

Mexico





Mexico Valle

Water Service Sustainability. Past, Present and Future: Institutional Reforms, Financing Plans and Partnerships

The Mexico Valley faces major problems linked to its water supply and sanitation system: fragmentation of responsibilities, overexploitation and pollution of underground water, natural limits in affordable remote sources, ageing and/or poor quality of existing networks, high rate of leakage, highly subsidized tariffs, high rate of incompletion with the payment of water charges, untreated waste water discharge in the neighbour valley and subsequent health and environmental issues. Analysis of the steps taken in the recent past and of the plans for the future: institutional reforms, financing plans and partnerships; lessons learnt from previous experiences and their impact on social and environmental sustainability.

Prof. Daniel Hiernaux-Nicolas, Research Fellow, Universidad Autónoma Metropolitana de la ciudad de México, campus Iztapalapa
General presentation of the Valley of Mexico in its relation to water supply. The Civil Society's point of view on the quality of the service provided/required, on affordable tariffs and perception of institutional reforms, financing plans and partnerships.

Ing. Edgardo Castañeda Espinosa, General Director of the Hydraulic Program, Secretaría de desarrollo urbano y obras públicas, Comisión del Agua del Estado de México
The State of Mexico's analysis of the water service in Mexico Valle: institutional, legal and financial background and reforms, fragmentation of responsibilities, population served. Coordination with the Federal District. Social and environmental sustainability. Lessons learnt and perspectives.

Chair: **Dr. Benjamin V. Carino**, General Manager, Public Estates Authorities, Manila, Philippines, evidence on the Governments' role as developed in the Hong Kong seminar.

Dr. Leopoldo Rodarte Ramon, Asesor del Jefe de Gobierno del Distrito Federal
Analysis of the Federal District's action to improve the water service in Mexico Valle; institutional, legal and financial background and reforms, fragmentation of responsibilities, population served. Social and environmental sustainability. Coordination with the State of Mexico. Role of the C. A. D. F. Lessons learnt and perspectives.

Ms. Lilian Saade, researcher
Evaluation of the institutional reforms, financing plans and partnerships from an economic, social and environmental point of view. Lessons learnt and perspectives.

Discussion



The Role of Government in the Provision of Sustainable Urban Services

Dr. Benjamin V. Carino

Public Estates Authority
Office of the President, Manila, Philippines

Background and Objectives

Among the stakeholders of development, the government is theoretically in the best position to provide public services and initiate various programs and projects. It has authority and substantial powers of policy formulation and resource allocation. Precisely because of its substantial powers and resources, the government should take the lead in providing services and in initiating various programs and projects. Indeed, there are several mechanisms available to government in serving as the prime mover of society not the least of which is the adoption of social reform policy designed to change patterns of ownership and control of resources (e.g., land reform).

However, there is a downside to «big» government or to having government wield too much power. For instance, such problems as bureaucratic «red tape», inefficiency, and even graft and corruption are often associated with too much bureaucracy and government. It is for this reason, among others, that in many parts of the world the trend now is towards de-bureaucratization, deregulation and privatization. It is argued in some contexts that the state must allow the market to take over the central role.

The government is needed only to nurture the climate that enables the market and the private sector to grow. Clearly, therefore, the principles and philosophies that have defined the role of the government have changed through the years.

In the context of this changing principles and philosophies, and building upon the observations made by the participants in earlier seminars sponsored by the Pacific Economic Cooperation Council's (PECC) Task Force on Sustainable Cities held in Bangkok and Hongkong, the main objective of this paper is to examine the role of the state in the provision of urban services and in the implementation of various programs and projects. In the process, the possible roles of other sectors of society will also be highlighted, with especial reference to the interrelationships between the state, the private sector and the so-called civil society in working towards common development goals.

The Roles of Government

As discussed above, the government could be the principal actor, the active agent in the provision of urban services and in the implementation of



various programs and projects. With the increasing participation of the private sector and non-government organizations (NGO's) in services provision, however, the government could play a more passive, supportive role. The various elements of these roles of the government will be discussed in the sections that follow.

The Government as Principal Actor

Many participants in the Hongkong seminar have stressed the need to maintain the primordial role of government particularly in respect to safeguarding the environmental system. In this role, the government is the prime mover and initiator in the provision of services and in the implementation of various programs. For many countries, the massive rehabilitation effort that was needed following the Second World War provided the main justification for this interventionist philosophy. Western economists such as Arthur Pigou and Maynard Keynes have articulated the theoretical justification for the government to play a major role in critical situations which require massive investments for social services, infrastructure build-up, and for the creation of employment opportunities. It was also during this period that socialist countries installed and consolidated central planning systems. Consequently, even in new independent colonies, the state was «the principal planner, energizer, and director of accelerated development effort» (Lewis 1964:26).

112 Some participants in the seminar held in Honkong felt very strongly about the primary role of the government in development efforts. Indeed, there are other arguments for having the government play a major role in development efforts and especially in the provision of vital services to the people. Among others, the government would ensure accountability to the people, given strict auditing and accounting rules that govern the disbursement of public funds. More importantly, and especially in the context of severe problems of inequity that characterize less developed countries in the world, the government, it is argued, could enhance the achievement of equity and

service objectives. Indeed, given the substantial powers and resources at its disposal, the government is in the best position to address the concerns of the poorer segments of society.

As noted earlier, however, there are also disadvantages to having government wield too much power. Mention has already been made of the slowness that characterize the delivery of government services, the rigidity of government rules and regulations, and even wastage of resources through graft and corruption. For this reason, participants in both the Hongkong seminar have observed that the trend in recent years is towards giving the private sector and the non-government sectors of society a greater role in development efforts.

The trend towards de-bureaucratization can also be attributed, in part, to the relative failure of government in achieving development objectives. In the First World, the interventionist state was discredited by the burgeoning welfare bill. In the Second World, the failure of the state was symbolized by the collapse of the Soviet Union (see Carino 1996). In the less developed countries, disenchantment with the state stemmed mainly from the failure of governments to achieve prosperity and to provide basic needs for the people.

The Supportive Role of the Government

It is in the context of this situation, along with such problems as governmental inefficiency and corruption, and international aid agencies' bias towards privatization that the government is being pushed away from its central role in services delivery and program implementation. The new paradigm of the private sector being the main engine of development has gained prominence in more recent years. The same inability of governments to provide basic services and to effect acceptable levels of redistribution and poverty reduction had likewise given rise to a more active role of the so-called «civil society.» At the same time, non-governmental organizations (NGOs) have sprung up not only to serve as alternative delivery channels, but also to protect the

environment, demand alternative social policies, as well as demonstrate their own desired models of development (Cariño 1996).

The manifestations of the increasing role of the private sector and civil society are readily evident. As observed by the Filipino participants to the Hongkong seminar, the Philippine government has literally urged private sector involvement in the planning and implementation of infrastructure projects. A new legislation, the Build-Operate-Transfer (BOT) law, has been enacted by the Philippine Congress and has become the mechanism for private financing initiatives (PFI). The success of the BOT concept can be seen in the implementation of numerous infrastructure projects in the Philippines including the mass rail transit system in Metro Manila. Another evidence of increasing privatization is the reliance on the concession model in which the delivery of a particular service (e.g. water supply, garbage collection) is actually contracted out to a private concessionaire.

As noted in the Hongkong seminar, NGOs had also taken a more active role in various development efforts in recent years. An important point that is often raised in respect to NGOs is that they seem to have a comparative advantage over public or state organizations in terms of their flexibility, innovation and participatory character. Because of their supposed flexibility, it is argued that NGOs are able to respond more effectively to the needs of the poorer segments of society. Such flexibility, in turn, enables NGO's to respond to the problems of vulnerable groups in more appropriate ways than the government or the state.

It is, in part, because of these characteristics of NGOs that they have gone beyond their traditional roles of advocacy and capacity building, and have taken on some of the basic functions of the government to include the delivery of basic social services (e.g., health and welfare services). This expanded role of the NGOs can be attributed to the recent changes in the relationship between NGOs and the large multi-lateral and bilateral

donor agencies. Increasingly, international donor agencies have relied on NGO's and even on community-based organizations in performing roles that have in the past been reserved for the government.

It is in this context that the government a more passive, supportive, but no less critical role to ensure the effective and efficient provision of urban services. The various dimensions and elements of this role will be discussed in the sections that follow.

The Government as Enabler

The increasing role of NGOs and the private sector in services delivery does not connote a less important role for the state. Rather, the government continues to visible and have a palpable presence in the economy and society without dominating it, a strong entity that recognizes the autonomy of the other sectors but does not overwhelm them. It is a government that «steers but does not row» (Osborne and Gaebler 1992). It works in the background and creates the conditions within which the civil society and the private sector could make their own creative and innovative contributions.

As noted in Carino (1996), the enabling role of the government includes, among others, the provision of the legal and regulatory platform and political framework within which various sectors and entities can plan and function (see Migdal 1988). For instance, it can encourage citizen action by liberating NGOs from fear of military action when they advocate certain policies which may run counter to those formulated by the state. Or it can assure private firms that policies will remain firm and stable despite the selfish interests of politically powerful officials.

In general, the government enables the private sector by operating according to norms of transparency and predictability and committing itself to the rule of law in the implementation of various programs and projects. Enabling mechanisms include just laws, a fair judicial system,



politically accountable decision-making, and an effective and reform-minded public bureaucracy, and a level «playing field» for various stakeholders and sectors of society.

In this connection, the policy environment created by the state may fall into one of three types: «highly restrictive,» where the laws tend to censure NGO action, do not guarantee basic freedoms and require NGOs to seek permission to undertake certain activities, e.g., the conduct of meetings, solicitation of funds from international donors; «regulative,» where the state sets broad parameters within which the private sector operates and allows the exercise of basic freedoms; and «supportive» where the state actively promotes collaboration with NGOs and the private sector (ANGOC 1995). Only the last two types (regulative and supportive) are characteristic of an «enabling state.»

The Government as Facilitator

The facilitating role of the government largely takes the form of actions of the state designed to render easier the performance of a function (by other sectors of society) or the achievement of a particular objective. Like the enabling role, the facilitating role of the government is not meant to take over the tasks of other entities. Rather, such a role serves to allow the work of the private sector flow and without encountering problems.

The facilitating role of the government basically entails making available resources to assist markets and communities in the performance of certain tasks. These include, among others, grants for volunteer efforts, as well as subsidies or tax exemptions to enhance the growth of private firms or corporations. The government may also facilitate the contributions of the private sector to development by the provision of information, technical advice and expertise, research and development, as well as through piloting of programs and project ideas. The facilitating role could also take the form of incentive schemes to promote the work of private organizations or actual purchase of their products and services.

The Government as Partner

Another role of the government is as collaborator or partner of the private sector. Partnership with the private sector is often resorted to by the state in the light of meager resources available to finance various government programs and projects. Collaboration and partnership do not just come in the service delivery process, but in all phases of a program or a project cycle, including project development, planning, financing, and implementation. This role of the government may range from networking to full partnerships with the private sector. As networkers, for instance, the government and an NGO may engage in exchange of information, personnel and technologies.

Full partnerships, on the other hand, have often taken the form of joint venture agreements between the government and a private organization where both parties contribute equity towards the attainment of a common goal. Joint ventures often cover such areas as land and infrastructure development, enterprise development, and operation of utilities and service facilities (e.g., transport systems, communication facilities, water systems, etc.). In some instances, the private sector is relied upon to implement a specific component of a larger government program.

Concluding Observations

The foregoing discussion has shown that the role of the government in pursuing participatory, people-centered development has, for many countries in Asia and other parts of the world, varyingly shifted from being the principal player in society to that of being an enabler, facilitator and partner of the private sector. A major lesson that could be learned from the experiences of various countries in the attainment of development objectives is to recognize the possible contributions of the private sector (i.e., NGOs, private firms, the civil society, etc)

As participants in various development efforts, one study summarized the activities of the other sectors of society vis-à-vis the government in terms of three roles (see Cariño 1996). First, they may be «competitors» in that they serve as critics of the government. In performing this role, NGOs may demonstrate the value and feasibility of their criticisms by undertaking alternative programs and approaches.

Second, they may be «complements» in that they extend the outreach and coverage of government operations. As such, they could mobilize people to avail themselves of government services, or provide services which the government is unable, or for certain reasons, may not be willing to provide (e.g., provision of certain types of family planning methods).

Third, they could be collaborators in that they undertake programs and projects jointly with the government. Collaboration may range from networking to full partnerships as exemplified in joint venture arrangements between private entities and the government. In some cases, NGOs and private institutions are relied upon to implement specific components of government programs (e.g., the capacity building component), or otherwise pilot-test the feasibility of a certain program concept. In such a case, the reliance on NGO's is justified by the latter's flexibility and independence.

There are, of course, problems that may surface from a situation where the private sector plays the lead role in development efforts. Basic is the concern that the private sector may not provide sufficient protection to the poorer segments of society as it is likely to be preoccupied with profit margins and costs recovery. Indeed, costs of services and utilities that are operated by private institutions are often beyond the affordability levels of people in low income groups. Moreover, the efforts of private institutions may have little reason to consider distributional and environmental issues which may lead to the notion that development is essentially growth in the first place. Finally, the requirements for accountability of public resources may

be difficult to satisfy when government funds are coursed through NGOs and private institutions.

Still and all, the government, as enabler and facilitator, must establish the legal framework under which NGOs and private institutions could maximize their roles in the development process. In particular, the government should not view the private sector and NGOs mainly as an alternative mechanism for service delivery, but should also recognize the special qualities that they bring to various development efforts -- commitment to the plight of the disadvantaged sectors of society, commitment towards safeguarding the environment, the capacity and willingness to take risk and, more importantly, the capacity to experiment and innovate.

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The Water Agenda in Mexico City : Challenges and Perspectives

Daniel Hiernaux-Nicolas

Research Fellow, Universidad Autónoma Metropolitana de la ciudad de Mexico, campus Iztapalapa

This presentation's objective is to define a framework in which the water situation in Mexico City may be set within a more general context, namely, the overall development of the nation.

General context of water in Mexico

1. As is well known, about 20 years ago Mexico began a shift in its economic model which has lead towards a greater integration with its northern neighbors, and more recently, with countries to its south and with the European Union. This is relevant not only in the economic sphere; it also implies important territorial transformations. In particular, the nation has witnessed a significant growth in middle-sized cities, particularly in the north, at the expense of Mexico City, whose growth has become slower.
2. This shift northward of economic and demographic development has resulted in a measured relocation of industries from the central region of the country to the North. There are strong environmental implications in the industrial development of Hermosillo, León, Monterrey, and Saltillo, among other northern cities settled on the desert belt of the country, where water is very scarce.
3. In addition, irrigation agriculture was developed in the North to supply products for the American market, and the water situation has been aggravated by the new economic-demographic growth now competing for a resource already scarce in the north.
4. An added complication to the situation so far described is the treaty Mexico has with the United States to share the water from the Río Bravo (Rio Grande). Its enactment has recently caused a diplomatic conflict, and pressure is mounting on the Mexican Federal Government, torn between its international commitments and the need to support its citizens, particularly farmers in the northern region, who have suffered long years of dramatic droughts.
5. The distribution of water resources in Mexico is uneven both in time (with a rainy and a dry season) and in space, which complicates the situation further.
6. On the other hand, Mexico City, even with its current more gradual growth, is still the most important city in the nation, and with a population of nearly 19 million it demands water at the rate of 75 cubic meters per second. Mexico City thus continues to represent the largest issue within the nation's water predicament.

Water in Mexico City

1. Even though 75 cubic meters per second is a seemingly large amount, the city still has a deficit of approximately 3 cubic meters more. These numbers, compared to the population, show a very high water consumption per person, high even compared to that observed in not a few developed cities. Before we explain why this situation exists, we must first describe a few general characteristics of the basin of the Valley of Mexico, where the capital city is located.
2. The basin where Mexico City is located is on a high plateau surrounded by mountain chains. The plateau has an altitude of 2400m; the mountains rise to over 3000m.
3. Originally, the central part of the basin where the city is located contained five interconnected lakes and several important rivers, fed by the rains and the water coming down from the mountains.
4. The Mexicas found the way to make the most of the environment and built a wonderful city on an island in the central lake. Tenochtitlan, the city, was formed by waterways and areas that had been filled, with great avenues leading to the shores. During the rainy season the avenues were preserved by a system of dykes which allowed the city to control the water flow completely.
5. The Spanish colonists were not able to follow the model set by the Mexicas, and instead filled the waterways and sought the most drastic and anti-ecological solution: to cut an enormous drain through the mountains for surface water to run off. This did not put an end to floods in the city, with all the destruction and disease they cause. The last great flood occurred in 1951.
6. Losing control of the water resources and upsetting the ecological equilibrium in Mexico City was a decisive factor in the water situation, although for centuries water demand was easily met by the springs and rivers at the fringe of the basin.
7. It was not until after the Second World War when the city underwent significant growth that the water issue became crucial. The need to quickly increase the availability of water was met in two ways: by pumping great amounts of water from the basin itself, which resulted in a rapid fall in the water table, and by bringing water from outside the basin.
8. At the present time, 80% of the water in Mexico City originates in underground reservoirs, while the rest is brought from the Lerma and Cutzamala rivers, located at 40 and 125 km. respectively from the Valley of Mexico. Since the water must be pumped to an altitude of 2500 m to reach the valley, supplying the City's water demands is very costly.
9. The engineering works to supply water to Mexico city have been expensive. They were charged to the federal budget, which was in charge of managing the capital from 1928 to 1997 as a federal district.
10. Pumping water from underground reservoirs has lowered the water table in a tangible way, particularly in the downtown district, where the sinking of structures and buildings is readily apparent. The central district of the city was built on the bed of the ancient lake, and is therefore more directly affected: structures may develop cracks and even collapse. This latent threat was clearly realized in the earthquake of 1985, when many improperly maintained buildings came down.
11. The uneven settling of different areas, together with constant seismic activity-even when low-intensity-also affects the city's infrastructures, causing pipe fractures and leaks throughout the city.

12. Another important aspect is that pumping has impoverished local agriculture. Farming in the Valley of Mexico is becoming weaker every day, and land is being sold to build low-income housing.
13. Bringing water from outside the valley also has dramatic repercussions for farmers in the areas where the resource originates. The benefit to the capital comes at a high cost to the surrounding areas, which further stimulates regional imbalance and migration to the city.
14. A key factor in the evolution of the water issue in Mexico City is the fact that, although the city is no longer growing at the rapid rates of the past, it continues to spread dramatically. This phenomenon owes itself to the gentrification of the central districts, which previously housed the lower-income population. Both rents and land prices have risen so rapidly that the lower-income population has had to move to the outskirts of the city. Between 1980 and 1995, the area of the city almost doubled, going from approximately 800 km² to 1500 km².
15. The impact of this growth is immediate: water demand falls in the central districts, where the infrastructure to satisfy it is in place. At the same time, in the neighboring Estado de Mexico—which is absorbing most of the impact of low-income migration in the Valley of Chalco—and generally in all of the east side of the city, demand for water skyrockets with extreme demographical pressures. In 1990, water consumption for the Valley of Chalco was estimated at 15 liters per inhabitant per day. This situation called for federal and state investments in the thousands of millions of pesos, money which had to be taken out of other areas of the budget of equal or greater importance.
16. Another core issue has to do with the maintenance of the water distribution network: it is extremely obsolete in the central districts,

and generally of poor quality and full of leaks elsewhere. This results in a loss of about 30% of the resource, both in the network before it enters buildings, and within the buildings themselves—due to faults in design as much as due to the lack of a much-needed water-conservation culture in Mexico. The self-contradiction is evident: water is brought to the City at a high price, only to be thrown in vast amounts down the drain, or at best into the subsoil.

Water management in Mexico

Solution of the water situation.

Water management is composed of several factors, which we will next examine.

1. It is essential to remember that since the 1960's Mexico City has grown beyond the limits of the Federal District and gradually covered neighboring regions of the Estado de Mexico. Today, the area and population of the City (as urban area) located in the Estado de Mexico are far greater than those located in the Federal District. It is evident that both entities should share the responsibility for the present situation.
2. Although a National Water Commission was created at a national level, with a subsidiary Water Commission for the Valley of Mexico, there is no clear scheme for coordination at the inter-state level (between the Federal District and Estado de Mexico). Again, an example is the Valley of Chalco, where the network of water wells located at the state border supplies downtown Mexico City, while the surrounding areas lack water.
3. Each entity has its own policies, and although there is a certain level of cooperation, a visible common policy regarding the water situation is non-existent. This lack of common purpose is due in part to differences in the political orientation of each entity. Unfortunately, political issues have tended to prevail over a technical

situation that should have been given priority over political concerns.

4. Taking into account the strong political participation of the population in the City, the issue of privatizing water management has been kept out of public discussion. The participation of private companies in the management of water resources, even though the government considers it necessary, has not been fully disclosed to the public. Fear of a public rejection of privatization, arising from recent violent experiences such as Bolivia's, is evident.
5. This also brings to attention the lack of social participation in the determination of water policies for the City, regardless of which political party is in government. International experience has demonstrated, however, that social participation is needed in order to achieve successful water management. This issue has not yet been realized, and water management is not presently on the agenda of civic and non-government organizations, who prefer to focus on other, doubtless equally important issues, such as housing, democracy, human rights, and others.
6. Perhaps the most obvious policy to be applied is water rationing. A first rationing program was launched in 1997, only to be abandoned in 1999. Nevertheless, reducing water consumption and the waste of drinking water, and possibly recycling treated black waters, are all elements essential to improve water supply, reduce the present water deficit, and reduce the pumping of underground reservoirs which so dramatically impacts the ecological equilibrium of the basin of Mexico.
7. Financing is yet another issue in water management. For at least two decades, Mexico city has been subject to a general attitude of rejection, which has resulted in flagrant lack of investment. Mexico City is still, whether people like it or not, the economic, social and political heart of the country, and-as several authors have shown-it is the only city possessing the global characteristics needed to face the challenges of globalization.
8. In this regard, a large financing program to reconvert the supply system, ration the use of water and modernize the supply network, founded by both the government of the Estado de Mexico and the Federal District in close communication with the federation seems essential to achieve these goals. The program must be carried out with full cooperation between federal and state authorities, and also to some extent with the participation of municipal authorities, even if until now they have been scarcely involved in the issue.
9. Finally, the population of Mexico City should be informed and educated about the water situation. People waste water unaware of its cost and of the risk of scarcity in the future. In order to gain public support for the needed

Water Management in the State of Mexico and in the Mexico Valley

Ing. Edgardo Castaneda Espinosa

Director General del Programa Hidráulico,
Secretaria de desarrollo urbano y obras públicas,
Comision del Agua del Estado de Mexico

Introduction

Water has always been related to the idea of life and welfare. Through time, we have intensified its use within the different activities that we develop, generating pressure over the sustainability of this natural resource, which is manifested by shortage, and diminish of its quality.

Generally we all agree with the idea that there is a serious crisis of hydraulic resources, the worry for their fragility is shown through all regions of the Planet, all socioeconomic sectors, and all levels of our society.

Today, almost all Nations consider water as an indispensable resource for sustainability and development within their national political agendas, incorporating the subject to their plans and programs through different strategies in order to improve its management and to assure its preservation; however, we haven't achieved completely the convergence between economical, social and environmental objectives, being this the principal obstacle to advance in a determinant way to sustainable use of water.

The challenge for Latin America is even greater since different adverse circumstances are combined, such as the high population density within its principal cities, high growth rates of population, important lag

of basic services, and strong competition for financial resources between different sectors and projects. All of these factors added to the poverty of the region indicate that this challenge needs more than good will to be solved.

Within the great range of uses for water, there is the urban public, which demands all attention and responsibility of all involved in this matter to do what it takes and to sum efforts towards the great challenge which is to achieve its sustainable use and, in consequence, to sustain the development of the cities.

Generally, and as a reference, I'll expose the situation of Mexican hydraulic Resources; after that, I'll describe the status of the potable and drainage water sub sector of the State of Mexico as well as the experiences learned and the strategies implemented by the State's Government. Actions taken in the co urban region of the Valley of Mexico, where the biggest issues of water matters are located for the State will be highlighted.

Mexico's General Framework

The Mexican Republic has an area of 2 million km² with a population close to 100 million.

According to studies of the National Water

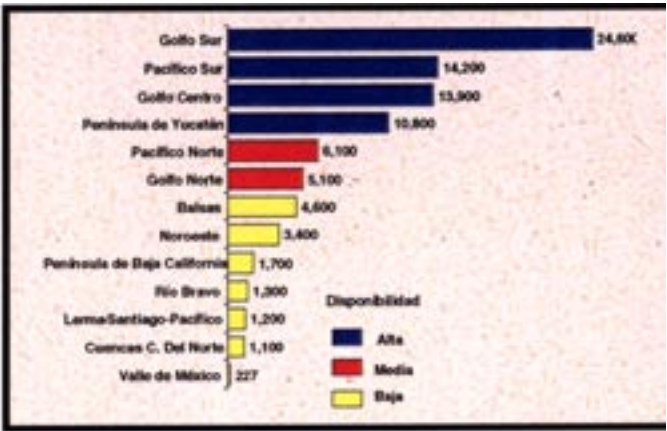


Commission, a federal government instance, the Mexican hydraulic resources status is as follows:

In average it rains 772 mm. per year being principally concentrated in four months, from the rainfall volume 24% spills in the surface and only the 3% is infiltrated; the per capita disposition is of 4,800 m3 per capita per year, which puts Mexico as a low disposition nation in the world context, being Canada the country with the most disposition.

The water problem in our country is the result of the temporal and space irregularities presented by the phenomenon that originates this resource, which is the rain. First, the greatest proportion of rainfalls occurs during the months of June to September. Second, the north part of our country (30% of the territory) generates only 4% of the run off, while the southeast and the coast zone (20% of the country) generates the 50% of the run off. How population is distributed and the economic activities aggravate the natural disequilibrium. So in regions where the 60% of the population live, and where more productivity is generated, the rainfall volume is only 25% of the total in our country.

Water Availability by Hidrológico Region.
(m3/inhabitant/year)



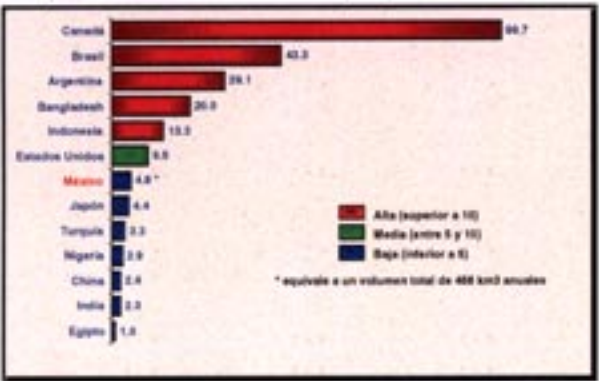
Talking about underground water deposits, the water bearings that provide the biggest volume of this liquid show conditions of overexploitation; over 600 water deposits, 100 are overexploited and are located in the most developed cities.

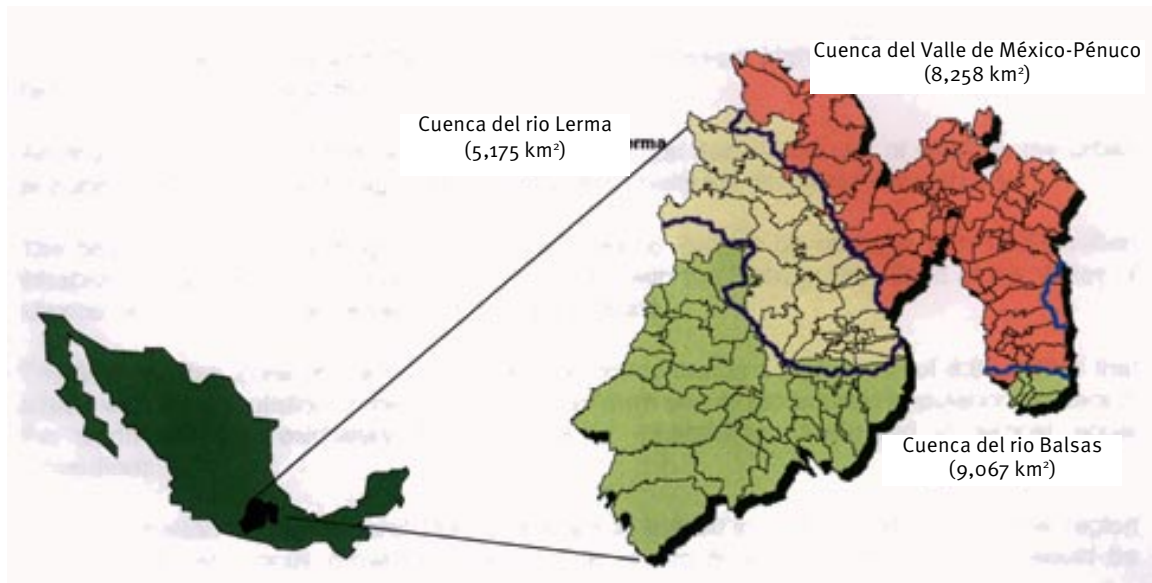
Of the volume used, 76% is for agriculture, 18% for the urban public use and 6% for industry and services.

General overview in the State of Mexico.

The state of Mexico is located in the central part of the Mexican Republic, it comprehends a 22,500 km2 surface formed by 124 counties where 13.9 million inhabitants, this makes it the most populated entity in the nation. Its population is considered equivalent to the population of your country, Chile.

Water average availability in different countries.
(thousands of m3/inhabitant/year)





Three hydraulic systems part of the most important in our country grow in our entity: Valley of Mexico-Panuco's basin, Lerma's Basin and the Balsas Basin; in the Valley of Mexico Basin lives 75% of the state's population, in Lerma 17% and in the Balsas lives the 8% of the population. The population expectations for year 2020 estimate that we would be 18.5 inhabitants, with similar urban growth characteristics.

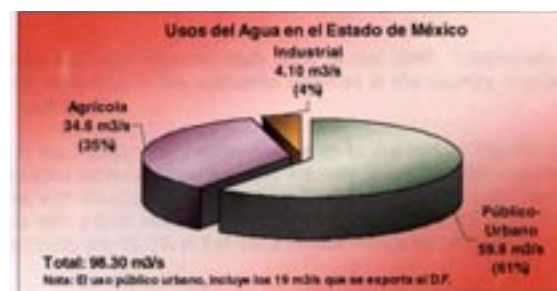
In our state the annual average rainfall is of 999 mm, which generates a volume of 22,472 mm³ per year, from which 16.5 % runs off and 5% is infiltrated.

The available surface water is distributed in the next way: In the Valley of Mexico-Panuco's Basin 20.2%, in the Balsas 58.3% and in the Lerma's Basin 21.55

There are identified six water bearings in our entity, four of them are overexploited and two of them are sub exploited, from the 4 overexploited water bearings water is transferred to the co urban zone benefiting the Federal District and counties of our state but in a smaller way.

There are two other water bearings in the state of Hidalgo and Mexico that also benefit our state and the city capital of our county, showing overexploitation. In a general way the eight water bearings show a 67% overexploitation.

The water flow used is of approximately 3,100 mm³ per year, from which 56% is underground and 44% in the surface and showing the following uses:



The availability and use analysis of this resource indicate an overexploitation of underground water (665.9 mm3 per year) principally in the Valley of Mexico's Basin. Also in this same basin it appears to be surface water available (382.5 mm3), however, it shows high pollution or it is compromised with the irrigations zones of the neighbor State of Hidalgo. Only Balsas' basin shows considerable availability of water that is why it is considered as the strongest supply source for the future.

There is a demand of 42.84 m3/sec for urban public use while the supply is 40.34 m3/sec, having a 2.5m3/sec deficit. The 85% of the water supplied for public use comes from the Valley of Mexico and Lerma's water bearings; the 15% left comes from surface resources, mainly from the Balsas' Basin.

The service coverage registers next data: potable water 90.19%, sewerage 75.12% and municipal residual water treatment 21.5%. This implies that 12.52 millions of inhabitants can dispose of piped potable water in their homes, and that 10.43 millions have sanitary drainage at home, connected to the drainpipe network.

Hydraulic basic service coverage

Region	Coverage (%)		
	Potable water	Sewerage	Treatment
Country	84	64	23%
State	90.19	75.13	21.5
Valley of Mexico	94.95	84.88	15.4

The Valley of Mexico basin has coverage levels above national and state average, except for treatment, however, supply problems are more marked for this region.

An important problem of our entity, is the hydraulic resources exportation to other basins or entities, to satisfy their water demands, as it happens in the Valley of Mexico Basin, where due to overexploitation of their water bearings,

starting at the decade of the 50's, when Federal Government authorized the use of underground waters of the Lerma's Basin, to transfer flows to Mexico City. Later, in the 80's, due to the demand increase and the continuous overexploitation, it was developed the Cutzamala system, to take advantage of the surface water deposits of the Balsas' Basin besides continuing overexploiting the Valley of Mexico's waters. Nowadays, this situation has created an obstacle for urban and economic development of the State of Mexico, originated by the restricted availability.

The co urban zone of the Valley of Mexico (Federal District and State of Mexico), is supplied by 62 m3/sec, 35 for the Federal District, and 27 for the State. In average, of the state's territory, 17.93 m3/sec are transferred to the Federal District, 9.6 m3/ sec come from the Balsas' Basin, 4.7 from the Lerma's Basin, and 3.6 from the Valley of Mexico's Basin. The exported flow is equivalent to 50% of the country capital's consumption.

Excessive extraction of the resources and transferences to other entity, has taken overexploitation of Valle of Mexico and Lerma's water bearings,generatingamongotherconsequences, sinking and cracking of those regions grounds. Besides, at the zones where supply centers are established to export to other entities, there is a strong competition for the locally exploited flows, since local government require them for their benefit.

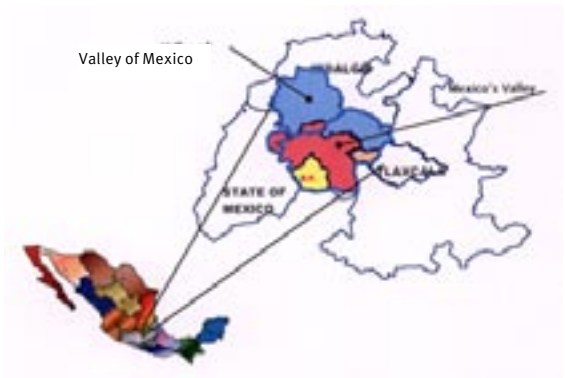
In the next table we can observe the water demand expectative for the local public use, highlighting the fact that for year 2020 it will be needed 12 m3/sec more to satisfy the population needs.

Parameter	Years				
	2002	2005	2010	215	2020
Population (millions)	13,946,751	15,124,304	16,687,979	17,836,284	18,519,527
Demand (m3/sec)	42.93	46.39	50.27	52.69	53.59
Increase (m3/sec)		3.46	3.887.34	2.459.76	0.910.66
Accumulated (m3/sec)					
Supply (m3/sec)	40.35	44.45	49.41	52.42	54.68
Deficit (m3/sec)	2.50	1.94	0.86	0.27	(1.09)

Valley of Mexico’s Metropolitan Zone (MZVM)

To understand the regional problematic of the conurbated counties to the capital and direct link existing, we would talk first about some peculiarities of the Valley of Mexico’s Basin.

The Valley of Mexico’s basin is formed by the partial territories of the states of Mexico, Tlaxcala, Hidalgo and Puebla, as such as the total area of the City Capital of our country, all together comprehend an area of 9,947 km2; the 19 million inhabitants make it the most populated region of the country, the 20% of the populations groups in only 0.5% of the territory.



Due to the hydro-administrative regions determined by the National Water Commission, a federal instance, the Valley of Mexico Basin is located on region XII, which is distinguished as the region with the lowest availability per capita in all the country with 227 m3 per person per year.

Global balance of the region indicates: overexploitation of the water bearings, a high reuse proportion of residual waters, principally in agriculture zones of Hidalgo, it only treats the 14% of the residual flow and the surface resources present high pollution, this generates a hygiene problem to the entity.

Another characteristic of this basin is that the principal demanded use of water is the urban or public (85%), followed by agriculture (10%) and finally the industrial use with 4%.

The basin part corresponding to the State of Mexico, groups 56 counties with 10.31 million inhabitants, including the 18 conurbation counties with the Metropolitan Zone of the Valley of Mexico, which is the most developed part of the State.

The Metropolitan Zone of the Valley of Mexico concentrates a population of 8.85 million that added with the population of the Federal District form one of the biggest population centers in the world with approximately 17.5 millions of inhabitants, distributed in almost equal proportions.

The conurbation of the Federal District started in the 50's; in the next decade the region registered an enormous growth originating that at late 80's the State of Mexico would be converted in the most populated entity of the country.



Metropolitan Zone of the Valley of Mexico

This zone participates with approximately 30% of the GNP. Traditionally the region has concentrated the most part of the economic activities in the country, conforming one of the biggest labour markets.

Quality of life in the metropolitan zone is superior to the rest of the country, for example, houses with soil floor represent less than the 4% versus the 20% they represent in the whole country. Houses with drainage constitute 91% for this zone while they represent 65% in the country; houses with piped water represent 95% compared to the 80% of the country and houses with electricity are 98.5% in this zone versus 87.5% in the country.

However, all these parameters do not mean that the socioeconomic situation in this zone is satisfactory, but means that development and economic lags are bigger in the rest of the country.

Hydraulic Services Situation in the Metropolitan Zone in the Valley of Mexico

With an endowment of 265 liters per habitant per day, the population of the 18 co urban counties of the State of Mexico in the Valley of Mexico demand a flow of 31.17 m³/sec, equivalent to the 73% of the state demand, on the other side its supply is of 27.18 m³/sec, with an actual deficit of almost 4 m³/sec.

The supplied flow in the 18 co urban counties for urban public use comes from the next sources: 80% come from underground deposits and 20% from surface water, likewise, the 78% of the sources is located in the same basin and 22% is imported from the Lerma's and Balsas' Basin.

On the other part, the service coverage indicates that: the 95.83 % of the population (8.48 millions) have potable water in their houses, and 369,585 people who represent the 4.17% do not have this service. In the sewerage service, the 84.88% of the population (7.86 millions) have with this service and the 15.12% left (1 million) don't have this service.

Principal Problems of the Region

The problems in the Metropolitan Zone of the Mexico's Valley (MZMV) is complex and difficult to analyze, however we would try to talk about the most important factors that make management of water difficult and adequate in this region.

The political and administrative division of Mexico is constituted by 31 states and a Federal District; however each state is formed by specific physical spaces which correspond to counties, which based in the Political Constitution, have in charge many functions to

supply public services, like potable water, sewerage and residual treatment of water for final users.

On the other side, the metropolitan zone growth generated a regional problem, having as a result a fragmented metropolis, in the interstate relations (Federal District and the State of Mexico) and in the intermunicipal case, so it is necessary to analyze its jurisdiction aspects from a conjunctive regional perspective. In fact, some authors describe the region as politically unstable, because the governments of the State of Mexico, of the Federal District and of the counties are in charge of different political parties, so the party equilibrium is broken in every election with deep implications in the programs and the budgets; likewise the supply of public goods and services is affected by this situation generating enormous variations in quality and quantity of the supplied services.

The responsibility fragmentation in the potable water service supply in the MZMV is visualized like this: at one side the federal instance through the National Water Commission, exploits, uses and administers the hydraulic resources of other basins for the «water in block» supply to two entities, the Federal District and the State of Mexico, likewise operates in conjunction with the Federal District the Mexico's Valley Hydraulic System for the removal of rainfalls.

The State Government through the State of Mexico's Water Commission receives water from the National Water Commission and operates the intermunicipal distribution systems and gets water from the state water bearings to complement the whole supply.

At last, the county occasionally takes advantage of the water bearings through a municipal decentralized operating organism distributing and operating supply systems to the final user without the state or the federal back up. In a

different way, the Federal District, an entity without a county division has a «vertical» public administration even in the supply of hydraulic services.

Demand for services exceeds the county and state government capacity, so lags in domestic supply of services is accumulated.

We have said before that the metropolitan zone and the Federal District form one of the biggest population centers in the world, however, some situations aggravate in the State of Mexico territory because there are a lot of immigrants from other states of the country that come to the conurbated zone and settle down. One of the characteristics of this group is that they are low income families, and they settle down in the limits of the county originating a big quantity of irregular urban settlements even in high risk zones.

The lag in the infrastructure for distribution generates inequity in the service; in the Federal District they have real endowments of 345 liters while in the State of Mexico the real endowment is of 250 liters per day with large zones where the service is not continuous. This same lag puts the State in disadvantage with the Capital City of the country because the shared sources of the good (agreed at the 50%) like the Cutzamala System cannot be exploited at the 100%.

Neighbourhood with the Capital City and the strong demand to supply the last one, has generated that the State yield a big part of its hydraulic resources (17.9 m³/sec) located in the State of Mexico, situation that has led to the inconformity between users of the entity.

There are also some incongruities like this one: The state of Mexico has to pay more elevated rights for far federal water source flows (like the Cutzamala) when from its territory have been extracted flows at a lower economic cost and that have been exported by the federation to the Federal District (Water bearing Wells System of the State of Mexico).



For the Valley of Mexico's Basin it has been necessary to fall back on importing water from other basins because the consumption is more than what is generated, specially in underground resources. In conjunction with the Federal District, the State of Mexico imports 21.5 m³/sec from the Lerma and Balsas' basin, from which 83% is for the Federal District and 17% for the State of Mexico.

The big demand of this resource has generated a competition situation between different users and uses.

The age of the distribution infrastructure and the lack of resources for its adequate maintenance generate network losses between 30 or 40%, equivalent to 21 m³/sec, sufficiently to supply 6.8 million inhabitants with an endowment of 265 liters per inhabitant per day.

The inefficient and irrational use of water, generated principally by the lack of recognition of the economic value of the source, has originated that the alternate sources that first pretended to reduce the overexploitation of the adjacent water bearing, have not yet accomplished its objective, continuing with the extractions and reaching a global overexploitation of the 130%, equivalent to 22m³/sec.

The overexploitation of the water bearings have induced, in some regions to the underground sinking of 30 cm per year, causing damage in the hydraulic infrastructure of the city, principally in the slopes of the drainage constructions, which increases the risk of catastrophic floods in case of torment of extraordinary magnitude.

Woods and reservation zones have been deeply damaged, the grounds suffer erosion and invasions from the urbanization, which affects in recharge zones and affect negatively to the hydrological cycle.

In the other hand there is a legal framework that is still in a modernization stage by con-

stant changes, this situation generates uncertainty in the actors that intervene in the water management.

Finally we have to recognize that the society's lack of sensibility to water, has not permitted yet to recognize it as a finite, scarce and vulnerable source in this region.

Expectations

The behaviour pattern of the population dynamics of the MZVM indicates that the Federal District will have growth rates that tend to stability, so the increases in water are expected to be minimum; in the other side The State of Mexico region will have in 2020 a population of approximately 12.3 millions of inhabitants, that is a 13.5 million increase of population demanding 40.7 m³/sec, registering an increase of 9.6 m³/sec with an endowment of 286 liters per inhabitant.

If we consider that Cutzamala System could operate at 100%, it could transport through 130 km and 1,200 meters of elevation a 19 m³/sec flow from the Balsas' Basin. If this system would work in conjunction with the Macro-circuit (it comprehends 117 km in its two lines of 72" of diameter), it would give us the possibility to use 6 m³/sec more to supply the conurbated counties.

We would need 4 m³/sec more to satisfy the demand of this region and abate the deficit, so this flow would need to be satisfy by some reused treated water programs, by the efficient use and saving of this resource, also by programs of attention of runs of the resource, as such as continuing with the supply through outside sources like the Amacuzac or Tecolutla's Basins. All these needs high investment in the operation and maintenance costs for the new infrastructure that would notably raise the price of the water service.

The actual growth of the region represents almost 250 thousand inhabitants per year, and 50 thousand more houses. Given the water shortage in the region, to satisfy the demand of the new inhabitants and to abate the lags, it is necessary to look for new mechanisms to diminish the urban growth and to order the new human settlements with a final objective, to offer good quality services.

Experiences and relevant actions taken

The Institutional Reform of the Governments organic structure appears today as a substantive factor in the political and social agenda. For the last years, all the countries have driven different programs of administrative and political reforms of their governments, from massive privatization politics to open global programs to restructure government entities, the substantive idea that appears is that governments must become highly efficient, compacts, and with a higher level of responsibility with society.

Public companies privatization, which started in the 80's decade, is one of the most important and controversial themes in the theoretical and practical points of view, this ideology, seen through the «failure» of the public sector companies in the accomplishments of their goals, has resurged as an alternative to give the potential to the private sector as the new engine of development, making privatization a central element in the economic reform of the State, proposed by the «Neoliberal» trend, as the panacea to the inefficient public administration.

Nowadays, there is a trend in the Country to the creation of a framework which propitiates a greater participation of the private sector; all international, national and development banks financial policies, imply the theme of private participation, trying to transform the idea of the offer of a private good rather to a public good, however, frontiers among what is public and what is private become vague, apparently showing that it's still a frontier constructed by social images rather than by an authentic possibility for overcome.

Institutional Reforms in Mexico, as in other countries of the orb, obey fundamentally to conditions established by financial agents. What these reforms attempt is an economical solidity of the Country and to guarantee the return of capital to the private sector, without destabilize the internal economy.

One of the key points for these theme could be to comprehend that under the cultural characteristics of our countries, the actors make decisions within multi organizational environment, where there are explicit rules, and implicit values with multiple power relations. As well, most of the legal frameworks, haven't yet been reformed in order to give total certainty to all the involved actors as well as security to their participation, all in a transparent way, and within a legal framework.

The acceptance of the cultural complexity of the actors must be the first requirement of any scheme which pretends to improve the performance of the Latin America organizations. Even if the cultural matter may be clearly unpredictable or uncontrollable, is not incomprehensible though.

On the other side, we have the experience of participating with two institutions of the international banking community, Interamerican Development Bank (IDB), and World Bank; this experience has led us to advance in different reforms, both in the institutional matters, as well as in the legal frame. In 1999 a Water Law for the State of Mexico was passed, as well as the Water Commission for the State of Mexico (CAEM) was created assuming control over the integrate management of water. In the year 2001, the rules for the mentioned law were passed, and in the present year the possibility of creating a water services regulatory organism is under analysis as a strategy to drive the participation of the private sector in the development of the activity, under a frame of certainty for them, as well as to search for the assuring of quality services at reasonable costs for the users; also we have inducted a change in the pricing policies, trying to slowly reduce the subsidy between the different steps of water administration.



We have the experience of 7 years in the participation of the national private sector in the treatment of residual waters. Results haven't been as satisfactory as wanted since the inefficiency of the collection activities for the treatment service and of the municipal operative organisms has propitiated that the state government funds the financial charge in a big percentage.

About service's tariffs, they have the contrariety that for a long time they have been subventioned, besides, the ones that apply to the operative organisms that provide the services, generally are minor than the authorized by the Congress of the State. The main challenge for this matter has been to define mechanisms to establish tariffs accordingly to the characteristics of the regions and of the users themselves, trying that they reflect the real cost of the services, without losing their social character; the purpose is that the operative organisms improve their income while assuring accessible tariffs for the most needed social classes.

For the case of «blocks of water» that CAEM provides to the Counties, prices are emitted annually, incorporating to them concepts that permit on one side to advance to technical and financial self-sufficiency, and on the other, to provide quality services. However, social-political inertias, the limited culture for the payment of the service, and our own economic conditions, have been a real obstacle to obtain the desired results.

130 To improve the quality of the services delivery, the decentralization of them to the Counties has been driven, defining the strategy of establishing decentralized public organisms as a first step. At the MZVM, 17 of the 18 co urban counties count with an operative organism.

Given the demographic growth dynamic, a pressure over the resource's good use is being generated, that's why, with the objective of creating a greater equity and justice among the users, nowadays the state government is driving a law initiative based upon economic compensation for those entities or settlements established at the

basins, that export their hydraulic resources to other basins or entities.

Coordination with the Federal District

Though the complexity degree of the political fragmentation that we've been referring to may vary, it can be considered as origin of many problems. Among them, those related to coordination and cooperation between Counties or between them and the state and federal governments, or even among entities, as it has been showing lately. These problems, associated to the metropolitan planning, can be synthesized in three great aspects: efficiency, coordination, and distribution equity or justice.

The coordination problems are evident when local governments try to be efficient. Within a political-administrative fragmentation context, if high levels of cooperation between government entities don't exist or are not created, that efficiency will be diminished. In the same way, many of the metropolitan services require a coordinated effort, even, if necessary, a coordinator organism.

The MZVM has experimented for the last 20 years multiple mechanisms of coordination for the planning of development, and the effects of the urban growth, from the National Development Plan, Social Development Agreements, Committees for Development Planning, the Center of the Country Conurban Commission (1976), the Development Program for the Metropolitan Zone of Mexico City and the Center of the Country (1983), Metropolitan Area Council (1988), and the Commission for the Prevention and Control of the pollution in the Metropolitan Zone (1992), to the creation of Metropolitan Commissions in 1994, among which are the Water and Sewerage Metropolitan Commission and the Metropolitan Development Office (2001); however, given the recent creation of a «specialized commission in the water matters», the coordination efforts among the three

levels of the governments (federation, states and counties), haven't been able to create a clear politic which contains in a homogeneous way, the intentions and the strategies for the matters of supply, drainage, tariffs and regulatory instruments, among others, that need to be developed for the MZVM.

In fact, the coordination for the attention of water related problems, has been given through specific agreements on which Federation participates directly through the Water National Commission; such is the case of distribution of flows coming from other basins, the hydraulic management of Valley of Mexico, and the drainage and treatment plants infrastructure are being constructed with International Banks resources such as Interamerican Development Bank (IDB), and the Japan Bank for International Cooperation (JBIC).

Nowadays, the trend points towards interstate metropolitan coordination mechanisms consolidation, as well as to the metropolitan policies design for the solution of common problems.

The State of Mexico advances towards the conformation of an integral metropolitan politic. The plural political mosaic of the MZVM is not just an obstacle; it may also represent an opportunity to integrate regional politics that may count over all with the firm support of the municipal authorities.

As far as the coordination with the Federal District tends to be strengthening, it also increases the opportunity to solve great scale problems such as sustainable use of the Basin's hydraulic resources.

With the objective to modify the water administration model, the federation has created new structures based on other countries experiences, where the basic cells for the resource administration are the hydrological basins.

Basins' Councils are based in the National Water Law, which are coordination instances where the three levels of government and the organized users converge. These strategy is still in process and undoubtedly would be a great support to

achieve the common objective the water sector is looking for. So, the Valley of Mexico's Basin's Council has been created.

Final comments

The water problem has threatening dimensions, we have passed from an unalterable and wealthy scenery to a fragile and scarce one, so it is of big priority to take actions to plan, administer and take advantage of this resource as such as hydraulic projects that have been developed under a real scenery of the resource.

Given today's conditions it has been necessary to incorporate an economical, social and environmental profitability analysis obtained by the different uses of this resource into its management, because quality and quantity availability of the water is important for human life and economic activities.

A modern view of all these would be to see water as an ecosocial asset, and is necessary to highlight the water potential as an economic, social and ecological function satisfier. This implies that water is not only essential for biological survival, but for economic development and sustainability for the economy and the social structure, showing that water is necessary for life, society and ecosystem equilibrium.

Towards this resource shortage, like the one in the Valley of Mexico's Basin, specialists that work in the hydraulic area have to look forward the next strategies and actions:

- Change or combine big projects of infrastructure enlargement with projects of loss control and efficient use of the resource.
- Treat residual water and intensify its use, making obligatory its use in activities that do not require potable water.
- Protect and recover natural water recharge zones and improve the artificial recharge of water bearings.
- Develop a modern legal framework and look

for mechanisms for its accomplishment with the principal objective, to assure transition to sustainability of the resource.

- Establish a regulatory scheme that could define obligations and rights of the principal users and suppliers of this good, improving the ordered participation of the private sector as an alternative for the sub sector development.
- Contribute for the adoption of a new sensibility of the population towards the hydraulic resources management, following the scarcity, vulnerability and vitality concepts of this resource.
- Consented and ordered participation of the different actors that have influence in the use, administration, preservation and development of the hydraulic infrastructure.
- The tariffs of services must be used strategically to show the user the economic value of water.

Finally I want to manifest a reflection about situations that are out of our control, however we have to worry about how we share this planet as human beings.

I restate that the principal obstacle for the Latin America's countries to achieve the sustainable use of the water is poverty that added with the actual developing model, taxes for the rich people, it only conduces us to the depredation of our natural resources. This situation reduces substantially the opportunity to achieve our objectives in respect of the water subject, we need to look forward a sustainable model different from the depredation that is still developed. The biggest part of this efforts must be accomplished with absolute support of the most developed countries and of course of the international financial institutions.

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Regulatory Framework for Water Service Operators

Dr. Leopoldo Rodarte Ramón

Asesor del Jefe de Gobierno del Distrito Federal
Comision de Aguas del Distrito Federal, Mexico

General Background

Mexico City, together with the State of Mexico, is part of an overall unit. Mexico City has a very large metropolitan area that belongs to the State of Mexico, where nowadays most of the Mexico Valley inhabitants live. Mexico City has made significant investments over the past 8 years in order to try to solve its drinking water shortage problem, with very big advantages in comparison to the State of Mexico. For example, Mexico City is practically not growing, just 0.5% per year. With a population of 8,600,000 inhabitants it only grows about 40,000 inhabitants per year. It is showing very slow increase of its population and all the problems are therefore affecting the State of Mexico and its surrounding area.

Institutional Framework

The third clause of Article 115 of the Mexican Constitution establishes the responsibility of the municipalities with the agreement of the States to deliver water, sewerage and sanitation services. In fact, in Mexico, all of the state governments of the 31 states of the Federal Government have had to assume this responsibility. The Federal District Government established service contracts with four private companies in 1993. By service contracts we understand that the property of the treatment plant network,

drainage network, treatment plants, drinking water network, and in general all infrastructure belongs to the Federal District Government, where only part of the operations to be carried out for a period of 10 years, is made for the four private companies mentioned above. The main activities that have been given in concession are water billing and collection.

Juridical Framework - Coordination between Municipalities and Federation

At a State level, the State drinking water, sewerage and sanitation law is the juridical framework that regulates all State services and coordinates the actions with the municipalities and the federation. Rate or tariff fixing, mandatory service metering, and leakage reporting, cutting off service for delayed payments, determination of subsidies and fixed installments, the type of operator, etc., all show different patterns throughout the Mexican territory, and at the same time are fundamental elements as well as the State Water Law regarding water.

State Law on Water, Sewerage and Sanitation

The Federal District does not have a State law for water, sewerage and sanitation and therefore, meter installation or leakage reporting is not regulated. The existence of this law is a fundamental step for the establishment of private operators. We do not have a law because from



a juridical point of view, the F.D. is not a federal entity or a municipality, it is some strange thing between a municipality and a State and it has many legal restrictions. Despite these legal restrictions, we have to operate with what the country's laws permit us.

Efficiency

Compulsory Service Metering

The installation of micrometers makes it possible to know the space and time distribution of city consumption and it permits to know the three fundamental parameters that define an operator's efficiency. I simply want to remind you that we are talking of a city with 8.6 million inhabitants and 1,776,000 users.

We use the parameters set by the International Development Bank (IBD) to measure efficiency. This is a little different from what I have heard here because we consider as total efficiency the product of: water efficiency, collection efficiency and metering efficiency. In the presentations that have been made here, metering efficiency is not taken into account. I say this because if we are going to improve efficiency, we have to consider metering efficiency, in my opinion, a fundamental parameter, because micro-metering allows regulating water consumption.

Water Efficiency

I administered the Water Commission of the Federal District between 1998 and 2000. In 1997, the city had 37% leakages in average. In 1998, we reduced leakages 1.5%; by 1999, we had reduced them up to a 3.3%, and by 2000, up to 5%. Each 1% increase in physical efficiency signifies an additional 350 liters per second. In total in the three year period, 664 km of network was repaired using the very best state-of-the-art technology: high density and

high molecular weight polyethylene, 82,669 distribution pipelines were repaired and more than 1,760 liters per second were recovered. This is a very significant recovery. We are talking about almost the same volume of water consumed by Cartagena de Indias. These are investments of a very different size than what was made in Cartagena.



Metering Efficiency

We assumed the administration of the Water Commission with an efficiency of about 78%, and in 2000, metering efficiency was 90.28%. By the end of 2000, we had installed 1,228,000 meters, more than 65% of which are digital. When I say digital, I mean that they are not mechanical. The reading is made with micro-computers or remote readings with radio frequency. Readings for more that 600 users are being made with remote reading on a weekly basis. These are big water consumers and we have them permanently controlled. Domestic users and the rest of the smaller users are controlled with 2 or 3 readings every two months. Water is charged every two months.



Collection Efficiency

We took over the water administration in January 1998, and efficiency was raised from 63.46% to 81.65% in 1999. It subsequently barely fell in 2000, not due to inefficiency, but due to a political problem. Collection went from 188 million in 1997, to 293 million dollars in 2000. In other words, during those three years collection grew 105 million dollars with lower rates. This is another way of looking at the problem: We consider that it is possible to improve the efficiency of the organisms without increasing the price of water. When it increases, it becomes a false way out that has been used in Mexico as well as in other countries in order to take the organisms' figures from red to black: the present figures show us it is not necessary to do so to achieve more efficiency. For example, billing volume. The volume shown by water bills grew from 390 million m³ in 1997 to 577 million in 2000, up 187 million m³ billed. At the end of 2000, we had approximately 1,735,000 users. Currently we have 1,776,000. Mexico City's population is practically not growing; it is growing in what I call quality of life. In other words there are 30-35 thousand new users each year, which are people who build a new house or improve their conditions of life.



Total Efficiency

Total efficiency is the product of the three efficiencies. The other speakers did not consider metering efficiency. For us this is essential. When we took the administration in Mexico City it had a serious water shortage and when we left the

administration there was practically none. When we took the administration total efficiency was 32% and we increased it to 48.71%. If we only consider the two parameters everyone has been talking about, Mexico City had a total efficiency in 2000 -without considering metering efficiency- of approximately 56-57%, practically twice than the State of Mexico.



Advantages Of Micrometers

What are the advantages of micrometers? Why is micro-metering so important for us? I'm showing statistical results of what occurred in Mexico City after the meters were installed. We are talking of large groups of population. For example, Alvaro Obregon, which has a population of 600,000 inhabitants. When we installed the meters, water consumption was 112.17 m³ per two-month period. Two years later consumption had fallen to 83.81 m³.

In general, average water consumption for the city after the meters were installed fell in average 15%. Meter installation creates water culture. After people have a water meter, they start being careful with water. In some districts, especially higher-income ones, where consumption was 200 m³ per two-month period without meter, after two years consumption had fallen to 100 m³ per two-month period. People start being careful because there is a progressive rate, so the more water you consume the more you pay. Whereas in districts where consumption is not measured, districts with a fixed rate, no consumption reduction is observed. In other words, only with meter installation were we able to reduce consumption.

Therefore, in Mexico City with metered service we nowadays bill 93% of drinking water.

Organization of the Water Supply System

The Kind of Operator

Clause 3 of Article 115 of the Constitution establishes the responsibility of the municipalities with the agreement of the States to deliver water, sewerage and sanitation services, whether directly or indirectly through an operating company. The Federal District, the operating entity of the Federal District Water Commission, which is a public entity, was created without legal capacity and without own capital. The national and international trend is to create decentralized public entities with legal capacity and own capital. They are able to plea before the courts in case of suits and they own their equipment, facilities, offices, etc. We have recommended the government of the Federal District that the Water Commission become a decentralized public company with legal capacity and own capital. We consider that that simple step would increase collection from 81.5% -the maximum we have obtained- to 95%. Let me give you more information about the Federal District Water Commission. It has 93% metered service; we have covered most of Mexico City with meters. We have installed digital meters making meter reading much easier. One person can carry out over 200 readings a day with contact meter. It is connected to a mainframe and it issues the bill immediately. This is a very modern, efficient process.

Services Offered by the Private Companies

The companies working for us have partial service contracts. The State maintains the entire control. These companies carry out the following services: they install meters, carry out preventive and corrective maintenance, replace valves

and domiciliary connections, read meters, consumption billing, billed consumption collection, repairment of the secondary water network and domiciliary connections, and elimination of non-visible leakages.

Rate Fixing

This is one of the most important problems faced by operators. In nineteen federal entities in the country, rates are authorized by the administration councils of the service providers, in ten entities by local congress and in one by the State governor. Rate definition is complicated by the existence of fixed installments, subsidies, and different rate definition criteria. In general, in Mexico most operators show losses. At present in the Federal District, 65 cents are recovered for every peso invested in the water budget. But it would be sufficient for one measure to be taken for our situation to change radically; for example, that the federal government would not charge us the water the way it does. The federal government charges us 150 million dollars per year for the total m³ of groundwater we extract in block. If they did not charge us for that water, the Federal District operator would be profitable, although the lowest rate charged, which covers a high percentage of the population, is 10 US cents per m³ billed.

The Federal District charges different rates to domestic and non-domestic users. 99.25% of domestic users consume subsidized water. The current cost per m³ of water is approximately 90 US cents. This only includes operating costs. However, it would be very easy for the entity to be profitable because of its efficiency levels, but we must not forget about two things that are very important in Latin America. First, in cities like Mexico City and, in general, in all of our countries, there is a high ratio of poor people. 73% of the inhabitants of the Federal District live in poor sectors and only 27% live in residential areas. Second, water is and has always been an indispensable service for the

population. Therefore, a political error may result in very serious problems for the country. In Mexico City practically everybody consumes subsidized water. Only 1%, which corresponds to industrial or business companies, makes it possible for us to collect 48% of the total. In other words, large industries and businesses are the ones that subsidize the consumption of the low-income sectors.

Non-Payment

Only one last reflection. Cutting off service because of non-payment. In the Federal District you can only cut-off supply to non-domestic users. According to Art. 145 of the Law of Public Health, water supply cannot be cut off to domestic users. Service is restricted to 10%.

Conclusion

And my final reflection: the State can also be efficient. We must not think that everything boils down to obtaining profits. In the case of water, the service we deliver to the population is essential. ■





Challenges in the Water Sector in the Mexico City Metropolitan Area

Ms. Lilian Saade Hazin
Independent Consultant

Abstract

The water supply and sanitation situation in the Mexico City Metropolitan Area is a real and growing problem. The total population of the metropolitan area is around 19 million people -approximately 8.5 million live in the Federal District and the rest in the peripheral states of the State of Mexico-. Both jurisdictions share common problems including the following: same water sources, inadequate and incomplete service provision, fragmentation of responsibilities in the sector, inadequate pricing policies, obsolete network and limited rehabilitation, water pollution, lack of treatment capacity, lack of quality control, delays in the payment of water services by the users and often lack of payment.

In the Federal District, since October 1993, four private firms have intervened in the form of service contracts to implement universal water metering, rehabilitate the distribution system and carry out a loss detection program. Substantial improvements have been made in the Federal District with the customer database, metering and billing. Yet there is significant potential for effective demand management of water use. The implementation of the contracts has been carried out in three phases (not being successive) and has been hampered by a number of setbacks, including the 1995 financial crisis of the country

and the lack of co-ordination among the institutions involved in the sector.

Important social and environmental issues need to be considered in the Mexico City Metropolitan Area. The unplanned urban growth and in particular, the irregular settlements, which have developed on reserved areas, supposedly dedicated to the recharge of the aquifers, are of particular concern for water resource planning.

Pricing policies have traditionally been based on political considerations. Water agencies are not financially self-sufficient and costs represent more than double of their revenues. Given the strong interconnection and combined water and wastewater systems serving both the Federal District and the State of Mexico service areas, important coordination efforts are needed. In recent years, the different actors have joined forces to implement a drainage and treatment plants infrastructure program, with resources from the Inter-American Development Bank (IDB) and the Japan Bank for International Cooperation (JBIC). In order to optimize the use of resources, this type of initiatives should be promoted.

Introduction

Water Availability

The mean annual rainfall in the country is 772mm. Despite the relatively high rainfall, water distri-

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bution is difficult and costly in the country since the geographical distribution of water does not reflect the distribution of the population and its needs. Around 77% of Mexicans live in the northern and upland part of the country (where the Mexico City Metropolitan Area is located) where approximately 28% of rainfall occurs (CNA, 1999). In addition, this region contains around 90% of irrigated land, and generates 84% of the country's GDP (24% being generated in the Federal District). The per capita GDP in the country is of the order of \$5000 US dollars¹. Water supply is also unevenly distributed seasonally since annual rainfall is mainly concentrated during the summer period.

Approximately 96 of the 653 Mexican aquifers identified are severely overexploited. (CNA 2001). The Mexico Valley area being one of the most affected ones. While the aquifers in that region are recharged with approximately 700 million cubic meters annually, nearly double the amount is extracted. Ground water exploitation first began last century. The falling ground water levels have resulted in an average subsidence of 7.5 meters in downtown Mexico City (National Research Council, 1995). Subsidence has exacerbated the natural propensity of the city to flood and has damaged the city's infrastructure. The city has been obliged to install pumps to push the water to what is called the Great Canal, and to move water through urban drainage networks. This situation has left the Great Canal to be operating at 10 per cent of its initial capacity (Adelson, 1999).

Common Problems in the Mexico City Metropolitan Area

The Story so far

The Mexico City Metropolitan Area (MCMA), which is the focus of this paper, comprises two political-administrative entities - the Federal District and the peripheral urban municipalities of the State of Mexico. The total area of the Federal District is

approximately 1,504 sq. km. (National Research Council, 1995) The metropolitan area extends to the East, North and West of the Federal District into around 18 municipalities of the State of Mexico, having a total area of 2,269 square kilometres. Approximately one-fifth of the Mexican population live in the MCMA, with around 8.5 million people in the Federal District and slightly more in adjoining parts of the MCMA in the State of Mexico.²

In total, the area served by the common water distribution and wastewater disposal systems equals 1,287 square kilometres. The management of water and wastewater services within the MCMA is shared by the Federal District and the State of Mexico, who are each responsible for providing water and sanitation services within their jurisdictional boundaries. It is important to note that while the rate of population growth within the north central urbanized portions of the Federal District has slowed, immigration to the surrounding jurisdictions, especially in the State of Mexico, has been responsible for significant population increase and urban expansion within the MCMA. Various forms of illegal or irregular settlements have been established and are of particular concern for water resource planning (National Research Council, 1995).

Table 1 shows some of the common problems face in the water sector in the MCMA. The National Water Commission (CNA) is in charge of providing bulk water to the service areas. From the 62m³/second of water received by the MCMA, the Federal District consumes 56% and the peripheral municipalities of the State of Mexico 44% (CADF).

1/23% of the total GDP of the country being generated in the Federal District and 10% in the State of Mexico.

2/ The area commonly known as Mexico City was traditionally associated with the north central area of the Federal District. With the increased urbanization that has occurred over the past decades, a larger metropolitan area has been designated that contains the entire Federal District and all or portions of 18 municipalities in the neighboring State of Mexico. Mexico City is situated in the southern part of the Mexico Valley Basin. This basin is formed by the partial territories of the states of Mexico, Tlaxcala and Puebla as well as the total area of the Federal District.

Table 1: Common Problems in the MCMA

	Federal District	State of Mexico (area corresponding to the MCMA)
Population	8.5 million	9 million
Water sources	2/3 comes from the Aquifer underlying the metropolitan area 1/3 from external sources (mainly the Cutzamala)	Mostly the same
Water coverage	98%	96%
Level of service	Discontinuous (tandeo)	Same
Daily water supplied per capita	350 liters	265 liters
Leakage	35%	30 to 40%
Quality	Lack of quality control	Same
Sewerage coverage	94%	85%
Wastewater treatment	More than 80% of the municipal wastewater from the MCMA untreated	Same
Service Provision affected by	Fragmentation of responsibilities	Same
Tariffs	Based on political considerations and not sufficient to cover costs	Same
Percentage of bills issued that are not paid	25%	50%

Source: Analysis of the author

Water Sources

Two-thirds of the water supply comes from the aquifer that underlies the metropolitan area. The rest comes from external sources mainly from the Cutzamala system (20%) and the Lerma river. The Cutzamala basin incurs high pumping costs since it is located at a considerable distance from Mexico City (some 130 km) and lies at a lower altitude (1000m below the city). Mexico City has been rapidly drawing the aquifer under the city. Over-exploitation is due to the great size of the population and the consumption patterns prevalent in the area.

Water Coverage and Level of Service

According to the Federal District Water Commission, 98% of the residents of the Federal District have access to piped water, either through an in-house connection or rely upon a common distribution faucet in the neighbourhood. The remaining 2% rely on water trucks from which they fill containers for home use. It is estimated that about 76% of the residents of the Federal District have access to piped water inside their home. In the State of Mexico, this percentage is roughly 52

per cent (INEGI, 2001). Figures from the State of Mexico Water Commission indicate that in 18 peripheral municipalities the State of Mexico 96 per cent of the population has some access to piped water.

In certain areas of the MCMA, there are the so-called *tandeos* (discontinuous water service). This means that the service is provided at specific times or only on certain days of the week. In some cases, it could even be every eight days. In most of these cases, users have a calendar on when the service will be provided to their area. It is important to note that one of the main features of the Mexican case, compared to other countries is the fact that, where possible, houses have their own water tanks where water can be stored (up to a certain capacity) for a certain time, so in the case that water is exhausted they can use the stored water as a supplement. Often, this is not enough to cover their needs. Alternatively, they have to make use of water vendors.

Leakage

Approximately one third of water supplied to homes in the MCMA is lost through leakage. This leakage is mainly due to the poor maintenance of the infrastructure and inadequate installations in homes. In addition, the average cost of providing water services to the fast-growing population is increasing.

Daily per capita water supplied

The average daily per capita water supplied corresponds on average to 350 liters per day in the Federal District and considering that 35% of the water is lost through leakage, the real water consumption is of the order of 227 liters per capita. This is still high relative to other cities in Mexico and the world. The daily per capita water supplied in the 18 peripheral municipalities of the State of Mexico is of the order of 265 liters.

Insufficient Sewerage services and Pollution

Around 60% of wastewater discharges are generated in the Federal District and in seven out

of the 31 Mexican states. Studies show that the Mexico Valley and the Lagunera region are among the areas with the heaviest groundwater pollution. Although 94% of households in the Federal District have access to sewerage services and in the case of the peripheral municipalities of the State of Mexico, around 85% of households have access to sewerage facilities, only 10% of the municipal wastewater from the MCMA is properly treated. The remaining 90% of wastewater generated is diverted out of the Basin of Mexico through the general drainage system. The untreated wastewater is then used to irrigate over 85,000 hectares of farmland in the Mezquital Valley in the neighbouring State of Hidalgo (National Research Council, 1995).

Issues on the fragmentation of responsibilities, tariffs and the lack of payment culture are discussed in the following sections.

Parties involved

A number of public authorities continue to play an important role in the sector. Having so many entities involved in the running of water operations causes certain problems. Although in theory each agency has a distinct role to play, in practice duplication and overlap often occur. Table 2 shows the institutions from the public sector involved in the water sector in the MCMA.

Table 2: Institutions from the public sector involved (Simplified scheme)

Federal District	State of Mexico (MCMA area)
CNA. Provides bulk water to the City Gravamex Planning and execution of regional programs	CNA Gravamex
Secretaria de Obras: - CADF* Commercial system and support to secondary networks. - DGCOH Responsible for the primary network	CAEM planning, technical assistance
Treasury Department Concentration of money collected from water services	Same
16 delegaciones (municipal districts) In practice, in charge of the operation and maintenance of the secondary water distribution and drainage networks	18 municipalities Provision of water, sewerage and wastewater treatment and disposal. They belong to different political parties.

Source: Analysis of the author

The CADF with work carried out by four private firms. One of CADF's most important duties is the issuing of bills, and water distribution to major users (grandes usuarios), who total approximately 17,000. Major consumers comprise only 1% of all users in terms of numbers, but contribute approximately 50% of water fees collected. CADF has retained control over these accounts.

This situation was recognized and some attempts have been made to improve it. One example in the Federal District is the enactment of the Decree of 21 October 1997 that gave the Works and Services Secretariat under the Federal District Government, the responsibility for the operation and maintenance of the secondary water distribution and drainage networks, currently under the responsibility of the delegaciones (municipal districts). However, in reality, this decree has not been implemented and the delegaciones continue to perform this activity.¹

In order to try to overcome some of the problems associated with the lack of co-ordination, at the Federal District level, it is intended to have only one autonomous public agency

(órgano público descentralizado) involved in the running of water operations. This agency will encompass all the activities of the CADF, the DGCOH and the water operations carried out by the delegaciones.

In the greater metropolitan area, it should be mentioned that although the structures are there and a special commission has been created for water issues, there is not a homogeneous policy in the water sector in the MCMA and still much more needs to be done to achieve some sort of coordination among the different levels of governments and between the two political entities.

¹/The Decree does not specify if this function will actually be undertaken by CADF or the DGCOH. However, it is likely that eventually the CADF will undertake this responsibility with the work undertaken by the four consortia.

Private Sector Involvement in the Federal District

Since October 1993, four private firms have been awarded service contracts to implement universal water metering, rehabilitate the distribution system and carry out a loss detection programme in Mexico's Federal District. The decision to involve the private sector was motivated by the urgent need to provide adequate water services for one of the largest cities in the world. Given the lack of information regarding the customer base, water consumption levels and network conditions, a phased approach to Private Sector Participation (PSP) was considered most appropriate. The Federal District was divided into four contractual zones and service contracts were awarded to four separate consortia following an international bidding process to which seven firms participated. The tasks of the consortia were to be accomplished in three phases:

- I.- Carry out a census to identify and register customers, install meters and produce network plans;
- II.- Read and maintain the installed meters, design and implement customer billing systems, calculate, print and distribute water bills, set up new connections to the networks; and
- III.- Operate, maintain and rehabilitate the water distribution and drainage networks.

The strategy of the Federal District Government was twofold: to implement universal water metering for the assessment of customer bills and to significantly improve the water distribution infrastructure. In July 1992, the Federal District Water Commission (CADF) was created. As mentioned earlier, this commission is in charge, among other things, of supervising the four private consortia and of the review and analysis of their financial statements.

The transition to PSP has achieved several goals. The change to metered consumption is one of the most important achievements. Substantial improvements

have been made in the Federal District with the customer database, metering and billing. In addition, there has been an important increase in collection levels. The adoption of a phased approach allowed for certain flexibility for mistakes to be corrected. Also, dividing the city into four zones has reduced to a certain extent the risk of private investment monopoly. If any company performs poorly, either financially or technically, its contract can be revoked.

The implementation of the contracts has been hampered by a number of setbacks, including the lack of co-ordination among the institutions involved in the sector and the 1995 financial crisis of the country.

The poor flow of information presents a potentially serious problem. The four consortia have difficulties to calculate commercial efficiency in their respective areas (bills issued/ bills paid) or to pursue non-payers since although they know which customers have paid in their offices, they do not have ready access to complete information on payments made to banks or the various Treasury offices. This, however, is improving and the time they have to wait to get the information has been reduced.

The length of the general contract is an issue for discussion. A ten-year period was considered to be the minimum acceptable period to achieve the goals of the project and allow the companies to recover their investments. However, subsequent delays have reduced the effective period of operation. In effect, the general contracts will expire in 2003. The companies are hopeful that the contracts will be renewed.

Economic and social issues

The case of the Federal District

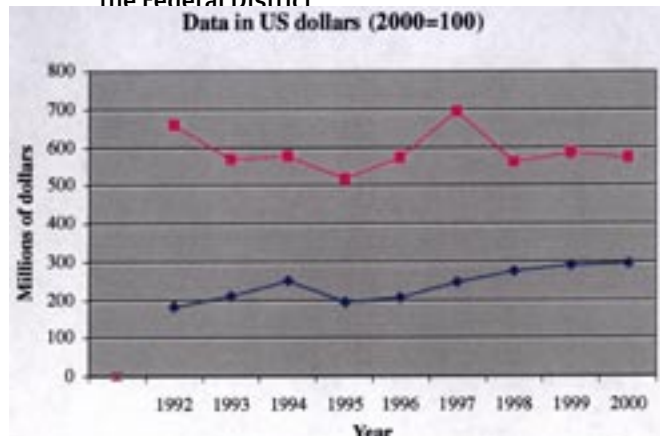
In the Federal District, prior to the large-scale implementation of the metered service (all meters are read every two months), tariffs in most areas were fixed and highly subsidised. The tariff structure gave users no incentive to save water. Despite

some attempts to motivate the population to use water more carefully through ecological information programs, users perceived water to be a cheap and unlimited resource.

The administrative and pricing policies have not been effective in ensuring that the increasing demands for water are met. In particular, revenues from water supply have contributed a small part of the total cost of financing the system.

As in the rest of the country the provision of water services in Mexico's Federal District has been highly subsidized. Expenses are more than twice the revenues (see Figure 1). The service has required an annual subsidy of over 2 billion pesos (over 200 million US dollars) from other Federal government resources. This annual subsidy for operation and maintenance of the water systems in Mexico City is equivalent to 0.5% of the country's GDP (Global Water Partnership, 2000).

Figure 1: Financial Situation of Water Services in the Federal District



Source: CADF

Note: Expenses include investments in large projects that are also financed through external loans.

Lack of payment culture

Wasteful water use is also exacerbated by a lack of payment culture. In the Federal Dis-

trict, while 75% of bills are paid, around 30% of users do not pay on time. According to the Federal District Financial Code, in principle, if domestic users fail to pay their bills, users can have their water services rationed to a «vital level».

Overexploitation

Significant problems remain. In particular, groundwaters continue to be exploited unsustainably, particularly in the eastern part of Mexico City. This is mainly due to the fact that additional water sources from outside of the city flow in from the West. Since demands in the western and central parts of the city are filled first, the external source is often exhausted before reaching the eastern part. As a consequence, four municipal districts in the eastern part of the City have to rely on local wells, which are over-exploited, and contain iron and manganese, which give the water a poor appearance. The Federal District government has tried to alleviate this problem by distributing water to affected areas using road tankers¹. However, since this solution appeared inadequate, the Federal District government is now looking for a more permanent and socially acceptable solution through the construction of a water transmission line (acuaférico) that will transport water directly from West to East. Construction of the transmission line initially was expected to be completed by 2005, although there have been some delays. In reality one should not discount the fact that this project will be irrelevant if the fourth stage of the Cutzamala system (which means bringing 5 additional cubic metres per second to the city) is not carried out as there will be no water to be distributed. The main reasons for the delay in the Cutzamala project are associated with social problems. People living in the areas that would be affected by the construction of the fourth state have opposed the project, as they perceive it would supply water to the people of Mexico City, and therefore, they feel they should not suffer because water is needed in another

*/ In addition, efforts have been made to restrict urbanisation in the Southeastern portion of the Federal District because of the difficulties in providing basic services, and also because it represents an important natural groundwater recharge zone.

part of the country (Tortajada, no date).

Tariffs in the Federal District

In the Federal District, in real terms, more than half of all residential consumers (using between 30 and 220 m³ per bimester) saw 1998 tariffs substantially lower than in 1996. It is worth noting that according to the CADF around two-thirds of residential users consume less than 60 cubic meters every two months.

The tariff reduction for residential consumers was accompanied by an increase in the cross subsidy from non-residential to residential consumers. At the same time, non-residential consumers have seen rising tariffs in nominal and real terms leading to a growing price differential.

Moreover, such cross-subsidies only benefit households who are connected. According to the Mexican Human Rights Commission, the very poor currently pay five times more per unit of water compared to the average domestic water tariff since they are less likely to have access to water in their homes and therefore have to rely on more expensive water vendors. In general, data are unavailable regarding the provision of water services to the poorer households who do not receive piped water to their home. In addition, rising block tariffs may be biased against households who rely upon multiple-household connections.

It is worth mentioning that the Federal District government has had a tradition of making late payments' exemptions or reductions for the different services provided with the aim of regularising debtors. These types of programs have been continuously repeated and if they continue they will provide less incentives for consumers to pay on time.

Finally, Mexican water authorities have faced social pressure from certain groups of the population that have complained about water services. In particular, in the Federal District, several

housing complexes do not allow for the installation of meters and are displeased with the billing and collection systems. Others complain about the fact that they do not perceive that tariffs increases are accompanied by significant improvements in service (Secretaría de Obras y Servicios, 1998).

Conclusions

The water sector reforms already implemented in the MCMA have not had the impact expected, including the partnership with the private sector. The main issues to be considered are institutional, political and social. Water authorities are still in search of solutions for the provision of water services. It will be necessary to define the institutional, legal and financial reforms that will be able to tackle the fragmentation of responsibilities, to resolve the financing needs, to reduce subsidies and to take into account the lessons learned in the different projects implemented so far such as the service contracts in the Federal District. It is a long-term process that will require patience and a lot of coordination among the different stakeholders.

Given the strong interconnection and combined water and wastewater systems serving both the Federal District and the State of Mexico service areas in the MCMA, important coordination efforts are needed. Initiatives such as the drainage and wastewater treatment program in the Mexico Valley (which was consolidated with a loan from IDB Bank and the Japanese government) should be multiplied. This is certainly a subject for further discussion, particularly since water is drawn from the same sources and deprivation is more pronounced in parts of the MCMA outside the Federal District.

Finally, the changes of administration in the Federal District and in the State of Mexico may have had an impact on water projects. However, the need for providing adequate water services in the

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Abbreviations and Acronyms

CADF-	Comisión de Aguas del Distrito Federal (Federal District Water Commission)
CAEM-	Comisión de Agua del Estado de México (State of Mexico Water Commission)
CNA-	Comisión Nacional del Agua (National Water Commission)
DF-	Distrito Federal (Federal District)
	Gravamex: Gerencia Regional del Valle de México (Regional Office of the Mexico Valley)
GDF-	Gobierno del Distrito Federal (Federal District Government)
DGCOH-	Dirección General de Construcción y Operación Hidráulica (General Directorate for Waterworks Construction and Operation)
MCMA.-	Mexico City Metropolitan Area- Zona Metropolitana del Valle de México
PRD-	Partido de la Revolución Democrática (Party of the Democratic Revolution)
PSP-	Private Sector Participation (Participación del Sector Privado)
SEMARNAT-	Secretaría de Medio Ambiente y Recursos Naturales (Ministry of Environment and Natural Resources). ■



Mexico

Discussion

Andrew Nickson

I would like to ask a question that I hope will contribute to the debate. I have the impression that the picture that Ms. Saade gave us some minutes ago is a little more negative with respect to the participation of private companies in the enormous challenge of improving water supply and efficiency, unlike Mr. Rodarte's presentation, who in my opinion gave us a more positive view, at least, in relation to the increase in efficiency. But for me things get a little more complicated because although Mr. Rodarte said that efficiency had increased in the F.D. according to the three indicators used for efficiency, he said this in the context of showing that the sector can improve efficiency levels. As if this would have been a consequence of an improvement in the public sector. But he also mentioned that there were four service contracts with private companies. Therefore, my question is: what role have these service contracts played in the F.D. over the past 7 years? Because this is really the central subject of this seminar. To see whether or not these new partnerships are useful. The question then is: Although an increase in efficiency has been shown, which apparently contradicts Ms. Saade's conclusion, within this apparent improvement, what has the public sector's role been through these service contracts?

Leopoldo Rodarte

We have to take into account the baseline conditions in Mexico City. In 1993 before the contracts were signed with the four private companies, there was a single entity called the General Water Construction and Operation Authority (DGCCH) with 14,000 workers, fifty percent of which could not be called workers because they were terribly inefficient. The Federal District Water Commission was created as a separate entity from the

DGCCH, which contracted four companies to execute a series of clearly defined activities, especially aimed at collecting water bills. The Water Commission started operating with 270 employees. Why do I say that the fundamental role is played by the State? Because the Water Commission is in charge of defining policies, fixing rates, deciding where to invest, how to invest, what has to be modernized etc.

What is the role of the private sector? The private sector has a very important role because we must not forget that in State-owned entities, and in the specific case of the DGCCH of the Federal District, the labor unions play a very conservative role, trying to maintain a series of privileges that the workers enjoyed and this made the water service very inefficient. Then, being able to operate with private companies without the burden of the labor unions of the Federal District's government made it possible to modernize the service but always under the control of the Federal District government. For example, it would not have been possible to try to streamline the DGCCH with its 14,000 workers because it is practically impossible to modernize it. It was much simpler to create a new entity with private participation in some activities, especially in water collection, in order to achieve significant efficiency improvements. I think that this can be applied to most countries in Latin America, where the old entity is somehow maintained.

We saw in the case of Cartagena that a large percentage of the staff was dismissed. In Mexico that would not be possible. It was better for us to create a new entity and maintain the old one with all its inefficiency waiting for the proper political moment to gradually dismiss the workers. In other words, that entity is frozen. It has not grown for



8 years, but there it is, it has 14,000 workers, which means there are about 10 workers per every 1000 water connections. On the other hand, we have the Water Commission that is operating perfectly well. Between the private companies and the Water Commission there is a total of under 2,000 workers. This is a very special problem. What can we do with the old entity? it does not operate, there they are, people do as if they worked, that is all they do in fact. But it is very difficult to dismiss them because they have a collective contract signed with the State, so it is not easy to fire them. So what is being done is that they are paid their salaries and they are asked to do some work. When they read the meters, they were required to make 10 readings a day, and they were paid a percentage per every additional meter they read, so they hired people to do the readings and they would read 50 meters a day, so they were paid 5 times their salary. There was tremendous corruption. They would pay the people they subcontracted much less and keep the difference. All these things seem to be taken out of a García Marquez novel but they really occur and so there we have them. So as we could no longer work with them we created an absolutely new, modern entity the Federal District Water Commission which repairs the networks with high-density polyethylene using modern equipment -the DGCOP still uses cement asbestos- it open ditches, unlike the Water Commission, which does not open ditches and uses a mole to replace pipes. So we are talking of two different worlds and two worlds that should not coexist many more years. The idea is to create a decentralized water company in the short term to eliminate all the legal inefficiencies we currently have. Then the first problem we have to solve is what to do with at least 7,000 workers that are unnecessary in the DGCOP. More than half of the workers are not needed. We have to solve the legal problem and the problem of what to do with them. We have workers that are in charge of wells that have been out of service for over 20 years. We have 3 shifts of workers taking care of wells that are out of operation. We have multiple inefficiency problems in that old structure.

Lilian Saade

I want to say why I am more negative or perhaps not so positive about service contracts. When I spoke about this case five years ago, I would set it as an example, because it had advantages. I believed that the Federal District Water Commission, which started with 29 people, had the best international water companies working for it. However, at present the number of staff at the CADF is already 275 people and they also subcontract some activities. And each one of the private companies in turn has about 300 people. The case had also the advantage that dividing the city into four zones and using four different consortia would allow for certain competition but in the end it was local monopoly in each of the districts. I cannot choose a water company to give me the service. The fact that it had been a three-stage approach was also beneficial, but we have seen that it has not been able to fully reach stage three. The first stage presumably started in May 1994, and it consisted of meter installation, which was to be completed in a two-year period, but it was not completed in two years. They just finished installing the meters in 1998. Then the second stage -they were not consecutive stages- had already started but it also faced difficulties. The advantage of this case was that it was the first time that a tender was called for in Mexico. Prior to that all contracts had been granted as direct assignments, like the case of Aguascalientes and Cancún. The third stage started with a pilot project but the companies are not operating and maintaining the network, which was the original idea, and there have been a series of delays, and the results have not been as positive as expected.

My final comment is about collection. I have a question because if we are talking about efficiency in collection, we are talking that there are late payers, and these figures are not handling people that should have paid last year and which are paying today and are paying with a surcharge; so to a certain extent are we counting collection today or are we including late-payers?

Leopoldo Rodarte

We are dividing the bill. The amount we are charging is the invoiced amount, but we are deducting

surcharges and penalties in order to really see the efficiency of our collection process. For example, we issued 1,776,000 bills and we are being paid around 1,300,000 bills but the most important thing is that larger water consumers are paying. That is why efficiency is good. It could be better if we did not have legal problems. Water is charged as a tax. This is very bad for us because if someone owes us money, the process of collecting that money is very complicated and it takes about a year. If it were a rate charged by a company, and if the user did not pay, the company could cut off the service and we would rapidly increase to an efficiency of 95%, 96% and 97%. The legal formalities have already been done, we are waiting for the authorization to convert the Water Commission of the Federal Service into a decentralized public company. In that case the service is offered, you sell the service and the contract signed with the contract stipulates that I sell you water and you pay me, but if you do not pay me, I will cut off the service. That is not easy to do at the moment, we have big problems. We have to wait for about a year to collect overdue bills because of the legal problems I have mentioned.

Arlene Inocencio

The case of Mexico is quite interesting. In the first or perhaps second presentation there was a mention of payment of 150 million per year for water. I think that makes a lot of sense given that the figures for water availability have decreased by so much from 1950 with 18 thousand per capita per year to just five thousand at present, 5 thousand per capita per year. This is of course, as I discussed earlier with the ones who were here, the charging of 150 million per year was in fact politically decided. It was not based on any technical reason, but what I'm saying is, it makes sense to charge for all waters especially in cases where water is becoming really scarce. And related to this is the need to charge or to price water properly. They are saying that it is difficult to charge because you have so many poor in the Mexico Valley. Yet these poor are in fact already paying so high prices for water. So maybe it is not a problem of really charging high prices because in fact

these people are already paying the high price but perhaps a matter of understanding the reasons for delay. Maybe if we learn more about these reasons the system of pricing can be adapted, so this problem can be addressed. That is one point.

A related point, I think, is the prices that are charged go to the National Treasury, so this is I think a big problem because for one the revenue does not go to the utility for its own use. That is why perhaps there is no incentive to collect, to have efficiency in collection because you do not know any way, what is being paid, who is paying, how much he is really paid, because it goes directly to the National Treasury, which is not the case in many utilities in other countries. Like in the Philippines we have a water utility, which is doing its own collection, so the money goes directly to the water utility that is also hiring collectors, private collectors. So it has in a way control over the revenues, which is not the case for Mexico. If I understand it right. I think this is one important aspect that should be taken into account. I think we learn a lot from here but what I see here is that there is a need for a political will to change perhaps the structure of running this public utility. Perhaps it maybe high time to consider a real privatization where you provide an enabling environment for a private sector to be able to operate water provision, water supply and sanitation. I know this is easier said than done, but I think it is a high time to start perhaps advocating for real changes.

Benjamin V. Cariño

May I make a comment. I think I heard Ms. Saade say that expenses are much more than revenues, is that correct? It probably doesn't really matter whether the revenues go to the Treasury or direct to the utility because in any case expenses are much more than revenues. Is it correct to say that the water system is subsidized by the national government?

Lilian Saade

They do not have any incentive to collect, this is the situation in the whole country, there is no



incentive at all to collect revenues; it is for water use and also for wastewater.

Claudia Martínez

Addressing a concern we were talking about during the coffee break. We did not talk about, or talked very little about wastewater treatment, which is precisely one of the most serious problems. Who is assuming those costs? I think that water deficit is much greater, and that that deficit does not transfer to Mexico City but to the conurbated areas, to the states, with a very high ecological cost.

Carmiña Moreno

I would like to ask the colleagues of Mexico, considering the overview they have given us, where there is no legal framework yet, I would like to know whether there is a real political will to advance towards a much more efficient and better quality service, of eliminating political management of rates?

Edgardo Castañeda

In the specific case of Mexico, water has to be considered as a political service provided by the State. We have to be very careful, because a rate increase could generate serious political problems in a country in which during many years water has been absolutely subsidized.

For example, Mexico has 6 million irrigated hectares -a very sizable amount anywhere in the world- and water delivered to the irrigated areas is free. Not a cent is charged per m³ of water used in irrigation. Drinking water efficiency in Mexico in general does not reach 30%, the State of Mexico has 35%, better than the national average. We were used to the State of Mexico absorbing all the water service costs. Apparently that situation has ended. I say apparently because the political decision of increasing rates is not taken by the operating entity, but by the Executive Power in each State, Department or Municipality; therefore, it is there where the political component is involved. For example, the rules to make the Federal District water

operator efficient, which could easily pass from negative to positive results, are very simple. We have proposed 4 or 5 possible changes to the rate-fixing policy. We are talking about the most inexpensive water being sold at 90 US cents per m³. It would be very simple, but it is a decision that must be made by the Executive Power, in other words, the State Governor or Municipal President. Rates are not directly resolved by the Executive Power, because it proposes the rates to the House of Representatives of the State, and it is this body that approves or rejects the rates. Therefore, there are a series of political components involved, which are the ones that determine the price at which water must be delivered to users. That is precisely why we have chosen the alternative of making the entity more efficient without increasing rates -rates increased below the inflation rate- but trying to raise efficiency to a maximum. Obviously, this requires a significant subsidy from the Central Government -the State Government, Federal entity or Municipality. However, the executive power is willing to assume that investment. Whenever it decides not to assume that cost, we will have to look for more realistic rates. In the case of the Federal District, approximately 60 US cents are being recovered per m³ of water delivered, but this is due exclusively to the fact that large water consumers, industries, soft-drink and beer industries, hospitals, schools, large factories, pay for water. They pay over 1000 m³ at a price of USD 3 per m³ of water. It is they in fact who are providing the crossed subsidy to the low-income inhabitants of Mexico city.

Nola-Kate Seymour

Can you clarify when you say the expenses are doubled. Is that because expenses include the 7,000 people who are not working? Or are real expenses doubled? That is a very important question because from the outside it seems like you are really stupid and not just inefficient. And my experience of Mexicans is that they are not stupid, so something is going on here that does not make sense to me.

Edgardo Castañeda

In fact our expenses include those 7,000 workers. In other words, we are including in the costs those 7,000 workers, who are not needed, who do not contribute anything to production, but whom we cannot dismiss and have to continue paying while we find a solution to discharge them. This is not a simple problem. We have to bear in mind that Mexico City has 325,000 public employees and, therefore, eliminating 7,000 of them is not a simple thing.

Nola-Kate Seymour

It sounds like a guaranteed annual income.

Antonieta Esparza

According to what I have heard, the Mexican government has a very narrow approach to water. You are always talking about water production, water distribution, but you haven't said anything about wastewater treatment and have not talked in a global sense. It seems to me that everything is absolutely separated, water generation, water use, sewerage, wastewater treatment and discharge. I think that the system is not economically sustainable in those terms.

Edgardo Castañeda

You are right, in this seminar we have only dealt with drinking water, we haven't included the rest of the areas, or water management in Mexico City. Mexico City is a very large city, it is gigantic, and of course we have a water treatment policy. At present, for example -although I know it is very low- we are treating 7 m³ of water per second. We have a network of 1,000 km of pipeline to sell treated wastewater. There are projects to treat 100% of the water generated in Mexico City as well as in the State of Mexico. These are projects that are about to be started but, however, because to the scarcity of time we have not mentioned this point and we have focused exclusively on drinking water.

The system is in fact quite complete, it includes new sources, loss reduction, a series of complementary activities, not only wastewater treat-

ment, water reuse, recharging of aquifers, etc. I remember that Ms. Seymoar, who visited Mexico at some time, was involved in activities related to the reforestation of the Mexico Valley to increase aquifer recharge. Therefore, as you can see, we execute a very complete job. Our intention is for this management to be sustainable despite the complexity of such a big city, which also requires very complex solutions. But we are involved with all of the aspects of water management and not only drinking water supply.

Ricardo Jordán

I am diverting a little from the line of the discussion, but I want to ask how does the land property structure affects the individual or water consumer? Because this ejido land-ownership structure, with the characteristics of a cooperative or collective ownership is very particular. Does this mean that greater billing and greater collection implies the transformation of this ejido land ownership structure into individual property? And I must imagine that there is great resistance on the part of the native colonies of changing their structure. How does that particular property structure affect greater efficiency, collection and billing?

Edgardo Castañeda

It affects us tremendously. In Mexico there is a tradition of collective land property, it is a tradition that dates back at least 700 years. Therefore, if we have to privatize that collectively-owned land called ejidos, we have to face a very complex problem. On many occasions we have wanted to drill a well in an area of the Federal District, and resolving the land ownership problem may take us 10 to 20 years. It is not a simple problem, because of the legal resources that the ejidos have to protect their property, which may considerably delay any action implying land expropriation. And this form of land ownership is very common in Mexico. Therefore, it affects us tremendously. For example, a week ago, the Governor of the State of Mexico declared that he did not agree with the joint

drinking water project that we have with the State of Mexico and the Federal District to carry 4 m3 per second. This is due partly to serious political problems in the area where the dam will be built to store water, which will subsequently be taken to a water plant to make it suitable for consumption and then to Mexico City and the metropolitan area of Mexico City. This is just one example. That very important project should have been completed in 2000 and we are in 2002 and we haven't been able to start. And it is all a matter of a land ownership problem, which is delaying the construction of a new water source. So, as you can see, the land ownership structure does create important problems in Mexico.

Lilian Saade

I wanted to add that it is precisely that problem that has stopped the construction of the fourth stage of the Cutzamala system. The social pressures and, specifically, the fact that people living in the areas perceive that the water will be taken to Mexico City, and they feel that they do not need to suffer because water is needed in another part of the country.

Ricardo Jordán

I know that the land-ownership structure has a tremendous impact and that it is an obstacle for advancement. But haven't you thought of some kind of system to adapt to that structure, treating the ejido in a collective manner, like Cartagena did with macro-meters and macro-billing in some communities, instead of opposing the system and trying to privatize the land. Have you thought about a more collective approach to billing and collection?

Edgardo Castañeda

Well, in the specific case of the Cutzamal project -the fourth stage to take water to the Federal District- as the construction of the dam will provide water to two Federal entities, the State of Mexico and the Federal District, the work is done by the Federal Government. The Federal Government has to negotiate with the private parties all of the aspects related to land ownership. We are

not involved in that nor is the State of Mexico or the Federal District responsible for negotiating with the Federal Government. The legislation is very complex because expropriating land is not a simple thing in Mexico. We have a very serious legal problem with water. Mexican Law does not stipulate anywhere that the first priority for water use is urban and industrial use. The Constitution does not specify anything in this respect. It would be very simple if the Mexican Constitution would have specified that, because it would have made any expropriation process much simpler. Most of the country's water is used in agriculture. However, because of the accelerated growth of cities, we have been faced with this problem. It is a problem that stops us completely from building new infrastructures. To date, none of the Houses of Representatives have thought about changing the law, and to specify that urban and industrial use of water is the most important use of all. It is signed in some international treaties, but it is not part of the Mexican constitution. I do not know how this is in other countries.

Lye Lin Heng

Just a question relating to the laws. You don't seem to have any problems making all these water pipe connections, but you just mentioned you have a lot of problems in relation to laws. In the case, for example, of Jakarta and Manila, they have a lot of problems making the connections, doing the pipes, because of land laws. I want to know how you resolve this problem because you have been very efficient in fitting all these new meters, etc. That is the first question.

The second question: you said that there are lots of legal problems in relation to the collection of the money etc., and that it takes one year to collect debts. Can you elaborate on what these legal problems are? You did mention that you have no right to close down the water supply, of course that is one of the most effective ways to make people pay. I'm interested because I am a lawyer.

Leopoldo Rodarte

We cannot cut water supply because the problem we have is that in Mexico City water is charged as a tax, and people may consider that the tax they are being charged is not equitable or that is exaggeratedly high, and appeal in order not to pay the tax. If water were collected in the form of a rate, if it were sold by m³ at a specific price, involving the water company and the private individual, it would be very simple. But unfortunately it is charged as a tax and there we have all the legal complications. That is why we are trying to transform the Water Commission into a decentralized public company, making it possible to charge water per m³ at a specified rate, and water would not be charged as a tax. These are the legal problems we have in Mexico, which prevent the water operator in Mexico City from being more efficient. We could be more efficient if we solved that legal problem. We hope -it was already proposed to the Governor of the Federal District, and he accepted- that the proposal of transforming the Water Commission into a company will be set forth shortly, and that would make it possible to increase collection efficiency to at least 95%. Our plans go in that direction.

Carmiña Moreno

Then why measure water consumption and incur in all the associated costs. How does that operate?

Leopoldo Rodarte

Well, the measuring system has been implemented to be able to charge water at a certain rate, but we must not confuse the rate with the tax. Taxes are paid in Mexico in a very different way than the way that a service provided by a company would be paid. That is the difference. Rates are very simple, I charge for electricity consumption in kW. That is what we would like to do with water, to charge it per m³, but entering into a contract with the user. A user-company contract and not between the user and the government, which is the situation at present, when it is paid as a tax. The Mexican Law pro-

vides individuals with several instrument to protect themselves from federal taxes, that is the problem

Gonzalo González

I would like to ask about the quality of the water supplied by companies in Mexico because this matter was dealt with very superficially in the first presentation. You said that pipelines are contaminated and therefore water gets contaminated. What are your plans? Can you just open the tap and drink tap water? What has the company done in this respect?

Leopoldo Rodarte

It is an exaggeration to say that water is contaminated. We take 60,000 samples a year in different points of the city to control water quality. I have been living in Mexico City for 40 years and have always drunk tap water. The only time I decided to boil tap water was when there was a cholera epidemic in South America. I can assure you that 90% of water delivered in Mexico City is absolutely potable. We have areas in the city where water contains iron and manganese, in the West side of the city, which gives water a yellowish color, but the water is perfectly potable. That is why I say that 90% of water delivered to households is potable. We are constantly controlling water quality. We make an exaggerated control because we conduct physical and chemical tests in compliance with the requirements of the Mexican health authorities, and also other kinds of tests like heavy metals, bacteriological tests, we even look for hydrocarbons in water. In other words, we look for any kind of elements that may contaminate water. When a water source becomes contaminated, generally wells, which are the water sources most easily contaminated -the rest of the water cannot get contaminated- we carry out samplings every fortnight, and take the steps necessary to eliminate contamination. We must remember a very important point, that in groundwater contamination advances very slowly, therefore, there is very little chance for contamination expanding to significant distances from the well, when a contaminated well is detected.



So all of you that visit Mexico can drink tap water safely, if you are afraid you may boil it, but at present there is no cholera problem in Mexico or America, you can drink tap water without any problem.

Lilian Saade

I would like very briefly to add something about water quality. In the East of Mexico City, in certain areas such as Iztapalapa, water has a brownish color. What happens is that water comes from external water sources located in the West. Since demands in the western and central parts of the city are filled first, the external source is often exhausted before reaching the eastern part. As a consequence some municipal districts in the eastern part of the City have to rely on wells, which are overexploited, and which contain iron and manganese that give the water a poor appearance. And that is a problem because in some places people do not want to pay their water bills because water does not appear to be good quality, it is brown, so you cannot install meters in those places.

There is another point related to health problems that we did not mention. There is a study conducted by Sergio Margulis of the World Bank in 1992 -it was revised later in 1994- which estimated that the annual costs of diarrhoeal diseases caused by water and soil pollution, as well as by the lack of sanitation and by food poisoning are US\$3,600 million. I think that that is another important issue that we have to bear in mind.

And finally we mentioned wastewater treatment. Private companies are not involved at all in wastewater treatment in the Federal District. Perhaps that is why it was not mentioned in the first presentation. In Mexico more than 80% of wastewater is not treated. There is an important project in the Mezquital Valley, where untreated water is used for irrigation, mainly vegetables. We are talking about 85,000 hectares in the State of Hidalgo, which is a significant amount. ■