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The Role of Water Policy in Mexico[1]

Sustainability, Equity, and Economic Growth Considerations

Musa Asad and Ariel Dinar

Background

Water resources management is one of Mexico's most urgent environmental and resource problems, and one that imposes heavy costs on the economy. The country is slightly less than 2 million km^2 in size and the population has quadrupled from 25 million in 1950 to over 106 million in June 2005. Population growth has occurred nationwide, but because of internal migration it has been greater in the semi-arid and arid north, northwest, and central regions, which are precisely the regions with greater economic activity and where water is scarce. The resulting increased demand for water, combined with more intensive use of water (stimulated in part by price distortions and relatively weak monitoring and enforcement arrangements), has led to insufficient water availability to support natural ecosystems, and seriously constrains growth in many areas.

Mexico has demonstrated many accomplishments in the water sector, including a comprehensive legal system, a national water authority, a functioning water rights system, and an incipient water market. However, the country's water sector still faces significant challenges. These include issues of sustainability, economic efficiency (or limits to growth), and equity. For example: (i) increasing and continued overexploitation of water resources has significant negative impacts on the resource's near- and long-term availability; (ii) distorted prices, subsidies, and/or other incentives in the water and related sectors encourage unsustainable water resource use practices and discourage water allocation to its highest productive uses; (iii) laws, regulations, policies, and investments that create the conditions for unsustainable water use and/or distortions often result in an inequitable allocation of fiscal resources.

More specifically, nearly 80 percent of Mexico's rapidly growing population is now concentrated in the northern and central areas, which account for over 80 percent of GDP, over 90 percent of irrigation, and 75 percent of industrial activity. Institutional arrangements to address the consequent increase in demand for water resources are inadequate. Water prices, as well as electricity prices for pumping groundwater, do not reflect water scarcity. Thus, Mexico now faces a "water crisis" that includes the overexploitation of 102 of its 653 aquifers, accounting for more than half of groundwater extraction in the country. The National Water Commission (CONAGUA) estimates groundwater overextraction at almost 40 percent of total groundwater use. The value of the overextracted groundwater in agricultural production alone is estimated at more than US$1.2 billion or 0.2 percent of GDP. The depletion of many aquifers leads

1 - This note is extracted from the synthesis of the various studies feeding into the Economic Sector Work, "Mexico Assessment of Policy Interventions in the Water Sector". A more detailed summary appears as Sustainable Development Working Paper No. 27. available from http://www.worldbank.org/lacruraldevelopment

to nonprice and unregulated rationing, distorting growth in Mexico's most dynamic economic regions. Some apparent contradictions between the Constitution and national water laws and regulations further complicate this sort of rationing, particularly in relation to disenfranchised populations.

Although some irrigation is shifting to water-saving technologies, the shift is limited, and the crop mix remains largely the same because (i) water and electricity prices still give the false signal that water is abundant, and (ii) irrigation infrastructure is insufficient to allow farmers to shift to specialty crops. Moreover, agricultural producers benefit from low electricity tariffs for pumping. Consequently, farmers have little incentive to change current practices, which result in overpumping of aquifers, lowering of the groundwater table(s), and in many cases the intrusion of salt water. In addition, the financial cost to society of the nearly US$700 million per year electricity subsidy may represent only a fraction of the full economic cost, since environmental degradation is not valued properly.

In summary, with water in Mexico becoming very scarce spatially and over time, it is now a factor that limits economic activity and social well-being in several regions. The identification of priorities and trade-offs in relation to water allocation requires careful and timely attention to address an ever-growing range of complications arising from the impact of various interlinked considerations, such as sustainability of water resources, fairness, pollution, environment, basic services, development, competition, and globalization. National policies, both within the water sector and for the overall economy, need to accommodate these issues. Otherwise, the trend in undervaluing and overexploiting water resources will lead to increasingly significant negative impacts on the overall economy and society (Box 1).

Objective and Methodology

While the issues described above may be familiar to many experts in and outside Mexico, understanding of the economic implications of possible solutions is far less obvious. Moreover, agreement on the multisectoral solutions required to fully address these challenges has not yet been reached. Consequently, the need for a comprehensive framework to allow various relevant stakeholders to assess and prioritize policy interventions is essential.

Box 1 - Water as a Limiting Factor to Economic Growth

Trade and Competitiveness. As Mexico's economy becomes increasingly open, regional and international opportunities for economic expansion are growing. However, such opportunities have not been fully pursued, in part due to (i) inadequate incentives to improve water use, such as moving water from low to high value uses, and (ii) the water rights administrative system in place that makes it difficult to trade in water and to adjust water use to sectoral demands and market signals. As foreign supply and demand enter the picture, the rational reallocation of production should move toward more water-productive activities, if there are relatively free market prices for water as well as for goods and non-water inputs. Products with greater water intensity would be imported from places with more water, and Mexico would specialize in tradable products that need less water. The transmission of such information and incentives (including those for water) to producers in a market–driven economy would take place through changes in relative prices. However, this has not happened for the most part, and the specialization of production within the nation's agricultural sector has shifted toward, not away from, water-intensive activities. Irrigated production in agriculture increased its share from 45 to 55 percent during the 1980s and 90s, and now accounts for about 70 percent of Mexico's agricultural exports.

The study reported in this note is part of a broader analysis of the sector. Its intent is to promote a stakeholders consultation process, development of a specific set of background papers to address the most pressing issues in water policy in the country. Finally, the study included the development of analytical models to assess the linkages and impacts of various policy instruments on the water sector and the economy with a focus on one river basin case study - Rio Bravo.

Main Issues and Findings

The main issues and findings of this study corroborate lessons learned from international experience. Namely, there is a need for a comprehensive and well-coordinated set of interventions that address issues of sustainability, equity, and economic efficiency (or constraints to growth).

Considering the overexploitation of aquifers, combined with rapid urban growth, it seems unlikely that preserving current water allocations for agricultural uses can be sustained. Part of the complication arises from allocating much more water for agricultural uses relative to urban uses. As such, meeting urban demands would likely only require small reductions in available water for agriculture, leading

to moderate reductions in total cultivated land and level of production. Moreover, some policy interventions to achieve this result have relatively lower negative impacts than others, so they are more politically acceptable.

Farmers seem to be quantity-responsive rather than price (cost)-responsive to both land and water. In other words, given current pricing and subsidy realities, policy alternatives that target irrigation water supply reduction (rather than irrigation water supply price increases) may be more likely to induce greater water use efficiency for agricultural purposes. Moreover, reducing water supply can be implemented more equitably, and would therefore be more politically viable, compared to policies that focus on eliminating energy subsidies for pumping groundwater. As compared to poor and medium income rural households, rich Mexican rural households (especially those in the North and in the Río Bravo Basin) are the ones that are most affected when water availability is reduced and when water costs increase.

The economic value of water analysis (Box 2) demonstrates substantial differences in water productivity across various agricultural products, among different economic sectors, and in different areas within the Rio Bravo region. This imbalance implies that distortions remain in terms of productivity, efficiency, and equity for the regional economy as a whole. Improving crop production techniques could address much of that distortion, in terms of both water savings and increased physical output. Improvement, diversion, or substitution of forage and grain crops (i.e., alfalfa, sorghum, and pastures) may lead to similar favorable results if adequate infrastructure and markets are in place.

Similarly, the review of the cost of providing and the willingness to pay for water suggests that ***improving the performance of utilities could lead to increased water savings, as well as better delivery of water supply and sanitation services (including for the most vulnerable)***. The municipal and industrial water use analysis highlights the scope for such improvements, which would lead to better sustainability of water use by reducing water losses in the system. Policy interventions regarding pricing, bill collection, leak-and-detect management, and performance–based incentives for utilities require greater consideration.

Transferring water among crops, water rights holders, and basins could also lead to more equitable and economically efficient water allocation. However, such transfers would require an adequate legal, institutional, and regulatory framework to be in place. Findings from the comparative analysis of water–related policies suggest that such a framework may need to be strengthened to assure that trading of water rights is feasible, viable (i.e., that the associated transactions costs are not prohibitive), and transparent. Otherwise, purely informal water markets may remain relatively marginalized and localized and/or may lead to inefficient and inequitable results.

Box 2 - Economic Value of Water (EVW)

Policy makers can learn a great deal from a relatively simple analysis (tool) that provides the economic value of water (EVW) across uses and regions. The reported values give policy makers a signal about the performance of the policies leading to a given allocation of the water among various sectors or various regions in the economy net of transaction costs. These transaction costs include the cost of pumping water, the cost of transferring water rights, and various indirect costs. The EVW prioritizes water uses based on their water productivity. However, transactions costs can be substantial and make unfeasible those water reallocations that would otherwise seem economically feasible. Therefore, the usefulness of an EVW analysis lies in its broad basis for dialogue among various stakeholders and its flexibility to incorporate alternative policy intervention considerations and their costs

Other important limitations to efficient, equitable, and sustainable water allocation include pricing and subsidy distortions. The analyses of farm types and groundwater pumping subsidies demonstrate, in particular, that the Tarifa 09 subsidy for electricity[1] negatively impacts both the agricultural sector, the environment and the entire economy. Moreover, the main beneficiaries are farmers who have groundwater concessions, i.e., only about 30 percent of all farmers in Mexico. With the cost of the subsidy reaching nearly US$700 million in 2004, this sort of distortion can no longer be overlooked. However, simply eliminating the subsidy would not likely be politically feasible, nor would it be particularly efficient in the context of existing institutions in Mexico. On the other hand, several alternative policy interventions may be more or less politically neutral, as well as efficient and equitable.

1 - Tarifa 09 - The average cost of producing electricity in Mexico is 0.61 pesos (10.7 pesos/US dollar) per kilowatt hour (KwH) without considering additional transmission costs. The fee for a farmer benefiting from a concession is 0.22 pesos per KwH (Tarifa 09-CU), which corresponds to a subsidy of 63 percent (other subsidies are also included under Tarifa 09, such as the night rate

These include the following options: (i) "decoupling" so that each farmer receives the average subsidy; (ii) allocation based on historical consumption; (iii) assigning subsidy benefits only to water concession holders, thereby stimulating a more efficient and legal use of water and electricity; and (iv) a combination of one of the preceding options with a payment per hectare approach to further target the subsidy. Each of these options has political economy consequences that would need to be considered in the context of the policy dialogue which the present study is intended to inform, but none of the options would be as politically charged as eliminating the subsidy altogether.

Inequitable water allocation also seems to arise from centralized water policy and investment decision making that inherently marginalizes certain elements of the overall society. The analysis of water management policies in indigenous communities indicates that the omission of the sociocultural dimensions of water not only makes contemporary indigenous civilizations vulnerable, but also negatively impacts overall water resources management. Many indigenous communities have adapted to cost-effective and sustainable water management practices. However, these communities remain marginalized from water sector policy and investment decision making. Such marginalization inevitably generates conflicts over water and leads to various negative impacts that upset the overall fabric of society at large. Ironically, indigenous communities are often strategically located in regions with high levels of biodiversity and natural resources, as well as aquifer recharge zones, precisely those areas that require greater attention under the current "water crisis" circumstances. However, public resources allocated to improve basic needs in indigenous regions remain far below the millennium development goal of US$550 per capita needed to resolve drinking water and sanitation deficits in these regions.

Many negative impacts that may result from reducing irrigation water supply can be offset by improved water use practices. Allowing Water Users Associations (WUAs) to retain revenues from water charge collections and locally reinvest the proceeds raised by charging fully according to the value of water in water-productivity improvement technologies. Policy changes that imply more resources to the WUAs and to the government, could improve government finances and be used for redistributive purposes; for example, by promoting a more efficient crop production of poor rural households. The above is particularly important for the portion of poor rural households that are indigenous, that is, for the poorest of Mexico's poor.

Free trade policies may facilitate many of the policy alternatives discussed above. For example, the negative impacts from restricting water supply for irrigation would be relatively low compared to the positive impacts from agricultural trade liberalization. These impacts may offset negative consequences to richer rural households whose incomes are the most affected when water availability is reduced and/or water costs increase. The same holds when a value-added tax on foodstuff is introduced and/or when agricultural subsidies to certain crops are eliminated. For example, reductions on water supply for irrigation in a context of free trade are less harmful to rural households than the elimination of the farmers support program, PROCAMPO.

Analysis of the existing legal and policy framework highlights the fragmented nature of the sector, the limited institutional capacity, and the lack of incentives to meet national objectives. If institutional, legal and regulatory, and monitoring and enforcement arrangements are not adequately addressed, few if any of the policy alternatives the present study seeks to identify would be effective. Broad regional interventions that could create market–based incentives, such as a tradable water rights system, require strong institutional, legal, regulatory, and monitoring and enforcement mechanisms to function well. Performance–based incentives to improve utilities would be most effective when adequate monitoring and enforcement arrangements are in place. Targeted interventions would be most beneficial when combined with an appropriate legal, regulatory, and institutional framework that assures the right pricing signals.

Climate change is likely to affect Mexico with differential impacts by regions. Localized policies seem appropriate to address the fact that impacts from changing water availability vary across regions, households, and cultural groups.

About the Authors

Musa Asad is a Senior Financial Analyst with the Environmentally and Socially Sustainable Development Department of the Latin America and the Caribbean Region and Ariel Dinar is a Lead Economist in the Agriculture and Rural Development Department, both within the World Bank

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