REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	**2. REPORT TYPE**	**3. DATES COVERED** *(From - To)*
28-10-2011	FINAL	

4. TITLE AND SUBTITLE

Optimizing Mexico's Water Distibution Services

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)

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Paper Advisor (if Any): Mr. Mike McGauvren and LTC Matthew Stanton

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Joint Military Operations Department
Naval War College
686 Cushing Road
Newport, RI 02841-1207

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT

For Example: Distribution Statement A: Approved for public release; Distribution is unlimited.

13. SUPPLEMENTARY NOTES A paper submitted to the Naval War College faculty in partial satisfaction of the requirements of the Joint Military Operations Department. The contents of this paper reflect my own personal views and are not necessarily endorsed by the NWC or the Department of the Navy.

14. ABSTRACT

Water is an essential resource for sustainment of life and integral to the socio-economic development of any nation-state. The Mexican federal government recognized this importance and identified a need to improve access to and quality of water distribution services for its citizenry. Efforts to implement structural reforms to improve water distribution services have been encouraging but have fallen short of meeting current and projected needs. Central to the current problem is insufficient financial capital to fully implement strategic modernization plans. This qualitative research paper explores expanding the development of business partnerships between the Mexican government (e.g., federal, state, and local municipalities) and the private sector as an attractive means to acquire the necessary financial capital and technical expertise to improve access to and quality of water distribution services among the Mexican citizenry. However, additional structural reform must be implemented by the Mexican government in order to attract and retain long-term private sector investment necessary to improve the Mexican water distribution infrastructure and meet growing demands for access to and quality of water resources.

15. SUBJECT TERMS

Mexico, water distribution, financial capital, infrastructure, investment

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
a. REPORT	**b. ABSTRACT**	**c. THIS PAGE**			Chairman, JMO Dept
UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED		20	**19b. TELEPHONE NUMBER** *(include area code)* 401-841-3556

Standard Form 298 (Rev. 8-98)

NAVAL WAR COLLEGE
Newport, R.I.

OPTIMIZING MEXICO'S WATER DISTRIBUTION SERVICES

by

Mr. Richard M. Toney

Headquarters United States Special Operations Command

A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

Signature: _____

28 October 2011

Contents

Abstract

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INTRODUCTION

Water is an essential resource for sustainment of life and integral to the socio-economic development of any nation-state. This research paper focuses on expanding the development of business partnerships between the Mexican government and the private sector as an attractive means to acquire the necessary financial capital and technical expertise to expand and improve access to and quality of water distribution services among the Mexican citizenry. In the context of the research, the Mexican government includes the federal, state, and local municipalities. The role, responsibilities, and required contributions of the private sector and the Mexican government to build and sustain a viable business partnership are addressed.

Research supports the need for implementing additional structural reforms by the Mexican government as a means to further attract, obtain, and secure sufficient private sector participation in any future business partnerships. The Mexican government needs the private sector long-term financial capital and technical expertise to improve access to and quality of the water distribution infrastructure services. However, obtaining this support will require further structural reforms to strengthen and expand partnerships between the Mexican government and the private sector.

The following analysis focuses on exploring previous Mexican government efforts to implement structural reforms and will analyze the effect of improving the water distribution infrastructure as a means to enhance access to and quality of water. From the analysis, implications may be drawn to enhance opportunities to further expand future business partnerships between the Mexican government and the private sector. The study also recommends future structural reform considerations that may conceivably lower private

sector risks associated with business partnerships between the Mexican government and the private sector. Gaining a full appreciation of the topic under investigation requires a fundamental understanding of key factors influencing the Mexican government's strategy, plan, and decision-making.

BACKGROUND

Provision of adequate water services is crucial to improving the quality of life for all Mexican citizens. Population growth and continuing urbanization is accelerating demand for expansion and improvements in the water distribution infrastructure sector.[1] Corresponding to this increased demand for water resources is damage to underground water and ecosystems.[2] This condition is consequently raising costs associated with providing safe, clean, water, yet the federal government is shifting its finite funds from the water distribution infrastructure to other social welfare programs to assist the country's poor citizens principally in rural areas.[3] Despite the federal decline in funding for water distribution services, federal policy continues to emphasize program support for pursuits that will improve access to and quality of such water distribution services. Private sector participation is a source for acquiring necessary financial capital to help mitigate Mexico's treasury limitations to improve the water distribution infrastructure.[4] Given this context, it is important to examine to what extent is the Mexican government institutions responding to the water distribution infrastructure sector needs.

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[1]National Water Commission of Mexico. *Statistics on Water in Mexico.* Coyoacan, Mexico City, 2009. http://www.conagua.gob.mx/english07/publications/EAM2010Ingles_Baja.pdf

[2] Ibid.

[3] World Bank and Public Private Infrastructure Advisory Facility (PPIAF), *Private Solutions for Infrastructure in Mexico: Country Framework Report for Private Participation in Infrastructure,* Washington, DC: World Bank, 2003, 46.

[4] Ibid.

INSTITUTIONAL APPROACHES

Since the early 1980s, the Mexican state and municipalities have assumed greater responsibility for providing urban water services as the federal government pursued a decentralization policy in the water distribution infrastructure sector.[5] This is evident in Article 115 of the Mexican Constitution that grants municipalities' ultimate responsibility for providing basic water distribution services.[6] Today there are over 100 million inhabitants in Mexico served by over 2, 440 municipal water companies operating in Mexico.[7] In urban cities where the population exceeds 50,000, more than 145 companies are providing essential water distribution services.[8] These cities comprise more than 50% of the Mexican population and 75 % of those with access to a piped-water supply, albeit many receive such services intermittently.[9]

After undergoing several organizational shuffles, the *Comision Nacional del Agu* (CNA) has primary oversight authority for water management at the federal government level. Responsibilities of CNA include:

> formulating and implementing national water policies, which form part of the national policy for environmental management, health, and economic development. One element of that mandate is to define policies and strategies aimed at strengthening the technical, managerial, and financial capacities of the state and municipal water companies. Other responsibilities include regulating water use, planning and construction of major hydraulic infrastructure, monitoring water

[5] Ibid, 47.
[6] Mexican Constitution. http://www.oas.org/juridico/mla/en/mex/en_mex-int-text-const.pdf (assessed October 27, 2011).
[7] National Water Commission of Mexico. *Statistics on Water in Mexico.* Coyoacan, Mexico City, 2009. http://www.conagua.gob.mx/english07/publications/EAM2010Ingles_Baja.pdf.
[8] Ibid.
[9] Ibid.

quality and the promotion of private participation in urban areas.[10]

Other federal organizations managing the water distribution sector include the *Secretaria del Medio Ambiente y Recursos Naturales* (SEMARNAT) to which CNA is responsible. SEMARNAT manages environmental standards and water discharge fees.[11] The Secretary of Health establishes potable water quality standards.[12] The *Secreteria de Hacienda y Credito Puliico (SHCP)* manages water usage fee collection and distribution of federal subsidies to the states and municipalities.[13] The principal financial lender for Mexican infrastructure projects is the Banobras state development bank.[14]

Subordinate to Mexico's federal water distribution infrastructure oversight are the 31 states that also play a significant role. The states administer water within their jurisdictions, distribute certain federal subsidies to municipalities, control access to credit, and often provide fiduciary and financial guarantees for municipal water company activities.[15] However, Mexican states generally do not have clear sector investment policies, tariff setting rules, and financing strategies that tend to deter outside investment.[16] Enforcement is selective even when regulations exist to govern activities, and in a few cases, states created water agencies to develop and approve state water master plans required for receipt of federal

[10] World Bank and Public Private Infrastructure Advisory Facility (PPIAF), *Private Solutions for Infrastructure in Mexico: Country Framework Report for Private Participation in Infrastructure,* Washington, DC: World Bank, 2003, 46.

[11] Ibid, 47.

[12] Ibid.

[13] Ibid.

[14] Ibid.

[15] Ibid.

[16] Budds, Jessica and McCranahan. 'Are the Debates on Water Privatization Missing the Point? Experiences from Africa, Asia, and Latin America." *Environment and Urbanization*, vol 15, no. 2, October, 2003, 87-114.

funding support.[17] The states also approve municipal water tariffs but the exercise of that authority is not clearly defined.[18]

States sometimes defer their oversight responsibilities to water companies and CNA to monitor drinking water quality. This is largely due to the fact that the state environmental agencies do not have the capacity to enforce the standards.[19] In short, the state cannot fulfill most of the responsibilities delegated to it by the federal government because funding has not accompanied the tasks levied.[20] Hence, the states have further delegated responsibilities to the municipal and local water company levels but they too lack sufficient financial capital to meet the water distribution infrastructure needs of the Mexican citizenry.[21]

At the municipality level of the Mexican government, the role and responsibilities for water distribution oversight are equally challenging. [22] Water companies conduct operations and maintenance and even conduct billing and revenue collection on behalf of the state even though they do not own any of the water distribution infrastructures.[23] The revenue received for water services is considered as a tax instead of income and is not a resource of the water company. The tax or tariff rates are subjectively set and are not in conformance to any established formula related to the cost of providing the water distribution and the quality of

[17] World Bank and Public Private Infrastructure Advisory Facility (PPIAF), *Private Solutions for Infrastructure in Mexico: Country Framework Report for Private Participation in Infrastructure,* Washington, DC: World Bank, 2003, 47.

[18] Ibid,47-48.

[19] Budds, Jessica and McCranahan. 'Are the Debates on Water Privatization Missing the Point? Experiences from Africa, Asia, and Latin America." *Environment and Urbanization*, vol 15, no. 2, October, 2003, 87.

[20] National Water Commission of Mexico. *Statistics on Water in Mexico.* Coyoacan, Mexico City, 2009.http://www.conagua.gob.mx/english07/publications/EAM2010Ingles_Baja.pdf.

[21] Ibid.

[22] Ibid.

[23] Ibid.

service.[24] The cumulative effect of such unorthodox managerial and accounting business practices compounds the difficulty to obtain accurate financial accountability and achievement of transparency in operations.[25] In response, the Mexican government has begun to address structural reforms required in government policy and regulatory areas.

POLICY AND REGULATORY PRACTICES

The Caldron Administration of the Mexican government has established specific policy goals within a strategic policy framework to improve urban water management, including distribution services.[26] These goals include: (1) ensuring financial self–sufficiency of water company operations, (2) expanding access to piped water, and (3) enhancing efficiency and quality of water distribution services.[27] Implementing these goals involve leveraging internal revenue generation, federal subsidies, and increased private sector financial capital. Using these combined sources of financial capital requires development and expansion of business partnerships involving participation of both the Mexican government and private sector enterprises.

In the early 1990s federal water distribution management laws provided an essential strategic framework for water resource management.[28] Four key provisions of the law address the urban water supply include:

> (1) CNA granting local governments rights to use national waters; (2) municipalities and their companies are to operate in a manner that will ensure their financial self-sufficiency; (3) it is in the public interest for local governments

[24] World Bank and Public Private Infrastructure Advisory Facility (PPIAF), *Private Solutions for Infrastructure in Mexico: Country Framework Report for Private Participation in Infrastructure,* Washington, DC: World Bank, 2003, 48.

[25] Ibid.

[26] Ibid.

[27] Ibid.

[28] Castro, José Esteban. "Water Governance in the Twentieth-first Century," 2007, http://www.scielo.br/pdf/asoc/v10n2/a07v10n2.pdf.

to grant concessions to private third parties for the provision of water services; and (4) CNA will continue to undertake water supply and sanitation projects under certain conditions.[29]

These stipulations in the water law were designed to clarify the roles and responsibilities of federal, state, and municipal levels of government and improve accountability measures for performance.[30] However, successful implementation is highly dependent upon state and municipality compliance and administrative program efficacy and prioritization.

PROGRAM PRIORITIES

Federal programs and activities focus on improving the legal and institutional frameworks that support improvements in the water distribution infrastructure sector while municipalities and water companies provide point-to-point water services directly to customers.[31] Through the *Programa de Agua Potable y Alcantarillado en Zonas Urbanas* (APAZU), the federal government also advises and assists municipalities and water companies with financial and technical support as well as investment planning and ways to improve operating efficiencies. However, the demand for such help often exceeds the program capacity to supply it.[32]

Municipalities are often subcontracting third parties to fulfill their service

[29] World Bank and Public Private Infrastructure Advisory Facility (PPIAF), *Private Solutions for Infrastructure in Mexico: Country Framework Report for Private Participation in Infrastructure,* Washington, DC: World Bank, 2003, 48.

[30] Ibid.

[31] Wilder, Margaret. "Paradoxes of Decentralization: Water Reform and Social Implications in Mexico." World Development 34, no. 11 (2006), 1997-1995, http://udallcenter.arizona.edu/publications/epp/2006_WILDER.et.al_world.develop-ment.pdf.

[32] Ibid.

responsibilities via concessions awarded to the private sector.[33] The belief is that they can provide required efficiencies and they have access to additional long-term financial capital that the public sector cannot adequately provide. However, success with these program initiatives is moderated by legal loopholes and limited Mexican government financing for encouraging private participation.[34] Consequently, the Mexican federal government has moved to close gaps in the legal framework governing the water distribution infrastructure sector at the local level and is underwriting financial loans for private participation in the water distribution sector business.[35] Federal efforts primarily focus on subsidy legislation and in 1996 authorities published a water sector law streamlining government institutional business practices and provided judicial clarity for the municipalities, water companies, and financial backers of water distribution infrastructure projects.[36] Evidence of these initiatives is seen in defined concession terms, arbitration procedures, and realignment of water distribution infrastructure responsibilities from CNA to the states.[37] Implementation at the local level is still in its infancy stage and very few states have taken measures to turn-off services for non-payment and granting of additional concessions to the private sector. Deficiencies still exist regarding governance over concessions and creation of distinct entities

[33] World Bank and Public Private Infrastructure Advisory Facility (PPIAF), *Private Solutions for Infrastructure in Mexico: Country Framework Report for Private Participation in Infrastructure,* Washington, DC: World Bank, 2003 .

[34] OECD."OECD Perspectives: Mexico Key Policies for Sustainable Development." May 2010. http://www.oecd.org/dataoecd/35/0/45570125.pdf.

[35] Idelovitch, Emanuel and Klas Ringskog, *Private Sector Participation in Water Supply and Sanitation in Latin America*. Washington, D.C.:The World Bank, 1995, http://www- wds.worldbank.org /external/default/WDSContentServer/WDSP/IB/1995/05/01/000-009265_3961219095837/Rendered /PDF/multi_page.pdf.

[36] World Bank and Public Private Infrastructure Advisory Facility (PPIAF), *Private Solutions for Infrastructure in Mexico: Country Framework Report for Private Participation in Infrastructure,* Washington, DC: World Bank, 2003, 49.

[37] Ibid.

to enforce water distribution service provisions.[38]

WATER DISTRIBUTION INFRASTRUCTURE SECTOR PERFORMANCE

Performance regarding goal achievement in the water distribution infrastructure varies significantly across the sector.[39] The overarching objectives include (1) increasing coverage, (2) enhancing efficiency, and (3) ensuring the financial self-sufficiency of service providers.[40] From 1980 to the early 1990s, more than 14 million Mexican citizens gained access to a piped-water supply.[41]

While official statistics reflect 95% of the population has access to water distribution services, this can be misleading.[42] For example, water access does not necessarily mean clean water or service standards comparable to the best international indicators. While most water is disinfected, less than 30% undergoes treatment at a water plant to ensure the highest quality of water is available.[43] In addition, aggregate statistics conceal regional disparities in the water coverage in Mexico. Southern states, especially in rural areas, have considerably less access to water distribution services than the northern states that border the United States.[44] Not surprisingly, the highest water distribution and quality coverage is among the largest cities or urban centers with sufficient infrastructure emplacements. Those citizens who receive piped water are also the same people who receive the highest quality water

[38] Ibid.

[39] National Water Commission of Mexico. *Statistics on Water in Mexico.* Coyoacan, Mexico City, 2009. http://www.conagua.gob.mx/english07/publications/EAM2010Ingles_Baja.pdf.

[40] World Bank and Public Private Infrastructure Advisory Facility (PPIAF), *Private Solutions for Infrastructure in Mexico: Country Framework Report for Private Participation in Infrastructure,* Washington, DC: World Bank, 2003, 49.

[41] Ibid.

[42] Ibid.

[43] Ibid.

[44] National Water Commission of Mexico. *Statistics on Water in Mexico.* Coyoacan, Mexico City, 2009. http://www.conagua.gob.mx/english07/publications/EAM2010Ingles_Baja.pdf

supply and distribution service.[45]

Similar to many other countries, Mexico's poor citizens are least likely to benefit from dominant private sector water distribution infrastructure services even in the wake of government decentralization.[46] Even though the poor citizens need the service disproportionately more than wealthier neighborhoods, they cannot pay for the service.[47] While contracts often stipulate the private sector must provide water distribution services to the poor, concessions circumvent this requirement through the employment of delay tactics.[48] Often costs are artificially capped as a means to ensure water distribution services will be available to the poor but private sector investors naturally frown upon this practice because they cannot obtain total cost-recovery for their services.[49] This is especially true in small and medium size cities where there is always high demand and low supply of water distribution infrastructure services.[50] Increased federal government subsidies offer one means to supplement existing revenue but the Mexican government does not possess the capacity to achieve this as evidenced by the decentralization of tasks and unaccompanied funding to implement them.[51] One alternative remedy may include selective targeting and minimum use of subsidies as part of the criteria for concession awards but the private sector exists to make

[45] Wilder, Margaret. "Paradoxes of Decentralization: Water Reform and Social Implications in Mexico." *World Development* 34, no. 11 (2006), 1997-1995, http://udallcenter.arizona.edu/publications/epp/2006_WILDER.et.al_world.develop-ment.pdf

[46] Ibid.

[47] Solanes, Miguel, "The Privatization of Public Water Utilities," *CEPAL Review*, vol. 56, August 1995, http://www1.american.edu/ted/mexfin.htm.

[48] Ibid.

[49] World Bank and Public Private Infrastructure Advisory Facility (PPIAF), *Private Solutions for Infrastructure in Mexico: Country Framework Report for Private Participation in Infrastructure,* Washington, DC: World Bank, 2003, 77-117.

[50] Ibid.

[51] Wilder, Margaret. "Water Governance in Mexico: Political and Economic Apertures and a Shifting State-Citizen Relationship." *Ecology and Society* 15, no. 2 (2010): 287.

a profit too.[52] More challenges are evident in the financial investment area.

INVESTMENT TRENDS AND CHALLENGES

The water distribution infrastructure significantly grew and quality of service improved from the 1980s to the mid-1990s because there was sufficient financial capital to implement strategies, plans, and operations.[53] This financial capital was provided by the Mexican federal government and to a smaller degree by private sector urban developers.[54] The Mexican federal government possessed the financial means to fund these infrastructure projects largely because the economy was flourishing as a result of incoming Mexican oil production revenue. Since that period, financial investments precipitously dropped because the municipalities and water companies have not become financially self-sufficient to implement responsibilities levied on them and the federal government no longer has the means to pay all costs due to declining oil production and rising infrastructure costs.[55] Additionally, the private sector has not recovered total costs associated with providing water distribution services.[56] Lastly, business partnerships between the Mexican government and the private sector diminish significantly because of insufficient opportunities for profit generation, thus warranting further analysis.

REVENUE GENERATION

In 1999, the Mexican urban sector collected revenues totaling approximately $8

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[52] World Bank and Public Private Infrastructure Advisory Facility (PPIAF), *Private Solutions for Infrastructure in Mexico: Country Framework Report for Private Participation in Infrastructure,* Washington, DC: World Bank, 2003, 77-117.

[53] Edwards, Jack K. and Werner Baer, "The State and the Private Sector in Latin America: Reflections on the Past, the Present and the Future," *The Quarterly Review of Economics and Finance*, vol. 33, Special Issue (1993), 9-19.

[54] Apogee Research International, Ltd., Innovative Financing of Water and Wastewater Infrastructure in the NAFTA Partners: A Focus on Mexico and a Recommendation .Report presented at PRO-ECO, 94.

[55] Ibid.

[56] CONAUUA, "2010 Statistics in Water in Mexico," Last modified 2010, http://www.conagua.gob.mx/english07/publications/EAM2010Ingles_Baja.pdf.

billion and while encouraging, this sum pales in comparison to other countries such as Brazil.[57] Even though there is some variation among the quality of country water distribution infrastructure assets, a cost/revenue generation comparison between Mexico and Brazil indicates that Mexico's revenue per connection is 25% of the total that Brazil collects.[58] It is very telling that only four Mexican municipalities acquire approximately $200 per year (about $17/month) for connection services.[59] While this statistic may appear discouraging, if Mexican rates and performance were comparable to their Brazilian social-economic counterparts, over $32 billion or a 300% increase in revenue could be afforded and collected.[60]

Insufficient revenue cost-recovery is a primary reason Mexico currently has difficulty in gaining access to debt markets. Additionally, private sector participation in the water distribution infrastructure sector is declining due to the absence of profit-motive thus, rebuffing governmental efforts to acquire their desperately needed financial capital and technical expertise to improve and expand the water distribution infrastructure.[61] In addition, official water company statistics are unreliable because accounting practices do not reflect true operating costs and are not included on accounting balance sheets.[62]

There are several explanations for the limited cost recovery, low revenue generation, and inadequate pricing of services within the water distribution infrastructure sector. Among

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[57] World Bank and Public Private Infrastructure Advisory Facility (PPIAF), *Private Solutions for Infrastructure in Mexico: Country Framework Report for Private Participation in Infrastructure,* Washington, DC: World Bank, 2003, 50.

[58] Ibid.

[59] Ibid.

[60] CONAGUA, "2007-2012 National Water Program," Last modified 2010, http://www.conagua.gob.mx/english07/publications/National_Water_Program_2007-2012.pdf.

[61] World Bank and Public Private Infrastructure Advisory Facility (PPIAF), *Private Solutions for Infrastructure in Mexico: Country Framework Report for Private Participation in Infrastructure,* Washington, DC: World Bank, 2003, 59.

[62] Ibid,51.

the explanations include dependence on federal subsidies, insufficient financial capital, and institutional inefficiencies. Most water companies providing water distribution services in Mexico's urban areas charge prices below operating costs. Customers are charged approximately 30 cents per cubic meter ($0.30/m3) as compared to other Latin American countries who charge 90 cents to $2.50 per cubic meter ($0.90-$2.5/m3) for such services.[63]

Similar to water charges or tariffs, revenue collected is unacceptably low as compared to international standards. On average, only 75% of usage fees are actually collected.[64] Only 8 out of the 140 water companies in towns with populations greater than 50,000 persons collected more than 90% of billings in 1998.[65] Components of water distribution services such as raw water, water distribution, and treatment are major costs incurred. It is essential that those cost-recovery rates significantly improve because otherwise its lost revenue that Mexico desperately needs. Up to 48% of water usage is unaccounted for in cost-recovery for all water distribution services.[66] Aside from raising prices for water distribution services and improving the collection rate, expanding financial capital investment sources is necessary to fund long-term water distribution infrastructure projects.

FINANCIAL INVESTMENT SOURCES

As discussed earlier, revenue generation is problematic for the Mexican water distribution infrastructure sector. Because internal cash generation lags significantly behind actual operating costs, water companies cannot obtain credit nor can they attract and expand sorely needed private sector financial capital.[67] Consequently, water companies are

[63] Ibid.
[64] Ibid.
[65] Ibid.
[66] Ibid.
[67] Apogee Research International, Ltd., Innovative Financing of Water and Wastewater Infrastructure in the NAFTA Partners: A Focus on Mexico and a Recommendation Report.

increasingly reliant on heavy subsidies at a time when the federal government has shifted its finite financial capital away from the water sector to other social programs such as poverty relief. There has been up to a 70% decline in the availability of federal funding in the last ten years for water distribution infrastructure services but policy support remains unaffected.[68]

For the last two decades, Mexican government advocated increased private sector participation in the water distribution infrastructure and that emphasis is continuing through current federal policies. The prevailing sentiment of government officials is that the private sector is more knowledgeable and experienced in obtaining economies and efficiencies and better funded to provide water distribution services, especially in the urban areas.[69] Encouraging results from previous public and private sector partnerships experiences is episodic.[70]

As a consequence of pro-privatization federal policies from the mid-1980s to 2000, more than 14 million Mexicans gained access to piped-water distribution services.[71] Private financiers provided up to $400 million of their own capital in partnership with the Mexican government to improve private enterprise services. However, this success is not sustainable over the long term due to the declining federal subsidies and other problems cited earlier.[72] In addition, the omission of performance criteria in service contracts has resulted in degradation of quality service.[73] It is not surprising that the private sector may be reluctant to participate in joint ventures or partnerships with the Mexican government under these

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presented at PRO-ECO, 94.

[68] World Bank and Public Private Infrastructure Advisory Facility (PPIAF), *Private Solutions for Infrastructure in Mexico: Country Framework Report for Private Participation in Infrastructure,* Washington, DC: World Bank, 2003, 52.

[69] Ibid.

[70] Ibid, 53.

[71] Ibid.

[72] Ibid.

[73] Ibid.

conditions. In response, the Mexican introduced new measures to bolster support from private sector financiers. Foremost among these measures was creation of the *Fondo de Inversion en Infraestructura* program, which reduces default risk on private sector loans by providing Mexican equity.[74] However, greater challenges lie ahead for Mexico.

FUTURE DEMAND FOR PRIVATE PARTICIPATION

Over the next two decades, the population growth and migration from the rural to urban areas will significantly increase at an accelerated rate.[75] Correspondingly, it is reasonable to anticipate that demand for access to and quality of water distribution infrastructure services will also significantly increase. Supplying the demand for this essential service will require substantial sums of money that currently exceed Mexico's internal capacity to provide.[76] Over the next decade investment projections indicate more than $1billion is required to meet urban water distribution needs alone annually.[77] In addition, another $1 billion annually will be required to conduct operations and maintenance of the water distribution infrastructure networks.[78] In stark contrast, the $200 million that the Mexico government currently spends annually on the nation's water distribution infrastructure is clearly insufficient to meet current and future needs.[79]

Given the magnitude of the problem, debt financing is required but water companies are not creditworthy to obtain loans. The private sector can help gain access to investment financing by improving water company efficiencies and raising their fees for customer use.

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[74] Ibid.

[75] CONAGUA, "2007-2012 National Water Program," Last modified 2010, http://www.conagua.gob.mx/english07/publications/National_Water_Program_2007-2012.pdf.

[76] OECD. "OECD Perspectives: Mexico Key Policies for Sustainable Development." May 2010. http://www.oecd.org/dataoecd/35/0/45570125.pdf.

[77] World Bank and Public Private Infrastructure Advisory Facility (PPIAF), *Private Solutions for Infrastructure in Mexico: Country Framework Report for Private Participation in Infrastructure,* Washington, DC: World Bank, 2003, 59.

[78] Ibid.

[79] Ibid.

To fully meet investment needs, prices would have to rise on average from $ 0.15/m3 to $ 0.25 m/3, or a 75% increase.[80] While this may be affordable for most Mexicans, the poorest of the population may require targeted federal subsidies. Fundamentally, the Mexican government must implement further structural reforms to attract, obtain, and expand the business partnerships with the private sector.

POLICY AND REGULATORY STRUCTURAL REFORM CHALLENGES AND RECOMMENDATIONS

Expansion and success of future business partnerships between the Mexican government and the private sector requires additional attention to complete policy and regulatory structural reform. As described herein, systematic challenges exist in the areas of commodity pricing, collection of payment, declining federal subsidies, and inefficient institutional business practices. Completion of policy and regulatory frameworks would conceivably include shaping a positive operating environment at the state and municipality/local level that promotes more private sector water distribution infrastructure services. This may specifically include more incentives to expand private sector financial support for improving access to and quality of safe, clean, and uninterrupted piped-water services. Such incentives may include selective targeting of the poor citizens and use of federal subsides at the state and municipal levels to help them could potentially optimize Mexico's limited financial resources and yet still underwrite the costs of providing water services to the poor who can't pay their water bills. This aside, not everyone supports expansion of business partnerships between the Mexican government and the private sector.

[80] Ibid, 55.

ALTERNATIVE PERSPECTIVES

Margaret Wilder argues that expansion of business partnerships between the Mexican government and the private sector is the wrong approach for meeting future water distribution infrastructure needs.[81] She also believes that private enterprise ignores social obligations and is not concerned at all about universal access to water services as experienced by Mexico's earlier business partnerships with the private sector.[82]

The Mexican government acknowledges the potential for this occurrence but intervened to preclude such exploitation through regulatory and legal reforms addressed earlier; however, such regulatory reforms are circumvented by the private sector delaying delivery of water distribution services to those who are poor and can't pay their bills. The fact is the private sector is not in the business of humanitarian assistance but providing the supply of services to meet demands of a free-market enterprise for a profit. This is a fundamental precept of capitalism and economics.

CONCLUSION

In summary, there are many challenges associated with and opportunities for improving the Mexican citizenry's access to and quality of water distribution services. Rapid population growth and urbanization, coupled with corresponding aspirations for improvements in quality of life will significantly increase demand for water distribution services in the next 20 years.[83] Mexico has taken responsible steps to implement structural reforms in such areas as regulatory, legal, and cost-recovery policies but much more work

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[81] Wilder, Margaret. "Paradoxes of Decentralization: Water Reform and Social Implications in Mexico." *World Development* 34, no. 11 (2006), 1997-1995, http://udallcenter.arizona.edu/publications/epp/2006_WILDER.et.al_world.develop-ment.pdf.

[82] Ibid, 1977.

[83] National Water Commission of Mexico. *Statistics on Water in Mexico.* Coyoacan, Mexico City, 2009. http://www.conagua.gob.mx/english07/publications/EAM2010Ingles_Baja.pdf.

remains to be done. Mexico has a financial capital problem. The country can not fully implement its strategic plans to sustain, modernize, and expand water distribution services without significant financial and technical assistance from the private sector.[84] The logical choice to secure that assistance to improve water distribution infrastructure services is through the expansion of existing business partnerships between the Mexican government and the private sector. Obtaining this required support will require difficult choices be made. First, the Mexican government must raise prices for water distribution services to cover operating costs and a profit margin to entice the private sector to increase their participation in future partnerships. Bill collection rates must also be significantly improved as well as implementation of standardized business accounting practices. Lastly, the Mexican government should make best use of its limited financial capital by selectively subsidizing the most poor and destitute of its citizenry to help them pay for critically needed water distribution services. Collectively, if these measures were implemented the private sector risks associated with market entry and subsequent operating costs could be conceivably lowered. Correspondingly, the probability of expanding and strengthening future partnerships between the Mexican government and the private sector may be significantly enhanced.

[84] World Bank and Public Private Infrastructure Advisory Facility (PPIAF), *Private Solutions for Infrastructure in Mexico: Country Framework Report for Private Participation in Infrastructure,* Washington, DC: World Bank, 2003, 77-117.

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