Key Water Issues for 2001-2006

Objective Analysis of the US-Mexico Border Region with Decision Makers and Stakeholders

Roundtable Summary

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The objective of this roundtable was to highlight the most salient and promising ideas for sustainability of supply, effective use of technology, successful project financing, and current projects. Concordant with the mission of the Institute of the Americas (Institute), roundtables bring together important players and promote private sector participation in building Latin America's infrastructure. The purpose of this paper is to bring attention to current trends and highlight possible solutions to future water shortages as discussed at the roundtable.

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Introduction

Both Mexico and the US have unquestionably similar water problems, yet practical short- and long-term solutions are very different. Human consumption is on top of the Mexican government's priority list for water use. Mexico has a shortage of water, particularly in large metropolitan and heavily industrial areas. Therefore, it is imperative that industry and agriculture look for ways to increase access to water while reducing dependence on municipal potable water. Water treatment and subsequent reuse will grow in Mexico, opening opportunities for effective, affordable technologies and partnerships between water companies and industrial or agricultural users, as well as partnerships with public water operators.

Mexican border officials estimate that the region currently has enough water but acknowledge that there will be future shortages as the population grows and wells are depleted. Consequently, construction of the Colorado River Aqueduct is of primary importance to water authorities whether it is built with national, binational, public, or public-private funding. Public-private partnerships are the most feasible way to finance a project, but these partnerships are only possible when there are contracts and a clear repayment mechanism. The best partnerships in Mexico seem to be those that incorporate end users, more specifically, industry.

Sustainable Water Supply for Baja California

The federal government in Mexico establishes water rights and specific amounts are allocated to each city, however, increases can be negotiated with the federal government. Water operators can also purchase water directly from growers. The Colorado River supplies Baja California with 1,850 million meters^3/year (m^3/yr). Baja California residents consume 200 million m^3/yr or approximately 140 gallons per day (gpd) while the remaining water is used in agriculture. Notwithstanding, this seemingly abundance of water, better irrigation technology for agriculture, and expanded infrastructure (such as the lining of canals) are needed to address future city needs. It is not clear if specific action plans currently exist.

Water loss due to leaks is a serious issue in Mexico. Mexico City averages a 40% overall loss while Tijuana registers a 25% overall loss. City officials hope to reduce the water loss in Tijuana to 22% by 2002. Unauthorized water usage, water theft, and errors in billing exacerbate the water problems in Tijuana.

Short-Term Alternatives

Rosarito and Tijuana

1) A three-year, three-phase rehabilitation and interconnection of local wells. The project has state government authorization and funding for 2001. A similar course of action is planned for the period 2002-2003.
2) Restructuring of the Colorado River Aqueduct to increase capacity to 4 cubic meters per second (m^3/s). Two oscillation towers were built in 2000 to increase the flow from 3.6 to 3.8 m^3/s. Both the federal and state governments have authorized funds to do additional work on the aqueduct in 2001.
3) Rehabilitation work to access the emergency connection feeding the United States and the purchase of water rights. Water from this emergency connection should be available by Summer 2001.
4) Construction of a Mexican aqueduct to complement water supply to Rosarito and Tijuana, increasing water flow from 4 to 5.5 m^3/s. This plan would require restructuring of the channel, installation of a parallel line, and thorough review of the electric capacity of pumping stations. Preliminary feasibility studies have been completed. A detailed budget and execution plan are in progress. Completion of the executive project is expected in 2001. Funds are being sought to begin construction by 2002. If these plans materialize, there would be enough water for Rosarito, Tijuana, and Tecate through 2010.
5) Construction of the first module of a desalination (a process by which pressure forces water through a membrane capable of holding back the salt) plant for the tourist corridor of La Misión (the Mission) in Tijuana.

Ensenada

1) Purchase of water rights and rehabilitation of local wells. The year 2000 brought sufficient state and local funds to rehabilitate wells in the area to a current capacity of 900 liters/second (l/s), while the current rate of consumption is 650 to 700 l/s. Summer months, however, bring supply problems due to low levels of rainfall that result in insufficient underground recharge to satisfy demand.
2) Reactivate construction of the Santa Rosa Dam in the Ensenada Valley, a joint venture between the federal government and the private sector.
3) Exchange treated wastewater from El Naranjo plant for well water designated for agricultural irrigation.
4) Recharge aquifers with treated wastewater from El Naranjo plant and construction of a desalination plant to treat briny water from the recharged aquifers.

Mexicali

1) The core plan involves purchasing water rights. The region's current supply is 82 million m^3/yr, but consumes 100.5 million m^3/yr. The difference must be accounted for by purchasing water from farmers.

Mexicali's water problem is relatively small because of the region's proximity to the Colorado River, allowing for exchanges of treated water for Colorado River water. With new treatment plants in Mexicali, any turnkey projects must include proposals for water reuse. Any developer looking for project feasibility must provide operating authority with the corresponding water rights.

Long-Term Alternatives

Tijuana

A Mexican and an American consulting firm (Planeación Sistemas y Control and Boyle Engineering, respectively) were hired to develop feasibility studies that highlight multiple alternatives. The three project alternatives proposed to date include:

1) Construction of a joint US-Mexico regional aqueduct (from the Imperial Valley through the Mexicali Valley to Tijuana and San Diego), including construction of a dam to store the water. An option being contemplated would provide San Diego with up to 12 m^3/s, and 4.5 to 7 m^3/s for the coastal region. Feasibility studies are scheduled for October 2001, to determine the best financing alternative for its construction (i.e., federal funds from the US and Mexico or a mixture of both federal

and private sector funding). The potential of this project for hydroelectric power generation is currently being studied.

2) Construction of a smaller local aqueduct (from the Colorado River to Mexicali) with federal government funding or through private concession.
3) Desalination plant for the City of Tijuana and the coastal zone.

Ensenada

Desalination is held to be the only long-term solution for Ensenada and is expected to happen soon, in small, easily financed modules.

Tecate

1) Increasing extraction of local wells instead of Las Auras Dam, to prevent contingencies from the Colorado River-Tijuana Aqueduct.
2) Construction of the Las Auras Dam.

Different tax bases and rate structures across borders and different quality standards that may pose health concerns for Californians are major obstacles in the development of an overarching binational water system. Furthermore, the National Water Commission, a federal agency in Mexico, manages Mexico's water supply whereas local agencies manage California's water supply. These are substantial, although not insurmountable, hurdles.

Various finance alternatives for these plans are being evaluated. If binational bids for the aqueduct do not materialize, a smaller, local aqueduct from the Colorado River to Mexicali will be constructed. Whether the private sector would be included through a concession is uncertain, yet it appears necessary that the Mexican government consider private investment.

The government will explore less costly alternatives such as exploitation of underground water and reuse of treated water before desalination, thought of as a "last resort" option. Paradoxically, desalination is considered a short-term solution because it could be completed in small modules in order to reduce the initial high cost of this kind of investment.

Tijuana's Master Plan for Sustainable Water Supply

Taking into account water loss, Tijuana receives 3,230 l/s from various sources, a point of equilibrium between supply and demand. Equilibrium is also expected by 2005, when one of the proposed aqueducts, whether binational or local, will be in place.

Principal Water Sources for Tijuana

Colorado River-Tijuana Aqueduct	Tijuana River wells and the Alamar (two local aquifers)	Rosarito wells	La Misión wells	Rodriguez Dam
Built to provide 4 m^3 or 4,000 l/s. Pumping cannot exceed 3,600 l/s. Tunnel loss amounts to 40 l/s.	Extraction amounts to 70 l/s — a modest amount due to the poor quality of the water in these wells. Well rehabilitation will allow extraction to increase 60 l/s in 2001 and 160 additional l/s in 2002. By 2003, and additional 410 l/s will be available on the supply side.	Currently 30 l/s are extracted.	Belonging to the municipality of Ensenada, which gives Tijuana rights of use. 45 l/s are extracted. In 2001, 56 l/s will be available, but this figure will decrease to 0 by 2003 as Ensenada exercises its rights to this water.	There is no extraction from the Rodriguez Dam, but 100 l/s are expected to be extracted in 2001.

The twenty-year master plan for potable water and sewage treatment for Tijuana will cost $1 million. Financing comes from the Environmental Protection Agency (EPA) and the North American Development Bank (NADBANK). The terms of reference were being finalized at the time of the roundtable and a public tender was expected soon after.

The master plan is designed to be dynamic, serving to evaluate needs, projects, and alternatives. It represents an essential instrument for urban planning and therefore should have a regulatory component. Although desalination is included, reuse of residual water is a more important component of the three-component master plan. The components include: I. Economic financing and population analysis; II. chapters dealing with long-term water supply, potable water systems, sewage collection and treatment, and other issues, and III. legal aspects and projections, including a framework for management and administration of the various projects. The addendums include a listing of conditions for document presentation, definition of an emergency plan given the region seismic conditions, and other emergencies.

Tijuana River Watershed

Recognizing that the region is culturally, economically, and environmentally interconnected, the Good Neighbor Environmental Board recommended a watershed approach to addressing water sustainability issues on the US-Mexico border. Even unique geographical arrangements call into necessity a binational approach to the regional water problem as water from the eastern part of the watershed that flows into Mexico ultimately flows into the Tijuana Estuary on the US side.

The Tijuana Watershed covers about 4,500 kilometers $(km)^2$. About one-third of the watershed is on US soil. The Tijuana River Watershed is, unfortunately, not sustainable. Major issues affecting water condition and therefore sustainability include water quality questions that relate to population growth, sedimentation issues, natural habitat degradation, surface water flow issues, and air pollution.

Socio-political factors also interface with these environmental issues such as population growth, questions of public safety, demographic trends, public health questions, methodological differences in political organization, differences in regard to land use planning, and economic development.

Data inconsistencies between both countries also present obstacles. Mexico classifies soils according to Food and Agriculture Organization (FAO) standards whereas the 7th approximation is applied in the United States, making data virtually impossible to reconcile. Asymmetries in technology and sustainability of water levels are major issues in a rapidly growing area where natural resources are being depleted.

Much greater integration of land use on both sides of the border is anticipated, as actions on either side are seldom isolated. Therefore, the elements of the watershed management plan must include:

1) Preventing loss of groundwater flowing into the ocean by diverting the flow into underground basins.
2) Addressing changes in hydrology due to sand and gravel mining.
3) Preventing the elimination of vegetation cover that results in loss of healthy ground soil that could be used to support vegetation growth.
4) Addressing habitat fragmentation caused by overgrazing.
5) Increasing green areas. Both nations would agree that natural land cultivation is important for its citizens, even if opposed by builders and developers.

Sustainable Water Supply for San Diego County

The two main sources of water for San Diego County are:

1) Colorado River Aqueduct (80% of supply).
2) California Aqueduct – State Water Project (20% of supply).

Three current sources of supply for San Diego County include:

1) Metropolitan Water District (85%).
2) Surface/underground water.

3) Recycled water.

The average water user base is anticipated to increase by 45,000 users/year over the next 20 years with an expected 3.7 million people in the water service area by 2020—a 1 million increase throughout the county. Demand is expected to be approximately 813,000 acre-feet of water by this benchmark date—an increase of about 100,000 acre-feet. Conservation is an essential part of the San Diego water program. Without conservation, demand would be much greater. Thus, future demands must be anticipated by an increase in a variety of tangible resources that outlines a plan with two principal components: diversification and conservation.

Diversification of supply through an effective, far-reaching water management strategy is essential. San Diego imports 589,000 acre-feet of water every year. Since a decrease in the need for outside sources is unlikely, the county must respond through supply diversification. Principal components of the supply diversification plan include a decrease over reliance on the Metropolitan Water District (MWD), the implementation of the water transfer system from the Imperial Irrigation District, and the identification of potential local supplies, including desalination.

Today, Imperial Valley farmers voluntarily conserve water through tail water recovery systems, water that is then transferred to and consumed in San Diego County. The aforementioned binational aqueduct, contingent on completion of extensive environmental work as well as approval by the State Water Resources Control Board, would carry Imperial Valley water transfers to San Diego. Since water will not be used in Imperial County but throughout San Diego County, approval is obligatory. A plan should be completed by 2002.

MWD policy of firm supply based on preferential rights specifies the amount of water reserved for specific clients. This policy creates tension for San Diego residents. The MWD determines the level of preferential right according to an agency's history of payments to MWD, excluding wholesale water purchases. While this was an acceptable arrangement at the time MWD was formed in 1920, the policy creates imbalances today. In 1920, water was not purchased and revenues were primarily tax based. Today, however, water purchases account for most of the revenue. While San Diego purchases about 25% to 30% of MWD's supplies, the county has a preferential right of about 14%. Either a change in MWD's preferential right configuration and/or a move towards less dependence on MWD is necessary for San Diego.

San Diego County plans to double its local water supply to 223,500 acre-feet by 2020. Although ambitious, water authorities believe the plan is achievable. Although surface water can be expected to remain relatively constant over the next twenty years, recycled water (wastewater for non-potable uses) must be increased from 13,000 to about 53,000 acre-feet by 2020—the most challenging element of San Diego's future water plans.

In coming decades, methods of recharge and recovery (the injection of groundwater into underground basins for recovery at a later date) are necessary. Also, San Diego must address the potential for desalination. Improvements in technology and reduction in costs make desalination more feasible than before.

San Diego needs to focus a mix of resources to meet rapidly increasing demands. Implementation of water transfer and aggressive local water supply development, including usage of recycled water, ground water, and desalination, is more important than ever.

Water Reuse Potential in San Diego

San Diego understands its need to find alternative, local sources of water given that it imports 80% of its water. Four years ago and under court order, a reclamation plant was built in the northern part of the city to irrigate golf courses and parks. A second reclamation plant near the border will be completed by December 2001. City planners wanted to provide water for the South Bay area of San Diego but also felt San Diego should be working more closely with its neighbor, Tijuana. Water is a vital issue for both cities.

The need to get water to industry in an efficient, clean manner is a top priority. For the circuit-board industry, which requires high-quality water, the purchase of micro-filtration equipment has allowed companies to use reclaimed water. This technology would be applicable in Tijuana, where studies are underway to determine the willingness to use reclaimed water.

The technology to bring water from a secondary to a tertiary to a re-purified state is very simple and well tested, and costs of reclaimed water are declining. Still, new, innovative uses must be found for this procedure to be economically sound.

Public opinion and the “toilet to tap” mentality may be the greatest obstacle for expanding use of reclaimed water, stalling re-purification projects such as the one in San Pasqual (North County San Diego). Political will to support this technology, though scientists deem it safe, is weak. In years to come, however, it is likely that drought conditions will arouse more active interest in this source.

Given that San Diego and Tijuana are economically and culturally joined, leaders need to look at the environment from a regional not just a local perspective. A regional master plan is to bring new ideas and binational collaboration as well as new funding venues.

Desalination Technology

Careful evaluation is key to a region’s overall water management plan. Surface, ground, and recycled water sources along with conservation methods must be carefully examined. Within every water plan, whenever possible, desalination must also be considered a feasible option, particularly in the San Diego-Tijuana region. Desalination is not considered the best long-term solution for either San Diego or Tijuana. The best long-term solution is water transfers and treatment. Water conservation is a more likely scenario in San Diego than in Tijuana because the actual water consumption in San Diego is 200 gallons per person per day whereas in Tijuana it is 50 gallons per person per day. Consequently, water consumption in Tijuana will be more likely to increase with further economic development. Watershed management is accepted as essential in academic circles; however, this has not yet translated into projects that will result in sustainability.

Processes for Desalinating Seawater

I. Thermal Process (Evaporators)

Evaporative technology has been in use for over 100 years. Multi-stage flash and multi-effect distillation are the two most common methods. These methods produce very high quality water falling below 20 parts per million (ppm) total dissolved solids (tds), a biologically sterile water as deemed necessary in the pharmaceutical industry. As an option, such facilities can be effectively coupled with power plants.

Disadvantages of using evaporators include:

1) High heat mixed with brine makes for a very corrosive environment, and scale formation in the plants is very difficult to manage.
2) These plants are very high in energy consumption.
3) Construction of just one multimillion-gallon plant can take a number of years. High operating costs and a lack of rapid development and use can be an unlikely combination to meet local and immediate need.
4) The system is very difficult to start and stop and must be kept running continually for maximum efficiency.
5) Plants have a very high profile, requiring a fairly large plot of land.

II. Membrane Process

The use of pressure driven membranes is a process approximately 30 years old. Reverse osmosis, nanofiltration, and ultra-filtration are the three main options in this field. Of these three, reverse osmosis is the most common process used for desalination. Water quality at 500 ppm is sufficient for drinking. In addition, seawater membranes remove more than just salt; they also remove arsenic, methyl tertiary butyl ether (MTBE), and pesticides such as atrozine.

Pressure driven membranes differ markedly from evaporators in certain key aspects. Plants have lower capital and operating costs, and construction can be completed in a year. Placed in low profile buildings, these plants can remain relatively inconspicuous. Membrane systems have instant on/off capability. Moreover, reverse osmosis methods have little negative environmental impact since the removal of biological material is not problematic.

Disadvantages to reverse osmosis include:

1) The quality level that is most economically produced is of 300 to 400 ppm tds—lower quality than what evaporator methods produce.
2) Biofilm can form over the membrane and cause inefficiency.
3) Maintenance of pressure driven membranes requires knowledgeable managers as operation must be adjusted according to changes in feed-water.

In 1979, Saudi Arabia built a filter capable of processing 3.2 million gallons/day, but was only producing 1,000 pps level drinking water, which is of somewhat low quality. This water was blended effectively with distilled water to create sufficiently potable water. Filtration levels could be more efficient.

Capital costs for reverse osmosis plants are approximately $29 million with operating costs averaging $4.80/1,000 gallons. In contrast, the basic cost for an evaporator system is approximately $42 million with operating costs at about $4.85/1,000 gallons.

Though the amount of initial capital required differs, operating costs for both reverse osmosis and evaporator technologies are nearly identical. Decisions-makers should carefully consider options, evading simplified either/or decision models in favor of hybrid, multiple-effect systems combining evaporator and membrane technologies to provide the lowest water cost. This has been the solution of choice, proven effective in the Middle East. Multiple effect systems are more competitive. Usage ratios are usually 50/50 or 65/35 (evaporator/membrane) while membrane technology is much more cost-effective in energy use.

Current capital costs for reverse osmosis are $.60 to $2.5 per gallon capacity installed, varying with the salinity of the feedwater.

Using brackish water	$1.5 million ($0.60 per gallon), less expensive than a MF/UF system.
Using seawater	$5 to $6 million ($2.00 per gallon).
Membrane cost	10% to 20% of initial capital costs. Three- to five-year lifetime. The cost of the membrane is $0.14 per 1,000 gallons permeate.
Cost of power	1,000 PSI (pounds per square inch), 45% recovery, $0.05 per kilowatt/hour (kw/hr), results in a cost of 20.5 kw/hr per 1,000 gallons or $1.03 per 1,000 gallons. With energy recovery added, the cost is reduced by 50% to $0.50 per 1,000 gallons.
Chemical addition	Varies with feed water. $0.05 to $0.15 per 1,000 gallons permeate.
Equipment repair	$0.05 per 1,000 gallons.
Operator labor	$0.10 per 1,000 gallons.
Capital amortization	Ten years, straight line, assuming a price of $6 million; $0.67 per 1,000 gallons permeate.
Total operating and maintenance costs	$1.61 per 1,000 gallons of permeate.

(Prices on chart are in US dollars)

Nanofiltration in the future offers high hopes. A selective rejection membrane would remove multivalent ions from seawater such as sulfate, calcium, and magnesium—major contributors to scale formation in seawater and leads to less chemical use and maintenance. With nanofiltration, both reverse osmosis and evaporators can operate at higher recovery rates, perhaps as high as 55% to 75% or higher at less than 100 PSI.

Desalination is a reliable, increasingly cost-effective method of adding water to a region's total water management plan. Hybrid plants are the most popular based on efficiency. Encouragingly, costs for new facilities and membrane replacements have fallen significantly in the past ten to fifteen years and will likely fall even more. New technologies and methods such as nanofiltration make desalination more efficient and cost effective. Energy costs remains one of the most important cost factors to consider when evaluating this technology.

Financing Models for Water Projects

Poseidon Resources Corporation has invested over 2.5 billion dollars to date. Landmark projects include the Tampa Bay Water Desalination Project in the United States and the water treatment project of Petróleos Mexicanos (PEMEX) in Mexico. The PEMEX project can be used as model for an effective water resources investment scheme through partnering project investment groups such as Poseidon with more localized corporations such as Atlatec.

In the early 1990s, PEMEX sought the private sector for build, operate, and transfer (BOT) projects to sell water on a pesos/liter basis to specific refineries. A competitive procurement process was conducted. In every case, PEMEX, Poseidon's local partner, provided onsite construction management, engineering, construction and maintenance of facilities, and day-to-day interfacing with clients. PEMEX also sits on the board of directors and assists Poseidon in making decisions. Poseidon's role is to provide developmental support, structuring and negotiating contracts for things such as construction, water sales, operations, and maintenance. Poseidon also arranges for third party financing and investment of equity as required.

Poseidon's funding mechanism is not an obligation for repayment. This makes projects very attractive to groups like PEMEX. Billions of dollars worth of power generation, natural gas, telecommunications, and water facilities are financed every year on a basis of non-recourse project finance in the US, where there is a deep and sophisticated market to provide this type of financing. This mechanism requires that all major participants and contractors have equity investment in the project, ensuring that every participant has a consistent set of objectives.

The Cadereyta Refinery in Nuevo León, Mexico, was the first project in Mexico to utilize the non-recourse project finance model, enabling PEMEX to tap international capital markets to attract funding from major financial institutions. Chase-Manhattan Bank provided initial funding, followed by Met-Life Corporation and other banks. Usually, interest from lending institutions and availability of capital increase once projects like these are in progress.

BOT was the structure for the Cadereyta Refinery with three additional sponsors also as equity participants. This was one of the first instances of "uncovered" or no government guarantee, export credit agency, or multilateral agency that provided credit support to the debt portion of the deal for financing in Mexico. This innovative form of financing was structured purely on the basis of the contractual arrangements of the parties and on their strengths and capabilities.

Important elements for attracting capital include:

1) A need for a strong, savvy, local partner such as Atlatec in the PEMEX project. Atlatec, well attuned to the local political atmosphere, was exceptionally helpful.
2) Although projects are local, it is in everyone's best interest to incorporate global capabilities, skills, and technologies. In all cases, the best available technologies and capabilities should be utilized.

3) Global capital markets were surveyed and the best available capital and structure were drawn in for the particular attributes of the project. It is necessary that project sponsors make sure that every element of the construction contract, the operations and maintenance contracts, the water sales agreements, and the site lease all interlink in order to ensure the predictability of available cash.
4) In order to succeed in these types of projects and to attract the appropriate capital, it is essential that all participants have similar incentives. If all participants in a project have some stake in ownership, the successful completion of a project is more likely.

The existence of deep capital markets is encouraging for water projects. Water infrastructure is only now approaching the level of activity that is sufficient to engage international capital markets.

Legal Aspects of International Water Projects

Water is singular among other natural resources. Perhaps most significant and unique is its emotional aspect. People adamantly expect to receive water as a basic human right. Unlike other resources, the real cost of water is in its transportation over long distances, yet it is inherently and physically local.

Generally speaking, water is, practically if not legally, controlled by local governments, and the water management branch of government is the least familiar with the workings of the private sector. Strongly affected by local regulations and practices, rules are often murky, particularly early in the process of involving the private sector. Furthermore, in response to election hopes, government must respond to citizens who expect to receive subsidized water rates. The handling of water has not been typically predicated by contracts. Astonishingly, even San Diego does not have a contract with the Metropolitan Water District (MWD).

Why Involve the Private Sector?

1) To obtain additional funding.
2) To improve the quality of services through private sector involvement.
3) To place the unpopular and difficult burden of hiring and firing local workers on the backs of the private sector.

Involving the Private Sector

The most simple way for a government to involve the private sector is to hire someone to run the existing system—a rather commonplace option. A more dynamic form of involvement is found in project-specific transactions such as the PEMEX project. Governments are generally eager to involve the private sector. At issue, however, is the tendency of governments to misunderstand the real needs of the private sector. Willingness of the private sector to agree to active fiscal and technical involvement in projects is contingent upon government response to a number of vital questions regarding the security of potential investments.

Investors desire assurances for reasonable rates of return, especially in regions where politics may be unstable and inconsistent. How certain, for instance, is a reasonable rate of return for investments even if that means raising user rates during election years? Governments must prove a commitment to fulfill agreements even when such decisions may be unpopular.

Investors seek guarantees that their project will be taken seriously with well-established long-term plans. Governments need to show exactly how committed they are to private investment and rule of law. The political atmosphere must also be stable; any potential transition between governments must be peaceful and economically uneventful. In addition, governments must assure the rights of private parties will be respected. Ultimately, there must be a clear framework for private/foreign investment. Mexico's legislation, with the passage of North American Free Trade Agreement (NAFTA), is one of the more reliable countries in this regard.

Fair and reliable dispute resolution is a very necessary guarantee. In certain jurisdictions, judges may not be objective, leaning heavily in favor of the government. This is an unsettling prospect for potential investors. When there is any doubt, international investors will insist on some alternative form of dispute resolution.

Questions regarding the quality of the regulatory scheme will be asked. Regulations must be comprehensive, effectively covering all issues, and must give adequate guidance to both regulator and operator in regard to any potential problems as concessions may often run from 30 to 90 years. Moreover, tariff settings must be predictable. Regulation and tariffs many be new to regions and may not yet be rooted or accepted. Finally, any mystery around what is sold and purchased must be eliminated. Both buyer and seller must share a clear mutual understanding of the product(s) and service(s) involved.

In essence, there are four areas of contractual provisions that must be adequately addressed. They are:

1) Governments must assure that parties will receive what they were promised.
2) A clear outline of the tariff regime must be provided.
3) Choice of law and dispute resolution must be accessible.
4) Treatment for early termination must be clearly defined.

Termination of contractual obligations may occur for the convenience of the government, for the default of the concessionaire, or by mutual consent. Each of these three situations should have a unique formula for payment upon termination. Unfortunately, there are many examples of governments retracting all payment to companies who default regardless of how much capital they may have theretofore invested. Clear formulas for payment are undoubtedly necessary.

Investors will resist involvement if they apparently have little chance to protect their interests in the event that the project goes awry. The ability of a lender to take over or to find another operator for a project without losing its rights is highly sought. Establishment of expert dispute resolution committees arranged in advance to handle specific technical and economic issues is a good way to circumvent sovereignty concerns.

If successful private investment is to be ensured, governments must recognize exactly what the private sector requires. Inevitably, the process becomes an internal negotiation where concerns of the private sector must be rightfully balanced with the legitimate needs of the government. To safeguard against stumbling blocks down the road, it is advisable to wrestle with legal issues before negotiations begin.

Bajagua Project

Bajagua is a project to reuse treated sewage water in landscaping, agriculture, industry, and possibly aquifer recharge. Bajagua is a solution to the treatment of wastewater from Tijuana, a long-time, long-term public health and political problem that has existed between the United States and Mexico.

In 1990, the US government approved the construction of a 25 million gallon wastewater treatment plant on the US side of the border (referred to as the Binational Wastewater Treatment Plant) with an outfall to the sea. In operation for a few years, this plant has fallen short of expectations. The cost to improve this plant to meet federal requirement is large, beginning with an increase in capacity from the current 25 to 50 million gallons of wastewater, an increase it cannot handle.

The United States Congress Public Law 106-457, and Senate Bill 835 are measured to correct the shortfall. The law also allows for the capture of 25 million additional gallons of water from Tijuana to be treated and sent to an outfall—all at the US government's expense. Legislation, passed unanimously in both houses, provides for an increase up to 75 million gallons, contingent upon approval by the EPA. Fifty million gallons a day is equivalent to 56,000 acre-feet per year that would be made available to the City of Tijuana and the manufacturing plants (maquiladoras) in Mexico.

This legislation propelled the creation of the Bajagua project in Mexico. Bajagua's plan is to pump the 25 million gallons of primary treated sewage from the Binational Wastewater Treatment Plant up the river to a facility located within six miles of the plant. Water would be treated to secondary treatment standards and returned to an outfall leading to the ocean. Bajagua also plans to sell treated water to the government of Baja California, offering the state a competitively priced reliable source of relief water.

Bajagua is a privately funded project. The US government would repay investors according to a fee for services contract. Although design, construction, and maintenance decisions have not been finalized, significant obstacles have been overcome on both sides of the border and the plant is expected to be operational by 2003.