in peripheral metropolitan municipalities is progressively decreasing to converge with that of central metropolitan municipalities, the main challenges for urban planning in Mexico remain: to guarantee processes of urban homogenization, reverse the trends of expansive urban growth, neglect and deterioration of central areas and protect peripheral green areas.

### Notes

- <sup>1</sup> The modern urban planning vision of the Athens Charter (1938) promoted the zoning of neighbourhoods and buildings according to the functions performed within the city.
- <sup>2</sup> Percentage of population in situation of extreme poverty. Source: Datamexico.org.
- <sup>3</sup> National Urban System (SEDATU) established the following categories: (1) metropolitan; (2) conurbation; (3) urban center.

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The author has no competing interests to declare.

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