AN OVERVIEW OF THE WATER SUPPLY AND SANITATION SYSTEM AT METROPOLITAN AND PERI-URBAN LEVEL: THE CASE OF MEXICO CITY

DRAFT FOR DISCUSSION

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About the project

This report is one of several outputs from the project *Service provision governance in the peri-urban interface of metropolitan areas*. This is a three-year project run by the Development Planning Unit, University College London in collaboration with a number of institutions from developing countries and with support from the UK Government’s Department for International Development (DFID).

The purpose of the project is to improve guidance on governance and management of water and sanitation in the peri-urban interface (PUI) of metropolitan areas, in order to increase access by the poor and promote environmental sustainability. Presently there is a gap in the operating knowledge of implementing agencies on the specific problems that arise in the PUI. A premise of the project is that greater knowledge of the social, environmental and governance issues arising from changes in the management of water supply and sanitation in the PUI, and more specifically of the impact on these of different and changing regulatory frameworks, would be beneficial not only for the poor but also for these agencies and other local agents.

The project examines the cases of five metropolitan areas, each with different and changing service management regimes influencing the governance of basic service provision: Chennai (India), Dar es Salaam (Tanzania), Cairo-Giza (Egypt), Caracas (Venezuela) and Mexico City.

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Acronyms

AMCM Metropolitan Area of Mexico City
ZMVM Metropolitan Zone of the Valley of Mexico
CADF Federal District Water Commission
DF Federal District
DGCOH General Direction of Construction and Hydraulic Works
EDOMEX Mexico State
WSS Water and Sanitation System
AGEBs Basic Geostatistic Areas
MUP Urban People’s Movement
PRI Institutional Revolutionary Party
PAN National Action Party
PRD Party of the Democratic Revolution
EAP Economically Active Population
CNA National Water Commission
SRH Secretary of Hydraulic Resources
DIF Integral Family Development (Children’s Services)
SACM Mexico City Water Systems
CESAC Citizen Attention and Service Centers
1. INTRODUCTION

As in other Latin American cities, Mexico City’s population increased and its process of urbanization was accelerated with the policy of industrialization promoted during the early twentieth century. The development of the urban system had the same characteristics as many other third world countries, producing an important increase in the urban population, at the same time as increasing the country’s industrialization.

Because this process was concentrated in the capital of the country, the population of the Federal District increased more in proportion to the other states in Mexico, between 1940 and 1980 having the largest population in the country, followed by Mexico State. This growth occurred according to industrial growth policies in the first stage, which made a territorial expansion towards rural areas in the north of the city and later with the tertiarization and depletion of these lands, growth began later in the southern zones. This is how Milpa Alta became the last borough to be incorporated into the metropolitan system of the Federal District in 1980.

With the final limits of the Federal District marked, in 1985 the population of Mexico State outgrew the Federal District’s population, in part because the damage caused by earthquakes that year caused many families to emigrate to the outskirts of the city.

The unmeasured growth of the population in Mexico City has made it into an over populated area with many social deficiencies, the manifestation of which is a lack of housing resulting in land invasions that many times do not have the necessary infrastructure.

This situation, expressed and expanded in all the boroughs of the Federal District, has a very particular expression in the case of Milpa Alta, since here, urban-rural characteristics still predominate which in other boroughs have already disappeared. The case of Milpa Alta gives us the opportunity to access a wide heterogeneity of conditions in which settlements are made, at the same time as providing knowledge on multiple formal and informal strategies of institutionalization of determined organizing practices around the access and supply of basic services. These practices involve interaction between distinct social actors at local and metropolitan levels and the presence of conflicts on many levels.

In addition to this, there is an intense socio-economic relationship between the population of the Milpa Alta borough and other metropolitan areas; the high poverty and marginality of this space and the characteristics of its water and sanitation system which confronts serious difficulties, in spite of being an important zone of water supply for the D.F. and an ecological reserve for the conservation of the region’s aquifers.

From the Milpa Alta borough we have selected two communities in particular, San Bartolomé Xicomulco and San Salvador Cuauhtenco. These two communities express the social, organizational and institutional complexity of the administration and access to resources of the poorest population in the Federal District.

The goal of this report is to display a general diagnosis of our case study relating to the forms of governance in administering water and sanitation services in a peri-urban zone of the Federal District, which is the case of the communities of San Bartolomé Xicomulco and San Salvador Cuauhtenco in the Milpa Alta borough. To achieve this we will develop an initial contextualization of the situation at the level of the geographic and political-administrative region in which these communities lie—the Federal District and the Metropolitan Area of Mexico City—, in order to then highlight the specificities of our case study at

1 These invasions are carried out by independent organizations as well as official ones. Social movements also arise around the improvement of poor neighborhoods without access to basic services (Garza/Schtingart, 1994: 596).
the level of the borough and communities, which will give us the possibility to explore the different strategies of the communities that struggle to obtain permanently a good quality of life, as well as the response of the corresponding authorities and institutions.

2. CHARACTERIZATION OF THE METROPOLITAN AREA AND REGION

2.1. Population Growth

Between 1940 and 1970 an elevated population growth occurred in Mexico City. This increase was caused by elevated rates of natural growth as well as by rural-urban migration, which responded to industrialization as well as to changes in agricultural activity. In those thirty years, the urban population increased by almost five times and grew from 26% to almost 50% of the national population. This population growth coincided with growth in economic activity and the first phase of the model of import substitution. In those years what is known as the megalopolization process also began, characterized by the gradual absorption of urban and suburban nucleuses, conforming a whole full of complex social structures and relationships, giving origin to the interrelationship between various urban centers (Mexico City, Toluca, Cuernavaca, Puebla) (See Charts 1 and 2 and Graph 1.)

This affected the limits of Mexico City as well as its Metropolitan Zone. In 1950 a first territorial marking existed which coincided with the urban and industrial growth of the northern zone, where the population was beginning to relocate (Annex Map 1). By 1960, firm steps were taken towards uniting the metropolitan zones of Mexico City and Toluca, which would give way to the first Latin American megalopolis. With it, a larger spatial conglomeration of economic activities and population was created, bringing with it an extremely complex social problem related to settlement issues and the needs of consumption of different social strata. In this way, by the 1960s 3 boroughs of the south and southeast were incorporated into the metropolitan area: Cuajimalpa, Tlalpan and Xochimilco. By 1970, following the pattern of growth toward the south, Tlahuac borough was incorporated. (See Annex Maps 2 and 3).

Beginning in 1980 the rhythm of the economy declined; the tertiary sector activities, which group informal labor or labor connected with underemployment, increased; the population and urban growth of the city did not occur with the same speed as in earlier stages, however, there were still people expelled from the central zone of the city to peripheral parts (Chart 3).

In this period an important expansion of the metropolitan area was made to incorporate one more borough, Milpa Alta, characterized by its rural and indigenous population, and ten municipalities from Mexico State: Cuautitlán Itzcalli, Atizapán, Villa Nicolás Romero, Tecámac, Atenco, Chiautla, Chicoapaian, Texcoco, Ixtapaluca, and Chalco. (Schteingart, Marta. El Colegio de México, 1989) (See Annex Map 4).

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2 In the 1950s, the center of the city was the zone that concentrated the largest quantity of population, in what are currently the boroughs of Benito Juárez, Venustiano Carranza, Cuauhtémoc and Miguel Hidalgo, with 75% of the total DF population. In the following decade a process of relocation of this zone began due to the change of the residential pattern of sectors of the bourgeoisie, long residents of the center, and an expulsion of workers, artisans or service employees because of renter pressures, construction of public works and new residential units. The center zone was deconcentrated and the surrounding boroughs grew rapidly. The process of relocation to the periphery was accentuated over later decades. (Massolo, 1992: 144)
Regarding the social expressions generated by the impact of this economic growth and the contradictions it generated in the structure of urban environment, during this period several different forms of conflictivity and urban struggle systematically occurred. From 1973 to 1976 important movements arose in the metropolitan area of Mexico City and the country, among others, the movement of the October 2 Camps in the boroughs of Ixtacalco and Iztapalapa, Cerro del Judío, Padierna, Ajasco, Pedregal de Santo Domingo, etc. These movements achieved forms of important organization with high social participation, provoking a strong response against them from the State.

After this date and up until 1979 the movements were kept isolated, some organizations disintegrated, adopting new forms of organization and negotiation with the State. It was in 1980 when important steps were taken to constitute a coordinating institution for the organizations of the urban people’s movement: The National Provisional Coordinator of People’s Movements, antecessor of the National Coordinator of the Urban People’s Movement (MUP) which began in 1981 in Durango.

By the early 1990s there were important MUP organizations in the Mexico Valley. In the Federal District, in the following boroughs: Álvaro Obregón (8 organizations), Azcapotzalco (1 organization), Coyoacán (8 organizations), Cuauhtémoc (2 organizations), Cuajimalpa (1 organization), Iztacalco (1 organization), Iztapalapa (11 organizations), Magdalena Contreras (2 organizations), Gustavo a Madero (1 organization), and Tlalpan (19 organizations). In the suburban municipalities of Mexico State: Tultitlán (1 organization), Ecatepec (5 organizations), Nezahualcóyotl (5 organizations), and Naucalpan (7 organizations) (MUP, s/r).

2.2. Urban-Rural Relations

As can be observed, during these years the growth of the city happened at the expense of the rural areas of the D.F. and Mexico State. Little by little, the needs of the urban zone doubled and were satisfied by using resources from the country.

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3It is important to note that the urban processes unleashed by dependent capitalism and its contradictions are not a sufficient explanation for the appearance of urban social movements. There is no direct connection between an accelerated urban process and an explosive social response. These factors cannot explain the organic structure or the orientation and political culture of these movements, the reason for their origins in some areas of the city and not others, etc.

4In this respect Pedro Moctezuma notes that in September 1976 there was a subtle modification of governmental policies that had maintained a discrete tolerance of irregular settlements and an “opening” towards independent movements. Other policies were adopted that were marked by massive evacuations and repression against independent popular movements. This is explained by important changes in the correlation of forces of the bourgeoisie which were reflected in the State and manifested in the decline of real wages, concessions to the exporting bourgeoisie, among other things. (Moctezuma, 1987:137).

5Regarding the composition of the MUP, Ramírez Sáinz (1992), notes that “…it is composed of groups, organizations, coalitions, and fronts, of neighbors, renters, petitioners or cooperativists who demand the necessary conditions for reproduction of their members (land, housing, infrastructure and urban services), the recognition of their organizations and citizen rights, and participation in decisions on city and national urban policy.” In the same respect, Ferrera Araujo (1994) states that the MUP is not one movement, since in its interior there are many kinds of conflicts, in different geographic places and of varied intensity; the member organizations represent a wide range, with people from one place or inhabitants of hundreds of places in several cities of the country. For the author, the common denominator is their independence regarding the area of direct influence of the State and the PRI.

About identity and the class composition of the movements, it is important to mention what Ziccardi points out (in Ferrera, Rodríguez and Tello, 1982), noting that they do not have a class identity, but a group identity –we could point out a social and collective identity–, given the heterogeneity in the composition of social urban movements, where there is no one position on production. However, the author notes that there is a group identity, because of the precariousness of housing, the absence of collective services and equipment, a minimum margin of subsistence, in many cases, the illegal occupation of lands, fiscal abuses, systematic corruption, etc.

6For a more detailed development of these movements, see Perló. "Notas sobre la articulación entre el movimiento obrero y los movimientos sociales urbanos: Un análisis comparativo a nivel latinoamericano", mimeo. (cited by these authors); Moctezuma, P, 1987; Bohórquez, G., 1989; Gómez-Hermosillo, R.; Perló, M and Schteingart, M., 1984.
Regarding the population dynamics by area, urban and rural, the behavior is similar to that previously described, for the DF as well as for suburban municipalities in Mexico State. By 1950, the urban population of the DF constituted 98% of the total population of the AMCM, but beginning in 1960, a process began of relative decrease (94.5% in 1960, 72.7% in 1970 and 66.0% in 1980), as can be observed in graph 1; this was accentuated by the earthquake in 1985, with a current relationship of inverse growth.

The population growth in urban areas of suburban municipalities of EDOMEX presented an important increase in 1970; by 1980 the urban component, those who resided in communities of more than 2500 inhabitants, constituted 80% of the total population, 84% in 1990 and 86% in the 2000 census (See chart 4).

Relative population growth in the DF with regards to the ZMVM presents a similar behavior to the entire ZMVM, with the difference that here the trend towards a relative descent, begun in the 1950s, is more drastic. It is a different situation which presents itself in the suburban municipalities of EDOMEX. An increase in the population is observed beginning that year, but it is between 1960 and 1970 when the largest population growth occurs. One could say that there is a change in the pattern of growth begun in 1930, when the largest concentration of population in the AMCM was in the DF—up until 1960 (90% on average that year, 78% in 1970, 65% in 1980, 54.32% in 1990 and 47.87% in 2000)—; while the population in EDOMEX in 1960 only represented 9% of the total population of the metropolitan zone, progressively increasing—beginning that year—to 22% and 35% by 1970 and 1980 respectively and 45.32% and 52.13% in 1990 and 2000.

### 2.3 Trends in Development

This pattern of growth is fundamentally due to industrialization policies in the first place and to the tertiarization of the economy in the second place.

Between 1930 and 1950, 100% of the EAP employed in branches of the metropolitan zone was concentrated in the DF. From 1960 on, the DF began to share part of this population with EDOMEX, and especially with suburban municipalities. This is how the EAP in the Federal District descended from 58% in 1980 to 50% in 1990 and 44.5% in 2000 (See chart 5).

Some data which show these transformations are the following: the capital city’s EAP in the industrial sector grew from 30.6% of the population in 1940 to 38.5% in 1970, and decreased from 43.1% in 1990 to 35.6% in 2000. The service sector is the only one which increased its participation significantly, going from 28.9% to 36.5%. In this way, the EAP concentrated in activities of transportation and commerce became based on industrial activities and services. At present, these services are growing significantly in the branch of communication and finances in the DF.

The spatial change of some productive activities and the growing dynamic of others—measured by the percentage of employed workers—along with the changes described show, in general, how the changes in the model of industrial development affected urban organization of the AMCM. It is clear that beginning in 1960, a process of decentralization or industrial displacement towards Mexico State began, which brought as a consequence the activation of other branches of economic activity such as transportation, commerce and services.

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7 See also De Oliveira, O. y García, B., 1987: 593.
8 See also De Oliveira, O. y García, B., 1987.
2.4 Industry

An element which shows the general development followed in these stages is the level of industrial concentration in Mexico City, which highlights the capital city’s place in the total gross manufacturing product in comparison to the rest of the country.

As a display of this concentration, it is important to mention that in 1930, the country had 46,830 industrial establishments; of which only 3,180 were located in the Metropolitan Area of Mexico City, representing only 6.79%. As the process of industrialization in Mexico City advanced, the concentration increased, reaching a total of 38,492 establishments in 1980, representing 28.1%. This trend continued, reaching 22.6% in 1988 and 16.8% in the entire Mexican Republic.

From 1940 to 1980 the participation of the AMCM in the gross value of production grew uninterruptedly: 28.5% in 1930, 32.1% in 1940, 40.0% in 1950, 47.1% in 1960, 46.8% in 1970, and from then on it began to decrease in value, becoming 43.4% in 1980, 32.5% in 1988 and 28.8% in 1993. This concentration of industry in Mexico City made it possible in 1980 for one city alone in the national urban system to produce almost half of the total industrial products of the Republic, now losing that capacity and transferring it to Mexico State (See Chart 3).

From 1950 to 1970, the industrial concentration is notable, particularly in Mexico City. According to the industrial aggregate value, the participation of Mexico City in industry, in 1950, was 43.6%, it grew to 47.1% in 1960 and by the late 1960s it became 48.6%. The result of this process of concentration consolidated during this period is a super concentration of production by 1970: 18,286 million pesos in Mexico City, with 19,337 million pesos in the rest of the country. This industrial concentration has had an additional consequence, expressed beginning in the 1970s, which consists in the need for territorial expansion of the capital, including exploitation of natural resources and labor force in other regions of the country. The trend is to make up socio-economic regions around already existing conditions, a phenomenon called megalopolization.

In this way, the rhythm of concentration of Mexico City was reduced over the period 1960-1970 since its level only grew 1.5% in the period. It is important to remember that from 1950 to 1960 there was a growth of 3.5%, 3.8% between 1940 and 1950 and 3.6% between 1930 and 1940. Parallel to the decrease in growth of the relative importance of Mexico City, there was an increase in participation in the geo-economic region. There is a tendency to conform, seemingly, a new environment of concentration in the country. The region Center-West, constituted by the entities of Queretaro, Mexico, Federal District, Morelos, Hidalgo, Tlaxcala and Puebla, constitutes the immediate zone of influence of Mexico City.

9 In the 1940s, the industrial plant was settled mainly in the traditional area of Mexico City, the first 12 boroughs and surrounding areas. The 12 boroughs made up what is called Mexico City until 1970. On this date, four boroughs are added which together with the 12 already existing recomposed the political division of the Federal District. The first boroughs hark back to the 18th century in the Borbónico reforms when the city was divided for administrative reasons. (Cfr. Daniel Hiernaux. El Colegio de México, 1989: 239.)

10 To have an idea of what this industrial concentration means, a quote from the authors: "...the increase in gross industrial production in the city between 1960-1970 is equal to the total industrial production in 1970, that is, the production that the 10 cities that follow the capital in industrial importance achieved along their entire historical development: Monterrey, Guadalajara, Toluca, Puebla, Torreón, Monclova, Veracruz, Chihuahua, Querétaro and Ciudad Sahagún" : 585. For a more developed analysis of the phenomenon of industrial concentration from a wide perspective, in which this phenomenon is analyzed in regards to dependent capitalism, see Garza, Gustavo. "Estructura y dinámica industrial del área urbana de la ciudad de México", in Demografía y Economía, XII, 1978. (Garza/Schteingart: op.cit: 583.)

11 This phenomenon of industrial concentration has a dynamic similar to the one in developed countries. However, in these countries there is a generalization of this development, creating systems of industrial cities constituting national development first, and transnational development afterwards. In the case of Mexico, macrocephelia adopts the peculiar form that it has because of the dependent capitalism at its core. Cfr. Garza, G. "Estructura y Dinámica Industrial... op. cit. (Cfr. Garza/Schteingart: 586; Garza, G. Atlas... op.cit:121.)
In this region, relative participation of the industry of transformation grew slightly at the same time as modifying the relationship with the tertiary sector of the Federal District and Mexico State (See charts 6a and 6b). Meanwhile, regarding the industrial structure of Mexico City, the same trend as the previous period persisted: the difference in participation in consumer durables was maintained, although smaller.

This industrial structure also had effects on the structuralization of economic space. There was a displacement of industrial location, mostly of capital goods and consumer durables, towards the outside boroughs of the D.F. and Mexico State. This is clear in the growth of the urban area in a very short period from 1940 to 1960. This expansion happened particularly in the 1960s.

Regarding industrial structure, in the 1960s, the trend established in the 1940s continued, with the added characteristic of displacing the industry of capital goods, of intermediate consumption and metal mechanics to the periphery of the city and surrounding municipalities.\(^2\)

If we consider the difference between participation in the number of establishments and the rest of the industrial characteristics, the concentration of small and medium industry in the D.F. and heavy industry in Mexico State is clear.\(^3\) At present, financial services are what are most developed in Mexico City in comparison to its metropolitan area, since these have grown from 62% in 1990 to 70% in 2000.

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\(^2\) For this period, there is no precise information on the behavior of this structure and its alterations because of the economic crisis of the country. However, because of the importance of this region of the country in the national industrial production, we can infer that the marked tendency for the country happened in the zone as well, and the most significant changes were not in the trend that followed the subsectors but in the restructuralization of the branches which compose them.

\(^3\) (idem: 104-105.)
3 CASE STUDY REPORT

3.1 Brief Introduction and Justification of Case Study

The area of study chosen to carry out the project is the Milpa Alta Borough, one of the 16 boroughs in the Federal District which, as we have already mentioned, was only recently incorporated as part of the metropolitan zone in 1980. The selection of this case is based on the following criteria:

a) Peri-urban characteristics present in this area.

b) Features and characteristics of its water and sanitation system.

c) Presence of problems on different levels for the water and sanitation system.

a) Peri-urban Characterization

The borough of Milpa Alta presents particular characteristics that place it within a peri-urban profile. Although the peri-urban category is still in construction and it is possible to establish empirical differences in a European, Latin American or African peri-urban context, some key elements exist which allow us to define peri-urban zones within a geographic area.

Some of the criteria that have been used to characterize the peri-urban interface (PUI) are:

- From an environmental perspective, the PUI can be characterized as a heterogeneous mosaic of “natural” ecosystems, “productive” or “agro-ecosystems” and “urban” ecosystems, affected by material and energy flows demanded by urban and rural systems.

- From a socio-economic viewpoint, the PUI is characterised by the presence of heterogeneous social groups, in constant transition. That is to say that the composition and interests of these groups tend to change over the time in a process characterised by the fluctuating incorporation of new stakeholders (be they individuals or organisations). Thus, small farmers, informal settlers, industrial entrepreneurs and urban middle class commuters may all coexist in the same territory but with different and often competing interests, practices and perceptions.

- From an institutional perspective, the PUI is often characterised as the converging of sectoral and overlapping institutions with different spatial and physical remits. This is related to the changing geographical location of the PUI, or PUI process. Where institutional arrangements, or areas of responsibility tend to be either too small or too large, too urban or too rural in their orientation to effectively address sustainability and poverty concerns. In addition, private sector bodies as well as non-governmental and community based organisations also intervene in the management of peri-urban areas, but often without clear articulation or leadership from government structures. (Allen et. al., 1999).\(^\text{14}\)

In addition to the above information are the presence of homes in conditions of poverty, location of natural resources consumed in towns and cities, transition between rural and urban features, pressure on natural resources (land and water), and an increase in pollution generated by the growing concentration of population and industries.

In the case of Mexico City, it is possible to note a group of agricultural spaces located in its surroundings, which were traditionally oriented towards the production of basic foods for the internal market, but which beginning in the last decades have been reconverted towards new crops in

\(^{14}\) Allen et. al., 1999 “Guidelines for the production of case study reports”.
horticulture and floriculture, in coexistence with the production of basic grains for consumption. Beside this new productive orientation, there is also a proliferation of non-agricultural, commercial and service activities, which lead to new socio-physical ways of life and social organization (Delgado, 2001).

Within this metropolitan context, and based on the criteria noted above, we have characterized Milpa Alta as a peri-urban area, according to the following criteria:

-It has economic, social and cultural features which combine urban and rural characteristics. This can be observed in the different types of ground usage\(^1\)\(^5\); the composition of the EAP, the presence of indigenous population, the persistence of forms of organization related to the native peoples of the country and the celebration of festivals and traditions that show the indigenous and mestizo origins of the zone.

There are an important number of agricultural producers of different kinds, mainly dedicated to the production of nopal, which has had an important expansion in recent years, responding to exportation to the international market.\(^1\)\(^6\) Milpa Alta is the first place in the country for production of vegetable-nopal, with an annual production of 254,916 tons cultivated on 5,597 hectares; in other words, 48.25% of the total agricultural surface and 96.39% of lands dedicated to perennial crops. According to official figures from the year 2000, 80% of national production is collected in this zone, which is equal to some 7000 producers who cultivate almost 4000 hectares.

The majority of nopal fields in the borough are small; the maximum extension is 3000 square meters, and almost all of them are found on private property with little surface area. The producers use vegetative propagation on their nopal plants; one leaf alone works as a propagule. Planting is done throughout the year, but with better results in the months of March and April. Farmers do not use chemical fertilizers, but they do use organic fertilizer in large quantities.

The harvest is done once or twice a week throughout the year, although more frequently in April and May. Sales of nopal are during the first two or three days of its harvest. Farmers sell the amount they possess to the Central Wholesale Market, the Merced market, the Jamaica market or the Milpa Alta markets.

Small producers own less than one ha with nopal plants and manual labor is carried out by family members, who transport their products on carts to sell. Large producers hire peons for the harvest and maintenance of their plantations. In general, workers are transported from other communities in the states of Mexico, Puebla and Oaxaca. For commercialization, producers transport nopal in trucks.

The use of nopal is varied. In the food sector, it is used for soups, salads, jams, breads, desserts; in the cosmetic sector, for shampoo, gel, creams; and for medicinal products. The Japanese use the fiber to make high fidelity speakers.

-At the same time, Milpa Alta has been affected by institutional changes implemented in the country in the last few decades. Different units of production, ejidos, communal lands and private lands are found

\(^1\)\(^5\) The entire zone is an ecological reserve, with 95% rural surface area, 3.5% for residential use, 0.5% urban and rural equipment and 0.5% mixed. When referring to agriculture and vegetation, INEGI notes that 23.53% of the borough’s surface is destined to agriculture, 18% pastures and 49.31% forests.

\(^1\)\(^6\) According to the study on Milpa Alta cited (Torres, 1988), three large periods of transformation in local agriculture can be characterized, to which we can add a fourth. The first, from the prehispanic period to the early 20th century, where the production process of the small corn field was predominant, associated with the exploitation of maguey plants, the second period, from 1920 to 1960, continued the centrality of small corn fields, although with a greater level of diversification of crops. Toward the end of this period, there was a substitution of maguey plants with nopal. The third stage identified by the author, is from 1960 to the period of study, when the corn field was displaced in productive importance by the nopal. We would add a fourth stage, characterized by a higher specialization and technological development accompanying nopal production, at the same time as the beginning of its foreign exportation.
in Milpa Alta, having been affected by diverse reforms implemented: property reforms, commercial openings, decrease in prices, difficulties in access to credit, transformation of regulation and institutionality of support to the rural sector.

Milpa Alta is a heterogeneous region in economic activities; the levels of urbanization and the services to which the population has access; and the customs. There are differentiations within the borough in towns presenting a higher concentration of equipment and services in comparison to others.

At the same time, the natural growth of the population and the arrival of immigrants from other states has generated some conflicts in the urban structure, such as the change in ground usage in central zones, the pressure on transportation infrastructure in central parts of these towns and the alteration of traditional types of buildings. There is pressure to modify rural ground usage to urban use and also to authorize higher densities (Distrito Federal, 1997). This process has led to development and consolidation of irregular settlements, defined as settlements of people in areas outside of the city limits, which demand a different type of services, among others, an expansion of the sewerage and piped water systems (See Chart 7).

b) Water and Sanitation System

Milpa Alta presents particular characteristics in the water and sanitation system:

- On the metropolitan level it is the borough with the least percentage of in-home water service (See chart 8).

-At the same time, in terms of sustainability, Milpa Alta represents a strategic resource for the city; it is inserted in the proposals for ecological rescue of the Valley of Mexico and is fundamental for its sustainability. It is located completely on Conservation Soil and plays a central role in the recharge of the Valley of Mexico aquifer.

-Its system of water supply presents particular characteristics, since it is carried out through turns called tandeos, which consist in the distribution of water in towns by zone, day and hour, in a differentiated manner, given the scarcity of the resource. In each town, valves are opened and closed on different days and time schedules. This job is the responsibility of the Unit of Potable Water and Sanitation of the borough. This system began to be applied in 1995.

-Another criteria for the choice of the case is the existence of serious problems in the supply of water, especially in the highest zones of Milpa Alta, because of topographic characteristics and problems confronted in the dry season.

-At the same time, the presence of different actors who participate in the system of water supply in the area is noted: the DF and borough governments; the sub boroughs (territorial communications); the private sector and the community. While formal rules exist for the system, an interesting process of application of informal rules is developed to demand and partially resolve the problems caused by the quality or absence of the service.

c) Presence of Problems on Different Levels for the Water and Sanitation System.

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17 The points b) and c) will be treated in more detail in the second section of the document: Characteristics and Trends of the System of Water and Sanitation.
In providing water and sanitation services, different actors on national, metropolitan, regional and local levels intervene. The relationship between these actors, beyond collaboration, brings a series of problems. The service of potable water in the Milpa Alta Borough presents conflicts at different levels:

- **Regional Level-Metropolitan Surroundings:** There is a borough institution for the supply of water provided by Mexico City Water Systems. This institution sometimes implies differences between demand and supply.

- **Borough Level-Users:** There is a high demand for water on behalf of the users which cannot always be resolved by the borough. Problems can occur because of the short time period when water is available in some towns (only a few hours a week in the extreme case). There is also a strong demand on behalf of the population occupying new zones in towns (irregular settlements) and the areas farthest away from the city limits who seek the installation of services and the expansion of the potable water network.

- **User Level-Users:** The water issue leads to the presence of conflicts between users within towns and between them. This leads to disputes because of inhabitants left out of the turn system; and users’ obstruction of construction works which would allow the supply of water in certain zones.

In addition, vulnerability, erosion and pollution of the system of distribution occur, since they depend in a large scale on the recharge capacity of deep wells and the good performance of electrical pumping and repumping plants.

d) **Selection of Communities: San Salvador Cuauhtenco and San Bartolomé Xicomulco**

While searching for secondary data and the development of the exploratory diagnosis that contemplated the application of a series of methodological techniques (interviews with key informants, interviews with users, direct observation), two towns in the Borough were selected: San Bartolomé Xicomulco and San Salvador Cuauhtenco.
This selection sought on one hand to compare between two locations representing, qualitatively, the most important features of the chosen area (Milpa Alta). In this sense the towns form part of the same socio-territorial unit and since they have a common history, they share features; however, they have different characteristics which make them interesting for the analysis of WSS.

This selection is based on the following criteria:

1.-Characteristics of WSS
2.-Economic Activities and Level of Income
3.-System of Land Ownership
4.-Organizational and institutional relations

1. Regarding WSS, both towns present situations where there are difficulties in the access to water because of their altitude. However, the situation in San Salvador is more dramatic, reflected in the supply and availability of water. In the case of San Bartolomé X., according to the data in the census study of the year 2000 (INEGI), homes with water connection represent 49.5% while those that “pour water from a bucket” are 48.4%; in San Salvador, the percentage is 30.6% and 65.9% respectively (See chart 10).

At the same time, in availability of water, in San Bartolomé, 40% of homes have water inside the house, while 51% have water outside, according to census data. But in San Salvador, 21.7% of homes have piped water inside the house, 38.3% with water outside the house and 37.1% of homes get their water from trucks¹⁸, which in the case of San Bartolomé is only 1% according to the source consulted (See Chart 11).

This reflects that in spite of the difficulty in access to water in both locations, San Salvador has a larger population with access through trucks¹⁹, which shows a situation with higher precariousness in the access to water, and a larger percentage of population in irregular settlements and outside the city limits than in San Bartolomé.

According to information from the Coordinators of Territorial Communications²⁰, in this last town, 95% of the population has all basic services, water, sewerage and pavement, and only 5% of the community does not have access to services, because they are outside the city limits (Interview with San Bartolomé Coordinator, June, 2003). Legal norms impede the extension of services to these zones since the borough is considered an ecological reserve area of the Federal District.

In San Salvador, the percentage of population in irregular settlements is around 50% (Interview with San Salvador Assistant Coordinator, June, 2003), which shows a higher percent of the population without access to water. This leads to the more extended existence of informal and illegal situations in relation to services. Irregular settlements cause strong pressure on services, not only demanding

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¹⁸ Trucks transport water in tanks to zones with scarce or no access to water. Generally, they are operated by the Borough, although there are private companies dedicated to selling barrels. Supposedly the trucks provided by the Borough are free to the population, although according to the testimonies collected, on some occasions, people must pay for this service. Trucks have programmed stops in the zones that are found outside of the city limits and are recognized by the Borough and non-programmed stops in the zones outside of the city limits and not recognized. The demand for trucks is solicited directly by the people through the Service and Citizen Attention Center.

¹⁹ We suppose that because there is a much higher percentage of homes with access to water through trucks in San Salvador, there is also a higher number of people. It was only possible to access data on the housing level for the availability of water, derived from the 2000 census study.

²⁰ The coordinators of territorial communications are authorities elected by traditional customs, who serve as mediators between the population and borough institutions. At the moment they do not have a legal foundation, although they do have legitimacy in the population, and in practice they serve as community representatives and as the link between people and borough authorities.
them, but using them informally since they get both electricity and water through clandestine taps, meaning they steal water and electricity, since they do not pay any service, while those who pay are the ones who are affected most by the situation. (Interview with the San Salvador Cuauhtenco Assistant Coordinator, Sergio Mancilla Rosas) (See Charts 9, 10 and 11).

2. Regarding the economic activities of the population, while both towns are similar in their EAP and type of occupation (mainly workers and employees according to census data); according to observation and information collected, in San Bartolomé the population is mainly a worker community which gives manual labor to different companies and factories; the majority leaves to work in other boroughs of Mexico City and suburban municipalities, and only 10 to 15% of the population works in agriculture (interview with San Bartolomé Xicomulco Coordinator).

In the case of San Salvador, there is a higher combination of activities, and agriculture is developed by 60 to 80% of the population, according to information provided by the San Salvador Cuauhtenco Assistant.

These characteristics allow in some measure a comparison between the two locations, because in spite of similar economic activities, in the case of San Salvador there is a higher combination with agriculture (See chart 12).

Regarding income level, although a situation of marginality predominates in the Borough, there is an important difference in the two towns, since San Bartolomé on average presents a higher income level than in San Salvador, which allows a comparison based on different economic situations (See Chart 13).

3. In the entire Borough, the property system is a complex question. However, in the selected towns there are interesting particularities. In the case of San Bartolomé the prevalent form is small ownership, since the majority has a private contract to buy and sell their land, although these lands are included within the 27 000 hectares of communal land in the borough of Milpa Alta, which is why San Bartolomé Xicomulco also has communal representation. This shows a completely contradictory situation that only the agrarian courts have the possibility of resolving, a process which has already begun.

In the case of San Salvador, land is communal, in the same way as all of the towns in Milpa Alta, but usufruct is private.

4. Regarding organization (see Chart 14), San Bartolomé is one of the towns with the highest levels of community organization. In addition, initiatives are being developed with educational institutions outside of the Borough for ecological rescue of the location and a project to develop San Bartolomé as an area of ecotouristic attraction within Mexico City.

According to the interviews carried out, San Bartolomé appears to be a more integrated community than San Salvador because of its organizations and traditional authorities.

Regarding the relationship with borough authorities, according to the coordinator, it is quite cordial and based on proposals and concrete projects.

In the case of San Salvador, the organizational level is lower and more traditional. In addition, a higher level of conflict exists within the community and between this community and the borough authorities, worsened by the subjects such as water and access to services, as reflected in the report.
In summary, we would like to point out that both towns selected represent the socio-economic, institutional and WSS characteristics of the entire area. However, they present important particular features that we believe allow us to go into depth in a differentiated manner on the performance of WSS, institutional relationships and the diverse ways the population accesses water.

3.2 Demographic and Socio-economic Characteristics

The demographic growth of Milpa Alta is a consequence of the general growth of the Federal District and its late economic incorporation as part of the metropolitan area. It is only recently when a trend of growth in the population has begun to show, which, because of its character, could be worrisome, as we shall see below.

a) Demographic Trends

The borough has a total population of 96,773 people (2000), with 49.3% men and 50.7% women. (See Chart 15). The towns chosen for our case study represent 7.7% of the total population of Milpa Alta, of which 5% of the population is found in San Salvador Cuauhtenco and 2.7% in San Bartolomé Xicomulco (See chart 16).

Between 1970 and 1990, the rhythm of growth in the borough was constant, and the population doubled, going from 33,694 inhabitants to 63,654 inhabitants. The rhythm of growth in the borough increased in the five years from 1990 to 1995 at an annual rate of 4.3%, in comparison to the period from 1980 to 1990 when there was an annual rate of 3% growth (See Chart 17). This situation affects in an important way the historical trend of population growth and the corresponding program projection established in the General Program of Urban Development in the Federal District 1995-2000, growth that will have physical implications of densification or expansion over protected areas, and more demand for equipment, housing, services and employment.

There is scarce population in the zone and the majority is concentrated within the city limits of the towns. The gross density of the borough is 2.85 inhabitants per hectare. Communities of 100 to 500 inhabitants and less than 100 inhabitants concentrate 6,430 inhabitants on 433 hectares, with a density of 14.84 inhabitants per hectare; mainly in irregular settlements in very disperse areas. Considering the surface of these areas, the density of the population of the borough would be around 43.18 inhabitants per hectare. This density is the lowest of all the boroughs in the Federal District.

The borough has an average density in rural towns of 52 inhabitants per hectare. The towns with the highest density are San Salvador Cuauhtenco and San Antonio Tecómitl with 88 inhabitants per hectare, and the towns with the lowest density are San Lorenzo Tlacoyucan with 27 inhabitants per hectare and San Francisco Tecoxpa with 13 inhabitants per hectare.

Between 1985 and 1990, the borough registered 1,321 immigrants from outside the Federal District which represent 0.44% of all the immigrants to the Federal District. However, given the natural growth rate, estimated at 2.58% annually, the rate of migration to the borough (considering migrants from other boroughs and the total rate in the period from 1990 to 1995) was an annual 1.72% (4.3% - 2.58%); this means that in the past few years Milpa Alta became a borough with a high level of attraction (Chart 18).

In accordance, the population growth is defined by the inhabitants of Milpa Alta in two categories: one is natural and the other is irregular. The first is understood as population expansion in natural growth, while the other is due to immigration to the zone, located mainly in marginal areas of the towns.
In 1999, according to a study carried out by the Commission of Natural Resources, on the Conservation Soil that goes over the territory of nine boroughs of the D.F., 626 human settlements have been identified in addition to 35 rural communities, of which 174 are regularized in their ground usage and 452 are irregular. According to this statistic, in Milpa Alta there are 44 irregular settlements with an average age of 9 years, of which 13 towns are within the protection zone.\(^{21}\)

Distribution by age from 1990 to 1995 shows an almost equal pyramid, with an increase in absolute volume and a small relative decrease in 1995 in the population between 0-14 years old, with males representing 37.07% in 1990 compared to 34.17% in 1995, while females represented 34.85% in 1990 and 33.3% in 1995. As for the population between 15 and 64 years of age, in 1990 men represented 59.98%, but 61.15% in 1995, and in 1990 women represented 61.02% and in 1995, 62.44%, which shows a significant increase in the working population, as well as in the generation of new families.

The population of 65 years old or older shows small increases. In 1990, senior citizens represented 7.68% of the population, and in 1995, 7.85%, which shows a process of aging society, and in absolute numbers meant an increase of 738 inhabitants.

According to the 1995 INEGI Population and Housing Census, the youngest population (0-14 years) represented 34.7% in males and 33.3% in women. This indicates that although there is an important relative decrease in these ages in comparison to 1980, the young population is still important if compared to the Federal District as a whole (29.2% male and 26.3% female).

Many of the indigenous origins of the settlers have varied over the years, given that only 5% of the population of Villa Milpa Alta speaks an indigenous language. The other 95% speak only Spanish. As for the towns in our case study, 4% of the population of San Bartolomé Xicomulco speak an indigenous language, while 6% of San Salvador Cuauhtenco do (See chart 19).

**b) Socio-economic Aspects**

\(^{21}\) According to the Law of Urban Development in the Federal District, conservation soil is defined in the following way: it comprehends all areas meriting protection because of location, extension, vulnerability and quality, the impact on environment and territorial order; slopes, hills, zones of natural aquifer recharge, mountains, elevations and topographic depressions that constitute natural elements of the territory of the city and whose groundwater has been affected by natural disasters or by exploitation or use of any means, which represent permanent or accidental danger for the establishment of human settlements. It also comprehends the soil destined for agriculture, fishing, foresting, agro industrial and touristy production and rural towns.

The areas of conservation soil are:

- **a) Rescue Areas:** Those whose natural conditions have been altered by the presence of inconvenient use or by bad management of natural resources and which require actions to reestablish their original situation. The works realized in these areas will be conditioned to carry out actions to reestablish ecological equilibrium. The programs will establish maximum coefficients of occupation and use of soil;

- **b) Preservation Areas:** natural extensions that do not show serious alterations and which require measures for the control of ground usage and to develop activities compatible with preservation. Only works to instrument preservation shall be carried out in these areas, compatible with the objectives noted, with permission from the Secretary, as well as the Secretary of Environment. The applicable environmental legislation will regulate these areas; and

- **c) Rural and Agro industrial Production Areas:** those destined for agriculture, fishing, touristic, forestal and agroindustrial production. The law will determine concurrences and characteristics of this production. These areas may transfer potentials for development, for their own benefit, in the terms defined by the programs and article 51 of this Law.
Currently, the population demands more support for agricultural activities, since 60% of the primary sector is dedicated to the cultivation of nopal; however, to create a larger source of income, the introduction of alternative crops is being contemplated, as well as the creation of a collection center of nopal and vegetables for wholesale and retail, and industrialization and commerce of nopal and meat produced in the borough.

The Economically Active Employed Population (EAEP) residing in Milpa Alta in 1990, independently of their place of work, was 19,106, while in 2000 it was 33,614, representing 98.5% of the total EAP.

On the other hand, the Economically Inactive Population was constituted by 24,670 people, mostly dedicated to housework. The presence of students in the borough is proportionately lower than in the rest of the Federal District (See Chart 20).

According to the census taken by INEGI, the population dedicated to the primary sector has decreased; in 1980 there were 5,379 people, while in 1990, only 3,658 people were registered (19.15%). In an inverse relation, an increase was registered in the tertiary sector, which between 1980 and 1990 rose from 46% to 59.8%, with 11,426 employed personnel. This increase is due to the proliferation of small businesses, mostly for sale of food and services (see Chart 21).

The income of the population is distributed in the following manner:

75.52% of the EAP receives less than 2 minimum wages\(^{22}\) and of these, 29.64% receives less than one. In the Federal District as a whole, the percentage of the population that receives less than 2 minimum wages is 59.41%, which shows that the borough in general has a higher level of poverty than the Federal District as a whole. It is necessary to emphasize programs of social support, generation of remunerative employment and just prices for the products generated. Around 3% of the population receives an income of more than five minimum wages (See Chart 23).

Commercial activity developed in the borough is high, since it incorporates 59% of establishments, 32% of personnel and 52% of income. (See Chart 24). Agriculture, agro industry and services stand out as well.

c) Marginality

The Milpa Alta Borough, and the Tláhuac Borough have the highest marginality of the Federal District, for which programs are necessary to elevate the levels of the factors considered, at least to the average of the Federal District, attacking critical factors presented in the borough (See Chart 25).

In social terms, the high grade of marginality and the lack of access to services in comparison the rest of the boroughs of the D.F. stand out. According to INEGI data (1990), 29.06% of the working population receives less than 1 minimum wage, compared to the Federal District as a whole where this population represents 18.91%. Meanwhile, according to the Municipal Marginality Index of the National Population Council (CONAPO), this borough has the highest marginality, along with Tláhuac.\(^{23}\)

\(^{22}\) The minimum wage is equal to $43.65 pesos a day in urban zones and $40.30 in rural zones (Approximately US$ 4.3 and US$ 4 respectively).

\(^{23}\) The Index of Municipal Marginality of CONAPO is built according to a series of indicators. This index captures and describes the intensity of the phenomenon of marginality according to the percentage of the population that does not participate in the access to goods and essential services. The construction of this index through techniques of multivariate analysis, such as principal components, allows the index of marginality to be a measure-summary that differentiates units of observation (states, municipalities and towns), according to global impact of deficiencies. In this way, the index captures socio-spatial inequalities that arise from patterns of
According to Rubalcava and Schteingart (2000), who built an index of socio-spatial differentiation which allowed them to stratify by boroughs and municipalities within the Metropolitan Area of Mexico City, Milpa Alta is located in the very low strata, reflecting medium low values related to the EAP; the percentage of people with primary education and high income; the percentage of housing with piped water; and the values related to increased crowding.24

3.3 Environmental Characteristics and Processes of Change

Of the total surface area of the borough, 28 375 hectares, 95% is Conservation Area. The ground usage which predominates in the towns is residential, with diverse intensities; in the central zones of the towns of Milpa Alta, Atocpan and Tecómitl, there are plots of land with mixed uses of housing and commerce or services, and in peripheral parts of the towns, housing with agricultural or nopal plots25 in the majority of cases.

In addition, there are towns with populations from 100 to 500 inhabitants and of less than 100 inhabitants concentrated mainly in irregular settlements in very disperse areas.

In general, the 12 towns are made up of the following areas:

Central Zone: where basic or medium equipment, mixed uses, housing and complete services are concentrated.

Intermediate Zone: represents a transition zone, mostly residential, where the poorest zones are found.

Peripheral Zone: residential area mixed with productive parcels. Bordering this last zone are irregular settlements without services and with precarious materials.

Global distribution of ground usage in the borough, considering rural uses, is the following: forestry use predominates with 58.53% to the total territorial surface area; agricultural use follows with 34.66% of the surface area, and the rural-urban area is last with 6.81%.

In Milpa Alta, there are three kinds of land ownership: communal (21 000 has), mostly occupied by forests; private (5 600 has), dedicated almost entirely to agriculture, and ejidos (1 395 has) (Torres Lima, 1988).26 In 1991 the Borough concentrated 26.1% of the total of Units of Rural Production of the Federal District, with a total of 5 251 and a total surface area of 7 847.809 has, mostly only temporary.

settlement, economic and social conditions. It is constructed based on seven indicators of deficiency: illiteracy, housing without piped water, housing without sewerage, housing without electric energy, housing with dirt floors, crowding, and working population making up to two minimum wages.

24 The variables used in the study are those that show social and physical spatial aspects of intra-urban differentiation, after a process of discarding variables. The variables chosen were: crowding, education, housing with water, EAP, income and home owners.

25 One of the principal crops in the borough is nopal.

26 In Mexico, ejidos and agrarian communities are forms of social or collective property instead of private ownership. Before the reform to article 27 of the constitution, they were not forms of property, but of usufruct, which implied the prohibition of their sale and only the possibility of inheriting it from ancestors. According to the Agrarian Law, “The nucleuses of ejido population have their own judicial personality and patrimony and are owners of the lands that have been given to them or that they have acquired by any other title." They have their own administrative organs: ejido assembly, commissary and vigilance commission. The supreme organ is the assembly where all the ejido members participate. Ejido lands by use are divided into: lands for human settlement, lands for communal use and parcelized lands. In communities, their judicial recognition implies the existence of the Commissary of Communal Goods as an organ of representation and administration of the assembly of commoners in the terms established by the communal statute and custom; the special protection of communal
In 1991, 9 of the 43 ejidos and agrarian communities in the Federal District were found in the Milpa Alta borough, with a surface area of 22,474 has, of which 19,139 were not divided into private parcels. In 1991, there were a total of 16,980 ejido members and commoners. (See chart 26).

In spite of the communal aspect of property, some plots are sold to people who do not belong to the community.

Crops in the borough are oriented mostly towards the production of nopal (4,159 has), corn (2,910 has) and oats (1,641 has).

Traditional family agriculture oriented towards self consumption and the production of basic grains has been reoriented in the last few decades towards the market, based mainly on the production of nopal. This last production has implied changes and technological development; transformations in the productive process, as well as pushing for advances in the community, such as pavement of internal roads (penetration roads).

Around nopal production, there have also been several different groups, as well as governmental and non-governmental institutions, and Universities, which have supported the process of learning and technological development linked to the different phases of production.

In Milpa Alta a change has been made, as in other parts of Mexico, in order for a larger insertion of the local economy into the international logic, starting with alterations in economic policies and regulatory framework. In this sense, processes of modernization of local production have been developed in the borough, going from traditional techniques to an improvement of processes, to exporting products. One of these is nopal, which has been exported to different countries by some local companies, such as Azteca, founded in August, 1991. While this situation is an exception in the regional context, it is one of the trends that are being promoted by the authorities, who seek to incorporate mercantile logic and modernization of processes, instead of more traditional practices. They seek to support sectors that still use agricultural production to form micro-enterprises.

In order to create more sources of income, alternative crops to those already developed are trying to be introduced; as well as the expansion of the center for collection of nopal (created recently); and the sale and industrialization of nopal and meat produced (Distrito Federal, 1997).

In spite of the communal form of land ownership, the change in economic structure caused the form of growth and transfer of land to be carried out through private buying and selling contracts, where the right to property is ceded. Although this goes against the rules of communal ownership of lands, it is the most frequent form of property ownership.

Therefore, once again we see a gap between the current legislation and the uses and customs that go beyond it. These examples are clear in our case studies.

\textit{a) San Bartolomé Xicomulco}
### Land Ownership

The situation of ownership and property of land in this town is complex due to the fact that it property limits are marked by the agrarian courts. The most prevalent form is small property ownership; in town, the majority of people have a private contract over their lands; however, these lands belong to the 27,000 hectares of communal land in the borough of Milpa Alta, for which reason San Bartolomé Xicomulco also has communal representation. This shows a completely contradictory situation which only the agrarian courts have the possibility of resolving. There is no public title, only private contracts between individuals. The communal rights are for the Town of San Bartolomé Xicomulco and are within the assignment of communal lands of Milpa Alta. However, the usufruct is private.

The way they explain the change from communal to private land is the following: “...traditionally in 1850 communal properties had to be registered and the only towns that did not register were San Antonio and San Bartolomé Xicomulco, these two did not register their communal properties and this is how it went from a communal regime to small ownership or private ownership.” (Coordinator of territorial communications, Oscar Meza, June, 2003.)

Beginning with the earthquake in 1985, the increase in population of the town began. This increased the demand for land on behalf of the population that came from outside the borough. Before, the land was divided between members of one family: land belonged to parents and they passed it on to their children. Currently, with the demand of land, an important market of property is beginning in the region. One of the people interviewed shows the way his parents arrived in the town, “…I think they got together [speaking of his parents] at work, and since my mom has family here, they helped her to get a plot of land to build on. …since there are always [new settlers] arriving, they are living in the outskirts. Barrio San José or something like that, towards San Pedro, all of those outskirts are getting really populated.” Health Center Patient.

### San Salvador Cuauhtenco

Coordinator Sergio Mancilla Rosas explains that the town was founded by a Xochimilca tribe and the problems began from the time of its formation, since this is the last town within the geographic limits of Milpa Alta and its population is 11,000 inhabitants. The population is divided between small farmers who represent 80% of the total population. The people who work in agriculture are generally cattle farmers, and they plant fodder, corn and nopal.

Land is communal, as is the land in all the towns of Milpa Alta, but usufruct is private. The legal form of a private ownership contract is used, while in other places there are property titles governed by the public register of property. Since the land is considered communal, however, and is exempt from taxes, many people do not pay property tax, even when for all other purposes, the land is used privately.

This town has the same problems as all the towns in Milpa Alta: one part of the population is considered within the city limits and therefore has access to water, sewerage, public lighting, telephone lines and other services provided by Mexico City boroughs, while another part of the population outside the city limits has no access to services.

### 3.4 Legal and Institutional Framework

Milpa Alta, as all the rest of the boroughs of the D.F., is constituted as a deconcentrated administrative organ within its territorial circumscription with autonomy in government actions in its political-
administrative area. The boroughs are hierarchically subordinate to the Chief of Government of the D.F. or the department he determines.

In each territorial limit, there is a head person constituted as Borough Chief, elected every three years by universal vote.

The boroughs must inform the Chief of Government on the exercise of budget assignations, although they exercise their budgets with administrative autonomy.

The Law of Citizen Participation in 1998 constituted the Neighbor Committees, representative citizen organs the principal function of which, among others, is to be the bridge between authorities and the demands and needs of the neighbors of a barrio, neighborhood or apartment complex.

**a) Forms of Community Organization**

One of the important elements associated with the cultural characteristics of Milpa Alta is the presence of traditional authorities who co-govern with regular authorities. This grants particular features for forms of organization, administration of services, attention and resolution of demands and conflicts between different local actors. The most important representatives in this phenomenon are the so-called coordinators of territorial communications, authorities elected by traditional modes, who serve as mediators between the population and borough institutions.

This figure presents complexities from the judicial point of view, because it is legitimate, but it does not have a legal correlation, nor is it immerse in the formal structure of administrative laws, as noted by the coordinators themselves:

> There is a legal void. We (coordinators) effectively do not exist as a legal framework, we exist as a traditional form, and the authority itself recognizes that traditional form, without taking a position within the structure of the borough. We have all the power to represent each one of our neighbors before any authority. (San Bartolomé X. Coordinator)

In general, the current position of the coordinators is to form part of the legal situation, in order to have a place within the norm, to access resources and be recognized by other governmental authorities. This has implied the formation of a Council on the Federal District level in coordination with the rest of the boroughs in the southern part of the city and the development of diverse advocacy activities and negotiations to achieve this.

> “...We are traditional authorities and we had to be recognized by the assembly of representatives or the local chamber in the local chamber of deputies, and on behalf of them or on behalf of another authority, we would have to join. But instead the borough is giving it to us, that is the inconsistency, in that we are traditional authorities elected by our town, but paid by the administration, that is an inconsistency, which is why the coordinators of the southern zone are making a council in Mexico City, for all these details...” (Coordinator San Bartolomé X, June, 2003.)

A central question is the legitimacy of the coordinators, given the great support of the people of their towns and the historical tradition of their representation. In addition is the supposed possibility of the assembly to remove the coordinator from their position when they believe it to be convenient.

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27 For more detail on modes of specific organization regarding the water and sanitation system, see point 4.5.
“Here, if the community does not agree with something, the very community can even remove their coordinator, if they believe he is not working well. If they believe the coordinator is working well, all of the people get together to fight against the authority (speaking of the borough authority) if they are doing things wrong. Then we coordinators have a lot of support from the people.” (Coordinator San Bartolomé X)

The coordinator of communications concentrates different formal and informal attributions, which go from the local administration to conflict resolution in the community on different levels. He serves as intermediary between the community and the political Borough, which is not without problems, since the coordinator owes more to his community than to the borough.

Q: How do you, as a representative of the community, get feedback and how does dialogue happen between you and the community?

R: They come directly here to me and I do the assemblies in every one of the neighborhoods or streets. I invite them to come to listen to their problems. It is direct. (Coordinator San Bartolomé)

In San Salvador Cuauhtenco, one of the case studies, the coordinator is elected by public secret vote and the elections are held every three years. The salary of the coordinator is paid by the Milpa Alta Borough while the personnel assigned to the coordination office are paid by the Federal District Department.

The coordinator was re-elected, although previously this did not happen, for example “…the coordinator who finished in 1997 had been working uninterruptedly for around 12 years, no one said ‘let’s change him’ until one person began to move and look for candidates and in the end an electoral process happened in the entire community, but it seemed like a lot of people didn’t agree that it should last for so long. The current coordinator has been here for 2 years and 7 months and they are already thinking about the next elections.”

The coordination is the link between San Salvador and the borough of Milpa Alta, and they are the ones who attend issues directly with the Government of the Federal District. In the relationship between the coordination and the borough, pressures exist. In fact, they consider that in the end, the borough is working badly, since there is no answer on their part to the needs of the community, which complicates the relationship of the Coordination with the population. In this respect, the assistant coordinator notes the following: “…and people think that we are the bad guys of the movie. We do what we are supposed to, in other words, report to Milpa Alta and insist. We have people who are very present. They have more than a month finishing leveling some grates, and for more than a week the grate has been open, dangerous for the people. We reported this, that’s why we have a journal where we note everything there is and the complaints and demands of the people. …The main street pavement is all broken up and it was around a year ago that we reported it. They haven’t even come to fix that. I had to call a plumber to fix the toilet (of the Coordination). That’s how bad things are. …I think the authorities don’t hire capable people.”

Regarding the type of organizations existing in the Borough, according to data by the authorities, there are a total of 349 organizations, which can be classified as: community, athletic, productive and commercial, religious and festive, parent, associations and political parties (See Chart 27).

San Bartolomé Xicomulco is one of the towns with the highest number of organizations, with community type organizations and productive and commercial ones standing out. In addition, in this town there are several groups of women and youth that carry out different types of activities.
A. The community is organized in different social groups from the very same community. We are talking about the church representatives, for example, the treasurers and majordomos, the commoners, and we are talking about youth groups that are here in the community.

Q. How many youth groups?
A. Approximately four.

Q. And what do these groups do?
A. They are dedicated to organizing festivals and cultural days and others are dedicated to promoting sports in the community. (Coordinator San Bartolomé)

In the case of San Salvador, community organizations predominate. The Territorial Coordination alongside the community organizes neighborhood committees for different things such as water, health, festivities, etcetera, according to what requires the participation and follow-up of the community. These committees work for the community, mostly in services, in almost the same way as the coordinator, with a sort of link with the coordination.

In traditional organizations there is communal representation, as well as majordomos organized by the Catholic Church, who are responsible for religious festivities. The civic events are organized by the borough in coordination with territorial communications.

In addition, there are traditional religious and festive organizations, oriented to the organization of diverse events of this kind developed in the towns of Milpa Alta throughout the year.

“There is a representative … a majordomo that belongs to the Catholic temple, they are responsible for religious festivities....

The civic events are organized by the borough in coordination with the territorial communication, but the religious festivities are done by the majordomos.” (San Salvador C. Assistant Coordinator)

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28 In rural communities in Mexico, a person is elected each year as “majordomo” to organize and fund each religious celebration, such as patron saint days.
4. CHARACTERISTICS AND TRENDS OF THE WATER AND SANITATION SYSTEM

4.1 Environmental Conditions and Water Resources

Mexico City is one of the most populated cities in the world. To satisfy growing demands of potable water, sewerage and sanitation, the infrastructure has gradually increased, but on a lower level than the demands of the city.

Mexico City confronts the need to assure potable water supply in a permanent sustained manner. The sustainability of the supply depends on one hand on the physical capacity of the hydrological watershed to capture rain water and recharge the aquifers and on the other hand, on the capacity of institutions to administer hydraulic resources and on society to use them adequately.

The hydrological system is made vulnerable by overexploitation of the aquifers, pollution of the environment and discharge of wastewaters. However, wastewater and rainwater precipitation collected in the sewerage system constitute a valuable resource to complement or substitute the supply of primary use water demanded by the growth and economic activities of the city. The Federal District, as a sociopolitical entity, is limited to assure the supply of 34.7 cubic meters per second of primary use water demanded by the population.

The daily amount of potable water required by a person in his or her home to satisfy their needs depends on the availability of water, customs and the socio-economic level of the family. Domestic consumption is distributed in the following percentages: 34% in toilet use, 4% in dish washing, 14% in washing clothes, 39% in personal hygiene and 9% in other uses. Average daily domestic consumption per person in the DF is 163 liters (there are zones that report 360 liters per inhabitant per day). This represents giving the city a flow equivalent to 16.16 m³/s. To comfortably satisfy the supply of potable water to the population, a daily amount of 180 liters per inhabitant is estimated, equivalent to 19.18 m³/s in the entire city. In boroughs located to the east of the city, for example, in Iztapalapa, the demand of water supply surpasses the availability of sources (UNAM, 2002).

Currently, the situation of the Mexico City aquifers is overexploitation. The continuous growth in the demand for the service, continues to increase exploitation and to carry out costly works to import water from sources far from the city, such as the case of the Cutzamala system.

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29 Region XIII Valley of Mexico is located in the high watershed of Río Pánuco. It is formed by two sub-watersheds, Valley of Mexico and Río Tula. At the head of these watersheds, the physical surface of Region XIII is 16 150 km², however, the administrative limits of the region cover a surface of 17 126 km². The states of Mexico, Hidalgo and Tlaxcala, as well as the Federal District, have political jurisdiction in this region. Region XIII is located within the hydrological region No. 26 Alto Pánuco; the Valley of Mexico Watershed is located here, which has an annual runoff of 1 636.4 million m³, as well as the Río Tula Watershed, the flow of which has a value of 947.2 million m³.

The principal source of recharge of the aquifers in the Valley of Mexico Watershed is rainwater precipitation. Another type of non-natural recharge is that derived from leaks in the potable water and sewerage networks.

The surface areas with the recharge of most importance are located in the surrounding mountain ranges of the valley towards the east and south.

There are 106 storage areas, between lakes and dams with a total capacity of 646.7 million m³. Reservoirs are used mainly for irrigation, on a lower scale for control of avenues, in a minimum proportion for supply of potable water and an even smaller amount for the generation of electric energy.
The overexploitation of the aquifer and the decrease of its natural areas of recharge have modified its general equilibrium, generating effects such as differential sinking of land, which has caused an increase in the number of leaks in the network of distribution and the potable water lines (Quiñones, 2001).

At the same time, in terms of sustainability, Milpa Alta represents a strategic resource for the city; it is part of the proposals for ecological rescue of the Valley of Mexico and is fundamental for its sustainability. It is located completely on Conservation Soil and plays a central role in the recharge of the Valley of Mexico aquifer. In this sense, the Milpa Alta Borough represents a fundamental reserve for ecological equilibrium in environmental terms for Mexico City.

This borough is divided into two large areas: agricultural and forest. In the agricultural area, corn, nopal, and fodder crops predominate, and in a smaller quantity vegetables, fruit trees and flowers are cultivated. The surface area dedicated to agriculture is approximately 10,535 hectares. It is important to point out the nopal zones, since they are natural, cultural and patrimonial environments, located inside and outside of the towns that need to be fostered and preserved alongside irrigation and temporary agricultural activity.

In the forest area, which occupies the main part of the south of the borough, there are different species of pine, fir, oak and other trees. The surface area is estimated at 16,560 hectares.

In these areas, clandestine logging for firewood or cultivation and/or pasturing soil threatens to break ecological equilibrium. In consequence, programs for erosion control, restoration and conservation of flora and fauna are needed (See chart 28).

The zone of recharge is the Chihinautzin Mountain Range, which constitutes one of the highest yielding aquifers in the watershed. The water extracted at the foot of the mountains is considered high quality. The volume consumed in the borough is approximately 14,397.54 mts³/day, equivalent to 177 lts/person/day. The resource coming from the borough covers additional needs, and is conducted to the La Caldera, Cerro de la Estrella and Xotepingo Pumping Plant tanks, through the Chalco-Xochimilco Aqueduct.

### DISTRIBUTION OF POTABLE WATER BY SOURCE (m³/s)

<table>
<thead>
<tr>
<th>SUBREGION</th>
<th>INTERNAL</th>
<th>EXTERNAL</th>
<th>TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GRND.</td>
<td>SURF.</td>
<td>GRND.</td>
</tr>
<tr>
<td>V. OF MEXICO</td>
<td>43.32</td>
<td>2.05</td>
<td>5.86</td>
</tr>
<tr>
<td></td>
<td>45.37</td>
<td></td>
<td>19.32</td>
</tr>
<tr>
<td>TULA</td>
<td>5.50</td>
<td></td>
<td>5.85</td>
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<tr>
<td></td>
<td>5.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>REGION XIII</td>
<td>48.82</td>
<td>2.40</td>
<td>5.86</td>
</tr>
<tr>
<td></td>
<td>51.22</td>
<td></td>
<td>19.32</td>
</tr>
</tbody>
</table>

The sources of potable water supply in Region XIII are classified as internal and external to the Valley and these can be surface or groundwater. The principal characteristics of potable water supply for domestic use are resumed in the following table.

In summary, for Region XIII there is a flow of 48.82 m³/s from internal underground supplies; surface water from the region contributes with an average of 2.40 m³/s and outside sources, Lerma and Cutzamala, provide 19.32 m³/s, which means that 27.4% of the total supply of potable water for domestic use is from neighboring watersheds.
Pollution is another big problem. In the Borough there is runoff and small ravines, which cross almost all the settlements, which represent a serious problem of pollution with discharge of wastewater, such as the ravine located in the barrio of Santa Cruz, which covers a distance of 5 kilometers; other factors that contribute to pollution are rodents, trash, pesticides applied to detain the propagation of pests, and open air defecation.

The Milpa Alta Borough, as we have already noted, is one of the zones of recharge of the Mexico City aquifer, and has a risk of pollution because of the problems already mentioned, in addition to the fact that agrochemicals used against pests and for fertilizer, are leached through the soil by rainwater until they reach the level of the aquifer. The Borough Program notes the need to carry out actions for rational use of fertilizers, canalization and treatment of sewerage, periodic cleanings, optimizing the system of trash collection, and fostering the use of latrines and septic tanks.

Another factor that affects the environment in this borough is the erosion caused by urban, agricultural, fishing and forest activities, as well as natural disasters. These elements open the way for the degradation of the soil and the deterioration of the hydrological regime, they create problems for human health and they foster the alteration of ecosystems.

The most affected zone within the borough is the northeast, since it represents a serious hydraulic erosion because it is the zone of plains in the borough. In the highlands of the south of the borough there is a moderate hydraulic erosion. This zone covers more than half of the territory and is considered moderate because there is still a forest vegetative cover, which impedes runoff of water and soil erosion.

The use of water in different human activities, classified as domestic, industrial, commercial and services, provoke pollution. The discharge of wastewater constitutes one of the most important environmental problems, aggravated by population growth and by technical problems for providing sewerage services, because the topographic characteristics result in extremely costly projects.

The existence of numerous clandestine dumps cause pollution of soil and water tables, because by leaching rainwater through waste or pre-strained polluting liquids, they deteriorate the quality of the soil, since it is a zone of recharge of the aquifer.

Environmental pollution caused by the deficiencies mentioned is aggravated by the presence of trash in streets, ditches and rivers, creating strong spots of insalubrity that endanger the health of the population.

The semi-cold sub humid climate with rain in summer of higher humidity, covers 69.54% of the borough. There are also sub humid mild climates with rains in summer of higher and medium humidity, which generates a rainwater precipitation of more than 100 monthly mm and an annual average of 31 years of observation of 746 mm.

In the northern zone of the borough there is flooding in the central areas of San Pedro Atocpan, Villa Milpa Alta and San Antonio Tecómitl. Because these are the main towns, better sewerage systems are needed.

4.2 Characteristics and Trends of the Water and Treatment System

Milpa Alta presents particular characteristics in its system of water and sanitation: in spite of having a high coverage of potable water (see chart 29) on the metropolitan level, it is the borough with the least percentage of in-home water service (see Chart 8).
Its system of water supply is carried out by giving turns to the population in different locations, which means that because the volume of water is insufficient, a measure is taken to distribute it according to towns and within towns, by days and hours in each zone. This system began to be applied in 1995.

This is why in each town, valves are opened and closed on different schedules. The population, knowing what day they have water, fills their own tanks. The task of opening and closing the valves is the responsibility of the Unit of Potable Water and Sanitation of the Borough.

Another characteristic of water supply is the existence of serious problems of supply such as suspensions of service. This happens particularly in the highest zones of Milpa Alta, because of topographic characteristics and problems encountered in the dry season.

**a) Water and Sanitation System**

There are two water sources for Milpa Alta: the tanks filled by the National Water Commission (CNA) and under the responsibility of Mexico City Water Systems, and wells owned and operated by the Borough. Two institutions are in charge of potable water supply in the borough: Mexico City Water Systems and the Milpa Alta Borough; the former is in charge of extraction of water from the borough wells and the water supplied by CNA and filling the distribution tanks of the borough, through the primary network, and the latter is in charge of distribution to users in the towns through secondary networks.

In Milpa Alta piped water is supplied by extraction of groundwater through two systems of deep wells: “Aguas del Sur” and “Tecoxpa;” the former is located in the surroundings of the town of San Antonio Tecomitl and has 15 deep wells; the latter is on the highway between this town and San Francisco Tecoxpa and has 9 deep wells. These wells, with high yield because of the permeability of the rocks, store water in distribution tanks, located mostly in the highlands of the jurisdiction, which by gravity distribute to the towns. However, in conversations with personnel of the General Direction of Urban Works and Development of the Borough, it turns out that at present there are only 7 wells working, since the others were extinguished by pollution or drought.

In order to transport water, there is a primary water network of approximately 38 km, which fills the storage and distribution tanks, which then provide water for the twelve towns through a secondary network 187,108 meters long.

- **Water Supply**

According to the Population and Housing Census of 1995, Milpa Alta registered 17,327 houses, with an average of 4.7 inhabitants per home. In 2000, the data showed that the houses increased by 21,600, with an average of 4.5 occupants.

Regarding the availability of potable water services, in 1995, 15,183 houses had piped water service. In 2001, according to the register of users and the register of consumption measured for the first two month period of 2001, an estimate of close to 5,840 homes (27% of the total number of homes registered in 2000) and close to 38.5% of homes with piped water registered in 1995, have a meter of water consumption (Quiñones, 2001) (See Chart 30).

According to borough officials, the system of turns is not applied because of lack of water, but because of the topographic characteristics of the land.
Besides the turns system, the towns or communities farthest away from the city limits, where there are irregular settlements, receive water through trucks. The system of supply by trucks is given two ways, newly dividing the population between natural and irregular. While the natural inhabitants, in other words, those originally born in Milpa Alta, inside the city limits or not, are provided with free water by the trucks, while the new inhabitants, also called “illegals” or “irregulars”, must pay for their water, although this can vary depending on the case.

The towns with the most scarcity of water are the highest towns: San Salvador Cuauhtenco, San Pablo Oztotepec, San Bartolomé and Santa Ana.

**b) Characteristics and Trends of the Water and Sanitation System in the Two Towns Selected**

- **San Bartolomé Xicomulco**

  In San Bartolomé Xicomulco, there are no wells, and the water which reaches the town comes from the Tecomitl wells 5, 6, 7 and 8. From there, it is repumped to the high part of Milpa Alta, in the barrio La Luz, passed to Tlaltenamic, then to a storage tank in San Pablo and finally to San Bartolomé Xicomulco, and from there the distribution to the town is made. Every six months there is a treatment to chlorinate the storage tank, done directly by the personnel of Mexico City Water Systems of the Federal District Department. For San Bartolomé to have water, there is a triangulation of three tanks and the water is distributed to the population through the town’s primary network.

  Because the town is located in the high zone of the borough, they have serious problems of water supply, even for the population connected to the potable water network. In the dry season, there is no water, and there is only service every 4 days or even every week. Normally, water arrives every third day for only two hours. To solve the problem, the people have built cisterns big enough to store water. In the dry season, the borough sends trucks with no cost to the population, or they carry barrels from the communal spout. Also, those who have resources buy water from private trucks which charge between 350 and 400 pesos for 3,000 liters.

  95% of the population has all basic services covered, including water, sewerage and pavement, and only 5% of the community does not have services, because they are outside of the city limits and the legal norms impede the extension of these services to these zones because the borough is considered an area of ecological reserve of the Federal District. (San Bartolomé Xicomulco Coordinator).

  Within the borough, the problem is worsened by the arbitrary decisions of the valve workers to supply water to the highlands and lowlands of the town. In this sense, one person interviewed states:

  “Here in San Bartolomé Xicomulco we have a great lack of potable water, we do not have enough water... Yesterday we had a problem. Why? Because yesterday those of us who live in Vicente Guerrero only got a little bit, a tiny thread... so I came to see the valve worker because we have an agreement that the valve should not be open or closed... it's halfway, okay? Half for the hill and half for us. So the valve shouldn't be opened, but yesterday they opened it and they closed us down completely and left us without water. So I came to see the valve worker to find out why he had closed it and he said, “The water isn't going up the hill at all,” “Yes, but you should take note that it isn't arriving to us the way it should either.” And... I didn't come to demand something that doesn't exist,
you know?, I came to see why ... if there is only a little thread, well we will conform and we don't come to demand water if there isn't any... Well, another thing I told this guy was: “Look, I'm not here to fight, I just came to see if you would give us two hours, at least you should have warned us so we could store drinking water.” They didn't warn us and we only filled one cistern and now we have no water…” (User and community leader, San Bartolomé, interview, May, 2003).

Agreements have been defined by local authorities on the times the valves should be opened for each part of the town. However, the lack of specialized personnel increases the problem, since when the valve workers go on vacation, the problems increase.

“...Well, in our neighborhood the valve is always (regular with the same schedule)... They had told us before that they were going to provide water on different schedules.” Speaking of the valve workers, she says: “…they work here … they are in charge …but there is one valve worker who when he is here, there is no problem, even if there is little water, there is no problem, but when he goes on vacation, these problems always happen” (User and community leader, San Bartolomé, interview, May, 2003).

The population of San Bartolomé knows there is little water and it is rationed and they have become accustomed to measuring the times. They know the amount of water they need to cover their needs and also when and how much they get weekly. When there are problems, they go to the coordinator and ask for water so it will come on time. (Interview with the doctor in San Bartolomé Xicomulco).

Only 60% of the population in San Bartolomé Xicomulco that receive water has a meter. The meter and charge service is hired out by the government of the Federal District to a private company. There is a lot of inconformity with the payment of water, because of the deficiencies of the service. They only have water a few hours a day, there is a lot of air in the pipes which makes the meters work even when they don’t have water, which makes the population believe that in reality they don’t pay for the water, but for the air in the pipes. 40% of the population that have the service don’t have a meter and pay a fixed bimestrial fee of approximately 25 pesos; those who do have a meter pay according to consumption and according to the interviews carried out, the amount is around 60 pesos per bimester.

The authorities interviewed as well as the population in general consider that the quality of the water is good. In the Health Center in town, the doctor noted that there is permanent care taken to chlorinate the water and the studies carried out by the Secretary of Health show that the water is good for human consumption.

The population without access to the primary network, mostly the population located in communities outside the city limits, is supplied with water by a system of trucks that supply water to the population on specific stops where the population leaves their barrels. At the largest stop, water arrives two times a week and the stops with less population receive water once a week with a maximum of three barrels per family. (San Bartolomé Xicomulco Coordinator). Once the water is collected, it is taken to homes by hose or carried in a bucket.

“In the peripheral zones in the irregular settlements they also receive potable water through trucks brought from San Antonio Tecome. This water is potable and comes from treated wells. (Doctor at the health center in San Bartolomé Xicomulco).

As a social support, the Borough supplies the water trucks to the population in irregular settlements and who have needs. They are not charged one cent unless the family considers it personally and has a tank and buys water, but this is by direct request.” (Doctor at the health center in San Bartolomé Xicomulco).
The situation of sewerage is variable in each town, since although it is estimated that 95% of the population has the service, in some towns it is extremely deficient, such as the case of San Bartolomé Xicomulco. In this town the sewerage is very poor. The existing sewerage was planned in 1978 and from 1977 to 1979 was the period of highest introduction of the sewerage network. At that time there were between 900 and 1100 inhabitants, and the sewerage was designed for that amount of people. At present, San Bartolomé has a total of 3423 inhabitants and sewerage is completely insufficient, which becomes absolutely clear in the rainy season. During this time, instead of going down the drains, the water overflows and comes out the manholes, flooding the town with wastewater.\(^{31}\) (San Bartolomé Xicomulco Coordinator).

- **San Salvador Cuauhtenco**

In the case of San Salvador, which is one of the highest towns in the borough, it had its own wells in 1935, but in 1970 the water from the wells was no longer provided to the population, but instead transported to meet the needs of the borough, and currently these wells no longer work, since they were extinguished.

The water for urban service comes from San Antonio Tecomitl. It is then repumped to San Francisco, then to San Mateo and to San Pedro Atocpan, where it is sent to a tank located in Tlacotenco which sends it San Pablo and from there it finally arrives at the San Salvador storage tank and is distributed to the population. The amount of transfers this water has to pass through to get to San Salvador makes the service of water to the population depend largely on the efficiency of these transfers, which in turn depends on there not being interruptions in the electric service. The problem is that in the last few years there have been serious problems with this service and power outages are more and more frequent. In order to give water to the town, the storage tank must have at least 3.5 meters. (San Salvador Cuauhtenco Assistant Coordinator: Sergio Mancilla).

One of the main problems in the town is the lack of water. There are places within the city limits which have no way for water to reach them through the network, and therefore have to be supported with trucks which periodically supply water to the families. The same happens with the population located in outside communities, who receive free water.

In San Salvador, the population is also provided with water by turns. The southern and eastern part receive this service on Mondays, by blocks, for two hours a day, giving a total of 1000 liters to the family tanks. On Tuesdays the northern part and a small part of the south receive water.

Because even in the zone considered city limits, there is no service to the population, there are many clandestine taps. The problems caused by these taps are multiple and serious since people open up the pavement to get to the pipe, they break it and then they connect to it. The authorities mention: “...Here water is being stolen because people have the need. If we had a good level of water, there would be no robbery. The solution would be that in each repumping tank there would be a generator. The other solution is to ask as a favor to the people who supply water by truck to send water. And when we ask for it, the trucks sometimes arrive.” (San Salvador Cuauhtenco Assistant Coordinator: Sergio Mancilla).

A very low percentage of the population has a meter. In fact, a program to put meters in the entire town was going to begin, with the company hired for this purpose by the Federal District government, but the population did not accept it and it could not be generalized. On average, those who have metered service pay around 70 pesos per bimester. Those who do not have a meter pay a fixed fee of

\(^{31}\) It is important to clarify that there is one system of sewerage, so there is no separation between rainwater and wastewater.
22 pesos per bimester and although it is low, the population refuses to pay the service they do not receive. (San Salvador Cuauhtenco Assistant Coordinator: Sergio Mancilla).

The authorities note that in general, sewerage is good, although there are some problems in the lowlands where the agricultural area is located, because the pipes frequently stop up, flooding the crops with wastewater. In the rainy season is when there are more problems.

4.3 Technical Infrastructure Development

The supply of water for all the populations located in the Valley of Mexico watershed is achieved through one of the fastest and most complex structures in the world. In the DF alone it has 490 kilometers of conduction lines, 241 storage tanks with a total capacity of 1500 million liters, from where water is distributed to users through more than 12 500 kilometers of primary and secondary networks. (Perló, 1993).

In Milpa Alta, the volume consumed by the borough is 14 397.54 mts$^3$/day, equal to 177 lts/person/day (Distrito Federal, 1997).

The hydraulic functioning of the borough is based mostly on two repumps: Tecomitl Viejo and Nuevo, located in the towns of San Antonio Tecómitl. They send their water to the repumping tank La Luz, with a storage capacity of 1.000 m$^3$. In total the eight repumps have a total capacity of 1 800 lts/sec. They supply water to 22 storage tanks with a total approximate capacity of 15 830 m$^3$. The capacities of each tank depend on the storage and regulation required in the zone they serve. The majority of tanks are located in the higher parts of the borough, which allows water distribution by gravity.

Water is supplied to the population from the tanks by gravity using the secondary network and providing the service to the towns: San Salvador Cuauhtenco, San Jerónimo Miacatlán, San Francisco Tecoxpa, San Antonio Tecómitl, San Lorenzo Tlacoyucan, San Agustín Ohtenco, San Bartolomé Xicomeulco, San Juan Tepenáhuac, San Pablo Oztotepec, San Pedro Atocpan and Villa Milpa Alta. In general, the potable water infrastructure serves almost all the towns; only the irregular settlements lack the service, but are supplied with water by trucks. (Borough Program 1995).

The deficiencies in the potable water supply are found principally in the highlands of the towns, where there is an estimated 3% lack of network, and the population is supplied with water by truck. Low pressure zones have been detected in San Bartolomé Xicomeulco, San Lorenzo Tlacoyucan (El Calvario and La Ermita), San Antonio Tecómitl (highlands) and San Salvador Cuauhtenco. At the same time, in some zones of the towns the service is intermittent; where previously established turns are taken. (Borough Program 1995).

a) Sanitation and Distribution of Treated Water

Regarding sanitation and distribution of treated water in Mexico City, the domestic, industrial and service discharges generate a flow of 44.4 m$^3$/s of wastewater, 90% of which remains without treatment and is used mainly to conserve the level of Texcoco Lake, and to irrigate cultivation zones in Tula, Chiconautla, Zumpango (90,000 hectares of crops in the Mezquital Valley, Hidalgo).

More than 65% of the total volume of potable water for primary use is estimated to be drained as wastewater through the sewerage infrastructure. Chart 10 (see Annex) shows the volume of wastewater conducted by type of sewerage in the Metropolitan Zone of the Valley of Mexico. It is important to note that the system of sewerage is combined, meaning wastewater of industrial,
domestic and service origins and rainwater are carried through it. At the same time, an estimate of the annual volume of rainwater in Mexico City is 16m3/sec (504.5 million cubic meters a year), and the total volume of wastewater coming from the Federal District is around 65% of the total from the ZMVM.

b) Sewerage Infrastructure in the Federal District

The Valley of Mexico Watershed, where the Federal District is located, is a closed watershed with no natural exits. Currently it has four non-natural exits to carry rain and wastewater. The sewerage network of the Federal District covers more than 10,000 kilometers in length, with 68 pumping stations, numerous dykes and regulation lagoons to control the flow of wastewater, above all in rainy periods. It also has 129 kilometers of open canals, 42 kilometers of rivers, used mostly for sewerage, and 118 kilometers of tunnels.

The sewerage system of the Federal District uses the same infrastructure to remove wastewater and rainwater. However, the most important problems the system has to suffer are problems for the control of flooding. In order to achieve these objectives, the operation becomes complex.

One of the central parts of the Federal District System of Sewerage is constituted by 10,363 km of secondary sewerage network, with a diameter smaller than 60 centimeters. The goal of this part of the network is to collect wastewater produced and conduct it to the primary network, along with rainwater runoff. This is a network which cannot be extended to places without collectors and components of the general system of sewerage. Chart 31 shows the historic evolution the extension of the secondary sewerage network has had by borough.

The general system of sewerage also includes rivers and natural open air waterways, which conduct rainwater, and are mostly contaminated by wastewater and trash. Trash and sediment, as well as urban growth, increase the waterways, which systematically cause fissures, leaks and faults in the sides of the waterways, problems which are complicated even more by the force and deformation suffered by the ground because of sinking. The Gran Canal is the most important open air waterway of the General Sewerage System.

The Federal District has a sewerage system that also provides service to municipalities in Mexico State, within the Metropolitan Zone. The discharges of domestic, industrial and service wastewater from Mexico City, as well as rain water, are captured in the secondary sewerage network, consisting of pipe systems by neighborhood. Next, the wastewater is conducted through the principal network. All the sewerage is eventually discharged in the general interceptors, which conduct the wastewater out four artificial exits located in the extreme north of the watershed (See Chart 32).

c) Milpa Alta Sewerage System

In Milpa Alta, the draining of wastewater is carried out through 39.04 kilometers of primary sewerage network, called the eastern and western collector, supported by the secondary network of each town and natural permeability through ravines.

The system is combined. Nevertheless, in the peripheral zones of the towns there is absolutely no service, for which the discharge of wastewater occurs in open air ditches and afterwards in waterways and ravines, generating pollution of the aquifer and spots of infection, even when there are primary and secondary networks and collectors located at their margins.

The majority of towns have secondary networks and some others have bits of primary network, which has caused concentrations of water and sediment in collectors, causing flooding in the lowlands in the north and northeast of the borough.
The primary network is 27 kilometers long and the secondary network is 348.5 kilometers long. The system of collectors can be subdivided into two systems: the Atocpan subsystem, which discharges into the San Gregorio canal, in the Xochimilco Borough, and the Milpa Alta subsystem, which discharges into the Ameca river in the Tláhuac Borough.

The Atocpan subsystem transports discharge from the town of San Salvador C., the neighborhoods San Miguel, Tlacpac, Centro and San Juán del Pueblo; San Pablo Oztotepec; the town of San Bartolomé Xicomulco and the barrios of Tula, Ocotitla, Nuchtla and Pachimalco in the town of San Pedro Atocpan.

The Milpa Alta subsystem transports discharge from the towns San Lorenzo Tlacoyucan, Santa Ana Tlacotepec, San Jerónimo Miacatlán, San Agustín Ohtenco and San Francisco Tecoxpa; as well as the barrios San Marcos, Miguel Hidalgo, San Mateo, La Concepción, Los Angeles, San Agustín, Santa Cruz and Santa Martha.

Currently the borough has two distribution networks for treated water located in the towns of San Juan Ixtayopan and San Antonio Tecómitl.

As for the coverage of sewerage in homes, 48% have a connection to the network, 36% of homes do not have sewerage, 13% have a septic tank and 3% have uncovered sewerage (Distrito Federal, 1997).

As for treatment of wastewater, the Milpa Alta borough has the plants San Pedro Atocpan and Rastro, with a nominal capacity of 60 l/s to treat wastewater, which was previously discharged in the open air. The plant operates at 35 l/s. The wastewater is destined for irrigation of green areas and 60 hectares of nearby agricultural zones.

d) Infrastructure of Treatment of Wastewater in the Federal District

The Federal District infrastructure for the treatment of wastewater has 71 registered plants: 20 plants operated by Mexico City Water Systems, 4 concessioned plants, 1 operated by the National Autonomous University of Mexico (UNAM), 2 operated by the Secretary of Defense (SEDENA) and 44 more, operated by users. It has a nominal production of 5,855 l/s, an effective production of 3,939 l/s, meaning that only 67% of the capacity of the infrastructure installed is used, and it has a potential of expansion of 915 l/s (See Charts 33, 34, 35).

The capacity and location of the treatment systems depends on diverse aspects: magnitude, quality and location of demand, sufficiency of crude wastewater in the place, availability of land in the zone of influence, geotechnical and geohydrological properties of the soil in the plots selected for the construction of the treatment plant.

The infrastructure for the distribution of treated wastewater in the Federal District has a length of 657 km. It is made up of isolated subsystems, in the zones of influence of the treatment plants. The network of treated wastewater has different diameters, which go from 122 cm to 10 cm. The Gustavo A. Madero borough has the most extensive distribution network. In the case of Milpa Alta, there is one treatment plant of Milpa Alta operated by the Mexico City Water System, and the level of treatment is secondary to be newly discharged. (See Chart 33).
4.4 Economic and Financial Aspects

In Mexico the model of regulation of water distribution went from having a strong state intervention to incorporating diverse social and private sectors in management and finances, based on mechanisms of assignment that agree with market logic. The centralized form of regulation occurred from the late 19th century until the 1980s, with regional differences and at different levels of integration.

After the crisis of this model, a second mode of regulation was imposed, characterized by rapid processes of decentralization and commercial opening. Currently, recent reforms promote the establishment of private rights on water use that would allow privatization of the administration of supply and sewerage services. In this way the privatization decree published in July 1992 created the new Federal District Water Commission, CADF, with the idea to administratively improve the public distribution of potable water and the services of sewerage, treatment and reuse of wastewater. The decree gives this Commission faculties to privatize the administration and operation of water services in the Federal District.\textsuperscript{32}

In October of 1992, the Federal District Department asked for quotations from private companies for the administration of distribution and payment in the D.F. They decided to form four zones of service in the Federal District\textsuperscript{33}:

- **NORTHERN ZONE**: includes the boroughs Gustavo A. Madero, Atzcapozalco and Cuauhtémoc, with 298.557 taps. Run by the private company Sistemas de Agua Potable S.A (SAPSA), a company associated for 10 years with the French company Generale des Eaux.

- **EASTERN ZONE**: includes the boroughs Venustiano Carranza, Benito Juárez, Ixtacalco and Coyoacán, with 257.825 taps. This zone is run by the company Industrias de Agua de la Ciudad de México S.A. (IASA) associated with the English company Severn Trend.

- **WESTERN ZONE**: includes the boroughs Alvaro Obregón, Tlalpan, Magdalena Contreras, Cuajimalpa and Miguel Hidalgo, with 263.789 taps. This zone is run by the company Aguas de México.

- **SOUTHERN ZONE**: includes the boroughs Iztapalapa, Tláhuac, Xochimilco and Milpa Alta, with 327.408 taps. Run by the company Tecnología y Servicios de Agua S.A de C.V. (TECSA).

The contracts contemplated three stages:

- The first stage implied updating user registration, regularization of home taps, installation of meters, taking cadastre of primary and secondary, treated residual and secondary sewerage networks.

In Milpa Alta, only in 1999, beginning with the private participation policy, did the installation of meters begin. That year 3309 were installed and in 2000, 4774.

- The second stage, currently in operation, consists of the installation of new taps and connections to the sewerage network, meter reading, billing and charging consumers, under the system of metered use.

- The third stage consists of operation, maintenance and rehabilitation of secondary water and sewerage networks, installation of systems of macro metering for different zones of the city, detection and reparation of leaks and the sediment removal of the secondary sewerage network.

\textsuperscript{32} Quiñones, 2001: 69-70.

In the final stage, the city will sell the water in a block to the companies, while the companies will sell it to the final consumers. The government will establish a preliminary outline for water tariffs, which may vary by zone. The companies will be in charge of operating and maintaining the system of distribution of water under two premises: they will lose income if they don’t charge the fees, and they will have to pay for leaks.

The policy of private participation is not a privatization that implies the total sale of the entire hydraulic system to private industry, but it is not a concession either. It is more like a service contract in which the only responsibility of private industry is to extend the secondary network, bring the register of users up to date, install home taps and meters, and bill and charge users. (Quiñones, 2001)34.

a) Tariffs

In Mexico, the traditional tariff outline has been through administrative decrees. In the DF two tariff outlines have predominated so far:

- A periodic fixed payment determined by the profile of the user.
- A periodic fixed payment determined by consumption.

According to the National Research Council, there are currently two types of tariffs:

a) Metered service, for which a price is established according to the volume of water consumed and registered by the meter.

b) Fixed fee, where the amount to pay is maintained constant without considering consumption. Fixed fees in general underestimate real consumption of water because the real consumption is never counted by a meter.

At present, there are two kinds of use: domestic and non-domestic (which includes industrial, commercial and services). For domestic use, the tariff system adopted in the DF is precisely the one most used in developing countries. The charge of water consumption increases by sector, in order to induce practices of savings in the highest consuming sectors. In this system the value the user pays for the consumption varies according to the range of consumption where he or she is located (See chart 36).

b) Fixed fee Tariff

This tariff takes into account the average consumption corresponding to the neighborhood35 where the building is located and the potable water tap is installed, when in this neighborhood the number of taps with a meter is greater or equal to 70% of the total of existing taps.

In the cases where this condition is not fulfilled, a fixed fee will be applied, established by neighborhood. There are 9 kinds of neighborhoods (which go from 0 to 8), where a tariff is applied according to the kind of neighborhood it is. The bimestrial tariff for 2000 according to the kind of neighborhood is found in Chart 37.

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34 Quiñones ibid: 72
35 Neighborhoods are differentiated based on the classification and characteristics noted by the Legislative Assembly of the Federal District, according to type of building and ground usage.
With the study by Quiñones we can infer that in the towns chosen for this case study, the inhabitants consume an average of 1% of their salary in water (See Charts 38 and 39).

Meters generate a negative impact on the population, because of the deficiency of the service and the general idea that they "steal water." Therefore there is no officially legislated regulation on meters. While the coordinator of Villa Milpa Alta, the maximum authority on water in the towns, guarantees that meters are not used in Milpa Alta, many houses have one and pay according to what is established by the meter. Others have a meter and pay a fixed fee and other families have never allowed a meter to be installed.

4.5 Political Institutional Framework

a) Governance of Water in Mexico\textsuperscript{36}

In the governance of water, before 1980 in the administration of water in general and also in the provision of potable water and sewerage services\textsuperscript{37}, only public institutions participated, with a significant predominance of federal institutions (the Secretary of Hydraulic Resources -SRH- had representations in all the states and territories of Mexico). Before that year there was no Law of National Water, and the laws in water were fragmented and incorporated in more than one normative body, instead of constituting one alone, as is shown in chart 41.

In the 1980s the decision of the Mexican State was clearly to decentralize the provision of diverse public services, in particular potable water. In this way the structural changes which have given way to the privatization of public services began to be expressed. In 1980, the federal government turned the operation of potable water and sewer systems over to the state governments, and in some cases the state governments transferred them to the municipal governments. (See Charts 40 and 41).

The change in hydraulic policy in favor of decentralization is very clear beginning in 1980, because of legal and institutional changes on the subject of water for urban use, since then the operation of systems is turned over to the state governments and these in turn turned them over to municipalities. At the same time, the Law of National Waters is the turning point of a national contemporary norm on the decentralization of the administration of water resources. In this law, the changes begun in 1980 are synthesized and brought together, and the first legal conditions are created for private participation in Mexico.

After a long period of centralization, the current policy of administration of hydraulic resources is marked by criteria of decentralization and consolidation, in other words, it is based on a basic premise from article 115 of the Constitution, which establishes the general principle that public services of potable water and sewerage should be run by municipalities and not states, and only by exception because of lack of resources and capacity of the municipality, should the potable water and sewerage service be provided by the state.

The transition from a centralized model to a decentralized one is only one component of the Program of Modernization of the hydraulic sector proposed in the last few years which implies, besides decentralization, other elements such as seeking more participation by users in the administration of systems, the participation of private investment in hydraulic projects and suspension because of lack of payment as one of the most effective mechanisms to achieve self-sufficiency of the sector.

\textsuperscript{36} Cited in the Aguascalientes Case Study, Mexico, PRINWASS, April, 2003

\textsuperscript{37} At this date, the integral sanitation dimension was not considered. The sanitation dimension began to be considered in the institutional norm in the 1980s, in 1982 the Federal Law of Rights included a charge for discharging polluted wastewaters. This dimension as a whole was not considered in laws until the promotion of the Law of National Waters in 1992.
In the context of modernization, the CNA reorganized its actions around three points of change which are, in order, improving use of hydraulic resources, administering water efficiently and modernizing the organizational structure of the sector. At the same time, the Secretary of Environment, Natural Resources and Fishing (SEMARNAP) which the CNA belongs to, has determined that these actions, in seeking sustainable development, should be developed in a sartorial context formed by three dimensions, the environmental, the economic and the social. The actions the CNA takes form part of an integral strategy to support a profound process of change. The institution is evolving towards a structure whose predominant function will be normative for the administration of water and its inherent goods, as well as specialized technical support, within an outline of organization by watershed and hydrological region.

In as far as the points cited above, the first one seeks to reinforce the financial and operative capacity of the organisms providing potable water and sewerage services, as well as local authorities, to more efficiently meet needs in rural and urban zones. At the same time, it is meant to improve operation and development of infrastructure for the control of the hydrological system and risk prevention. The second point is based on more precise knowledge of availability, quality and location, which will provide better control of discharge of wastewater, a more equitable and rational collection, and updating the judicial framework for exchange and efficient assignation of water rights. The third point, the modernization of the organizational structure of the sector, will reorder responsibilities. Decentralization of functions will provide an efficient solution to local and regional problems, increase the participation of users and the three levels of government in hydraulic planning through Watershed Councils, as well as for funding, building and operating non-strategic systems.

In light of these three points, the government proposed to reach levels of coverage of potable water, sewerage and sanitation services in the period 1995-2000 that contribute to healthcare and quality of life of the population and the development of communities, at the same time as proposing to stop the current process of deterioration of the environment by pollution of domestic origins. Additionally, it stated as a priority to attend the lack of services in rural zones and marginal urban populations, with federal and municipal government support, as well as the participation of sectors of the population.

To achieve this objective, strategies were proposed such as supporting the operating organisms and the municipalities so that in urban zones high levels of physical and commercial efficiency are reached, and service coverage is increased, through technical actions and institutional development favoring access to funding, including the integral concession of potable water, sewerage and sanitation services. In the same way, there was a proposal to promote access to subsidized services for sectors of the population in conditions of poverty and extreme poverty, with an emphasis on attending indigenous communities, in support of the Program to Overcome Poverty 1995-2000.

Another strategy was to support, in coordination with state governments, channels of communication between different operating organisms in order to establish commercial strategies that allow reducing costs in acquiring goods and services, and at the same time, urging municipalities to contemplate planning and providing potable water, sewerage and sanitation services in an integral form to urban and rural populations. This would allow the establishment of a tariff policy to facilitate financial self sufficiency.

Another group of points of action was constituted by the support given to municipalities and operating organisms in technical and administrative aspects and the creation of a healthy financial environment to favor private participation under different modalities. In the same way, support was given for the rehabilitation of potable water and sanitation systems in rural communities, emphasizing the termination of unconcluded works and improving operation.

38 Now Secretary of Environment and Natural Resources (SEMARNAT).
In sanitation, the design, construction and operation of municipal systems of treatment of sewage waters was promoted in medium-size cities through the instrumentation of outlines of conversion or concession to private industry. Inspection visits were carried out to users responsible for discharging wastewater with and without treatment to ensure the fulfillment of quality in discharges, and the treatment and adequate availability of organically generated sludge. Observation actions were coordinated with the Federal Agency of Environmental Protection for controlling discharges of treated wastewater and the availability of organic sludge in coordination with the Environmental Program 1995-2000.

On another level, actions of coordination were carried out with federal, state and municipal institutions to support programs in communities located in the 15 priority watersheds and the priorities stated by the state governments. In addition, actions were carried out for the fulfillment of the norms of discharge of municipal wastewaters in these priority water sheds and in the regional programs determined by the SEMARNAP.

In the same way, actions of support were carried out to raise the capacity of treatment of surface water employed for domestic use and for the improvement and expansion of existing treatment plants, with the Program of Health Sector Reform 1995-2000. The Secretary of Health, DIF, the Secretary of Education and municipal and state authorities were supported in programs for public healthcare and environment related to water. Programs that contributed to the development of the culture of water and serve as an example for children were especially supported.

The CNA continued the Clean Water Program in coordination with the Secretary of Health and state governments, with actions such as coordination, observation, monitoring and diagnosis of the quality of water, instrumentation and operation of information systems, follow-up and evaluation of supply sources and wastewater discharge, programming, coordination and support of normal, emergency and corrective operations for disinfecting water for human consumption, protection of sources of water supply, formulation and execution of a program for training, communication and publication of water culture, revision of the norms for sanitation, control of the operation of treatment plants, particularly the removal of contaminants and the availability of biological sludge and the observation of the application and fulfillment of legislation and official current norms on the subject.

Another point of action of the program consisted in the consolidation of the first three stages of the Cutzamala System, rehabilitation and replenishment of existing infrastructure in the Valley of Mexico, and the operation and maintenance of existing systems that currently supply 45% of the total flow consumed by the population, with which the demand would be met until 1997. There were advances in the construction of the fourth stage of the Cutzamala System with which the capacity of supply of the system would be increased from 19 to 24 m3/s in order to satisfy demand until the year 2000. A Peripheral Aqueduct was planned to be built, as well as rehabilitation and expansion of the Berros treatment plant.

At the same time, an integral solution to the treatment of 42 m3/s of wastewater generated in the ZMVM was proposed, through the Valley of Mexico Sanitation Program, under the CNA which includes the construction of macro treatment plants for each transmitter that removes waters from the Valley and diverse actions in the zones of irrigation to use those flows.

To counteract the excessive demand for water and the losses because of poor quality of the supply systems, an efficient use of water was promoted, through campaigns of awareness and economic incentives that promote more participation of private agents in the markets.
To increase levels of coverage in urban zones and decrease deficiencies in rural zones, the following strategies were developed:

- In rural zones, subsidies were given through the three levels of government to finish or build water and sanitation works and the participation of the population in the operation and maintenance of water and sanitation systems is promoted to contribute to ensuring its duration. These subsidies are considered to be continued in the long term.  

- In towns of less than 500 inhabitants, public hydrants were installed, while in towns with a population of between 500 and 2500 inhabitants, the service is provided through home taps.

- In medium cities (with populations of up to 50,000 inhabitants), there is financial support including a mix of federal and local resources donated, as well as credits from the development bank which complement the cash flows of the organisms. The financial self-sufficiency of these operating organisms is foreseen in the long term.

- In large cities (of more than 50,000 inhabitants), financial self-sufficiency of operating organisms is promoted; meanwhile in the short term, there are fiscal and credit supports. As an instrument to achieve self-sufficiency, private participation is stimulated in the administration and investment in systems of potable water and sanitation.

The programs described have allowed the sustained increase of coverage of potable water and sewerage services, in urban and rural areas, by joining federal investment with state and municipal funds in specific programs elaborated together.

In 1990 national coverage of potable water was 78%, by 1999 it was 87%, which represents an increase of 21.4 million people with this service.

While in 1990, 11 states had coverage over 85%, in 1999 there were 23, and the number of states with coverage lower than 70% was reduced from 8 to 5.

### Judicial Framework of Borough Participation in Water and Sewerage Services (See Chart 41)

The administration of the service of water and sewerage in the Federal District is run by three main actors: the Political Boroughs, private contractors and Mexico City Water Systems (SACM), a deconcentrated organ which was recently created (January 2003) which integrates what was the DGCOH and the Federal District Water Commission.

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41 Beginning on January 1, 2003, by decree published in the Gaceta Oficial of the Federal District Government, the General Direction of Hydraulic Construction and Operation and the Federal District Water Commission, dependents of the Secretary of
The legal framework which gives faculties, norms and regulates the actions of the political boroughs of the DF in water and sewerage is made up of several different kinds of dispositions such as laws, rules, agreements and manuals.

The elaboration of borough and sector programs constituted the first step in administrative hydraulic activity, since they are the instrument which explains the state of the public services and the strategies to improve them. According to the interior rules of public administration and the law for urban development of the DF, respectively, it is the boroughs’ job to make up a commission with SACM to formulate these programs together exclusively for water and sewerage, while in general they participate with the Secretary of Urban Development and Housing in drafting and modifying.

One aspect that stands out on this subject is the obligation that the boroughs have since 1997, the year when the rules of Environmental Law of the DF entered into force, to promote the establishment of separate systems of sewerage for wastewater and rainwater in order to reuse rain water.

The construction of hydraulic works and installations in the political boroughs should stick to the agreements established with the commission integrated by the SACM as well as carrying out what has been previously outlined in their respective borough programs, but with the clear statement of the previous Public Administration rules which mark borough programs of works for supply of potable water and sewerage and sewerage services in secondary networks.

The boroughs have the power to develop preventive actions when they concede or refuse construction licenses, after checking, among other things, the installed capacity of potable water and sewerage services, that public hydraulic works are carried out preferentially along sidewalks and central walkways, the presentation of authorization of environmental impact, to avoid or reduce imminent damage to resources and find the best way for use and exhibition on the part of commercial establishments in a preventive report which includes materials and products to be used or obtained.

The Manual of Procedures and Services to the Public regulates in the political boroughs the ability to carry out different hydraulic installations at the request of users: potable water taps and derivations, their removal and connections of exterior sewers, which is a conduct that removes rainwater and wastewater included within the property line, up to the union with the culvert. The appliance not installed by the boroughs, although they receive requests, is the meter of water consumption, since its installation, revision and reparation is responsibility of the SACM.

The Citizen Attention and Service Centers (CESAC) created by agreement on November 25, 1997, are borough organs in charge of receiving, administering and responding to this type of requests for public services that the population of a respective territory requires.

Regarding the provision of potable water and sewerage, the legislation only establishes that the boroughs will provide them within their physical limits of action, only when they are not assigned to other entities, with which priority is given to the activity of central and Para governmental sectors. The scarcity or lack of water should be attended according to the manual of procedures, first, by the CESAC and secondly by the borough in charge of managing hydraulic services through supply with tank-cars and, according to the rules of water and sewerage services for the DF, distributing water equally, according to the proposals of the affected population.
The reparation of water leaks is one of the most important tasks to optimize conduction networks as well as supply. On this topic, the political administrative organs should coordinate with SACM and the local Secretary of Environment for constituting and operating programs to promote their detection and repair. Because of the attribution assigned by the interior law of public administration, leaks should be repaired on the secondary network and for this effect, users should report damage to the CESAC so this institution can give an expedite procedure.

For sediment removal from the secondary sewerage network, requests should also be directed to CESAC so that this institution can channel the petition to the corresponding borough (UNAM, 2002).

According to the Public Account of 2002, the political boroughs carried out programs of supply of water in trucks, leak reparation, conservation and maintenance of the secondary network of potable water and expansion of the same. For sewerage, they participated in the expansion of the secondary network, its conservation and maintenance, and the sediment removal of different sources (For activities in 1999-2001 see Chart 42).

As for private actors, as was mentioned in the section related to economic and financial aspects, currently, recent reforms promote the establishment of private rights over water use that allow the privatization of services of supply and sewerage.

In the southern zone of Mexico City, the company Tecnología y Servicios de Agua S.A de C.V. (TECSA) is in charge of installing meters in the Milpa Alta Borough since 1999.

b) Functions and Public and Community Actors in WSS in Milpa Alta

In the borough, for operating water distribution, SACM is in charge of filling tanks through primary networks, sending the block volume of water authorized by the CNA to the borough. From then on, the borough is in charge of distributing water through secondary networks by three operations:
- Taking Turns
- Repumping
- Extraction from wells (Eng. Agustín Jaime, Borough Milpa Alta)

Besides distributing water through this system, there are other formal and informal modalities developed by the Borough and the population with access to this resource. On the part of the borough, the supply to zones located outside of the city limits occurs by sending trucks every certain number of days.

On the part of the user population, several different legal and illegal practices exist for water supply:

- Buying from trucks
- Clandestine taps (70% according to an informant from the borough)
- Illegal opening and closing of valves.
- Paying valve workers for opening and closing
- Sabotage to the turns system

Q: What other ways does the population obtain water when there is none?
A: Well, buying water from private trucks.
Q: That is very expensive.
A: Around 350 or 400 pesos for 3,000 liters.
Q: And the population recurs to this a lot.
A: Only in the outside communities and some people who have the network but the water doesn't get to them (San Batolomé X. Coordinator)
Regarding the expansion of the network, according to the legal framework, the population should request this through the Citizen Attention Centers. From there, the Borough should resolve the different requests, with authorization from SACM. However, this institution does not approve expansion in zones outside of the city limits. In addition, the approval of requests takes a long time; therefore, illegal practices are worsened, as is the conflict around water.43

Q: And how is a request made?

A: A personal request, directly, through the… Citizen Attention Center. The request arrives, and the government supervises the zone. It should be within the city limits, as a norm. And it should be feasible. They request inside the city limits but above the level of the tanks, and we can’t make water move except by gravity.

Every year we program a goal of expansion of the potable water network, and an expansion of the secondary network of potable water. Every year we do works on different streets, either new streets or streets that don’t have the service. In our operative annual program, we have a budget for network expansion, we go through the requests day by day and we make a list.

(...) The volume is insufficient, in the installation of water taps, a problem that has been reflected by the non authorization by the water system of payment for taps. That is the Water System, and the lack of water in the dry season, which is a very problematic time. The rainy season is near and the people who are above the level of the tanks are already complaining. (Director Milpa Alta Borough Department of Potable Water).

One of the ways to partially resolve the problem of infrastructure for water is through the Agreements of Collaboration between neighbor Work Committees and Borough authorities for hydraulic works in barrios and streets. Although this practice is not contemplated legally, it is carried out by authorities and the community in order to develop necessary infrastructure.44

4.6 Sociopolitical Aspects

a) Population Growth

Population growth is a reality that weighs down on the natural reserves of the entire world and Mexico is not the exception. Milpa Alta, one of the last natural reserves of the Federal District, is being

43 A: Normally when people lack water they meet with their neighbors and they go talk with the coordinator. They put a lot of pressure, and I get hit too. What we do when people come and we realize they are suffering quite a bit, there are people who even insult us, and we have to process that with the authorities. Here they have been demonstrating recently, and they have let us know that if they suffer again from lack of water they are going to block the streets, because they have done it before, they have blocked the way. (Assistant Coordinator San Salvador C)

44 Q: Do you have a kind of work where the population works with the coordination and the borough? A: Sometimes, when a community demonstrates that they are willing to do mainly labor for the elaboration of different services like sewerage, and the Borough provides the materials. (Santa Ana Assistant)
undermined by the urban growth extended over it. This is intimately related to the decline in traditional forms of production and the new economic insertion of Mexico in the world.

As we have already mentioned, demographic growth brings logging and the conversion of lands declared as ecological protection zones into deserts, with consequences for the recharge of aquifer tables and their pollution.

To control this situation, the government of the Milpa Alta borough implemented a measure denominated “Zero Growth,” in which they prohibit new settlements. The measure consists in the signing of an agreement between the populations settled outside of the city limits, which is already counted, stating that only the population appearing in these censuses will be able to access basic services authorized by the borough. New settlements not in the census will not have the right to any services. The main point of this is a perverse consequence where the settlements continue to reproduce with population expelled to other places because of the need to improve their quality of life, at the same time as not receiving basic services because they are considered “irregular” or “illegal” because they do not fulfill the Agreement of Zero Growth.

“There are two types of growth. One is natural. If you have a piece of land, two hectares, for example, and you have a lot of children and they don’t have any place to live, but they are married and they want to live separate from you, you give one part of your land to one, another part to another. That is natural growth, because you are the owner, a native of the place.

But there are people who sell new plots of land. That is irregular growth.” San Salvador Coordinator

“What used to be small farmers who produced on the land are now selling land and buying cars to work as taxi drivers. This has had repercussions on the towns because there are irregular settlements. Land is sold at low prices and to people who maybe don’t have the customs or traditions of the original peoples, but who come with another way of life.” San Juan Coordinator

To belong or not to the city limits constitutes a limit between “poverty” and “wealth” of water that everyone suffers in the end. Since the solutions, as we have seen, to obtain water, finally affect all of the residents of the region, and the non regularization of the services does not represent anything more than the aggravation of the problem, the solution is far from occurring with “Zero Growth.”

Therefore, this measure of zero growth generates a relationship of tension between “old residents” and “new”, since the settlements denominated as “irregular” of the latter produce a greater demand on water and electric energy, which makes the amount of water supplied by the government insufficient. The idea that the “new” “illegal” or “irregular” people come with “another way of life” shows the latency of a conflict that is barely the tip of the iceberg.

b) Expropriation of Water

For its part, the Federal District government appropriates the water extracted from wells, treats it and turns it over in blocks to the different towns. This redounds to the general conception of the population of Milpa Alta that the government does not give them the same amount of water as is extracted from their soils. These towns have wells with excellent quality water but the population has no direct access to it. And with the scarcity they confront daily, this is seen as an injustice by the residents of the towns of Milpa Alta.

“In 1935, we had our own water that we got from our own wells. In 1970 our wells were extinguished because they took the water to Xochimilco and our wells are now dry.” User in San Salvador.

“The main problem we have is that the town of San Jeronimo has a well which belongs to us, and since we don’t have it here, we have to ask for water from Santa Ana Tlacocteno so that it can come here.” Merchant San Juan Tepenahuac
c) Delay in the Decentralization of Decisions

In the governance of water, serious inconveniences arise due to the centralization of decision-making in the organ Mexico City Water System, which is the one that does explorations, perforations, extractions, treatment and supply of water in block to the different boroughs. Due to the extension of territory it controls, it is not always aware of the problems that Milpa Alta residents have.

It is for this reason that when the coordinators from different zones, also the most related to the population and who know their needs the best, try to solve the different problems in their communities, they find the delay of decentralization of functions within the government of the Federal District does not let them decide anything besides sending in complaints of the population to the corresponding institution at the level of the borough.

In this sense, the uses and customs of the communities to organize in assemblies and make common decisions are segmented at the moment of acting on the agreements.

“... it is truly complex because many times what is a priority for us is not for them, so that’s where the traditional authorities have to struggle with the administrative authorities, to carry out the true interests of the community, which is really serious for us, and they in turn, waste the resource. There on central levels, it is another reality.” San Bartolomé Coordinator

This generates a double legality in these communities: one endorsed by law and one endorsed by the negligence of the authorities. When they are impeded from intervening in determined issues, under social pressure, the only thing they have left to do is try to mediate so the least amount of conflict possible occurs, and in this way the law becomes a thin line with fluctuating limits that are lost in the complexity of daily practices, such as irregular connections and settlements, or connections carried out by the coordination with materials or labor provided by the residents.

d) Informal Solutions to Unattended Problems.

• Irregular Connections

Confronting the impossibility of achieving a water tap legally, the neighbors of different towns connect clandestine taps.

A: We have 70% clandestine taps.

Q: And how do you do it?

A: They do it by night or our very same personnel falls into the crime. And they join the game. The problem is that SACM does not authorize the payment for the taps, it has been a year and a half since we asked for a tap, but a person is not going to wait to put in water for a year and a half.

I was mentioning to you that they do not authorize it, so the borough cannot install a tap.

They say there are people who are not in the city limits, who are irregular, on the ecological reserve. Coordinator Villa Milpa Alta

• Personal Works

Another informal and illegal way of solving the water problem is for neighbors to install the works themselves. Then the borough asks the neighbors to collaborate with materials or labor, and oftentimes they resolve the problem of water or sewerage. This should not happen since the only one
with the ability to allow new connections is SACM, but their procedures can become much slower than the needs of the population in constant growth.

Q: And the pipes that you say you put out there?
A: There are pipes, but I don’t know why the water doesn’t come up … but there are pipes… they say they have pipes but there is no water and a lot of people.

Q: Do you know if the pipes and water works were only made by the borough or people have also made them?
A: Um...there I don’t know… in our street they just left it there… it was pretty far and they didn’t put it in any farther up, so we pulled it, we put the rest of the material.

Q: You put it all?
A: Well only up to where they had stopped, up to there, and then just connected it. … and with the sewerage the same thing happened, where our alley is, here is where our alley is and up to here is where the drain came… and the man said “we can’t go on,” so from here we pulled over there ourselves… (Merchant Santa Ana).

• Change in Direction of Water

Another way is to change the direction of water through the valves. In no few cases this generates conflicts between neighbors and with the coordination, because of the discrentional and individual modification of the change in water flow.

Q: Do you get water through the network?
A: Yes, but we have to have tanks to keep the water. And in that way save it and make it last.

I never lack water, thanks to the tank guard, since when we lack water, he opens it and we fill our tanks and save it.” User in San Salvador

At the same time, it would seem that not all the valve workers understand the needs of the population, which becomes a vital question when water is scarce for everyone.

Q: Are the valve workers from the Borough?
A: Yes, they work here …they are in charge…but there is one valve worker that when he is here there aren’t problems, even if there’s just a little water, there is no problem, but when he goes on vacation, these problems always happen.

Because they don’t know… I think they don’t know how to distribute the water or they don’t know how the water is distributed, and that’s why these problems happen.” Woman from San Bartolomé

• Collective Actions – Social Movements

When the problem is accentuated, generally in the dry period, the neighbors organize, normally by affected street or barrio and they go talk with the coordinator of the town. If the problem is not solved, they block streets or routes or there can be a take-over of offices until the petition is solved. This generally results in a change in the direction of the water by opening or closing some valve.

Another form of advocacy is when the neighbors name a representative to go talk with the coordinator and look for a solution to the water problem.
The problem of the scarcity of water definitely highlights serious inconveniences which appear when governing such a valuable and vital resource. This is why tensions and conflicts are half solved and are always latent and threatening to become something more serious.

Still no solutions appear from above that listen to “those from below” and can be made into a norm for equitable use of the resource. Meanwhile the possibility of achieving joint responsibility for management of water, which would imply the solution of internal struggles, are far from being possible.
5. CONCLUSIONS

The case of Milpa Alta, particularly in the towns of San Bartolomé Xicoculco and San Salvador Cuauhtenco, clearly shows the social, political, institutional, governmental and environmental complexity for water administration in peri-urban spaces of Mexico City. While the problem identified cannot be extrapolated to all the cases of the city, it does give us guidelines for understanding the common framework in which these areas are inserted, which will be modified and operated in a different manner depending on the particular conditions of each particular situation. However, our case study allows us to identify some central aspects.

- The pre-existence of forms of traditional representation in the administration of services, conflict management and solution of problems inside the community. This figure is still prevalent in the Milpa Alta, Xochimilco, Tlahuac, Tlalpan and Iztapalapa boroughs. The Coordinator of territorial communications not only has a central role within the community, but also has the support and trust of the people. However, while this situation is necessary it is not sufficient for the optimum performance of the coordinators’ functions, particularly referring to water. One of the main problems found in both communities is the legitimate character for the community and the borough but without legal judicial recognition supporting it. The local congress would have to make this recognition in the Federal District Government legislature, not only of the coordinators’ functions but the economic and political tools that make their optimum performance possible.

- In the particular case of the Milpa Alta Borough, there is a large social heterogeneity existing in relationship to ways to access the resource. There is a population with formal access to the service, who are connected to the secondary network in town, but this is not a guarantee to have regular service. Depending on the location of one’s house, in high or lowlands of the town, one will have better or worse service, generally having water on certain days and hours of the week. On the other hand, there is informal access by the population inside the city limits or near the water network with no access, who resolve the problem through clandestine connections. In general, everyone ends up fulfilling their need for the resource through a request for water trucks to the borough or private companies.

- The authorities’ solution to the demand for water of the population located in irregular settlements has been to sign agreements of zero growth between borough authorities and the population in irregular settlements. These count the population, and only the registered population who has signed the agreement has a right to water distributed by truck at no cost, two times a week, and a determined number of liters and barrels per family. The population not counted, having arrived after the agreement or being located in zones far away from the city limits, have no rights to this water. This situation has not stopped the growth of irregular settlements; it has only provoked confrontation between neighbors for the resource or has made the incipient irregular market of water an emergency.

- The problem of administration is not only between the territorial coordinator and the borough authorities. The borough authorities also have serious problems in their relationship with the Federal District Government to administer and solve the problems which occur on this level. This is a result of the incipient recent decentralization of functions in the Federal District Government, responsible for assigning budgets authorized by Congress and defined by specific projects, which do not always have sufficient resources or the authorization for budgets. On this level, a legislative reform is required to give more autonomy and budget to the borough governments.

- The water problem in the Milpa Alta Borough seems to have no short term solutions. On the contrary, everything indicates that it will be aggravated with time, not only by the complexity of
the operation and infrastructure and by the fact that currently only 7 of the 22 wells existing in the zone in the 1970s are operating, but also because Mexico City demands larger and larger volumes of volumes and it is clear that the Milpa Alta Borough, and its population, have been one of the most sacrificed in this sense. Milpa Alta has been a provider of very good quality water to the D.F., and even today not all the volume extracted stays in the borough, because a percentage—it was impossible to verify the volume—leaves the area.

- From this perspective, the population of the Milpa Alta borough, including the population within city limits, some of whom have daily eight hour service, is in a situation of open disadvantage compared to the rest of the Federal District, in spite of having wells in service to supply the entire population.

- An additional element making the administration of this space more complex is that on the level of the corresponding Watershed (Valley of Mexico), there must be coordination between federal authorities, Mexico State authorities and Federal District authorities, in the volumes of water assigned to the capital city.

- The fact that the Milpa Alta borough is the last to be incorporated into the metropolitan system of Mexico City and that it still has an important part of its territory designated as an ecological reserve, allows for the construction of a sustainable peri-urban development project, if there is political will. This situation would be almost impossible in other zones of the Federal District.
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CHRONOLOGY

**Most Relevant Occurrences in the Administration of Potable Water in Mexico City with the Participation of Private Industry (1989-2003)**

February 16, 1989
Creation of the CNA, deconcentrated organism of the Secretary of Hydraulic Resources, with the ability to make "decision on the use in quantity and quality of national waters," in other words, with the responsibility to promote efficient use of water and conservation in all the phases of the hydraulic system.

July 10, 1992

Creation of the CADF as a unique operating organism, responsible for the provision of potable water services in Mexico City. Main objectives: 1) provide by own means or through third parties the public service of water for domestic, commercial, industrial or other means; 2) provide sewerage, treatment and reuse of wastewater in the DF; 3) administer, operate and conserve the hydraulic infrastructure necessary for providing this service; 4) optimize the public service of potable water, sewerage and treatment and reuse of wastewater in the DF to ensure its preservation and continuity; 5) foster a new culture of water.

November 18, 1992

Creation of the National Waters Law (goes into force on 2-12-92). This law intends to order and regulate hydraulic matters, that is, the role of the State is redefined as responsible for the integral administration of the resource and the consolidation of the hydraulic programming. The integral administration of water is regulated with more user participation. The creation of a systems of concession and assignation for use of national waters is also highlighted.

December 13, 1992

Call for public bids for providing services related to potable water and sewerage services. With the goal to provide a better service in potable water, the administration of this service is opened to the participation of private industry. According to local authorities, the new modality of mixed administration constitutes one of the means to improve public finances and confront the hydraulic problem.

February 1, 1993

An act of presentation and opening of offers is carried out, where proposals from Mexican and foreign companies published in the call for submissions are received.

March 15, 1993

The results are published, with four winners made up of 51% national companies and 49% foreign. The companies that obtained the contract for 10 years are: Servicio de Agua potable (SAPSA), Industrias del Agua S.A de C.V (IASA), Tecnología y Servicios de Agua, S.A de C.V (TECSA) and Agua de México, S:A de C:V

November, 1993-1994

The General Contract was signed, and beginning on this date, the companies began to operate following the points of the contract where 3 stages of operation are established.

1st Stage (2 years). 1) Update the registry of users. Incorporate already existing domestic taps not registered in the current register. 2) Regularize domestic taps and water meters. Substitute obsolete
domestic taps and meters for new ones. 3) Cadastre of primary, secondary, treated residual and secondary sewerage networks. Identify and locate these networks and the corresponding macro meters on a graph.

2nd Stage (9 years). 4) Install new taps and connections to the sewerage network in zones of the city where there were no previous ones. 5) Meter readings (consumption readings). Pass from lot to lot to take readings of meters. 6) Billing and charging. Design the technical support to determine fees, distribution and reception of bills for paying service rights.

3rd Stage (8 years). 7) Operate, maintain and rehabilitate potable water and sewerage networks.

From 1994 to 2002

Gradual development of different actions corresponding to the services stipulated in the three stages of the contract.

1998

According to official data from the CADF, at the end of this year, the register of users was little more than 1,652,000, of which 840,000 paid metered service, within a specific program that tends to increase meter use.

November, 2003

The general contract is finished.
ANNEX: MAPS

Map 1: Map of Mexico City in 1950
Map 2: Map of Mexico City in 1960
Map 3: Map of Mexico City in 1970
Map 4: Map of Mexico City in 1980

Map 5: Urban Zone of Mexico City in 2002
### Total Population of the Federal District (by delegation) and Mexico State (by municipality)

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Source: INEGI, XII Censo General de Población y Vivienda, 2000
### CHART 1: AMCM: Total Population

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Source: from 1950 to 1970, Dirección General de Estadística, VII, VIII and IX general census of population and housing; from 1980 to 1990, INEGI, X Y XI X and XI general census of population and housing and 2000, INEGI; XII general census of population and housing, Preliminary Results. The limits of the urban area of Mexico City were taken for 1970 from Unikel, Ruiz y Garza (1976: 117); for 1980, from Negrete y Salazar (1986: 124) and for 1990, from INEGI (1993: 1).

### CHART 2: GROWTH RATE

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Source: from 1950 to 1970, Dirección General de Estadística, VII, VIII and IX general census of population and housing; from 1980 to 1990, INEGI, X Y XI X and XI general census of population and housing and 2000, INEGI; XII general census of population and housing, Preliminary Results. The limits of the urban area of Mexico City were taken for 1970 from Unikel, Ruiz y Garza (1976: 117); for 1980, from Negrete y Salazar (1986: 124) and for 1990, from INEGI (1993: 1).
Graph 1

Total Population AMCM (1940-2000)

Source: based on information from Chart 1

Graph 2

Gross Value of production: AMCM and rest of Mexico (1930-1993)

Source: Elaborated with information from chart 3
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Chart 4a: Type of Population

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Source: Population and Housing Census 1990 and 2000

Chart 4b: Population According to Size

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*Percentage compared to the total population of the Federal District

Source: Population and Housing Census 1990 and 2000
### Chart 5: Economically Active Population According to Condition of Activity: 1990 and 2000

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*Percentages of total population of the Federal District

Source: Inegi: Population and Housing Census 2000

### Chart 6a: Economically Active Population by Sector: 1990 – 2000

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Source: Inegi, Population and Housing Census 1990, 2000
Chart 6b Economically Active Population (EAP) by Sector: 1990 – 2000

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<td>64.7</td>
<td>57.8</td>
<td>44.9</td>
</tr>
<tr>
<td>AMCM</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Milpa Alta*</td>
<td>24.6</td>
<td>1.0</td>
<td>0.8</td>
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</table>

*Percentage of Population in Comparison to the Federal District

Source: Inegi, Population and Housing Census 1990, 2000
### CHART 7: FEDERAL DISTRICT: REGULAR AND IRREGULAR SETTLEMENTS BY DELEGATION

<table>
<thead>
<tr>
<th>Delegation</th>
<th>Regular</th>
<th>Irregular</th>
<th>Total</th>
<th>No. of families</th>
<th>Surface Area (ha)</th>
<th>Average Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Obregón</td>
<td>12</td>
<td>1</td>
<td>13</td>
<td>3,240</td>
<td>74.3</td>
<td>9</td>
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<tr>
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<td>54</td>
<td>62</td>
<td>4,859</td>
<td>622.0</td>
<td>15</td>
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<tr>
<td>G. A. Madero</td>
<td>1</td>
<td>22</td>
<td>23</td>
<td>3,090</td>
<td>58.5</td>
<td>8</td>
</tr>
<tr>
<td>Iztapalapa</td>
<td>56</td>
<td>59</td>
<td>115</td>
<td>9,615</td>
<td>259.6</td>
<td>9</td>
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<tr>
<td>M. Contreras</td>
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<td>15</td>
<td>19</td>
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<td>10</td>
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<td>0</td>
<td>44</td>
<td>44</td>
<td>1,550</td>
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<td>9</td>
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<tr>
<td>Tláhuac</td>
<td>4</td>
<td>51</td>
<td>55</td>
<td>2,277</td>
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<td>7</td>
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<td>Xochimilco</td>
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<td>100</td>
<td>162</td>
<td>12,632</td>
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<tr>
<td><strong>Total</strong></td>
<td>174</td>
<td>452</td>
<td>626</td>
<td>48,727</td>
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</table>

Source: Natural Resources Commission, 1999

### CHART 8: Supply of water for Domestic Use

<table>
<thead>
<tr>
<th>Delegation</th>
<th>In-house</th>
<th>On-sites</th>
<th>Neighbourhood</th>
<th>None</th>
<th>Non specific</th>
</tr>
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<tbody>
<tr>
<td>Alvaro Obregón</td>
<td>81.2</td>
<td>16.5</td>
<td>1.0</td>
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<td>0.8</td>
</tr>
<tr>
<td>Azcapotzalco</td>
<td>84.7</td>
<td>14.0</td>
<td>0.7</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Benito Juárez</td>
<td>96.5</td>
<td>2.2</td>
<td>0.2</td>
<td>0.3</td>
<td>0.7</td>
</tr>
<tr>
<td>Coyoacán</td>
<td>85.9</td>
<td>12.9</td>
<td>0.4</td>
<td>0.1</td>
<td>0.6</td>
</tr>
<tr>
<td>Cuajimalpa de Morelos</td>
<td>69.9</td>
<td>25.7</td>
<td>2.4</td>
<td>1.2</td>
<td>0.8</td>
</tr>
<tr>
<td>Cuauhtémoc</td>
<td>93.1</td>
<td>4.8</td>
<td>0.4</td>
<td>0.2</td>
<td>1.5</td>
</tr>
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<td>Gustavo A. Madero</td>
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<td>0.4</td>
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<td>0.9</td>
</tr>
<tr>
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<td>27.6</td>
<td>1.3</td>
<td>1.2</td>
<td>0.7</td>
</tr>
<tr>
<td>Magdalena Contreras</td>
<td>67.7</td>
<td>28.2</td>
<td>1.9</td>
<td>1.7</td>
<td>0.6</td>
</tr>
<tr>
<td>Miguel Hidalgo</td>
<td>90.4</td>
<td>8.3</td>
<td>0.3</td>
<td>0.2</td>
<td>0.8</td>
</tr>
<tr>
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<td>50.3</td>
<td>6.0</td>
<td>6.4</td>
<td>0.6</td>
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<tr>
<td>Tláhuac</td>
<td>61.0</td>
<td>36.0</td>
<td>1.6</td>
<td>0.8</td>
<td>0.6</td>
</tr>
<tr>
<td>Town</td>
<td>Income Level</td>
<td>Number of homes in irregular settlements</td>
<td>Water Problems because of Altitude</td>
<td>Water from Trucks (% of population)</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>--------------</td>
<td>------------------------------------------</td>
<td>-----------------------------------</td>
<td>------------------------------------</td>
<td></td>
</tr>
<tr>
<td>San Bartolomé</td>
<td>2</td>
<td>130</td>
<td>Si</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>San Pablo</td>
<td>1 y 2</td>
<td>254</td>
<td>Si</td>
<td>7.4</td>
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<tr>
<td>San Pedro</td>
<td>3, 4, 5</td>
<td>84</td>
<td>No</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>San Antonio T</td>
<td>1 y 2</td>
<td>536</td>
<td>Si</td>
<td>8.3</td>
<td></td>
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<tr>
<td>San Salvador</td>
<td>1</td>
<td>179</td>
<td>Si</td>
<td>37.0</td>
<td></td>
</tr>
<tr>
<td>San Lorenzo</td>
<td>1</td>
<td>23</td>
<td>Si</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>Villa Milpa Alta</td>
<td>1, 4, 5</td>
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</tr>
<tr>
<td>Santa Ana</td>
<td>2 y 3</td>
<td>187</td>
<td>No</td>
<td>1.4</td>
<td></td>
</tr>
<tr>
<td>San Juan</td>
<td>2</td>
<td>21</td>
<td>No</td>
<td>s/i</td>
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<tr>
<td>San Fco</td>
<td>1 y 3</td>
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</tr>
<tr>
<td>San Jerónimo</td>
<td>s/i</td>
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<td>s/i</td>
<td></td>
</tr>
<tr>
<td>San Agustín</td>
<td>s/i</td>
<td>17</td>
<td>No</td>
<td>s/i</td>
<td></td>
</tr>
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</table>

**Source:** Quiñones, 1999.
### CHART 10

**Water connection in Milpa Alta towns**

<table>
<thead>
<tr>
<th></th>
<th>Have water connection</th>
<th>Pour water from a bucket</th>
<th>Cannot pour water</th>
<th>Not specified</th>
<th>Total</th>
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<td><strong>Three Other Towns</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>56</td>
<td>424</td>
<td>201</td>
<td>1</td>
<td>68</td>
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<td></td>
<td>8.20%</td>
<td>62.20%</td>
<td>29.50%</td>
<td>0.10%</td>
<td>100.00%</td>
</tr>
<tr>
<td></td>
<td>6.40%</td>
<td>29.30%</td>
<td>58.30%</td>
<td>25.00%</td>
<td>25.50%</td>
</tr>
<tr>
<td><strong>Villa Milpa Alta</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>176</td>
<td>234</td>
<td>34</td>
<td></td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>39.60%</td>
<td>52.70%</td>
<td>7.70%</td>
<td></td>
<td>100.00%</td>
</tr>
<tr>
<td></td>
<td>20.10%</td>
<td>16.20%</td>
<td>9.90%</td>
<td></td>
<td>16.60%</td>
</tr>
<tr>
<td><strong>San Antonio Tecomilt</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>266</td>
<td>195</td>
<td>29</td>
<td></td>
<td>49</td>
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<tr>
<td></td>
<td>54.30%</td>
<td>39.80%</td>
<td>5.90%</td>
<td></td>
<td>100.00%</td>
</tr>
<tr>
<td></td>
<td>30.30%</td>
<td>13.50%</td>
<td>8.40%</td>
<td></td>
<td>18.30%</td>
</tr>
<tr>
<td><strong>San Bartolome Xicomulco</strong></td>
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<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>45</td>
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<td>1</td>
<td>1</td>
<td>9</td>
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<tr>
<td></td>
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<td>48.40%</td>
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<td>1.10%</td>
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</tr>
<tr>
<td></td>
<td>5.10%</td>
<td>3.00%</td>
<td>0.30%</td>
<td>25.00%</td>
<td>3.40%</td>
</tr>
<tr>
<td><strong>San Francisco Tecoxpa</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>91</td>
<td>109</td>
<td>20</td>
<td></td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>41.40%</td>
<td>49.50%</td>
<td>9.10%</td>
<td></td>
<td>100.00%</td>
</tr>
<tr>
<td></td>
<td>10.40%</td>
<td>7.50%</td>
<td>5.80%</td>
<td></td>
<td>8.20%</td>
</tr>
<tr>
<td><strong>San Pablo Oztotepec</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>144</td>
<td>34</td>
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<td>21</td>
</tr>
<tr>
<td></td>
<td>18.30%</td>
<td>66.10%</td>
<td>15.60%</td>
<td></td>
<td>100.00%</td>
</tr>
<tr>
<td></td>
<td>4.60%</td>
<td>10.00%</td>
<td>9.90%</td>
<td></td>
<td>8.20%</td>
</tr>
<tr>
<td><strong>San Pedro Atocpan</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>95</td>
<td>134</td>
<td>15</td>
<td>2</td>
<td>24</td>
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<tr>
<td></td>
<td>38.60%</td>
<td>54.50%</td>
<td>6.10%</td>
<td>0.80%</td>
<td>100.00%</td>
</tr>
<tr>
<td></td>
<td>10.80%</td>
<td>9.30%</td>
<td>4.30%</td>
<td>50.00%</td>
<td>9.20%</td>
</tr>
<tr>
<td><strong>San Salvador Cuauhtenco</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>52</td>
<td>112</td>
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<td>65.90%</td>
<td>3.50%</td>
<td></td>
<td>100.00%</td>
</tr>
<tr>
<td></td>
<td>5.90%</td>
<td>7.70%</td>
<td>1.70%</td>
<td></td>
<td>6.40%</td>
</tr>
<tr>
<td><strong>Santa Ana Tlacotenco</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>28</td>
<td>37</td>
<td>3</td>
<td></td>
<td>6</td>
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<td></td>
<td>41.20%</td>
<td>54.40%</td>
<td>4.40%</td>
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</tr>
<tr>
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<td>3.20%</td>
<td>2.60%</td>
<td>0.90%</td>
<td></td>
<td>2.50%</td>
</tr>
<tr>
<td><strong>San Lorenzo Tlacoynacan</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>28</td>
<td>13</td>
<td>2</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
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<td>30.20%</td>
<td>4.70%</td>
<td></td>
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</tr>
<tr>
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<td>3.20%</td>
<td>0.90%</td>
<td>0.60%</td>
<td></td>
<td>1.60%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>877</td>
<td>1446</td>
<td>345</td>
<td>4</td>
<td>267</td>
</tr>
<tr>
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<td>32.80%</td>
<td>54.10%</td>
<td>12.90%</td>
<td>0.10%</td>
<td>100.00%</td>
</tr>
<tr>
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<td>100.00%</td>
<td>0.00%</td>
<td>100.00%</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

Source: Inegi, Population and Housing Census 2000
### CHART 11: Availability of water by source in towns of Milpa Alta

<table>
<thead>
<tr>
<th>Source of Water</th>
<th>Three Other Towns</th>
<th>Villa Milpa Alta</th>
<th>San Antonio Tecomitl</th>
<th>San Bartolomé Xicomulco</th>
<th>San francisco Tecoxpa</th>
<th>San Pablo Oztotepec</th>
<th>San Pedro Atocpan</th>
<th>San Salvador Cuauhtenco</th>
<th>Santa Ana Tlacotenco</th>
<th>San Lorenzo Tlacoynucan</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piped Water Inside House</td>
<td>91</td>
<td>145</td>
<td>204</td>
<td>40</td>
<td>64</td>
<td>49</td>
<td>101</td>
<td>38</td>
<td>31</td>
<td>22</td>
<td>785</td>
</tr>
<tr>
<td>Piped Water Outside House</td>
<td>142</td>
<td>295</td>
<td>231</td>
<td>50</td>
<td>152</td>
<td>137</td>
<td>140</td>
<td>67</td>
<td>35</td>
<td>22</td>
<td>1271</td>
</tr>
<tr>
<td>Piped Water at Public Spigot or Hydrant</td>
<td>105</td>
<td>11</td>
<td>13</td>
<td>4</td>
<td>1</td>
<td>4</td>
<td>6</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>147</td>
</tr>
<tr>
<td>Piped Water Carried from another House</td>
<td>48</td>
<td>8</td>
<td>5</td>
<td>3</td>
<td>10</td>
<td>21</td>
<td>4</td>
<td>6</td>
<td>3</td>
<td>1</td>
<td>108</td>
</tr>
<tr>
<td>Water from Trucks</td>
<td>337</td>
<td>8</td>
<td>42</td>
<td>1</td>
<td>1</td>
<td>17</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>1</td>
<td>466</td>
</tr>
<tr>
<td>Water from wells, rivers, lakes, creeks or other</td>
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<td>8</td>
<td>8</td>
<td>8</td>
<td>2</td>
<td>8</td>
<td>3</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>26</td>
</tr>
<tr>
<td>Not specified</td>
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<td>467</td>
<td>590</td>
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<td>230</td>
<td>230</td>
<td>255</td>
<td>175</td>
<td>74</td>
<td>46</td>
<td>2828</td>
</tr>
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<td>Total</td>
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<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

Source: Inegi, Population and Housing Census 2000
### Chart 12: Milpa Alta Towns. Employed Population

<table>
<thead>
<tr>
<th>Town</th>
<th>Total Pop.</th>
<th>Percentage of total population</th>
<th>Percentage of EAP</th>
<th>Percentage Workers or Employees</th>
<th>Percentage Peons or Farmworkers</th>
<th>Percentage Self Employed</th>
<th>Percentage with no income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Santa Ana</td>
<td>9130</td>
<td>10</td>
<td>36.6</td>
<td>57.6</td>
<td>5.8</td>
<td>27.8</td>
<td>6.5</td>
</tr>
<tr>
<td>San Salvador</td>
<td>10323</td>
<td>11.3</td>
<td>35.0</td>
<td>65.2</td>
<td>4.6</td>
<td>21.6</td>
<td>2.7</td>
</tr>
<tr>
<td>San Francisco</td>
<td>8549</td>
<td>9.4</td>
<td>38.6</td>
<td>47.0</td>
<td>9.2</td>
<td>32.3</td>
<td>8.1</td>
</tr>
<tr>
<td>San Bartolomé</td>
<td>3423</td>
<td>3.7</td>
<td>36.0</td>
<td>66.5</td>
<td>1.7</td>
<td>21.9</td>
<td>0.8</td>
</tr>
<tr>
<td>San Pedro Atocpan</td>
<td>8575</td>
<td>9.4</td>
<td>37.3</td>
<td>37.6</td>
<td>3.5</td>
<td>45.1</td>
<td>11.1</td>
</tr>
<tr>
<td>San Pablo</td>
<td>11932</td>
<td>13.1</td>
<td>36.1</td>
<td>64.2</td>
<td>5.4</td>
<td>23.1</td>
<td>3.8</td>
</tr>
<tr>
<td>San Antonio</td>
<td>18931</td>
<td>20.8</td>
<td>37.1</td>
<td>65.4</td>
<td>4.2</td>
<td>22.9</td>
<td>3.2</td>
</tr>
<tr>
<td>Villa Milpa Alta</td>
<td>16536</td>
<td>18.2</td>
<td>40.7</td>
<td>44.5</td>
<td>8.9</td>
<td>33.7</td>
<td>9.2</td>
</tr>
<tr>
<td>San Lorenzo</td>
<td>3373</td>
<td>3.7</td>
<td>40.6</td>
<td>24.5</td>
<td>19.9</td>
<td>40.5</td>
<td>13.2</td>
</tr>
<tr>
<td></td>
<td>90772</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Elaboration based on 2000 Census

### CHART 13

#### Average income by town

<table>
<thead>
<tr>
<th>Town</th>
<th>Income Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>San Bartolomé</td>
<td>2*</td>
</tr>
<tr>
<td>San Pablo</td>
<td>1 y 2</td>
</tr>
<tr>
<td>San Pedro</td>
<td>5, 4, 3</td>
</tr>
<tr>
<td>San Antonio T</td>
<td>1 y 2</td>
</tr>
<tr>
<td>San Salvador C.</td>
<td>1</td>
</tr>
<tr>
<td>San Lorenzo</td>
<td>1</td>
</tr>
<tr>
<td>Villa MA</td>
<td>1, 4, 5</td>
</tr>
<tr>
<td>Santa Ana</td>
<td>2 y 3</td>
</tr>
<tr>
<td>San Juan</td>
<td>2</td>
</tr>
<tr>
<td>San Fco</td>
<td>1 y 3</td>
</tr>
<tr>
<td>San Jerónimo</td>
<td></td>
</tr>
<tr>
<td>San Agustín</td>
<td></td>
</tr>
</tbody>
</table>


*Income Level

1= up to 3000 pesos
2= 3000-3500
3= 3500-4000
4=4000-4500
5=4500 or more
**CHART 14**

**TYPE OF ORGANIZATIONS IN TOWNS SELECTED**

<table>
<thead>
<tr>
<th>Type of organizations</th>
<th>San Salvador</th>
<th>San Bartolomé</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community organizations</td>
<td>13</td>
<td>15</td>
</tr>
<tr>
<td>Athletic organizations</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Productive or commercial organizations</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Religious and festive organizations</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Parent organizations</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Political parties</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Associations</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>29</strong></td>
<td><strong>46</strong></td>
</tr>
</tbody>
</table>

Source: elaboration based on directory of organizations, Milpa Alta Delegation


<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>47,417</td>
</tr>
<tr>
<td>1990</td>
<td>63,654</td>
</tr>
<tr>
<td>2000</td>
<td>96,773</td>
</tr>
</tbody>
</table>


**CHART 16: Population of Milpa Alta by town 2000**

<table>
<thead>
<tr>
<th>Town</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other towns</td>
<td>5932</td>
<td>39.5</td>
</tr>
<tr>
<td>Villa Milpa Alta</td>
<td>1987</td>
<td>13.2</td>
</tr>
<tr>
<td>San Antonio Tecomitl</td>
<td>2253</td>
<td>15.0</td>
</tr>
<tr>
<td>San Bartolomé Xicomulco</td>
<td>409</td>
<td>2.7</td>
</tr>
<tr>
<td>San Francisco Tecoxpa</td>
<td>1014</td>
<td>6.8</td>
</tr>
<tr>
<td>San Pablo Oztotepec</td>
<td>991</td>
<td>6.6</td>
</tr>
<tr>
<td>San Pedro Actopan</td>
<td>1135</td>
<td>7.6</td>
</tr>
<tr>
<td>San Salvador Cuauhtenco</td>
<td>752</td>
<td>5.0</td>
</tr>
<tr>
<td>Santa Ana Tlacotenco</td>
<td>337</td>
<td>2.2</td>
</tr>
<tr>
<td>San Lorenzo Tlacoayucan</td>
<td>206</td>
<td>1.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15016</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Source: INEGI Census of Population and Housing- 2000
### CHART 17. POPULATION GROWTH.

<table>
<thead>
<tr>
<th>YEAR</th>
<th>POPULATION OF DELEGATION</th>
<th>POPULATION OF FEDERAL DISTRICT</th>
<th>% OF FEDERAL DISTRICT</th>
<th>URBAN AREA DENSITY MILPA ALTA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>33,694</td>
<td>6,874,200</td>
<td>0.48</td>
<td>60.5</td>
</tr>
<tr>
<td>1980</td>
<td>47,417</td>
<td>8,029,500</td>
<td>0.51</td>
<td>58.7</td>
</tr>
<tr>
<td>1990</td>
<td>63,654</td>
<td>8,235,700</td>
<td>0.77</td>
<td>50.4</td>
</tr>
<tr>
<td>1995</td>
<td>81,102</td>
<td>8,499,007</td>
<td>0.95</td>
<td>53.6</td>
</tr>
<tr>
<td>2000</td>
<td>96,773</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Note: The information corresponding to the years 1970, 1980 and 1990, corresponds to census information, and in 1995 to the definitive results of the Population and Housing Count.

### CHART 18. PERCENTILE GROWTH RATE OF POPULATION.

<table>
<thead>
<tr>
<th>PERIOD</th>
<th>MILPA ALTA TOTAL %</th>
<th>NATURAL RATE</th>
<th>MIGRATION RATE %</th>
<th>FEDERAL DISTRICT %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990-1995</td>
<td>4.3</td>
<td>2.58</td>
<td>1.72</td>
<td>0.50</td>
</tr>
</tbody>
</table>

### CHART 19: Milpa Alta Towns by Indigenous Language Spoken

<table>
<thead>
<tr>
<th>Town</th>
<th>Total</th>
<th>Speaks an indigenous language</th>
<th>Does not speak an indigenous language</th>
<th>Not specified</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Other towns</strong></td>
<td>5213</td>
<td>287</td>
<td>4908</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.5%</td>
<td>94.1%</td>
<td>.3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>41.1%</td>
<td>38.9%</td>
<td>38.3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>135</td>
<td>1674</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.4%</td>
<td>92.2%</td>
<td>.4%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>19.3%</td>
<td>13.3%</td>
<td>14.9%</td>
</tr>
<tr>
<td><strong>Villa Milpa Alta</strong></td>
<td>1816</td>
<td>46</td>
<td>1976</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.3%</td>
<td>97.6%</td>
<td>.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.6%</td>
<td>15.7%</td>
<td>6.4%</td>
</tr>
<tr>
<td><strong>San Antonio</strong></td>
<td>372</td>
<td>15</td>
<td>356</td>
<td>1</td>
</tr>
<tr>
<td><strong>San Bartolomé</strong></td>
<td></td>
<td>4.0%</td>
<td>95.7%</td>
<td>.3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.1%</td>
<td>2.8%</td>
<td>2.1%</td>
</tr>
<tr>
<td><strong>San Francisco Tecoxpa</strong></td>
<td>893</td>
<td>64</td>
<td>827</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.2%</td>
<td>92.6%</td>
<td>.2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.2%</td>
<td>6.6%</td>
<td>4.3%</td>
</tr>
<tr>
<td><strong>San Pablo Oztotepec</strong></td>
<td>876</td>
<td>18</td>
<td>855</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.1%</td>
<td>97.6%</td>
<td>.3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.6%</td>
<td>6.8%</td>
<td>6.4%</td>
</tr>
<tr>
<td><strong>San Pedro Actopan</strong></td>
<td>1018</td>
<td>59</td>
<td>953</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.8%</td>
<td>93.6%</td>
<td>.6%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.5%</td>
<td>7.6%</td>
<td>12.8%</td>
</tr>
<tr>
<td><strong>San Salvador Cuauhtenco</strong></td>
<td>646</td>
<td>37</td>
<td>604</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.7%</td>
<td>93.5%</td>
<td>.8%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.3%</td>
<td>4.8%</td>
<td>10.6%</td>
</tr>
<tr>
<td><strong>Santa Ana Tlacotenco</strong></td>
<td>309</td>
<td>30</td>
<td>278</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.7%</td>
<td>90.0%</td>
<td>.3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.3%</td>
<td>2.2%</td>
<td>2.1%</td>
</tr>
<tr>
<td><strong>San Lorenzo Tlacoypucan</strong></td>
<td>184</td>
<td>7</td>
<td>176</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.8%</td>
<td>95.7%</td>
<td>.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.0%</td>
<td>1.4%</td>
<td>2.1%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>13352</td>
<td>698</td>
<td>12607</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.2%</td>
<td>94.4%</td>
<td>.4%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Source: Inegi, Census of Population and Housing, 2000
### CHART 20. ECONOMICALLY INACTIVE POPULATION 1990.

<table>
<thead>
<tr>
<th>Type of inactivity</th>
<th>MILPA ALTA</th>
<th>%</th>
<th>FEDERAL DISTRICT</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students</td>
<td>9,017</td>
<td>36.55%</td>
<td>1,256,990</td>
<td>39.69%</td>
</tr>
<tr>
<td>Housework</td>
<td>13,139</td>
<td>53.26%</td>
<td>1,518,298</td>
<td>47.94%</td>
</tr>
<tr>
<td>Retired and pensioned</td>
<td>363</td>
<td>1.47%</td>
<td>163,626</td>
<td>5.17%</td>
</tr>
<tr>
<td>Disabilities</td>
<td>187</td>
<td>0.76%</td>
<td>32,194</td>
<td>1.02%</td>
</tr>
<tr>
<td>Other</td>
<td>1,964</td>
<td>7.96%</td>
<td>196,210</td>
<td>6.19%</td>
</tr>
<tr>
<td>TOTAL INACTIVE POP.</td>
<td>24,670</td>
<td>100.00%</td>
<td>3,167,318</td>
<td>100.00%</td>
</tr>
</tbody>
</table>


The composition of the EAP is observed in the following chart, the majority of which is dedicated to tertiary sector activities (60%), 19.15% to the primary sector and 17.5% to the secondary sector.

### CHART 21. ECONOMICALLY ACTIVE POPULATION EMPLOYED BY SECTOR.

<table>
<thead>
<tr>
<th>ACTIVITY SECTORS</th>
<th>FEDERAL DISTRICT</th>
<th>MILPA ALTA</th>
<th>% OF FEDERAL DISTRICT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>POPULATION</td>
<td>PERCENT</td>
<td>POPULATION</td>
</tr>
<tr>
<td>Primary Sector</td>
<td>19,145</td>
<td>0.66%</td>
<td>3,658</td>
</tr>
<tr>
<td>Secondary Sector</td>
<td>778,434</td>
<td>26.98%</td>
<td>3,346</td>
</tr>
<tr>
<td>Tertiary Sector</td>
<td>1,971,646</td>
<td>68.35%</td>
<td>11,426</td>
</tr>
<tr>
<td>Not Specified</td>
<td>115,582</td>
<td>4.01%</td>
<td>676</td>
</tr>
<tr>
<td>Total EAEP</td>
<td>2,884,807</td>
<td>100.00%</td>
<td>19,106</td>
</tr>
</tbody>
</table>

Source: XI General Census of Population and Housing, 1990. INEGI.
### CHART 22

#### GROSS NATIONAL PRODUCT IN FEDERAL DISTRICT AND PARTICIPATION COMPARED TO THE NATIONAL TOTAL ACCORDING TO GRAND DIVISION OF ECONOMIC ACTIVITY (AT 1993 PRICES)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>276,461,70</td>
<td>286,463,350</td>
<td>261,890,07</td>
<td>273,421,565</td>
<td>292,321,731</td>
<td>300,980,25</td>
</tr>
<tr>
<td><strong>Agricultura, Forestry and Fishing</strong></td>
<td>386,521</td>
<td>373,480</td>
<td>415,121</td>
<td>378,579</td>
<td>418,563</td>
<td>418,563</td>
</tr>
<tr>
<td><strong>Mining</strong></td>
<td>342,291</td>
<td>365,224</td>
<td>280,830</td>
<td>275,129</td>
<td>239,485</td>
<td>239,485</td>
</tr>
<tr>
<td><strong>Manufacturing Industry</strong></td>
<td>47,650,936</td>
<td>48,304,840</td>
<td>43,873,387</td>
<td>49,090,399</td>
<td>55,061,765</td>
<td>58,443,901</td>
</tr>
<tr>
<td><strong>Construction</strong></td>
<td>14,807,055</td>
<td>15,381,709</td>
<td>11,022,301</td>
<td>11,070,949</td>
<td>12,536,607</td>
<td>11,201,165</td>
</tr>
<tr>
<td><strong>Electricity, Gas and Water</strong></td>
<td>1,460,447</td>
<td>1,460,902</td>
<td>1,415,677</td>
<td>1,375,334</td>
<td>1,410,600</td>
<td>1,368,037</td>
</tr>
<tr>
<td><strong>Commerce, Restaurants and Hotels</strong></td>
<td>51,858,942</td>
<td>55,251,276</td>
<td>53,701,234</td>
<td>56,487,870</td>
<td>63,253,024</td>
<td>65,260,192</td>
</tr>
<tr>
<td><strong>Transportation, Storage and Communications</strong></td>
<td>28,573,423</td>
<td>30,391,631</td>
<td>28,304,781</td>
<td>30,374,966</td>
<td>33,227,298</td>
<td>35,245,211</td>
</tr>
<tr>
<td><strong>Financial Services, Insurance, Rental and Real Estate Activities</strong></td>
<td>48,647,942</td>
<td>52,846,968</td>
<td>51,788,446</td>
<td>51,593,211</td>
<td>55,118,403</td>
<td>56,709,405</td>
</tr>
<tr>
<td><strong>Community, Social and Personal Services</strong></td>
<td>89,255,441</td>
<td>91,090,587</td>
<td>88,173,869</td>
<td>89,330,279</td>
<td>91,216,546</td>
<td>92,726,304</td>
</tr>
<tr>
<td><strong>Imputed Bank Services</strong></td>
<td>16,521,297</td>
<td>19,003,268</td>
<td>17,085,546</td>
<td>16,555,156</td>
<td>20,160,568</td>
<td>20,622,902</td>
</tr>
</tbody>
</table>

Source: INEGI. National System of Accounts in Mexico.
### 12.3. ESTABLISHMENT OF MANUFACTURING INDUSTRY IN THE D.F. AND NATIONAL

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Micro</td>
<td>16,566</td>
<td>18,124</td>
<td>18,573</td>
<td>17,942</td>
<td>17,067</td>
<td>16,359</td>
<td>18,888</td>
<td>18,075</td>
<td>17,957</td>
<td>21,700</td>
<td>24,506</td>
</tr>
<tr>
<td>Small</td>
<td>4,764</td>
<td>4,995</td>
<td>5,021</td>
<td>4,721</td>
<td>4,291</td>
<td>4,056</td>
<td>3,828</td>
<td>3,990</td>
<td>4,117</td>
<td>4,891</td>
<td>2,289</td>
</tr>
<tr>
<td>Medium</td>
<td>705</td>
<td>694</td>
<td>675</td>
<td>623</td>
<td>551</td>
<td>545</td>
<td>493</td>
<td>521</td>
<td>538</td>
<td>648</td>
<td>864</td>
</tr>
<tr>
<td>Subsect or MSMI*</td>
<td>22,035</td>
<td>23,813</td>
<td>24,269</td>
<td>23,286</td>
<td>21,909</td>
<td>20,960</td>
<td>23,209</td>
<td>22,586</td>
<td>22,612</td>
<td>27,239</td>
<td>27,659</td>
</tr>
<tr>
<td>Large</td>
<td>420</td>
<td>422</td>
<td>415</td>
<td>383</td>
<td>370</td>
<td>348</td>
<td>307</td>
<td>328</td>
<td>345</td>
<td>391</td>
<td>173</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Federal District</td>
<td>22,455</td>
<td>24,235</td>
<td>24,684</td>
<td>23,669</td>
<td>22,279</td>
<td>21,308</td>
<td>23,516</td>
<td>22,914</td>
<td>22,957</td>
<td>27,630</td>
<td>27,832</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National</td>
<td>105,10</td>
<td>117,89</td>
<td>125,76</td>
<td>127,00</td>
<td>123,34</td>
<td>121,64</td>
<td>141,43</td>
<td>143,46</td>
<td>153,48</td>
<td>225,70</td>
<td>234,24</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Includes Micro, Small and Medium Industry.

Source: SECOFI. Dirección General de la Industria Mediana, Pequeña y de Desarrollo Regional, with data from IMSS
### CHART 23. EMPLOYED POPULATION BY INCOME GROUPS, 1990.

<table>
<thead>
<tr>
<th>LEVEL OF INCOME</th>
<th>MILPA ALTA</th>
<th>FEDERAL DISTRICT</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Population</td>
<td>Population</td>
<td>OF D.F.</td>
</tr>
<tr>
<td>No income</td>
<td>992</td>
<td>30,424</td>
<td>1.05%</td>
</tr>
<tr>
<td>Less than one MW</td>
<td>5,553</td>
<td>545,441</td>
<td>18.91%</td>
</tr>
<tr>
<td>From 1 to 2 MW</td>
<td>7,885</td>
<td>1,168,598</td>
<td>40.51%</td>
</tr>
<tr>
<td>More than 2 MW and</td>
<td>1,991</td>
<td>443,807</td>
<td>15.38%</td>
</tr>
<tr>
<td>less than 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>From 3 to 5 MW</td>
<td>893</td>
<td>316,737</td>
<td>10.98%</td>
</tr>
<tr>
<td>From 5 to 10 MW</td>
<td>370</td>
<td>191,714</td>
<td>6.65%</td>
</tr>
<tr>
<td>More than 10 MW</td>
<td>214</td>
<td>100,556</td>
<td>3.49%</td>
</tr>
<tr>
<td>Not specified</td>
<td>1,208</td>
<td>87,530</td>
<td>3.03%</td>
</tr>
<tr>
<td>TOTAL EMPLOYED POPULATION</td>
<td>19,106</td>
<td>2,884,807</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

Source: XI General Census of Population and Housing, 1990. INEGI.

### CHART 24. DISTRIBUTION OF ECONOMIC DELEGATION ACTIVITY BY SECTOR, 1993.

<table>
<thead>
<tr>
<th>SECTOR</th>
<th>ECONOMIC UNITS</th>
<th>% OF DELEGATION</th>
<th>% OF DF ECONOMIC UNITS</th>
<th>EMPLOYED PERSONNEL</th>
<th>% OF DELEGATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>MINING</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
<td>44</td>
<td>0.07%</td>
</tr>
<tr>
<td>MANUFACTURING</td>
<td>929</td>
<td>8.19%</td>
<td>3.31%</td>
<td>14,939</td>
<td>22.95%</td>
</tr>
<tr>
<td>COMMERCE</td>
<td>6,660</td>
<td>58.69%</td>
<td>3.96%</td>
<td>20,649</td>
<td>31.72%</td>
</tr>
<tr>
<td>SERVICES</td>
<td>3,758</td>
<td>33.12%</td>
<td>3.46%</td>
<td>29,465</td>
<td>45.26%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>11,347</td>
<td>100.00%</td>
<td>3.72%</td>
<td>65,097</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

Source: Economic Census 1994 Definitive Results, INEGI.
### CHART 25. MARGINALITY.

<table>
<thead>
<tr>
<th>Concept</th>
<th>Milpa Alta</th>
<th>D.F.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>63,654</td>
<td>8,235,744</td>
</tr>
<tr>
<td>% illiterate older than 15</td>
<td>8.06</td>
<td>4.00</td>
</tr>
<tr>
<td>% without primary education older than 15</td>
<td>25.47</td>
<td>16.77</td>
</tr>
<tr>
<td>% of residents in homes without sewer or toilet</td>
<td>16.19</td>
<td>1.81</td>
</tr>
<tr>
<td>% of residents in homes without electric energy</td>
<td>5.37</td>
<td>0.76</td>
</tr>
<tr>
<td>% of residents in homes without piped water</td>
<td>16.46</td>
<td>3.33</td>
</tr>
<tr>
<td>% of residents with crowding</td>
<td>67.31</td>
<td>46.48</td>
</tr>
<tr>
<td>% of residents in homes with dirt floors</td>
<td>15.15</td>
<td>2.48</td>
</tr>
<tr>
<td>% of population in towns with less than 5000 residents</td>
<td>10.00</td>
<td>0.32</td>
</tr>
<tr>
<td>% of employed population with income lower than 2 MW</td>
<td>75.53</td>
<td>60.47</td>
</tr>
<tr>
<td>Place occupied on national level</td>
<td>2112</td>
<td></td>
</tr>
<tr>
<td>Place occupied on DF level</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

## Chart 26: Ejido and Communal Land with More than 26,647-87-92 hectares.

<table>
<thead>
<tr>
<th>Communal Lands</th>
<th>Surface Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Milpa Alta</td>
<td>17,944-00-00</td>
</tr>
<tr>
<td>* Small property</td>
<td>7,948-00-00</td>
</tr>
<tr>
<td>* Forest zone</td>
<td>9,996-00-00</td>
</tr>
<tr>
<td>2. San Salvador Cuauhtenco</td>
<td>6,913-60-00</td>
</tr>
<tr>
<td>* Small property</td>
<td>1,800-00-00</td>
</tr>
<tr>
<td>* Forest Zone</td>
<td>5,133-60-00</td>
</tr>
<tr>
<td><strong>Total 1 and 2</strong></td>
<td><strong>24,857-60-00</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ejidos</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>* San Francisco Tecoxpa</td>
<td>82-16-81</td>
</tr>
<tr>
<td>* San Antonio Tecómitl</td>
<td>1,275-94-92</td>
</tr>
<tr>
<td>* San Jerónimo Micatlán</td>
<td>59-50-05</td>
</tr>
<tr>
<td>* San Juan Tepenahuac</td>
<td>27-49-99</td>
</tr>
<tr>
<td>* Santa Ana Tlacotenco</td>
<td>345-18-15</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,790-29-92</strong></td>
</tr>
</tbody>
</table>

*Source: Secretary of Agrarian Reform*
### CHART 27: ORGANIZATIONS AND REPRESENTATIVES OF TOWNS IN MILPA ALTA

#### COMMUNITY ORGS
- Communal President
- Representative of communal goods
- President of Ejido Commissary
- Ejido Commissary Secretary
- Council of Observation
- Neighbor Committees
- President of base committee
- Neighbor representative
- Barrio representative
- Commission of Treasury of Economic Support
- Coordinator of Neighbor Committee
- Communal Accounts
- Ejido
- Ejido Commisary

#### ATHLETIC ORGS
- President of Athletic Committee
- Soccer League
- Children’s Soccer League
- Union of Young Athletes
- Representative of Cyclists
- President of Basketball Players

#### PRODUCTIVE ORGS
- Representative of Nopal Growers
- Representative of tables and barrios in Nopal Market
- Directive Nopal-Vegetable Tables
- Representative of Internal Roads
- Rep. Directive Nopal-Vegetable Table
- President of nopal grower groups
- Agricultural Association
- Representative of Agricultural and Industrial Fair
- Fruit Tree Growers
- Market Leader
- Representative of semi-fixed vendors
- President of Restaurant Owners
- President/representative of market association
- Cattle Organization
<table>
<thead>
<tr>
<th>Merchants</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>RELIGIOUS AND FESTIVE ORGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>President of majordomos</td>
</tr>
<tr>
<td>Majordomo of the Chalma sanctuary</td>
</tr>
<tr>
<td>President of majordomos of San Pablo</td>
</tr>
<tr>
<td>President of chapel majordomos</td>
</tr>
<tr>
<td>Person in charge of the pilgrimage to Chalma</td>
</tr>
<tr>
<td>Representative of La Salva de Tecoxpa</td>
</tr>
<tr>
<td>President of Board for Remodeling the San Francisco temple</td>
</tr>
<tr>
<td>President for church building</td>
</tr>
<tr>
<td>Committee for Cemetery</td>
</tr>
<tr>
<td>President of Church Board</td>
</tr>
<tr>
<td>Representative of Holy Week</td>
</tr>
<tr>
<td>President of directive table of the sanctuary</td>
</tr>
<tr>
<td>Representative of nocturnal adoration</td>
</tr>
<tr>
<td>Representative of artistic cast</td>
</tr>
<tr>
<td>Board</td>
</tr>
<tr>
<td>Fair Committee</td>
</tr>
<tr>
<td>President of Evangelical Temples</td>
</tr>
<tr>
<td>Representative of Religious Festival of Bo. De los Angeles</td>
</tr>
<tr>
<td>Representative of Fair reg. LVII</td>
</tr>
<tr>
<td>Representative of Brass Band Contest</td>
</tr>
<tr>
<td>Representative of Artisan Exhibit of Santa Martha Festivities</td>
</tr>
<tr>
<td>Advisor on Culture and Nomenclature</td>
</tr>
<tr>
<td>President of the Cultural Council of the Zapatista Museum</td>
</tr>
<tr>
<td>Aztec and Cowboy Dances</td>
</tr>
<tr>
<td>Commission for Patron Saint Festivals</td>
</tr>
<tr>
<td>Commission for Castilleros</td>
</tr>
<tr>
<td>Youth Commission</td>
</tr>
<tr>
<td>Commission for Youth Band</td>
</tr>
<tr>
<td>Rodeo Commission</td>
</tr>
<tr>
<td>Holy Week Commission</td>
</tr>
<tr>
<td>President of Independence Day Celebrations</td>
</tr>
<tr>
<td>Representative of Santa Martha Fair Dance</td>
</tr>
<tr>
<td>President of Special Events Commission</td>
</tr>
<tr>
<td>Representative of Community</td>
</tr>
<tr>
<td>Treasurer</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PARENT ORGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Society of Primary School Parents</td>
</tr>
<tr>
<td>Role</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>President of Primary School Directive Table</td>
</tr>
<tr>
<td>President of Secondary School</td>
</tr>
<tr>
<td>President of Kindergarten Directive Table</td>
</tr>
<tr>
<td>Society of Kindergarten Parents</td>
</tr>
<tr>
<td>President of Tele-secondary</td>
</tr>
<tr>
<td>President of Committee for Buying Plots of Land for Primary School</td>
</tr>
</tbody>
</table>

**POLITICAL PARTIES**

<table>
<thead>
<tr>
<th>Role</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sec. Of PRD</td>
<td></td>
</tr>
<tr>
<td>Sec. Of PAN</td>
<td></td>
</tr>
<tr>
<td>Sec. of PRI</td>
<td></td>
</tr>
</tbody>
</table>

**ASSOCIATIONS**

<table>
<thead>
<tr>
<th>Role</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taxi Driver’s Group</td>
<td></td>
</tr>
<tr>
<td>President of Women’s Group</td>
<td></td>
</tr>
<tr>
<td>President of Solidarity Social Association</td>
<td></td>
</tr>
<tr>
<td>Youth Organizers Group</td>
<td></td>
</tr>
<tr>
<td>Representative of Senior Citizens Group</td>
<td></td>
</tr>
<tr>
<td>President of Indigenous Community</td>
<td></td>
</tr>
<tr>
<td>Representative of National Indigenous Institute (INI)</td>
<td></td>
</tr>
<tr>
<td>Representative of social group J.U.C.C.</td>
<td></td>
</tr>
<tr>
<td>President of agricultural, cattle and forest union</td>
<td></td>
</tr>
<tr>
<td>Apiculture representative</td>
<td></td>
</tr>
<tr>
<td>President of Ecological Rescue Association</td>
<td></td>
</tr>
<tr>
<td>Representative of Nursery</td>
<td></td>
</tr>
<tr>
<td>Representative of Deer Raisers</td>
<td></td>
</tr>
<tr>
<td>Committee for Distributing Liconsa subsidized milk</td>
<td></td>
</tr>
<tr>
<td>Culture</td>
<td></td>
</tr>
</tbody>
</table>

*Source: Elaboration based on Milpa Alta Delegation Directory of Organizations.*
### CHART 28. NATURAL AREAS REQUIRING SPECIFIC TREATMENT.

<table>
<thead>
<tr>
<th>Name</th>
<th>Vegetation</th>
<th>State</th>
<th>Non-compatible Activity</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chichinautzin Mountain Range</td>
<td>Open forest of pines and association of pines and brush.</td>
<td>Moderate erosion. Serious erosion.</td>
<td>Agriculture</td>
<td>Conservation, Restoration and Erosion Control</td>
</tr>
<tr>
<td>Tláloc Volcano</td>
<td>Dense pine forest. Open pine forest.</td>
<td>Moderate erosion.</td>
<td>Agriculture</td>
<td>Conservation, Restoration and Erosion Control</td>
</tr>
<tr>
<td>Teuhtli* Volcano</td>
<td>Pastures Brush</td>
<td>Very endangered</td>
<td>Agriculture</td>
<td>Restoration and Erosion Control: terracing, control of ruts and reforestation</td>
</tr>
</tbody>
</table>

Note: * Requires coordination of actions with the Xochimilco Delegation.

### CHART 29

**Federal District: Principal Indicators of In Home Service Coverage**

<table>
<thead>
<tr>
<th>Segregation</th>
<th>Piped Water 1</th>
<th>In Home Services</th>
<th>Homes that use gas to cook with Piped Water 1</th>
<th>Owned Homes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secretary District</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Azcapotzalco</td>
<td>98.8</td>
<td>99.3</td>
<td>98.1</td>
<td>99.1</td>
</tr>
<tr>
<td>Coyoacán</td>
<td>98.8</td>
<td>99.2</td>
<td>94.3</td>
<td>99.0</td>
</tr>
<tr>
<td>Cuajimalpa de Morelos</td>
<td>94.1</td>
<td>98.1</td>
<td>88.6</td>
<td>97.2</td>
</tr>
<tr>
<td>Gustavo A. Madero</td>
<td>97.8</td>
<td>99.0</td>
<td>97.2</td>
<td>99.0</td>
</tr>
<tr>
<td>Iztacalco</td>
<td>98.7</td>
<td>99.0</td>
<td>98.2</td>
<td>99.0</td>
</tr>
<tr>
<td>Iztapalapa</td>
<td>94.0</td>
<td>98.1</td>
<td>89.0</td>
<td>98.5</td>
</tr>
<tr>
<td>La Magdalena Contreras</td>
<td>96.1</td>
<td>97.7</td>
<td>93.7</td>
<td>96.4</td>
</tr>
<tr>
<td>Milpa Alta</td>
<td>82.4</td>
<td>93.0</td>
<td>83.1</td>
<td>85.7</td>
</tr>
<tr>
<td>Alvaro Obregón</td>
<td>96.8</td>
<td>98.7</td>
<td>95.8</td>
<td>99.0</td>
</tr>
</tbody>
</table>

Note: All percentages are rounded to the nearest whole number.
DPU                                          Service Provision Governance in the Peri-Urban Interface of Metropolitan Areas

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tláhuac</td>
<td>93.9</td>
<td>98.6</td>
<td>76.8</td>
<td>97.1</td>
<td>97.9</td>
<td>99.5</td>
<td>97.5</td>
</tr>
<tr>
<td>Tlalpan</td>
<td>85.6</td>
<td>90.9</td>
<td>84.2</td>
<td>97.0</td>
<td>98.7</td>
<td>99.4</td>
<td>97.2</td>
</tr>
<tr>
<td>Xochimilco</td>
<td>90.4</td>
<td>94.1</td>
<td>80.6</td>
<td>91.8</td>
<td>97.2</td>
<td>99.2</td>
<td>96.2</td>
</tr>
<tr>
<td>Benito Juárez</td>
<td>98.9</td>
<td>99.0</td>
<td>98.6</td>
<td>99.3</td>
<td>99.9</td>
<td>99.8</td>
<td>97.7</td>
</tr>
<tr>
<td>Cuauhtémoc</td>
<td>98.3</td>
<td>98.3</td>
<td>97.9</td>
<td>98.3</td>
<td>99.8</td>
<td>98.9</td>
<td>96.3</td>
</tr>
<tr>
<td>Miguel Hidalgo</td>
<td>98.6</td>
<td>99.0</td>
<td>97.7</td>
<td>99.1</td>
<td>99.8</td>
<td>99.8</td>
<td>97.2</td>
</tr>
<tr>
<td>Venustiano Carranza</td>
<td>98.7</td>
<td>99.2</td>
<td>98.5</td>
<td>99.1</td>
<td>99.8</td>
<td>99.7</td>
<td>97.8</td>
</tr>
</tbody>
</table>

Includes homes with piped water inside, outside but on the land, and public spigots or hydrants, or carried from another home.


**CHART 30 Milpa Alta Delegation: private inhabited homes, availability of water, occupants and average occupants, 1970-2000**

<table>
<thead>
<tr>
<th>YEAR</th>
<th>Private inhabited homes (thousands)</th>
<th>Private inhabited homes with piped water</th>
<th>Private inhabited homes without piped water</th>
<th>Occupants (thousands)</th>
<th>Occupants per home</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>5.9</td>
<td>5333</td>
<td>567</td>
<td>33.7</td>
<td>5.7</td>
</tr>
<tr>
<td>1980</td>
<td>9.4</td>
<td>7696</td>
<td>1704</td>
<td>53.5</td>
<td>5.6</td>
</tr>
<tr>
<td>1990</td>
<td>12.3</td>
<td>10095</td>
<td>2205</td>
<td>63.6</td>
<td>5.2</td>
</tr>
<tr>
<td>1995</td>
<td>17.3</td>
<td>15183</td>
<td>2117</td>
<td>81.1</td>
<td>4.7</td>
</tr>
</tbody>
</table>

**D.F. Delegations**

**CHART 31 Expansion of the secondary sewerage network**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Azcapozalco</td>
<td>492.8</td>
<td>401.4</td>
<td>344.2</td>
<td>520.3</td>
<td>520.3</td>
<td>522.4</td>
</tr>
<tr>
<td>Coyoaocan</td>
<td>747</td>
<td>729</td>
<td>625.1</td>
<td>698.1</td>
<td>698.1</td>
<td>698.1</td>
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<tr>
<td>Cuajimalpa</td>
<td>140.9</td>
<td>98.7</td>
<td>84.6</td>
<td>226.9</td>
<td>227</td>
<td>226.9</td>
</tr>
<tr>
<td>Gustavo A. Madero</td>
<td>2,261.8</td>
<td>1,682.0</td>
<td>1,442.3</td>
<td>1,490.8</td>
<td>1,490.8</td>
<td>1,490.8</td>
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<tr>
<td>Iztacalco</td>
<td>493.8</td>
<td>491</td>
<td>421</td>
<td>440.5</td>
<td>440.5</td>
<td>440.5</td>
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<tr>
<td>Iztapalapa</td>
<td>1,406.1</td>
<td>1,388.0</td>
<td>1,190.2</td>
<td>1,799.30</td>
<td>1,800.0</td>
<td>1,799.3</td>
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<tr>
<td>M. Contreras</td>
<td>238.6</td>
<td>226.0</td>
<td>193.8</td>
<td>277.8</td>
<td>277.8</td>
<td>277.8</td>
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<tr>
<td>Milpa Alta</td>
<td>163.9</td>
<td>433</td>
<td>371.3</td>
<td>184.5</td>
<td>184.5</td>
<td>184.5</td>
</tr>
<tr>
<td>Aálarvo Obregón</td>
<td>1,171.1</td>
<td>1,510.0</td>
<td>1,294.8</td>
<td>726.1</td>
<td>726.1</td>
<td>726.1</td>
</tr>
<tr>
<td>Tlahuac</td>
<td>442.5</td>
<td>205.0</td>
<td>175.8</td>
<td>424.5</td>
<td>410.1</td>
<td>424.5</td>
</tr>
<tr>
<td>Tlalpan</td>
<td>389.1</td>
<td>472.3</td>
<td>405</td>
<td>555.9</td>
<td>555.9</td>
<td>555.9</td>
</tr>
<tr>
<td>Xochimilco</td>
<td>349.7</td>
<td>223.1</td>
<td>191.3</td>
<td>433.7</td>
<td>433.7</td>
<td>433.7</td>
</tr>
<tr>
<td>Benito Juárez</td>
<td>1,325.0</td>
<td>1,325.0</td>
<td>1,136.2</td>
<td>556.8</td>
<td>556.8</td>
<td>556.8</td>
</tr>
<tr>
<td>Cuauhtemoc</td>
<td>1,660.0</td>
<td>487.8</td>
<td>418.3</td>
<td>614.1</td>
<td>614.0</td>
<td>596.4</td>
</tr>
<tr>
<td>Miguel Hidalgo</td>
<td>1,001.0</td>
<td>1,173.0</td>
<td>1,005.8</td>
<td>721.1</td>
<td>721.1</td>
<td>721.1</td>
</tr>
<tr>
<td>Venustiano Carranza</td>
<td>700,0</td>
<td>700,0</td>
<td>600,2</td>
<td>566,9</td>
<td>566,9</td>
<td>566,9</td>
</tr>
<tr>
<td>---------------------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>Total DF</td>
<td>12,983,3</td>
<td>11,545,3</td>
<td>9,899,9</td>
<td>10,237,3</td>
<td>10,223,6</td>
<td>10,221,7</td>
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Source: System of DF Geo-economic Information.
### CHART 32  Sewerage Infrastructure in the DF

<table>
<thead>
<tr>
<th>Delegation</th>
<th>Coverage</th>
<th>Primary Network</th>
<th>Secondary Network</th>
<th>Piped Waterways</th>
<th>Other Sewerage Infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alvaro Obregon</td>
<td>98</td>
<td>132</td>
<td>726</td>
<td></td>
<td>Rivers and Ravines</td>
</tr>
<tr>
<td>Azcapotzalco</td>
<td>100</td>
<td>132</td>
<td>522</td>
<td>2.7</td>
<td>Deep Sewerage</td>
</tr>
<tr>
<td>Benito Juarez</td>
<td>100</td>
<td>557</td>
<td>840</td>
<td></td>
<td>Semi-deep Sewerage</td>
</tr>
<tr>
<td>Coyoacan</td>
<td>98</td>
<td>179</td>
<td>698</td>
<td>5.9</td>
<td>Semi-deep Sewerage</td>
</tr>
<tr>
<td>Cuajimalpa</td>
<td>95</td>
<td>32</td>
<td>227</td>
<td></td>
<td>18 KM of open air waterway</td>
</tr>
<tr>
<td>Cuauhtemoc</td>
<td>100</td>
<td>135</td>
<td>596</td>
<td>7.3</td>
<td>Deep sewarage</td>
</tr>
<tr>
<td>Iztacalco</td>
<td>100</td>
<td>103</td>
<td>440</td>
<td>10.9</td>
<td>Deep sewarage</td>
</tr>
<tr>
<td>Iztapalapa</td>
<td>91</td>
<td>306</td>
<td>1,810</td>
<td>4.8</td>
<td>8 Km of canals</td>
</tr>
<tr>
<td>Madero</td>
<td>95</td>
<td>287</td>
<td>1,491</td>
<td>9.5</td>
<td>18.1 km of open air waterways</td>
</tr>
<tr>
<td>Magdalena Contreras</td>
<td>98</td>
<td>33</td>
<td>278</td>
<td>9.5</td>
<td>4 km of open air waterways</td>
</tr>
<tr>
<td>Miguel Hidalgo</td>
<td>100</td>
<td>178</td>
<td>721</td>
<td>10.6</td>
<td>5.4 km of open air waterways</td>
</tr>
<tr>
<td>Milpa Alta</td>
<td>54</td>
<td>14</td>
<td>184</td>
<td></td>
<td>Open air ditches and ravines</td>
</tr>
<tr>
<td>Tlahuac</td>
<td>98</td>
<td>82</td>
<td>429</td>
<td></td>
<td>39.6 km of open air waterways</td>
</tr>
<tr>
<td>Tlalpan</td>
<td>77</td>
<td>109</td>
<td>556</td>
<td></td>
<td>17 km of open air waterways</td>
</tr>
<tr>
<td>Venustiano Carranza</td>
<td>100</td>
<td>129</td>
<td>566</td>
<td>12</td>
<td>2.5 km of open air waterways</td>
</tr>
<tr>
<td>Xochimilco</td>
<td>90</td>
<td>72</td>
<td>434</td>
<td></td>
<td>Regulatory reservoir and lagoon</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>2,034 km</td>
<td>10,235 km</td>
<td>73.2 km</td>
</tr>
</tbody>
</table>

*Source: DGCOH 1997*
**CHART 33: Treatment Plants**

<table>
<thead>
<tr>
<th>Delegation</th>
<th>Treatment Plant (Residual)</th>
<th>Use of treated residual water</th>
<th>Nominal capacity(l/s)</th>
<th>Real Capacity(l/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Obregon</td>
<td>Santa Fe</td>
<td>Irrigation of green areas</td>
<td>280</td>
<td>280</td>
</tr>
<tr>
<td>Azcapotzalco</td>
<td>El Rosario</td>
<td>Irrigation of green areas</td>
<td>25</td>
<td>16</td>
</tr>
<tr>
<td>Coyoacan</td>
<td>Coyoacan</td>
<td>Maintain levels of Xochimilco canals</td>
<td>800</td>
<td>203</td>
</tr>
<tr>
<td>Cuauhtemoc</td>
<td>Tlatelolco</td>
<td>Irrigation of green areas</td>
<td>22</td>
<td>18</td>
</tr>
<tr>
<td>G.A Madero</td>
<td>Acueducto Guadalupe</td>
<td>Commerce, industrial and irrigation</td>
<td>87</td>
<td>76</td>
</tr>
<tr>
<td>G.A Madero</td>
<td>San Juan de Aragón</td>
<td>Lake Aragón and irrigation, industry</td>
<td>500</td>
<td>238</td>
</tr>
<tr>
<td>Iztacalco</td>
<td>Iztacalco</td>
<td>Irrigation of green areas</td>
<td>13</td>
<td>10</td>
</tr>
<tr>
<td>Iztacalco</td>
<td>Cd. Deportiva</td>
<td>Industry, commerce and irrigation</td>
<td>230</td>
<td>149</td>
</tr>
<tr>
<td>Iztapalapa</td>
<td>Cerro de la Estrella</td>
<td>Filling lakes and agricultural irrigation</td>
<td>3500</td>
<td>1853</td>
</tr>
<tr>
<td>Miguel Hidalgo</td>
<td>Bosques de las lomas</td>
<td>Irrigation of green areas</td>
<td>55</td>
<td>17</td>
</tr>
<tr>
<td>Miguel Hidalgo</td>
<td>Chapultepec</td>
<td>Filling lakes and irrigation of green areas</td>
<td>130</td>
<td>106</td>
</tr>
<tr>
<td>Miguel Hidalgo</td>
<td>Campo Militar No 1</td>
<td>Irrigation of green areas and agriculture</td>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td>Milpa Alta</td>
<td>Rastro de Milpa Alta</td>
<td>Sanitation</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Tlahuac</td>
<td>San Juan Ixtayopan</td>
<td>Irrigation of green areas</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Tlahuac</td>
<td>San Nicolas Tetelco</td>
<td>Irrigation of green areas and open air flow</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Tlahuac</td>
<td>San Pedro Actopan</td>
<td>Agricultural irrigation</td>
<td>60</td>
<td>35</td>
</tr>
<tr>
<td>Tlahuac</td>
<td>San Andres Mixquic</td>
<td>Agricultural irrigation</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Tlahuac</td>
<td>San Lorenzo</td>
<td>Irrigation of green areas, agricultural irrigation,</td>
<td>255</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>lakes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tlalpan</td>
<td>Ciudad Universitaria</td>
<td>Irrigation of green areas</td>
<td>54</td>
<td>30</td>
</tr>
<tr>
<td>Tlalpan</td>
<td>Abasolo</td>
<td>Irrigation of green areas and open air flow</td>
<td>15</td>
<td>7</td>
</tr>
<tr>
<td>Tlalpan</td>
<td>H. Colegio Militar</td>
<td>Irrigation of green areas</td>
<td>30</td>
<td>12</td>
</tr>
<tr>
<td>Tlalpan</td>
<td>Parres</td>
<td>Irrigation of green areas and open air flow</td>
<td>7.5</td>
<td>2</td>
</tr>
<tr>
<td>Tlalpan</td>
<td>PEMEX-Picacho</td>
<td>Irrigation of green areas</td>
<td>20</td>
<td>6</td>
</tr>
<tr>
<td>Tlalpan</td>
<td>San Miguel Xicalco</td>
<td>Agricultural irrigation and open air flow</td>
<td>7.5</td>
<td>4</td>
</tr>
<tr>
<td>Tlalpan</td>
<td>Topilejo</td>
<td>Sanitation</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Xochimilco</td>
<td>Reclusorio Sur</td>
<td>Irrigation of green areas</td>
<td>30</td>
<td>18.6</td>
</tr>
<tr>
<td>Various</td>
<td>Registered</td>
<td>Industry, irrigation and cleaning</td>
<td>75,9</td>
<td>68.3</td>
</tr>
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</table>
### CHART 34: TREATMENT PLANTS OPERATED BY PRIVATE PARTIES

<table>
<thead>
<tr>
<th>Delegation</th>
<th>No. of treatment plants</th>
<th>CAUDAL (l/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alvaro Obregón</td>
<td>22</td>
<td>20.5</td>
</tr>
<tr>
<td>Coyoacan</td>
<td>5</td>
<td>1.12</td>
</tr>
<tr>
<td>Cuauhtemoc</td>
<td>1</td>
<td>3.52</td>
</tr>
<tr>
<td>Miguel Hidalgo</td>
<td>7</td>
<td>20.13</td>
</tr>
<tr>
<td>Tlahuac</td>
<td>1</td>
<td>1.30</td>
</tr>
<tr>
<td>Tlalpan</td>
<td>8</td>
<td>29.82</td>
</tr>
<tr>
<td>Total</td>
<td>44</td>
<td>75.94</td>
</tr>
</tbody>
</table>

Source: DGCOH, 1997

### CHART 35: Volume of Residual Waters Conducted by Type of Sewerage in the Metropolitan Zone (thousands of m³/year)

<table>
<thead>
<tr>
<th>Type of Sewerage</th>
<th>1995</th>
<th>1996</th>
<th>1997</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deep sewerage</td>
<td>466,733</td>
<td>199,000</td>
<td>199,000</td>
</tr>
<tr>
<td>Eastern Transmitter</td>
<td>133,397</td>
<td>347,000</td>
<td>347,000</td>
</tr>
<tr>
<td>Tequixquic Tunnels</td>
<td>725,328</td>
<td>1,091,000</td>
<td>1,091,000</td>
</tr>
<tr>
<td>Total</td>
<td>1,325,458</td>
<td>1,637,000</td>
<td>1,637,000</td>
</tr>
</tbody>
</table>

Source: INEGI

### CHART 36: Federal District: Domestic Use Tariff for Metered Service 2000

<table>
<thead>
<tr>
<th>Bimonthly Consumption m³</th>
<th>Tariff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Limit</td>
<td>Upper Limit</td>
</tr>
<tr>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>10.1</td>
<td>20</td>
</tr>
<tr>
<td>20.1</td>
<td>30</td>
</tr>
<tr>
<td>30.1</td>
<td>50</td>
</tr>
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<td>70.1</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>90.1</td>
<td>120</td>
</tr>
<tr>
<td>120.1</td>
<td>180</td>
</tr>
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<td>180.1</td>
<td>240</td>
</tr>
<tr>
<td>240.1</td>
<td>420</td>
</tr>
<tr>
<td>420.1</td>
<td>660</td>
</tr>
<tr>
<td>660.1</td>
<td>960</td>
</tr>
<tr>
<td>960.1</td>
<td>150</td>
</tr>
<tr>
<td>1500.1</td>
<td>MORE</td>
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</table>

CHART 37

Federal District: Fixed Tariff in Domestic Use 2000

<table>
<thead>
<tr>
<th>Type of neighborhood</th>
<th>Bimonthly Fee in Pesos</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>15.56</td>
</tr>
<tr>
<td>1</td>
<td>23.66</td>
</tr>
<tr>
<td>2, 3 and 8</td>
<td>47.33</td>
</tr>
<tr>
<td>4, 5 and 7</td>
<td>202.04</td>
</tr>
<tr>
<td>6</td>
<td>473.39</td>
</tr>
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</table>


CHART 38. AGEBS: Basic Geo-statistic Areas

<table>
<thead>
<tr>
<th>Ageb Key</th>
<th>Average income home / AGEB</th>
<th>Consumption of water per 1 family homes (m³)</th>
<th>Water Use (billing)</th>
<th>Number of Homes</th>
<th>Consumption of water on average per home</th>
<th>Water use a/h (m³)</th>
<th>% of monthly income spent on water services per month</th>
</tr>
</thead>
<tbody>
<tr>
<td>037-A</td>
<td>2507</td>
<td>2770</td>
<td>2.6</td>
<td>2.6</td>
<td>6490</td>
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<td>2.7</td>
</tr>
<tr>
<td>033-1</td>
<td>2669</td>
<td>4790</td>
<td>4.5</td>
<td>7.1</td>
<td>13549</td>
<td>5.6</td>
<td>8.3</td>
</tr>
<tr>
<td>035-0</td>
<td>2767</td>
<td>73</td>
<td>0.1</td>
<td>7.2</td>
<td>129</td>
<td>0.1</td>
<td>8.3</td>
</tr>
<tr>
<td>034-6</td>
<td>2813</td>
<td>837</td>
<td>0.8</td>
<td>8.1</td>
<td>1558</td>
<td>0.6</td>
<td>9.0</td>
</tr>
<tr>
<td>030-8</td>
<td>2915</td>
<td>4005</td>
<td>3.8</td>
<td>11.8</td>
<td>10916</td>
<td>4.5</td>
<td>13.5</td>
</tr>
<tr>
<td>031-2</td>
<td>2923</td>
<td>6518</td>
<td>6.1</td>
<td>17.9</td>
<td>17915</td>
<td>7.4</td>
<td>20.8</td>
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<tr>
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<td>2934</td>
<td>2262</td>
<td>2.1</td>
<td>20</td>
<td>4839</td>
<td>2.0</td>
<td>22.8</td>
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<tr>
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<td>2986</td>
<td>6834</td>
<td>6.4</td>
<td>26.4</td>
<td>13981</td>
<td>5.8</td>
<td>28.6</td>
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<tr>
<td>024-2</td>
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<td>15</td>
<td>0.0</td>
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<td>18</td>
<td>0.0</td>
<td>28.6</td>
</tr>
<tr>
<td>019-1</td>
<td>3121</td>
<td>3246</td>
<td>3.1</td>
<td>29.5</td>
<td>5943</td>
<td>2.5</td>
<td>31.1</td>
</tr>
<tr>
<td>039-9</td>
<td>3130</td>
<td>850</td>
<td>0.8</td>
<td>30.3</td>
<td>1503</td>
<td>0.6</td>
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</tr>
<tr>
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<td>3231</td>
<td>884</td>
<td>0.8</td>
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<td>2076</td>
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<tr>
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<td>23040</td>
<td>21.7</td>
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<td>46849</td>
<td>19.3</td>
<td>51.8</td>
</tr>
<tr>
<td>012-A</td>
<td>3301</td>
<td>8069</td>
<td>7.6</td>
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<td>58.4</td>
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<td>041-6</td>
<td>3330</td>
<td>10421</td>
<td>9.8</td>
<td>70.2</td>
<td>25239</td>
<td>10.4</td>
<td>68.8</td>
</tr>
<tr>
<td>023-8</td>
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<td>219</td>
<td>0.2</td>
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Source: Quiñones, 99. Elaboration based on information provided by TECSA and Mexico City Secretary of Health, 2000

Note: The average income of the house of each AGEB was imputed to each one of the houses located within them. This was done once it was verified that in all the AGEBS each home had an average of 1.1 families (Secretary of Health, 2000)
### CHART 39. AGEBS Key, Milpa Alta Towns

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### CHART 40: Modifications installed in governance of water

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<th>Year</th>
<th>Action</th>
<th>Consequences</th>
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<td>1982</td>
<td>Responsibility for federal intervention in urban and industrial water is transferred from the SARH to the SEDUE.</td>
<td>A federal institution of regulation of urban development and ecology is created, which administers water, particularly urban industrial water.</td>
</tr>
<tr>
<td>1983</td>
<td>Art. 115 of the Constitution is reformed.</td>
<td>Responsibility for providing water and sanitation services is transferred from the Federation to the municipalities.</td>
</tr>
<tr>
<td>1986</td>
<td>Federal Fees Law is reformed.</td>
<td>Fees are introduced. The issue of efficiency and cost of water begins to be discussed.</td>
</tr>
<tr>
<td>1989</td>
<td>Creation of the CNA, dependent on the SARH.</td>
<td>Commission in charge of water.</td>
</tr>
<tr>
<td>1990</td>
<td>Federal Fees Law is reformed.</td>
<td>Fees for water use are updated.</td>
</tr>
<tr>
<td>1991</td>
<td>Federal Fees Law is reformed.</td>
<td>A charge is included for discharge of polluted wastewaters.</td>
</tr>
<tr>
<td>1992</td>
<td>Promotion of the National Waters Law. 46</td>
<td>Possibility to give way to private industry.</td>
</tr>
<tr>
<td>1993</td>
<td>Public Registry of Water Rights (REPDA)</td>
<td>Titles of concession, assignation and permission for water rights are registered.</td>
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<tr>
<td>1999</td>
<td>Art. 115 of the Constitution is reformed.</td>
<td>Frees the water market even more, transfers from State to municipalities.</td>
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</table>

Source: Our own elaboration.

---

45 In the beginning, the CNA is a deconcentrated organ of the Secretary of Agricultura and Hydraulic Resources (SARH). However, in 1994, it becomes a deconcentrated organ of the recently created Secretary of Environment, Natural Resources and Fishing (SEMARNAP) which is transformed in 2000 into the Secretary of Environment and Natural Resources (SEMARNAT). Axel Dourojeanni et. al. 2001, CNA, 2001.

46 In 1992, after the significant constitucional reform, the National Waters Law was promoted, to regulate Article 27 “which sustains as fundamental objectives the integral administration of water, more user and private participation in financing, building and operating water; the judicial security of water use, and the integral sustainable development of water, its goods and services.” Ortiz Rendón, Gustavo con la colaboración de Flor Cruz y Juan Carlos Valencia, Aspectos relevantes de la política del agua en México, en el marco del desarrollo sustentable. INTERNET. Regarding the participation of private companies, the Law offers a judicial framework base for their participation in hydraulic works and projects under the responsibility of the Federal Government. The Law considers the possibility that private industry participate in funding, building and operating federal hydraulic infrastructure, as well as providing corresponding services. This legislation represents a central change in relationship to previous water issues, because it specifies government responsibilities and because it notes that the effort of the public sector can be complemented with the participation of private investment in funding, building and operating federal hydraulic infrastructure.
CHART 41. Judicial Framework

<table>
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<th>Judicial Framework before 1980</th>
<th>Current Judicial Framework and Regulation of Private Participation in Mexico</th>
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<tr>
<td>Law of Nationally Owned Waters</td>
<td>Political Constitution of the United Mexican States</td>
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<td>Federal Law of Sanitary Engineering</td>
<td>National Waters Law and Regulation</td>
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<td>Irrigation Law</td>
<td>National Fees Law</td>
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<td>Law of Cooperation for Providing Potable Water to Municipalities</td>
<td>Public Works Law</td>
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<td>Regulatory Law in the fifth paragraph of Article 27 of the Constitution on SUBSUELO Waters</td>
<td>General Law of National Goods</td>
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<td>State Water Laws</td>
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<td>Diverse state laws and orders related to public works and fiscal and comercial aspects, among others.</td>
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<td>Municipal regulations.</td>
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</table>

CHART 42

ACTIVITIES OF THE POLITICAL DELEGATIONS ACCORDING TO THE 1999-2001 BUDGET PROGRAM (WATER AND SEWERAGE)

- Conserve and maintain the secondary potable water network.
- Conserve and maintain the secondary sewerage network.
- Distribute potable water in trucks.
- Expand the secondary sewerage network.
- Repair water leaks.
- Remove sediment from the secondary sewerage network.
- Expand the secondary potable water network.
- Connect home sewerage discharges.
- Carry out clearing and sediment removal of collectors, culverts and wells.
- Install home water taps.
- Give preventive and corrective maintenance to culverts and manholes.
- Build collectors for the sewerage system.
- Build sewers.
- Build wastewater treatment plants.
- Remove sediment and rehabilitate lagoons, lakes, waterways, rivers, canals and reservoirs.
- Build containers to collect rainwater.
- Rehabilitate the secondary sewerage network.
- Build a storage tank.
- Rehabilitate sides of open air waterways.
- Build wells to absorb residual water.
- Rehabilitate the secondary potable water network.
- Carry out studies and projects to support works for the sewerage system.
- Carry out a citizen campaign for a rationed use of water.
- Build dam reservoirs.
- Build, expand and/or update storage tanks for hydraulic reinforcement.
- Carry out studies and projects to support works for the potable water system.
- Build dykes.

Source: Agenda of hydraulic policy from the Legislative Assembly of the Federal District, _La participación de las delegaciones políticas en la gestión del servicio de agua en el D.F. UNAM_, 2002.