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Abstract

During the last thirty years there has been a great expansion of the city of Guadalajara and the surrounding urban area. Commercial, industrial and especially housing activities have brought about substantial changes to its morphology. From 1970 to the year 2000, the metropolis grew more than at any other time in its history, and during this time it has spread through the Valley of Atemajac onto agricultural land in the valleys of Tesistan and Toluquilla.

Most of the growth of the second largest city in Mexico has taken place on public, private and ejido (commonly held) land without due regard to urban planning. This has led to the occupation of large areas by irregular human settlements with inadequate infrastructure and urban services, which in turn has added to traffic congestion on main roads and increased the exposure of the inhabitants of the city to natural and technological risks.

First hand information gathered at ground level from the municipalities and the state of Jalisco planning offices, digital aerial photographs and satellite images, in combination with the use of state of the art technology such as Teledetection, the Global Positioning System, and Systems of Geographical Information, allowed us to chart the changing dynamics of land occupation and to identify urban developers as the principal agents involved in extending the built-up area of the city from 1970 to 2000.

THE SYSTEM OF CITIES IN MEXICO, AN UNBALANCED MODEL

The formation of metropolitan areas in Latin America and in particular in Mexico took place for the most part in the second half of the twentieth century. In Mexico the process started in the early forties with the introduction of an import substitution model of industrialization. So began a stage of accelerated urbanization that was significantly concentrated in the centre of the country (Aguilar, 1995: 25).

Some urban studies judge Mexico to be an extremely unbalanced system, with an excessive concentration of the nation’s population, economic activity and power in the centre. The system of cities in Mexico shows great unevenness in different parts of the country, which is due in part to the large size of its principal metropolitan zones, Mexico City, Guadalajara and Monterrey.

However, since around 1970 there has been an increase in the number of urban centres in Mexico undergoing a process of rapid development. With the proliferation of urban settlements has come a diversification of metropolitan zones and an expansion of urban areas, which implies changing from a model having only one pole to one with many centres, though the predominant position of Mexico City in the country as a whole remains unaltered.

Currently a sketch showing the spatial distribution of the inhabitants of Mexico, of whom there are just over ninety-seven million (INEGI, 2001) would show a tendency for the population to be concentratced in urban centres, especially metropolitan areas, while the rural population is widely scattered in a large number of small centres. This gives us a model that contains both great concentrations of inhabitants and the opposite, a wide dispersion of the population in less densely populated centres of human habitation.

One of the most noticeable features of Mexican society today is the extraordinary growth of its metropolitan areas in the last thirty years of the millennium. More recently the “big three” have been growing at a slower pace, without ceasing to be the largest metropolitan areas in the country. The accelerated pace of urbanization means all the metropolitan areas in the country will have to meet many difficult challenges as they find themselves in this new situation: where space has become international, trade liberalization has brought the need for greater competitiveness at home and abroad, ways of accumulating capital are changing, and technology is constantly developing.
Most of the states of the federation show signs of progressive urban development. In only eight states do less than half of the population live in cities. These are Chiapas, Guerrero, Hidalgo, Michoacan, Oaxaca and Zacatecas. Whereas in Aguascalientes, Baja California, Coahuila, the state of Mexico, Nuevo Leon, and Tamaulipas, the number living in urban areas rises to 80% of the population. In the Federal District the whole population counts as urban as it forms part of the metropolitan zone of Mexico City. Over three quarters of the inhabitants of these seven areas and of the state of Colima, live in settlements of one hundred thousand inhabitants or more (Partida, 2003: 15).

According to data from the most recent census, in the year 2000 the national system of urban areas consisted of 364 cities. Nearly a third of the population of the country live in the nine cities with a million or more inhabitants, each of them covering extensive metropolitan areas. These are Mexico City, Guadalajara, Monterrey, Puebla, Toluca, Tijuana, Torreon and the conurbations of Ciudad Juarez y Leon. It is also predicted that within fifteen years another six cities will grow to having a million inhabitants: the metropolitan areas of Queretaro by 2010, Merida by 2014, Cuernavaca in 2017, San Luis Potosi in 2018 and Aguascalientes by 2021 (Partida, 2003: 15).

The development of these diverse state capitals has proceeded apace during recent decades. The same proportion of the urban population as before live in metropolitan areas of a million or more inhabitants, only now there are more such areas: nine instead of the three in 1970. The implication is that people living in large urban agglomerations are now to be found in different parts of the republic, and not just in Mexico City, Guadalajara and Monterrey.

In 2003, using data from the 2000 census, The National Population Commission, CONAPO (Consejo Nacional de Población) designated 42 Metropolitan Zones on the basis of the number of inhabitants and other criteria. For example to qualify the city must be conurbated, and the municipalities which go to make it up must be functionally integrated and themselves possess an urban character. (Map 1)

![Map 1. Metropolitan Zones in Mexico. 2000](image)

Source: Based on the designation of Metropolitan Zones by CONAPO.

Each of the four largest metropolitan zones of Mexico has at its centre one of the nation’s principal cities. These are Mexico City, Guadalajara, Monterrey and Puebla, and it is thanks to the strong demographic attraction of these cities and their economic activities, closely tied to nearby centres of human habitation, that the metropolitan areas have developed around them.
Historically the region that has ruled the roost in Mexico has always been the Centre. Some of the most important pre-hispanic cultures were here, and so were the most successful haciendas during the colonial period and after independence. It is geographically and culturally very varied, and is still the most densely populated region of the country.

Currently the largest mega-city in Latin America, Mexico City is an enormous conglomerate (of 18 million people according to the census for 2000) which has enjoyed a clear dominance over other cities since colonial times. It is at the top of the national system of cities and its area of influence covers almost all the country, to a greater or lesser extent.

Monterrey, originally a small town in a mining region bordering on the United States, started to expand towards the end of the 19th century, and its growth was favoured by its potential for manufacturing. It is the most important centre in the North-East of the country (CONAPO 1991: 24-25), and currently has a population of over 3,124,000 inhabitants (INEGI, 2000).

Finally, the urban system of the region covering the West and territory to the North of the Centre is well integrated to the city of Guadalajara, the second largest state capital in the country, whose influence over the cities of the state of Jalisco extends to the smaller centres in the states of Nayarit, Colima, Guanajuato, Michoacan, Aguascalientes and Zacatecas. This makes it the nodal centre of a large zone in the West of the country, and the main point of interest for most of the towns in the Northwest (CONAPO, 1995, p.69).

THE DEVELOPMENT OF GUADALAJARA AS A METROPOLIS

The city of Guadalajara, the second largest in the country, is becoming harder to identify with the way it was in nineteen seventy, when its limits were clearly defined. Now it has become an agglomeration with an increasingly complex structure and shape.

Between 1970 and 1990, the surrounding municipalities of Zapopan, Tlaquepaque and Tonala have shown signs of an extremely high rate of growth, while the central municipality, of Guadalajara, has shown a lower rate of growth since the eighties, and in the nineties it achieved a negative rate of growth. (Figure 1)

Due to accelerated population growth from the mid seventies onwards, and because most of the migration of the population was to the conurbated municipalities, the rapid urbanization of Guadalajara affected the economic, social and political organization of its territory decisively. This shows how monitoring the changes can help us to understand the complicated development of a metropolis better.

![Figure 1. Average rate of population growth by municipality in the metropolitan area of Guadalajara, 1960-2000.](Atlas of Land Production in the Metropolitan Zone of Guadalajara)
Disciplines such as Geography, Architecture and Urbanism are currently experimenting with the possibilities offered to urban studies by the geographical information technologies that have proved most useful: teledetection, the global positioning system and geographical information systems. Aerial photographs and satellite images allow us to monitor the growth of cities, and when the chosen scale and the spatial resolution adopted allow it, to recognize the landscape and its dynamics with complete fidelity, while the digital information systems allow us to produce, organize study and map the data. Hence the interest in creating an Atlas of Land Production in the Metropolitan Zone of Guadalajara, using theoretical and technical approaches to study the basic components of the urban landscape, and applying technologies of geographical information to show how Guadalajara has been transformed during the last thirty years, at the peak of its expansion.

Looking at some of the results obtained, we can see that in 1970, the conurbation of Guadalajara including the municipalities of Zapopan and Tlaquepaque, had a population of 1,409,262 inhabitants in an area of approximately 11,574 hectares (nearly 45 square miles) giving a figure of 121.76 persons per hectare (i.e. 12,176 per square kilometre or 31,544 per square mile). There were 175 authorized developments and the urbanized zone left 22% of the land within its boundaries unoccupied, which is attributable amongst other things to the speculative activities of real estate developers at the stage of parcelling land. It is consistent with the mechanics of urbanization in Guadalajara that speculative activity should be favoured at the expense of productive activity (Vázquez, 1989: 80). It should be noted that other factors also contribute to the existence of vacant land within the city, such as the legal status of the plot, the owner’s lack of financial capital, and the absence of appropriate government policies.

During the eighties the conurbation of Guadalajara became a metropolis of over two million inhabitants with an increased regional function. At the same time there was a qualitative change in the urban structure as some activities were displaced from the centre to the recent developments in the west; this led to a consolidation of the incorporation of Tlaquepaque and Zapopan into the metropolitan zone, which also spread into the nucleus of Tonala. So by 1980 there were 2,198,084 inhabitants and five years later the built-up area extended to 21,583 hectares (approximately 83 square miles) (Jiménez and Cruz, 2004).

By the start of the nineties the built-up area covered 31,330 hectares, and according to the 1990 census there was a population of 2,843,736 inhabitants, giving a figure for population density of 90.76 inhabitants per hectare (23,512 per square mile), making the city less compact and with a moderate population density. Between 1990 and 2000 the number of people living in the metropolis increased at a rate of 1.9% per annum, and by the year 2000 it had reached a total figure of 3,427,986 in an area of 35,120 hectares, which gives a figure for population density of 97.60 inhabitants per hectare (approximately 25,285 per square mile), which is actually a little less than the figure for the nineteen seventies. Thus the density of the city lessened during this period, which is undoubtedly due mainly to the horizontal growth of the city and the size of the intervening spaces in its outward advance. More recently there has been a move towards more vertical growth, but, for various reasons, not enough yet to affect the overall reduction in population density. (Map 2)
So the population density of the metropolitan area has come down in recent years as Guadalajara expands physically towards the conurbation centres of the municipalities of Zapopan, Tlaquepaque and Tonalá, which when first incorporated into the metropolis tended to have very low population densities. We may also attribute different densities to the dynamics of land occupation, type of urban service structures in place, location of the municipality or depending on which administrative boundaries within the built up area are occupied. This means there are notable differences in population density in the different basic spatial units (BSU) and various municipalities which go to make up the Metropolitan Area of Guadalajara, though it is clear that in the year 2000 people in the north and the south of the Metropolis lived in the greatest proximity to each other. The figures for population density also vary considerably between one BSU and another in Guadalajara: at one extreme the figure is of 0.0475 inhabitants per hectare (12 per square mile), and at the other extreme, in the most densely populated part of the whole metropolitan area, the figure is of 445.57 (i.e. over 115,000 per square mile). In one of the BSUs of Tlaquepaque the figure for population density reaches 439.46 inhabitants per hectare (113,850 per square mile), in Zapopan the figure is of 359.18 inhabitants per hectare (just over 93,000 per square mile) and, to conclude, the figure for Tonalá in 2000 is of 324.78 inhabitants per hectare (amounting to some 84,140 per square mile). Map 3 shows the distribution of the population over basic spatial units for the year 2000.

Map 3. Population density per hectare in the basic spatial units of the Metropolitan Zone of Guadalajara, 2000.

The high density of some parts of Guadalajara shows a new tendency of urbanization that consists of saturating vacant plots and demolishing old houses in order to build high rise building for high income inhabitants. The low density registered in the municipalities of the periphery shows the typical traditional horizontal urban growth of public and private housing for the low and middle income population (Photos 1, 2 and 3).
Urban developers

What makes land fit to be developed is the activity of the various actors involved at different stages of the process of land production (Durand-Lasserve, 2003: 108). To understand the dynamics of the process which results in the offer of housing, it is important to study both the developers and the other agents, such as landowners, inhabitants, financial institutions, construction companies or builders, architects, planners and other professionals, non-government organizations, and international organizations (Durand-Lasserve, 2003).

The urban developer is defined as one whose principal function is to provide the necessary capital, whether his own or that which he has been able to obtain through his ability to concentrate other people’s – often combining government
funding with his own money – and to guarantee for himself an uninterrupted flow of land which will sustain the rate of monopolistic benefits in the long term (Mazón, 1994: 20).

In this article we focus on real estate developers as they are more directly responsible than anyone else for the expansion of the built-up area. This growth takes place mainly as a result of the construction of housing, but also of shopping malls, sport centres, industrial areas, etc. We therefore consider that a study of the recent growth of Guadalajara should identify, record and analyse the part played by developers as producers of urban space in the metropolitan area from 1970-2000. To this effect, four years ago, in 2000, we began to produce an inventory of real estate developments in the four municipalities that make up the metropolitan area (Guadalajara, Tlaquepaque, Tonalá and Zapopan). The inventory was made from files kept in archives in municipal and state government offices; and once it was completed, field trips were made to compare the archive information with observations made in the field.

The urban growth of Guadalajara, as of most cities in Latin America, Africa and Asia, takes place outside the law and regulations. In these cities, as much as 70 per cent of the urban area and the population live in irregular settlements, also called illegal or informal. In Guadalajara a recent estimate is that 30 per cent of the area corresponds to irregular settlements (Jimenez, Cruz and Rabago, 2005). This called for two distinct approaches to dealing with the figures. In the case of the irregular settlements we can be sure that all those recorded in government archives were built, because the government only registers those that are regularized (when they are legalized and the inhabitants obtain a property title). This means that most of the irregular growth (as we already said, amounting to 30% of the expansion of the city) is not in the inventory of the state or municipal agencies. Whereas in the case of the legal growth of the city, the archives of the municipalities and the state government keep a record of all the applications for real estate development but do not make a follow up of whether the authorized developments were built or not, or whether they were only partially built, something that usually happens in times of economic recession. Therefore, in both cases the missing information is now being completed, through field work, and with the analysis of high resolution Satellite images such as those produced by Quick Bird (2003).

The Atlas project has produced a total of 4,498 files after filtering the data. For each of the 3,872 formal and 626 informal urban real estate developments that are registered in municipal and government offices, we have a record of, amongst other things: location, rural site name, owner, name of developer, area to be developed (or in the case of informal settlements, that was developed), date of application, proposed use (or actual use), any environmental problems (Jimenez and Cruz, 2004). This information is now being linked to digitalized urban maps, the aerial photos, the satellite images, a database on the ejidos (of commonly held agricultural land), and digital photographs, so as to be able to integrate the appropriate geographical information system into our work and organize information efficiently. (Maps 4 and 5)
Information about Guadalajara on the Web

Preliminary results and other information related to this research project can be consulted on the Web at: http://www.udg.mx/atlasdelsuelodeguadalajara/. (Figure 1)
The research produced three main data bases: real estate developments, socio-demographic data and agrarian background of the land around the metropolitan area. The web page shows some of the basic figures produced: in the form of socio-economic statistics, as cartography and in tables and graphs on the agrarian history of what is now urban land. Under socio-economic figures, we give information on rural and urban population changes for the state, the municipalities and the metropolitan area, from 1960 to 2000. In the same category we give figures for speakers of an indigenous language, on migration, income, housing tenure, on the numbers of people per household, and the materials and services used. Under cartography, we include basic information on both the formal and informal development of land from 1970 to 2000, the period of fastest urban growth in the life of the city. The figures show the area developed and the number of developers, by decade and six year governmental periods. Finally, under agrarian history we present background information for the land that has been transformed from rural to urban use in the last thirty years as well as information on the rural land surrounding the city. This section shows changes of land ownership during the last century, from private tenure of rural land to collective tenure after the revolution, and now back into private hands again but this time as urban land.

BY WAY OF A CONCLUSION

From the seventies to the nineties, the lines of spatial development in Guadalajara had become so apparent that just by observing the purely physical fact of the extension of the built-up area it was possible to appreciate that a new scale of metropolitan reality was coming into play. We see an integrated territory that has overreached administrative boundaries.

Between 1970 and 2000 the Metropolitan Area of Guadalajara incorporated 23,574 hectares (around 91 square miles), and by the end of this period it covered an area of 35,120 hectares (some 136 square miles) inhabited by 3.4 million people at notably different densities, depending on the geographical features of the part lived in and the history of its incorporation into the metropolitan area. In this process the role of urban developers as agents in the production of urban land has been the most remarkable. Private formal developers on the outskirts of the city have been incorporating large amounts of fertile land to urban growth, mainly through building large amounts of housing for low and middle income inhabitants, but without taking into account the planning of the city. Overall, developers have incorporated at least 30 per cent of the build up area without regard to urban planning and outside the law. In both cases the lack of information kept by traditional methods has been compensated for by the use of geographical technologies. Their use in this project has helped to preserve and systematize existing data, by concentrating dispersed data and providing the technical conditions which allow information on record to be permanently updated. The publication of this information on the web allows what we have learned so far about Guadalajara in the course of this project to be consulted and brought up to date at any time.

Bibliografía


