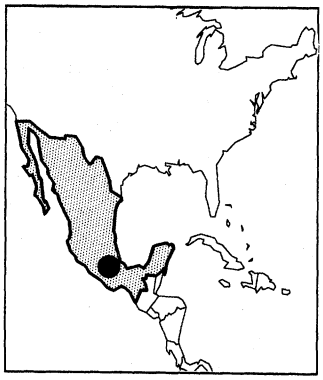

The environmental problems associated with urban development in Mexico City

by Martha Schteingart, El Colegio de México

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I. INTRODUCTION

MEXICO CITY HAS often been described as an example of calamitous and pathological urban development. Such catastrophic visions often use partial and misleading information and sometimes apply biased interpretation to that urban reality. The principal aim of this paper is to give a more balanced and objective interpretation of some of the more pressing environmental problems in Mexico City and to do so within an understanding of the demographic and physical growth of the city and its wider metropolitan zone. Section II gives some background information on the city - how and why it grew and its economic and employment base. Section III describes the environmental problems facing the city: shortages of housing and services; problems in urban transportation; biological and environmental degradation; air pollution; and water problems. Section IV reviews government policies on transport, environment and water supply. Section V considers Mexico City in the Year 2000 and is followed by some concluding comments.

II. BACKGROUND

THE DEVELOPMENT OF an industrial city depends to a great extent on an already established base of pre-industrial infrastructure. Mexico City, as Mexico's principal economic and political centre for centuries, had the more favoured situation for industrial development. The city had the most sophisticated infrastructure in the country, the largest consumer market, a concentration of existing industries, and a relatively well-trained labour force. These factors, combined with the city being the seat of the federal government (which facilitated commercial transactions) significantly spurred later dynamic growth.[1]

Mexico City's rapid growth during this century is well known. In 1900 there were 344,000 inhabitants and an annual growth rate of 3.1 percent - indicating that migration already made an important contribution to population growth. The annual growth rate grew to reach 5 percent in the 1920s at a time when the growth rate for the national population was only 1.6 percent. These migratory processes were in part the outcome of the Revolution of 1910. Although the Agrarian

1. Garza, Gustavo and Schteingart, Martha (1978), *La acción habitacional del Estado en México*, El Colegio de México

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Reform tended to keep rural population on their lands, it was insufficient to overcome the lack of balance between the agricultural and non-agricultural sectors of the economy, and this led to urban migration by many peasants. The main centre of attraction was Mexico City.[2]

2. See Note 1.

From 1940 to 1970, the city experienced annual growth rates of over 5 percent which meant it almost doubled its population with each decade. In these three decades, 6.2 million people moved from rural areas or small towns to large urban centres and half of them made their way to Mexico City.[3] In the 1970s, the growth rate slowed slightly to an annual average of 4.8 percent; the importance of migration to Mexico City declined compared to natural increase. But this is still a very high rate of growth for a metropolis of the size of Mexico City and according to an estimate from the Federal District Offices, around 1,000 people arrive daily in search of work from other parts of Mexico. This mass of migrants is forced to leave rural areas by the dissolution of the peasant economy, modernising agriculture or stagnating small population centres. They come seeking new opportunities in Mexico City and they continue to have an important impact on its development.

3. Unikel, Luis, with Ruiz Chiapetto, Crescencio and Garza Villareal, Gustavo (1976), 'El desarrollo urbano de México: diagnóstico e implicaciones futuras', El Colegio de México.

In 1940, the population was 1.7 million; by 1980 it had grown to 14.4 million in what is termed the Metropolitan Zone of Mexico City, making it the most populous metropolis in the world. Of this, 9.4 million lived in what is termed the Federal District with 5.1 million in the State of Mexico. In 1950, virtually all the population was still in the Federal District; in this year, just 29,000 people lived in that part of the Metropolitan Zone that was in the State of Mexico. The urban area expanded more than ninefold between 1940 and 1983; the urbanized area was 117 square kilometres in 1940, 633 square kilometres in 1970 and over 1,200 square kilometres by the mid 1980s.

Despite this rapid growth, Mexico City has always concentrated a higher proportion of the nation's commercial activities than of its national population. Apart from being the dominant industrial centre, it is also the pre-eminent banking and consumption centre. It has long had a large concentration of educational and cultural activities. Furthermore, it has long had a high concentration of public employees; in 1975, it had some 500,000 employees of government agencies or ministries and of decentralized public businesses.

Since the 1940s, Mexico's industrialization process at a time when the government was supporting import-substitution fostered further growth and industrial concentration in the capital city. Established industrial units increased from 3,180 in 1930 to 34,543 in 1975, climbing from 3.8 percent to 29 percent of the national total. Mexico City increased its shares of national production from 29 percent in 1930 to 45.4 in 1975.[4]

4. Garza, Gustavo (1981), 'El proceso de industrialización de la Ciudad de México: 1845-2000', *Lecturas del CEESTM* (Centro de Estudios Económicos y Sociales del Tercer Mundo) 1(3):pp. 103-11.

However, despite this concentration of industry, the nature of the industry that developed only produced a limited capacity to absorb large quantities of labour, especially after 1960. Thus, the growing urban population has been increasingly employed in the tertiary (service) sector which has absorbed most migrants displaced from agriculture. Currently more than 58 percent of the economically active population are estimated to be working in the tertiary sector of the economy.

The largest contribution to the increase in service employment is the expansion of public administration, which also contributed substantially to the growth of the middle classes. However, the expansion of services was also due to a growth in the population employed in low-productivity activities (such as repairing and

cleaning services) with low incomes representative of urban underemployment.

Thus, a surplus workforce developed which helped maintain salaries at a low level. Between 1938 and 1965, minimum salaries increased by 316 percent while the cost of living grew by more than twice this - by 745 percent.[5] On the other hand, open unemployment (the number of people actively seeking jobs) appears to have doubled each decade since 1940. At least 24 percent of the economically active population in the Federal District were estimated to be involved in fringe occupations (those receiving less than the minimum wage). Were it possible to include not only those who received very low salaries but also those who received larger salaries but were not permanently employed (and whose income was consequently reduced by distributing it over a whole year), the proportion of underemployed persons would have grown to 35 percent of the economically active in the Federal District in 1970.[6] By 1978, 48 percent of the economically active population were estimated to be underemployed.

5. Centro Operacional de Vivienda y Poblamiento (1977), *Investigación sobre Vivienda*, Vol.2, Mexico City.

6. Hewitt de Alcántara, Cynthia (1977), 'Ensayos sobre la satisfacción de necesidades básicas del pueblo mexicano entre 1940 y 1970', *Cuadernos del CES*, no.21, Centro de Estudios Sociológicos, El Colegio de México, Mexico City.

III. ENVIRONMENTAL PROBLEMS

ONE CANNOT DENY environmental problems - and problems such as unemployment and underemployment - have not been aggravated by an annual addition of 600-700,000 new inhabitants (each year the equivalent of a medium-sized city). But they cannot be explained simply in terms of population growth. The problems must also be seen in the context of a model of dependent and unbalanced national development which presents problems of structural unemployment and working force exploitation, and works for the benefit of the land-owning, industrial, financial, and real estate sectors (who also profit from the concentration of population and economic activities in Mexico City).

a. Shelter and Services

While in the period just after World War II, most poorer groups were concentrated in overcrowded, centrally located rental units (vecindades), during the Fifties, the poor began to occupy the Texcoco lake bed, despite the fact that no public provision was made for infrastructure and services. The lake-bed lies to the north-east of the city and is the most inhospitable part of the Valley of Mexico, within which the city is located. It is plagued by regular floods in the rainy season and by dust storms in the dry season - as well as an almost complete lack of services. During the Sixties, with a large scale shift in population away from the central city and the establishment of new industries in that part of the metropolitan zone in the State of Mexico, there was also a proliferation of irregular settlements. One example is Nezahualcoyotl, a clandestine land subdivision whose population grew from 65,000 in 1960 to 650,000 in 1970 and 1.3 million people by 1975. According to COPEVI,[7] illegal and informally developed settlements occupy 65 percent of the metropolitan urbanized area. These communities generally consist of illegally acquired lands without services and with limited and deficient facilities and self-constructed housing.

By 1970 an estimated 577,000 new dwellings would be required to eliminate Mexico City's housing shortage. This figure corresponds to 242,000 units for homeless families, 148,000 to replace deteriorated housing, and 187,000 to eliminate overcrowding.[8] According to

7. See Note 5.

8. See Note 1.

Federal District Department estimates, the actual deficit affects more than 800,000 families in the district.

Tap water reaches 80 percent of homes with a primary network of 540 square kilometres and a secondary network of 12,000. Nevertheless, in the areas with the worst condition, 40 to 46 percent of the population lack water service. Although a sewage system serves 70 percent of the population, this still means that some three million people are not served. The lower income settlements in the State of Mexico are the worst served where water and sewer installation is more problematic and urban growth is most rapid.

The areas experiencing an expansion of low income settlements are characterized basically by irregular land tenure, lack of services, and precarious housing which is generally self-constructed by those who settle there. Although there are considerable differences in the quality of housing, degrees of consolidation and level of consumption, conditions are very poor in most settlements with problems now further aggravated by the economic crisis, increased unemployment, and limited possibilities for housing improvement.[9]

Regarding land tenure, a large part of these low income settlements are on illegally developed 'ejidal' and communal lands or on state-owned property, derived from the Texcoco's drying lake bed (in the State of Mexico). The fact that Mexico City (and other Mexican cities) grew to a great extent on land which was not private property[10] sets them apart from most other Latin American cities. Nevertheless, this has not benefited the low income sectors with no access to the capitalist real estate market. Relatively well off households have occupied an important part of communal or 'ejidal' lands through both legal and illegal means. Some of these also served the lower income settlements. Illegal land purchase by the 'colonos' has been tolerated by the state and has served to mitigate the conflicts produced by irregular settlements. These conflicts tend to be much greater in countries where urban expansion takes place almost exclusively on private property and where confrontations occur between 'colonos' and powerful owners of the peripheral land. Yet the legal situation in force does not allow the low income sector to settle without a long series of repeated payments for regularization of developments.[11]

b. Urban Transportation Problems

Mexico City has a pressing need for new transportation policies. The transportation system has developed based on the proliferation of private automobiles with little co-ordination of and support for public transport. This system is deficient and expensive for low income workers. On buses there is the obvious increase in overcrowding, longer waiting periods in stations and at bus stops, and the percentage of wages spent on transport rose from 9.4 percent to 13.4 percent between 1968 and 1978 for the average family.[12]

In the Metropolitan zone of Mexico City, at present some 23 million person-trips are registered daily; of this total only 16 percent are in private automobiles and the rest are by public means (bus, taxi, trolleybus, metro). The metro concentrates some four million trips with a network which as a result of recent extensions serves an area of around 100 km^2 with 6 lines and 85 stations. Nevertheless, on some lines and during rush hours, a 25 percent overload of passengers has been calculated.[13]

Almost a third of all the person-trips take place on the city's periphery, particularly in metropolitan municipalities where there are no subway lines with subsidized fares. To get to work, those living in

9. Schteingart, Martha (1983), 'La promoción inmobiliaria en el Area Metropolitana de la Ciudad de México, 1960-1980', *Demografía y Economía* 17(53):pp.83-105.

10. In the Federal District between 1940 and 1975, growth of the urban area covered some 42.8 percent of private property, 26.5 percent of communal lands, and 20.7 percent of 'ejidal' lands. In the State of Mexico, the urban area has expanded by 21.9 percent on 'ejidal' lands, 27 percent on communal lands, and 27.8 percent on state-owned lands (resulting from the drying up of Texcoco Lake), and by only 22.8 percent on private lands. The figures demonstrate clearly that the city grew on non-private lands to a much greater extent than in the Federal District

11. Schteingart, Martha (1983), 'La incorporación de la tierra rural de propiedad social a la lógica capitalista del desarrollo urbano: El caso de México', in *Relación campo-ciudad: la tierra, recurso estratégico para el desarrollo y la transformación social*, Sociedad Interamericana de Planificación, Mexico City.

12. Ibarra, Valentín (1981), 'El papel económico del transporte de personas en la Ciudad de México', *Lecturas del CEESTEM* (Centro de Estudios Económicos y Sociales del Tercer Mundo) 1(3): pp.77-83.

13. Mexico, Secretaría de Programación y Presupuesto (1984), 'Programa de desarrollo de la Zona Metropolitana de la Ciudad de México y de la Región Centro', Mexico City.

these areas have to crowd into increasingly overcrowded buses or take 'collective taxis' whose prices have increased considerably in the last few years.

The transportation scheme implies an annual increase of 10 percent in the number of private cars. At present the number of cars in circulation is 2.2 million - 97 percent of the total transportation units but only making 16 percent of the total trips. Automobiles promote inefficient energy consumption; they use 66 percent of all gasoline while public transportation accounts for less than 22 percent.[14] The lack of road space and parking places for this growing mass of automobiles increases traffic jams in the city centre and on freeways leading to the periphery. Road systems developed in the last few years meant enormous expenses for the public administration. These encouraged greater private car use without solving the lack of capacity and the congestion which continues to worsen.

14. Campbell, Timothy (1981), 'Resource Flows in the Urban Ecosystem - Fuel, Water, and Food in Mexico City', Working Paper, Institute of Urban and Regional Development, University of California, Berkeley, no.360, Berkeley.

c. Biological and Environmental Degradation

The Metropolitan Zone is located in the south-west of the Valley of Mexico, in the country's southern region at some 2,300 metres above sea level. The Valley covers an area of approximately 9,600 square kilometres and is open only toward the north and south-west; in other directions mountain chains rise more than 600 metres above the Valley area.

The Valley of Mexico has undergone drastic transformation. Much of it was once covered by a series of lakes of which only the salty Texcoco lake bed remains. This salt base creates a barrier to any kind of construction in the north-west of the Metropolitan Zone. It is likely that 73 percent of the forest area has been lost; 99 percent of the lake area has also been lost, with the result that 71 percent of the soil has been eroded. In addition, 700 hectares of agricultural land are lost annually.[15]

15. Mexico, Comisión de Desarrollo Agropecuario del Distrito Federal (1981), 'Estudio de espacios abiertos en el Distrito Federal', Mexico City.

The Valley's geographical location in the inter-tropical zone, as well as its altitude, are important influences on its climate which is also influenced by winds. There is little rain and clear skies in winter and spring; in summer and autumn, the valley has clouds and heavy rain. Vegetation, also important in climate modification, has been seriously eroded. This affects temperature variations which now register more extreme maximums and minimums. These geographic, climatic and environmental change factors play an important role in the city's ecological and environmental degradation and, as discussed later, in providing water necessary for urban activities.

d. Air Pollution

The Metropolitan Zone has frequently been called one of the most polluted areas in the world. Altitude, rains, and limited winds, together with industrialization and the pattern of urban growth (the transportation system, diffusion of popular settlements, and land use in general), have aggravated the situation.

In the Valley of Mexico, the atmosphere is badly affected by the thermal inversion produced when a mass of cold air, at a certain height, does not allow the renewal of warmer air. During the rainy season, when a cold air mass penetrates, the thermal inversion is upset. Thus, the six month dry season is when air pollution is most serious.

16. At this altitude, because of a lower concentration of oxygen in the air, there is an increase of 30 percent in hydrocarbons and 100 percent in carbon monoxide produced compared to that produced at sea level.

The heavy circulation of road vehicles, poor maintenance of their engines and traffic jams, combined with the city's altitude[16] result

in heavy air pollution. Added to this are some 60 polluting industries such as oil refineries, thermoelectric plants and cement factories which emit vast amounts of particulate matter.[17]

17. See Note 13.

Other pollution sources are the Texcoco lake bed with its sandy, loose, salty soil and scant vegetation; arid eroded zones (20 percent of the Metropolitan Zone is in the process of advanced erosion and another 17 percent suffers moderate erosion); the 14,000 tons of waste matter dumped in the open air and 20,000 put in clandestine dumps. Excrement deposited in open places is dehydrated by the sun and its residues distributed by the winds. The highest concentrations of these dust particles, according to measurements by the Secretary of Health and Assistance, were found in the south-east and north-east of the Metropolitan Zone where lower income people live.

The highest monthly mean averages of sulphur dioxide are found in the south-west and north-west. Concentrations in the north-west can be blamed on emissions from a major oil refinery and from thermoelectric industries. Carbon monoxide emitted by the engines of road vehicles reach high concentrations close to roads; the highest levels occur during the hours of the most intensive vehicle use, particularly in the centre and north of the urban area. The pollution level varies according to the city's zones and the season. The lower income population is, of course, exposed to heavier pollution since they live in areas close to industry or in the eastern districts of the Metropolitan Zone.

Table 1 presents estimates of emissions of dust particles, sulphur dioxide, hydrocarbons, carbon monoxide, and nitrogen oxide. Here we can observe the increase in total emissions between 1972 and 1983 with all but dust particles showing a considerable growth in this period.

There has been very limited use of emission control devices in industry and transportation units; consequently, in 1983 total emissions had increased by 45 percent compared to 1972. Pollution in the Metropolitan Zone is six times higher than the accepted standard for humans - a likely cause of or contributor to 90 percent of the respiratory illnesses and infections the capital's population suffers.[18]

18. Marcó del Pont, Luis (1984), *El crimen de la contaminación*, Atzcapotzalco, Universidad Autónoma Metropolitana-Atzcapotzalco, Mexico City

Table 1: Total Emissions from Fixed and Moving Sources - Mexico City, 1972-1983.

	From Fixed Sources										From Fixed and Moving Sources	From Moving Sources
	Dust Particles		Sulphur Dioxide		Nitrogen Oxide		Hydrocarbons		Carbon Monoxide			
Year	Tons	%	Tons	%	Tons	%	Tons	%	Tons	%	Total	
1972	153	5.76	207	7.61	51	1.92	314	11.82	1,933	72.89	2,653	
1973	158	5.52	217	7.57	53	1.84	338	11.80	2,101	73.27	2,868	
1974	152	4.68	236	7.27	57	1.75	371	11.43	2,429	74.87	3,244	
1975	129	3.79	278	8.20	64	1.90	381	11.23	2,541	74.88	3,394	
1976	117	3.41	305	8.89	70	2.04	386	11.26	2,553	74.40	3,431	
1977	117	3.48	284	8.26	100	2.90	391	11.37	2,544	73.99	3,438	
1978	124	3.59	307	8.89	74	2.15	398	11.54	2,547	73.84	3,449	
1979	128	3.64	343	9.74	81	2.31	407	11.54	2,562	72.74	3,521	
1980	233	3.68	374	10.37	87	2.42	418	11.61	2,589	71.89	3,600	
1981	136	3.71	384	10.44	90	2.38	435	11.83	2,628	71.56	3,672	
1982	140	3.73	393	10.46	91	2.43	452	12.03	2,680	71.33	3,757	
1983	147	3.66	400	10.44	93	2.41	470	12.20	2,747	71.31	3,851	

Source: Mexico, Subsecretaria de Mejoramiento del Ambiente (1980).

e. Water Problems

In the 16th Century the extensive system of lakes in the Valley of Mexico began to disappear. Springs were used indiscriminately and this natural source dried up since the water was absorbed at a rate greater than its natural rate of replenishment. Over-exploitation of subterranean water caused the city to sink - in some parts by up to nine metres.[19] Since the 1960s, Mexico City's traditional water supply has been in a state of crisis. Great increases in demand, limitations on increasing supply from local sources imposed by the natural environment, and techniques used for gathering and consuming water made it essential to create new schemes to increase supply. This led to greater dependence on water imported from external basins. The great majority of these water sources are at considerable distances, making the necessary infrastructure expensive to construct and maintain.

In 1980, consumers in the Valley of Mexico used 2.4 million cubic metres of water daily. Of this total, 78 percent came from subterranean waters, 6.3 percent from surface waters, and 15.4 percent was imported. Water use included 53 percent for domestic purposes, 11.6 percent for commerce and services, 18.9 percent for industry, 23.5 percent for agriculture and 16.4 percent for public purposes.[20]

Domestic water use represents the largest group of consumers and per capita consumption varies greatly according to social group. Residents of the high-income Chapultepec area consume on average some 450 litres per person daily while in low income Nezahualcoyotl, the average is only 50 litres per capita. Nine percent of the consumers use 75 percent of the water total and more than 2 million have very limited access to it. Policies concerning utility rates appear to have reinforced this pattern.[21] In 1980, demand for water exceeded supply by 284 million cubic metres per day.

Residual and sewage waters are produced by various different urban activities. The need to remove them from the city resulted in construction of hydraulic works which allowed their extraction from the Valley of Mexico toward the River Tula where half the water is used for irrigation. A variety of chemicals and micro-organisms (many of them toxic) pollute these waters and affect the population by exposing it to diseases either through direct consumption or from eating foods that have been in contact with the polluted water. This occurs when these waters are used for irrigation or pollute the subterranean waters which are used later. Faced with this critical situation which affects the entire water provision system, the population's health, and agricultural production, it has been considered indispensable to develop residual water and sewage treatment plants.

19. Ramírez, Pablo (1981), 'Problemas del abastecimiento de agua potable a la Ciudad de México hasta el año 2000', *Lecturas del CEESTEM* (Centro de Estudios Económicos y Sociales del Tercer Mundo) 1(3): pp.94-97 .

20. Mexico, Comisión de Conurbación del Centro del País (1981), 'Balance hidráulico del Valle de Mexico', Mexico City.

21. México, Secretaría de Programación y Presupuesto (1984), 'Programa de desarrollo de la Zona Metropolitana de la Ciudad de México y de la Región Centro', Mexico City.

IV. SOME ENVIRONMENTAL POLICIES

a. Transport

EFFICIENT URBAN STRUCTURE is often derived from routes of public transport, either metro or bus systems. However, in Mexico, state actions have allowed a proliferation of automobiles. This action could be explained by the impetus given to the car industry, construction of

major highways, low-priced gasoline, and so on. Public transport, particularly buses, was until recently in private hands; in 1981 it was taken over by the local government which improved routes, focused greater attention on maintenance, and increased the number of units in circulation. Nevertheless, there is still no detailed evaluation of results of these changes. Subway construction began only 15 years ago. Because of recent extensions and creation of new lines, only lately has the subway begun to cover a large area of the metropolis and the system is still very limited. The cost of these transport projects, particularly for an underdeveloped country experiencing a strong economic crisis, is very high. This makes it difficult for the state to continue expanding Mexico City's transportation system.

The development programme for the Metropolitan Zone emphasizes the need to modify the distribution of public investments in favour of public transport and recommends that the subway be set up as the structuring element of the multi-nodal system with bus, trolleybus, and tram services being organized as feeder elements or substitutes. Improving the organization of existing systems and not spending money on increasingly large works is also considered necessary. To help integrate municipalities in the State of Mexico, the programme proposes building a suburban railway and co-ordinating municipality road systems with that of the Federal District through a hierarchical structure of arterial roads. The plan presented by the Federal District Department only refers to transport appropriate to the proposed eight centres. When this scheme is completed, the hope is that transportation will be more efficient and economical because of reduced person-trip hours.

b. Environmental Policies

Up to the present, very little has been done to stop increasing pollution and environmental deterioration. The seriousness of the situation encouraged the administration of Miguel de la Madrid to give priority to this problem. Although there were already some public bodies addressing these problems, their importance increased with the creation of the Department of Ecology within the Ministry of Urban Development and Ecology. In addition, a series of plans was proposed and a campaign developed to heighten public awareness of these issues through the mass media. Furthermore, a reinforcement of university programmes sought to train professionals in this field. In the Federal District Department, new offices have also been established to deal with these problems.

Among recent proposals are those included in the Ministry of Urban Development and Ecology Plan.[22] They emphasize the need to establish monitoring centres to determine air quality levels and maintain control over vehicular emissions. They oversee necessary changes in the automobile industry to lower smoke and noise emissions and to eliminate the lead additive in gasoline. The Federal District Department plan proposes an industry relocation programme, the prohibition of new industries with high pollution potential, and the creation of ecological reservations to avoid continued environmental deterioration.

For the moment, despite all the institutional and media promotion, very little is being done to implement these policies. For example, vehicle emission control is hardly applied, even with public vehicles, because there are insufficient resources to do so at this time, according to authorities. Of course, it is even more difficult to establish industry controls; during economic downturns, entrepreneurs are

22. Mexico, Secretaría de Desarrollo Urbano y Ecología (1984), 'Plan de ordenamiento ecológico e impacto ambiental, México', Mexico City.

in the worst possible condition to increase production costs through installation of pollution control devices.

Ecological pressure groups are beginning to have considerable influence in urban issues and in raising public awareness of environmental issues.

c. Water Provision Policies

Policies for providing water to Mexico City have been directed toward increasing the proportion of clean water coming from external sources. In the 1950s water began to be imported from the Lerma Valley, but this source was insufficient to meet growing demands resulting from urban growth. In recent years, a series of projected works to bring water from external basins has involved three water-gathering systems: the Cutzumala, Tecolutla, and Amacuzal Systems. Intended to be completed by the end of the 1980s, these projects involve enormous investment because of the need to transport water from great distances and lower altitudes. Such projects require massive pumping installations and resulting heavy energy use.

The first stage of the Cutzumala project is completed; the second is scheduled to finish in 1987. With these works it will be possible to increase the water supply by 24.5 cubic metres per second. Prospects for further expansion of these very large works are doubtful because of the enormous debt it would create for the Federal District Department whose financial situation is very weak. Thus there are proposals insisting on the need to improve water gathering from local sources by avoiding, for example, piped water loss which affects 40 percent of the total water supply being carried to the Metropolitan Zone. An extension of the gathering capacity and use of rain water is also proposed.

To limit the city's water consumption, it is recommended that the size of the contiguous urban areas be controlled to fit the availability of this vital resource and that large water-consuming industries be prohibited. A new rate policy seeks to reinforce the goal of rationalizing water use (Plan of the Federal District Department and Program for the Development of the MZMC and the Central Region).

The particular characteristics of the Valley of Mexico established that, from the beginning, with the drying up of the lakes, city expansion would affect the environment. This impact is much greater because of the metropolitan process in recent decades. It is ironic that a place once covered by lakes, where water excess resulted in constant flooding, has been transformed into an area where it becomes increasingly difficult for a large part of the population to have access to this basic resource.

V. MEXICO CITY IN THE YEAR 2000

EVEN ASSUMING THAT the rate of growth of the Metropolitan Zone's population will slow down, it could still reach 30.8 million in the year 2000. At this rate of expansion, it is estimated that from 1990 to 2000, the MZMC will probably absorb nine more municipalities from the State of Mexico and one each from the States of Tlaxcala and Hidalgo.[23] Thus, by the end of the century, that zone will be physically located within four federal entities, forming a megalopolis including the metropolitan areas of Mexico City, Toluca and, very likely, Cuernavaca.

Mexico City's projected industrial growth has been calculated to

23. Centro de Estudios Económicos y Demográficos (1975), 'Estudio demográfico del Distrito Federal', CEED, El Colegio de México, Mexico City.

24. I find contradictions between the aims of the governments of the Federal District and State of Mexico on the one hand and the national objective of decentralization on the other. Both the Federal District Department and State of Mexico have continued to promote the city's growth by issuing new industrial and residential development permits and developing very costly urban projects.

be 440 percent over the next 20 years. Contradictory[24] past and current government programmes for industrial decentralization have had negligible results and have, at times, been self-defeating. Emergence of this vast megalopolis will further accentuate the country's great spatial disparities in economic development, as well as the already overwhelming urban problems of the capital itself. It will require the federal government to devote an ever-larger proportion of its revenues to maintaining the Metropolitan Zone of Mexico City. For example, if the anticipated growth occurs, in the year 2000 the Federal District will require about 40-45 percent of the federal public investment; it now absorbs 33 percent.

To accommodate urban growth during the next 15 years, it will be necessary to develop another urbanized area with infrastructure and services similar to the present one, to increase enormously the capacity of highways converging on the city, and to provide substantially more water, energy, and food. In these circumstances, such an endeavour would not contribute positively to Mexico's development.

Internal problems of the metropolis will greatly worsen if measures are not enforced that drastically change the policies or lack of controls now in existence. For example, the daily demand for person-trips could grow to more than 40 million; the vehicle total could reach some 6 million units and access to the city could be permanently clogged by nearly 100,000 freight carriers. The level of polluting emissions (already highly unsatisfactory with serious impacts on health) could triple, thus increasing respiratory illness and lowering still more mean visibility in the city (already diminished from 10-15 to 2-4 kilometres between 1937 and the 1980s). There would be demands for 100 million cubic metres of water per day - water that to a great extent would have to be brought from very distant sources at extremely high cost and enormous energy outlay (at present the demand is for 36.6 million cubic metres per day). The cost of providing water, its transportation to the city, the necessary investment to widen the water network, meter installation, and so on will all increase water costs so much that in the year 2000 Mexico City's population could be drinking some of the world's most expensive water.

In the Federal District alone, an estimated five million people would not have tap water service, seven million would lack a sewage system, and it would be necessary to improve or build at least 2.5 million housing units by the end of the century. These social deficits would be produced in spite of maintaining a public investment per capita of twice the national average.

The projections by the Federal District Department give us a very worrying vision of Mexico City's future in the year 2000. Unfortunately, for the moment, many of the initiatives and policies proposed to address those problems and to stem present trends are not being implemented.

VI. CONCLUDING REMARKS

IT IS LIKELY that efforts will be made to address certain problems, but there are strong structural limitations to the application of many of these proposals. Such policies must be viewed in the context of governmental decision-making in a country with an extremely dependent capitalist economy and high inegalitarian distribution of resources.

Because of this, there is likely to be a significant transformation of state policies (and of metropolitan development perspectives) only if

basic changes are made in Mexico's socio-economic structure. My view is that there must be a democratization process at national and local levels to open the way for greater participation of the masses and popular organizations in decision-making about the future of Mexico. Otherwise, technocratic and antipopular urban development plans, rather than modifying present tendencies, may accentuate Mexico City's growth only to benefit its already powerful minorities. Better mobilization of independent popular organizations and more activism by those who suffer most intensely the negative consequences of metropolitan growth can create progressive new options. Such developments, of course, will be encouraged neither by the city's privileged groups, nor by firmly established government leaders.