

MEXICO CITY: INDIVIDUAL AND COLLECTIVE RESPONSES TO URBAN ENVIRONMENTAL DETERIORATION

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Summary

Mexico City's environment has been exposed through its history to very radical transformations. The industrialization and urbanization processes after World War II gave way to an increasing dependence on fossil fuels, that, together with the natural setting of the city, caused an unprecedented environmental crisis associated with air pollution. This new environmental problem reached a peak in the early 1990s.

The spread of environmental information, as well as the population's perception of the threats that the quality of air was posing to their health and quality of life, activated different responses by the society. In this chapter, two among the various responses designed by middle class women and families are documented. The first relates to demographic responses at the individual family level: out-migration to smaller cities. The second is a collective response, by which the population protects the micro-local environmental deterioration against urban sprawl and speculation.

1. Introduction

Mexico City, one of the most populated cities in the world, has been subject to important environmental changes since its populating around seven thousand years ago. The first inhabitants of the Basin of Mexico settled on a lacustrine ecosystem, causing dramatic modifications that allowed the expansion of small islands, giving rise to the

development of Tenochtitlan, which would later become Mexico City. This settlement housed one of the most important Pre-Hispanic civilizations, the Aztecs, whose population size was estimated to be of 300 000 citizens.

Contact with Europeans in the sixteenth century gave way to a most important environmental change, besides the economic, social, political, demographic, and cultural conquest. Through the centuries, influence from colonizers led to the near disappearance of the lakes and waterways system, which also represented the main source of food, transportation, housing materials, and symbolism.

These environmental modifications originated mainly from the different relationships the Europeans held with nature, especially due to their foreign ecological origins, which were conformed by a cooler weather and relatively alien species of flora and fauna.

Additionally, the conditions under which the Aztecs were subdued, the spread of European diseases, and the needless slaughter during the conquest, decreased the indigenous population to a mere 10% of the original.

Almost five centuries after the Spanish conquest, Mexico City seems to be facing another environmental crisis, as dramatic as the aforementioned. This time, however, the change of the natural ecosystem has considerably different manifestations and causes.

Due to the city's natural setting, the industrialization process that began after World War II gave way to new important environmental problems. These were associated with the rapid growth of the city, both in spatial and demographic terms. The urban area grew from 260 km² in 1950 to approximately 1 500, fifty years later. The population in 1950 (three million) increased by 600%, recording the highest growth rates during the period 1940-1970. This later process was a result of the important rural-urban migration and the mortality decrease due to sanitation and medical improvements.

Despite the complexity of the environmental crisis that affects several aspects of Mexico City, those associated with air pollution have had priority from the government and from society. This sudden attention owes itself mainly to the accurate pollution measures that became common knowledge in the mid 1980s.

Before this situation the local population, however, did not remain passive to the environmental damage, but, on the contrary, it responded in different ways depending on the perceived threats that the ecological disruptions posed to its quality of life.

Among the different responses designed by the population to face the pollution problems are those related to the demographic and the political dimensions. Within the former, out-migration to smaller cities by middle-class households in the early stages of the family cycle is outstanding. The social participation by middle-class women in fighting urban sprawl and real estate speculation is also a highlight in the subject.

The first part of this chapter will be devoted to a brief description of Mexico City's natural setting. The second part will present the main economic and demographic

processes related to the quality of the environment, which are later presented in more detail. The third part will briefly document the different responses of the population to the environmental crisis during the early 1990s. The final part will present some brief conclusions.

2. The Natural Setting

Mexico City is located at 2240 meters above sea level in the southern part of the basin of Mexico, over a surface of approximately 1500 square kilometers.

The basin, which was originally closed by land formations, occupies an area of approximately 9600 square kilometers, and is located in the southern part of the Central Volcanic Axis, between meridians 98° 15' and 99° 30' and between parallels 19° 00' and 20° 15' (See Map of Mexico). In the greatest length this valley measures 110 kilometers. The mountain chains that surround it are of volcanic origin: to the north of the valley are the sierras of Tepotzotlan, Tezontlapa and Pachuca; to the east, the plains of Apan and the Sierra Nevada; to the south, the Sierras Chichinautzin and the Ajusco; to the west, the Sierra Las Cruces, Monte Alto and Monte Bajo. The highest peaks are located towards the Southeast, the Popocateptl and the Iztaccihuatl, with an altitude of 5465 and 5230 meters above sea level, respectively.



Figure 1. Mexico Country and Mexico City

Due to Mexico City's natural setting, the content of oxygen in the air is 23% less than that at sea level. This scenario causes a reduced efficiency of internal combustion in vehicles and industries, provoking a higher emission of pollutants into the atmosphere. Besides, the surrounding mountains act as a natural barrier against the contaminants' dispersion.

The basin of Mexico is also surrounded by other basins: to the north by the valley of the river Tula and the Mezquitlan lagoon, to the east by the Tecolutla river, to the west by the Lerma river, to the southeast by the Atoyac and Mixteco rivers, and to the south by the Amacuzac river.

At the bottom of the basin, which is where Mexico City lies now, there rested a system of lakes which covered a surface of 1500 square kilometers, five of them being the most important: Texcoco, Zumpango, Chalco, Xochimilco, and Xaltocan. The lake of Texcoco, the shallowest of these, used to receive all the flow of the basin, before evaporation. Presently, there are only about 50 square kilometers of lakes left, which include the remnants of Xochimilco, Texcoco, Chalco and Zumpango.

The climate of Mexico City can be considered as high altitude subtropical, temperate and semi-dry. The mean temperature is 20 °C and the rainy season is concentrated between the months of May and October. The annual rainfall approximates to 700 millimeters; that is, a mean annual flow of ca. 210 cubic meters per second on the catchment area where Mexico City is located.

Regarding the natural setting, nine original environmental zones have been identified within the basin: lake system, saline lakeshore, deep-soil alluvium, thin-oil alluvium, upland alluvium, lower piedmont, middle piedmont, upper piedmont and sierras. This environmental diversity provided a great variety of flora and fauna which, in turn, provided the inhabitants of the basin with a sufficient food supply.

Nevertheless, even before Spanish influence, the overwhelming increase of population caused scarcity of animal protein, which was only available through fishing and hunting. This led the indigenous cultures to develop farming techniques, which included the domestication of plants, principally maize, terracing and the construction of *chinampas*, one of the most productive agricultural systems. These consist of floating gardens or rafts on the lake, covered with soil, on which vegetables and flowers are planted. At present only 10 km² are left on what remains of the lake of Xochimilco; within the basin, there still exist over 2000 registered species of wild flora and fauna, 350 of them catalogued as endangered species.

3. Industrialization and Population Growth

Despite the inappropriate natural setting for the industrial development, Mexico City experienced an overwhelming concentration in industry from the late 1940s. The dominant pattern of industrialization through import substitution in Latin America after World War II caused this phenomenon. Mexico City produced alone almost half of the industrial product of the country by 1970 and 37% of the total GNP. The share within industrial employment in 1975 was 45%.

During the 1980s, major structural transformations necessary for the insertion of the country into the global economy reduced the industrial concentration in Mexico City. By 1988 Mexico City's contribution to the total GNP was 42% and 33% to the industrial product; in 1994 only 24% of the national industrial employment was generated in the capital of the country.

These major tendencies are replicated by the city's demographic dynamics. As mentioned before, by 1950 the population size was around 3 million people. By the year 2000, according to the population census, it was 18 and a half million (Table 1). During the decade 1940-1950 the mean annual growth rate registered a 6.7% peak whilst in the 90s it reached 1.2%, below the 1.44% at national level. It is projected that 1% will be the mean annual growth rate by the year 2010

Year	Inhabitants
1521	300,000
1742	101,000
1803	138,000
1900	347,721
1910	471,066
1921	615,367
1930	1,029,068
1940	1,644,921
1950	2,982,199
1960	5,155,327
1970	8,656,851
1980	13,734,654
1990	15,047,685
1995	16,898,316
2000	18,518,770
2010	20,462,242

Table 1. Mexico City population 1521-2010

At the core of these demographic transformations is the fact that the power of attraction is declining for the first time in the recent history of the city. Actually, the main internal migration flows of the country prior to 1980 directed towards Mexico City, whereas after 1985 mobility patterns changed dramatically. Internal migration was increasingly characterized by out-migration from the capital city. The city's net migration rates in the late 1980s were negative for the first time in this century. Between 1985 and 1990, over 500 000 people emigrated from Mexico City, while fewer than 500 000 immigrated, a net loss of 100 000 people, or approximately 0.6% of the city's 15 million inhabitants in 1990.

The major causes of this reduced growth and the proliferation of out-migration flows from Mexico City between 1985 and 1990 are those associated with a slower economic growth, a reduced employment generation, industrial deconcentration, and restrictions to new industries in the capital city. But most important for this chapter is the influence of the environmental deterioration associated with the quality of air after 1985, although traditional information sources, such as census and surveys, usually do not include questions on migration causes and intentions. The only exception is the 1987 Mexican Survey on Migration to Urban Areas (ENMAU) and more recently the 2000 Population Census that questioned causes of internal migration. As a result, to gain a deeper understanding of the causes and intentions of migration, it has been essential for the researchers themselves to collect information, generally restricted to small case-studies.

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Biographical Sketch

Haydea Izazola was born in Mexico City in 1954. She obtained a degree in Economics from UNAM (National Autonomous University of Mexico), and a Master's degree in Demography and a Ph. D. in Social Sciences with major in Population Studies from El Colegio de México. She has been a member of the LEAD-Program, Mexico (Leadership for Environment and Sustainable Development), since 1995. She is a professor and researcher with tenure at the Department of Methods and Systems, Faculty of Sciences and Arts for Design, at Universidad Autónoma Metropolitana (UAM) Xochimilco (Metropolitan Autonomous University, campus Xochimilco). At present she coordinates the concentration area on Sustainability and Design of the Graduate Studies Program in Science and Arts for Design. Since 1995 she has been a member of the Mexican National Researchers System (SNI), level I.

She has been a member of the Mexican Society of Demography (SOMEDE) since 1984; she coordinated the working group on Population and Environment of the Society, from 1991 to 1997. She has written several scientific articles and has edited several books on the relationship between population and environment, including: *Población y ambiente ¿nuevas interrogantes a viejos problemas?* in 1993, *Desarrollo sustentable, medio ambiente y población a cinco años de Río* and *Población y medio ambiente, descifrando el rompecabezas*, both in 1999.

Her research interests include the relationship between quality of life and quality of the urban environment in Mexico City, and in particular, between migration and the deterioration of environment, with a special focus on family and gender issues.