VII

Beyond the All-American Canal: Future Scenarios of Water Availability in the Mexicali Valley

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Introduction

In 1988, Congress passed House Bill 100-675 authorizing the U.S. Department of the Interior to order the lining of the All-American Canal (AAC) in California's Imperial Valley. It would recover approximately 100,000 acre-feet (AF) of water lost annually through seepage along the 60 kilometers (km) (40 miles) of the canal that run parallel to the U.S.-Mexican border. In December of the same year, the Imperial Valley Water District published its *Water Conservation and Implementation Plan*, which established the lining of the main canals that transport water from the Colorado River as an essential measure to achieve the utility's expected water savings.

The unilateral nature of these events not only upset and concerned Mexican officials but launched a debate about how lining the AAC would affect Mexico. It was a debate that, until recently, carried on mainly in academic and non-governmental organization circles and focused on the project's implications for the agricultural users on the Mexican side of the canal's area of influence. This area has been estimated at nearly 19,182 hectares (47,400 acres) (Cortez Lara and García Acevedo 2000) and is located in the northwest portion of the Mexicali Valley.

The issue of AAC lining has been raised again, given the U.S. government's decision to proceed with the project despite the Mexican position about the then-existing water debt from the Rio Grande. The arrival of this long-foreseen scenario has renewed interest in the project's impacts.

This chapter provides context for the concerns that those managing and planning water resources in Baja California have about urban water demand. The first of three sections of this chapter provide background on the state's urban development and in particular development of the Mexicali Valley, as well as how this development has progressed given low water availability. In the second, the current conditions of the water supply in the region are addressed. Following this, some hypotheses on urban demand scenarios are posed and discussed, both for the valley itself as well as the state in general. Any scenarios that deal with lining the AAC must consider the restrictive impacts of the available water supply.

Baja California: Urban Development and Water Dependency

The concentration of population near the water supply has been characteristic of the development of the border region between Mexico and the United States. Compared to other areas along the border, the urbanization of the Baja California border was a late but dynamic phenomenon defined in large measure by its historic relationship with the state of California. With the exception of the settlements located in the Mexicali Valley, the problem of water availability for Baja California communities has been endemic.

Urban growth in this region began in the early 20th century. Then, Tijuana and Tecate were small settlements of 242 and 127 inhabitants, respectively,[1] and provided minimal services for the transient population. Events such as the surge of development in the Mexicali and Imperial Valleys, and later Prohibition in the United States, generated the initial conditions for urban expansion that the border would exhibit in the decades that followed. As Table 1 shows, by 1921 Mexicali had consolidated itself as a service center for agricultural activities in the northeastern part of the state. In Tijuana the balance of the Prohibition years were characterized by annual population growth rates of 26.3% between 1921 and 1930, with migrants accounting for nearly 95% of that growth rate. These conditions began to generate a water availability problem for the city that would continue for the next 50 years.[2]

The *Bracero* guest worker program during World War II and the dynamic reputations these border cities had acquired further triggered development in the following decades. The 1940s marked the beginning of a stage of sustained growth that would last through the second half of the 20th century and that the cities of Ensenada and Tecate would join in time.[3] Upon the end of the *Bracero* program in the 1960s, the Mexican government promoted the Programa Industrial Fronterizo (PIF, in English Border Industrial Program) which provided an alternative for the border cities' labor market. Although the consolidation of this program in the Baja California border region was not immediate, eventually its impact transformed the economic base and the urban structure of cities such as Tijuana.

Currently, with the exception of Mexicali, all the cities in the state maintain annual growth rates in excess of 3.0%. The influence of the maquiladora sector, in both the municipalities where they first located and others where the sector diversifies the economy, continues to be a basic determining factor. The municipality of Tijuana has 48.7% of the state's population, and more than 95% of residents live in the city of Tijuana itself. As a whole, by 2000 Baja California's 39 border municipalities held 36.9% of the population.

Mexicali and Its Valley

The urbanization of the Mexicali Valley has been intimately linked to the rise and evolution of the agricultural sector in the region. This entire development was sustained by the Colorado River, given its strategic proximity and seasonal reliability (Figure 1). While the city gained popularity as a central border crossing point from its founding in the summer of 1901, it did not boom until 1907 when flooding of the arable land, caused by failures in the canal systems, was resolved. This, in turn, allowed for production in the Imperial

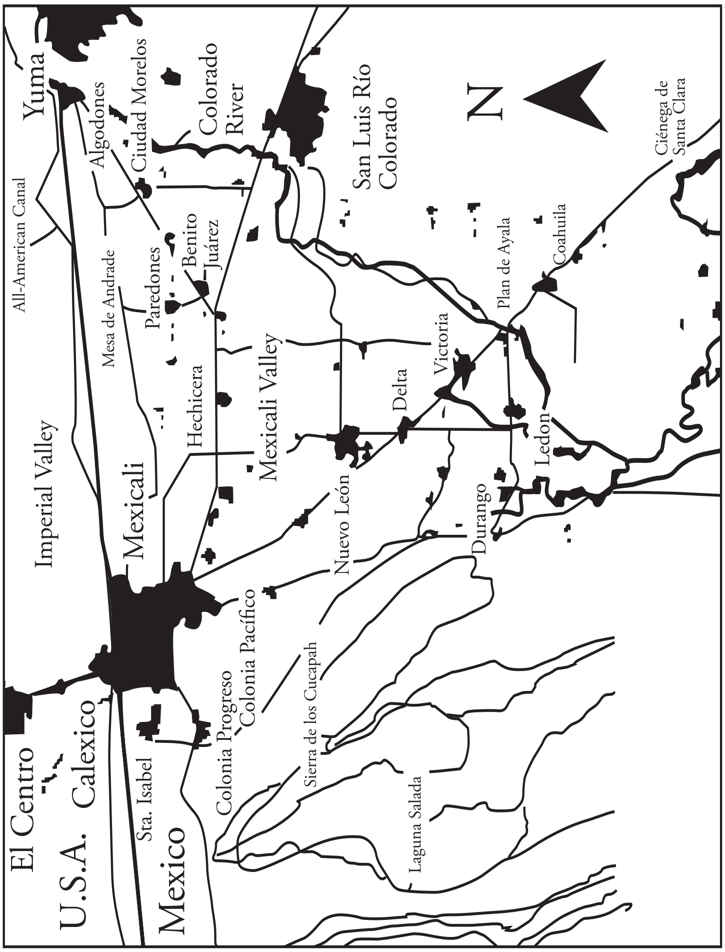
Table 1. Population Growth of the Principal Cities in Baja California, 1900–2000

	1900	1910	1921	1930	1940	1950	1960	1970	1980	1990	2000
Tijuana	242	733	1,028	8,384	16,486	59,952	152,473	277,306	461,257	702,228	1,148,681
Census Rate (%)	-	11.7	3.1	26.3	7.0	13.8	9.8	6.2	5.2	4.3	5.0
Mexicali	-	462	6,782	14,842	18,775	65,749	179,539	263,498	341,559	439,756	549,873
Census Rate (%)	-	-	27.7	9.1	2.4	13.4	10.6	3.9	2.6	2.6	2.3
Ensenada	1,726	2,170	2,178	3,042	4,616	18,150	42,561	79,146	120,483	259,379	370,730
Census Rate (%)	-	2.3	0.3	3.8	4.3	14.7	8.9	6.4	4.3	8.0	3.6
Tecate	127	-	493	566	-	3,679	7,074	14,738	30,540	51,946	77,795
Census Rate (%)	-	-	6.7[1]	1.5	-	9.8[2]	6.8	7.6	7.6	5.5	4.1
Rosarito	-	-	-	-	-	-	-	-	-	23,067	49,178
Census Rate (%)	-	-	-	-	-	-	-	-	-	-	7.9

Valley and the eventual consolidation of an important regional labor market on both sides of the border. This led to settlement in the city by small farmers, business people, and providers of basic services, who in turn attracted new immigrants employed in irrigation and communications projects. The concession policies of the Porfirio Díaz Administration that characterize this era promoted U.S. investment in the Mexicali Valley, which led to the establishment of the Colorado River Land Company. The company's presence determined the control of the economic activities in the valley through its financial and land-leasing operations, as well as its experimental planting of cotton (Anguiano 1995). By 1910, the population of Mexicali and its valley totaled 1,600, and approximately one-third of these people lived in the city and worked in the service sector. Prior to the 1930s, the city's economy consolidated around the services generated by cotton production in the valley and the emerging market opened up by Prohibition in the United States. During those years, immigration into the valley and the city was intense and resulted in Mexicali's having the greatest concentration of the state's population (62%). The city's population grew to more than 14,000 between 1910 and 1930 (see Table 1).

The 1930s marked a series of changes for the valley's economy. First, the worldwide economic crisis of the times caused a drop in cotton production, which led to an 80% drop in single-crop production. Then, changes in national policy regarding the restructuring of territorial property promoted the expropriation and redistribution of large areas of land held by Colorado River Land. Finally, and as complementary measures by the Lázaro Cárdenas Administration to support the *ejidatarios* (communal land owners) and colonizers, the Distrito de Riego del Río Colorado (in English, Colorado River Irrigation District) was created in 1938, rising from the displacement of Colorado River Land's control of the water in the valley. This period, essential for the coming years and characterized by a drop in economic activity, nevertheless did not affect the municipality's general growth. Population increased through new immigration, attracted by the federal government's agrarian policies and the creation of *ejidos* as a basis for agrarian distribution.

Figure 1. Principle Urban Settlements in Mexicali Valley



During the 1940s and 1950s the valley's economy consolidated around cotton. After a period of depressed fiber prices all over the world during the war years, production finally rebounded. Other subsequent events, such as the Korean War and the devaluation of the Mexican peso, helped increase the supply of cotton even more. In the Mexicali Valley, all these events occurred at the same time as an increase in irrigation and communications infrastructure investment including: the construction of the Morelos Dam to divert and store the water from the Colorado River under the 1944 Water Treaty,[4] the expansion of the network of canals in the valley, the construction of the Sonora-Baja California railroad that finally united the peninsula with the rest of the country, the construction of highways to the Sea of Cortez and the town of San Luis Río Colorado, and the construction of a network of rural roads uniting the valley with the municipal seat. During this period, the populations of both the city and the municipality grew (Table 2) as a result of inter-municipal migration as well as the arrival of immigrants from other parts of the country, attracted by the *Bracero* program.

The 1960s marked the beginning of the last stage in the valley's urban growth. It was during these years that PIF began, and while it is true that it started slowly in Mexicali and other cities, its impact on the economic base has been significant in the last 20 years[5] and eventually changed the relative participation of the municipal population.[6] Some settlements in the valley became population magnets, in some cases showing growth rates higher than the municipality's (Table 3). Currently, more than 80% of the municipality's urban population is concentrated in the Mexicali Valley alone.

Table 2. Mexicali's Population and Growth Rates, 1930–2000

Year	Municipality	Annual rate (%)	City	Annual rate (%)	Percent Population in City
1930	29,985	n/a	14,842	n/a	49.5
1940	44,399	4.0	18,775	2.4	42.3
1950	124,362	10.8	65,749	13.4	52.9
1960	281,333	8.5	179,539	10.6	63.8
1970	396,324	3.5	263,498	3.9	66.5
1980	510,664	2.6	341,559	2.6	66.9
1990	601,938	1.7	439,756	2.6	73.1
2000	764,602	2.4	549,873	2.3	71.9

The Colorado River and Urban Uses in Baja California

Estimates show that Baja California has a total annual supply of 2.52 million acre-feet (MAF) of water, of which 1.5 MAF (60%) comes from the only reliable surface flow in the state—the water allocation from the Colorado River that the United States delivers to Mexico.[7] The remaining 1 MAF is extracted from the region's aquifers (Comisión Estatal del Agua de Baja California 2003). The Colorado River water delivered to the Mexicali Valley totals 71% of the 2.1 MAF available annually for its urban and rural uses, including agriculture.[8] This volume alone is 85.5% of the total annual supply of Baja California's statewide needs (Román and Bernal 1995), which is why the true availability of this resource is unknown—it could be transferred to other regions of the state where it might be needed. Currently, the Comisión de Servicios de Agua del Estado (COSAE, in English State Water Services Commission)[9] receives from Comisión Nacional del Agua (CNA, in English National Water Commission) an annual volume of 162,000 AF from the Colorado River quota and approximately 51,000 AF

Table 3. Urban Locations in the Mexicali Valley

Locale	Population 1990	Population 2000	Annual Inter-census Rate
Mexicali	439,756	549,873	2.3
Santa Isabel	5,624	18,041	12.4
Guadalupe Victoria	10,816	15,561	3.7
Puebla	5,420	7,421	3.5
Ciudad Morelos (Cuervos)	6,031	7,234	1.8
Alberto Oviedo Mota	6,279	6,878	0.9
Estación Coahuila	5,349	6,479	1.9
Hermosillo	4,974	5,458	0.9
Estación Delta	5,040	4,860	-0.4
Benito Juárez (Tecolotes)	4,242	4,486	0.6
Progreso	2,457	4,462	5.8
Vicente Guerrero (Algodones)	3,489	4,157	1.8
Paredones	3,510	3,634	0.3
Nuevo León	3,073	3,255	0.6
Michoacán de Ocampo	2,659	3,237	2.0
Mexicali Valley (*)	68,873	95,163	3.3
Municipio of Mexicali	601,938	764,602	2.4
Baja California	1,660,855	2,487,367	4.1

Note: Does not include the city of Mexicali.

from aquifers to satisfy the urban demand in the state. Approximately half is transferred from Irrigation District 014 to the cities of Tecate and Tijuana via the Colorado River-Tijuana Aqueduct (in Spanish, ARCT). The total volume extracted from wells includes the various aquifers in the state.

Of the 81,000 AF of Colorado River water remaining from COSAE's allocation for urban demands, nearly 82% is transferred to the Comisión Estatal de Servicios Públicos de Mexicali (CESPM) to cover the municipality's needs.[10] CESPM must complement current demand with 13,300 AF from the purchase of water rights from farmers in the valley and 3,500 AF from other sources.[11] With this supply of water, CESPM currently services nearly 98% of the city's population and 33% of the remainder of the municipality's population (CESPM 2000). By the end of 2000, CESPM registered a total of 20,215 installed connections with which it serves approximately 100 settlements in the remainder of the municipality,[12] including the largest settlement in the valley (see Table 3).

The volume of water transferred via ARCT to Tecate and Tijuana totals 72% and 95%, respectively, of each area's annual need. The Comisión Estatal de Servicios Públicos de Tecate complements its urban water needs with water from the aquifers of the city and the Arroyo San José area. The city of Tijuana has other supply sources, but their relative contribution is quite low. These include the Abelardo L. Rodríguez Dam (1%) and wells located in the riverbed of the Tijuana River and in the la Misión and Rosarito areas (4%).

Future Water Demand in the Valley and State: Some Hypotheses

The city and valley of Mexicali have historically been perceived as a region removed from the water availability problems of the state of Baja California by virtue of their proximity to the Colorado River. Undoubtedly this attitude has permeated the water consumption and administration patterns of the various consumer sectors. Notably, CESPM emphasizes in medium- and long-term planning alternatives that the water allocations to the valley's sectors will not change in the future.[13] In contrast with these expectations, both the water use trends previously outlined as well as the high proportion of water resources concentrated in this area suggest the need for more focus on the demand scenarios that may arise in the future. To this end, the following section poses two feasible scenarios of future water demand, both for the valley itself and the state in general, and includes the effects that lining the AAC could have on water supply planning in each case.

Mexicali and Its Surroundings

The conditions that may arise in the valley in the medium- and long-term warrant the most immediate analysis. One obvious hypothesis is that, to the extent urban growth in the city and valley maintain at least a similar pace to what has been experienced to date, important urban settlements will continue to consolidate and attract migration to the area.

Official estimates for Mexicali foresee a population of 1.1 million inhabitants by 2020, an increase of approximately 100% of the population reported in the 2000 census (CNA 2000). With a conservative assumption that the current allocation of 117 gallons of water per day per inhabitant reported by the city is maintained, the population growth will generate an approximate annual demand of 143,500 AF. This requires, independent of the needs of other cities in the state, an annual increase in the urban water supply of 77,000 AF. For the rest of the municipality, the same estimation parameters show an increase in the population by 2020 of more than 175,000 inhabitants. Assuming the same proportion of urban residents currently concentrated in the valley will be maintained, the result would be approximately 149,000 new residents with an approximate additional annual consumption of nearly 19,000 AF.

While the demographic dynamic is the variable here, the effects of the growth and diversification of the business sector cannot be ignored. The location of industrial plants and the expansion of commerce and services also increase water demand. CESPM reported for 2000 a growth of water consumption in the non-domestic sector of slightly more than 800 AF annually (CESPM 2000). Considering an incremental increase of this nature in the non-domestic sector, the result would be an additional urban demand of 16,200 AF in 2020.

The foregoing is a scenario of urban water demand raised here only for discussion purposes. It assumes that the current trends of population growth, urban economic activities, and the consumption patterns among the different sectors will be maintained in the long run. Nevertheless, this framework brings up such questions as:

- What are the implications of this panorama on the valley's water supply?

- What effects will this increase in urban demand have on the valley's agricultural activities?

Returning to the estimated numbers, the assumed scenario will result in an additional annual demand of 112,600 AF of water, a volume double CESPM's reported production in 2000. It is reasonable to suppose that the responsibility for supplying this increase will fall on the utility, considering the goal of 100% service coverage in a relatively shorter time frame than the 2020 horizon. Assuming for these purposes that the same proportional scheme of supply sources will be maintained, CESPM will need an additional re-allocation of nearly 800,000 AF of Colorado River water, which is equal to the quota CNA currently receives to cover the urban demand of the entire state.

The previous amount would still need to be increased by nearly 17,800 AF and acquired through the purchase of irrigation rights from farmers in the valley. The trend this process follows will depend a great deal upon how the city expands spatially, as well as upon the willingness of the irrigation users to sell their rights.[14] In any event, a transfer of these characteristics will accelerate the change from mostly agricultural to urban water consumption in the valley.

Lining the AAC

The lining of the AAC cannot be ignored when considering future water demand in the Mexicali Valley. Studies of the seepage from the AAC into the valley's aquifer show an annual recharge of nearly 64,800 AF (Secretaría de Recursos Hidráulicos [SRH] 1972). Technically, this volume is part of the aquifer's annual 632,300 acre-foot contribution to the total available water production in the valley. Studies on the effects of lining the AAC have emphasized the changes in the quantity and quality of agricultural irrigation water in the valley as an effect of the high number of users supplied through wells.[15] In the case of the water volumes related to the urban uses in the valley, its management falls primarily on CESPM, which basically establishes its supply with contributions from the Colorado River.

Taking into consideration the current supplies upon which CESPM relies, it can be assumed that lining the AAC will not have an immediate effect on the water supply available to the city. The relevant scenario for this discussion will take place on a much larger scale, though, when the eventual increase of demand forces the utility to seek other options, including using aquifer water. This change will not only establish new pressures on resources that have traditionally been assigned to agriculture, but a reduction in the recharge volumes as a result of lining the AAC in the area immediately north of the Mesa Arenosa (Sandy Mesa) could accelerate conflict between urban and agricultural uses in the valley. This scenario will require significant attention by the utility to either negotiate access to greater volumes from the Colorado River or seek support to give it priority over non-urban uses in accessing aquifer water. These conditions could occur with the allocation of the available water CESPM has in Mesa de Andrade, which it does not currently access because it needs to build an aqueduct but which nevertheless forms part of the utility's future expansion plans.

Two other elements should likewise be considered. The first deals with the quota CNA delivers to the municipality of San Luis Río Colorado from the Mesa Arenosa area, which at present amounts to 16,200 AF annually (CNA 2000). Assuming this municipality maintains the growth rate of the past two decades into 2020, water demand will increase by approximately 4,900 AF. In the event it cannot satisfy delivery of this volume, CNA will have to seek other alternatives, among them Colorado River water. The second element has to do with the levels of consumption by other settlements in the valley not served by CESPM and whose supply options will continue to depend greatly upon the aquifer. For these groups the effect will not only be a reduction in available water volumes, but also the deterioration of its quality.

Water Demand in the State

The scenarios discussed thus far have been limited to those with internal impacts on the Mexicali Valley as a result of population growth and the evolving dynamic of economic activity. There is, however, a longer-term condition whose feasibility is increased if the state's urban population grows, particularly in the border region—the expectations Colorado River water will generate in urban centers located beyond the valley. To this end, consider on the one hand that the quota from this source is fixed, and on the other hand that the official population projections for this region will increase by 100% by 2020 (CNA 2000). A scenario of open competition for Colorado River water, which could lead to conflict between the parties, cannot be ignored.

Independent of any water saving and wastewater reclamation measures considered by state water management programs in the medium- and long-term, the supply proposals are strongly based on the possibility of expanding, little by little, the volume of Colorado River water transferred from the Mexicali Valley. Currently, the design capacity of ARCT is 1,190 gallons per second (g/s) (Comisión Estatal de Servicios Públicos de Tijuana 2003), which results in an increase in the current transfer of water of some 30,800 AF annually to fulfill the demand of the next five years. By that time, multiple proposals will depend on Colorado River water not only to ensure the supply for cities currently using it but also to increase coverage to include Ensenada. For example, the Plan Estatal Hidráulico 1994–2015 (in English, State Hydraulic Plan) developed by COSAE, establishes as part of its proposals a series of supply scenarios during this period that call for increased use of Colorado River water through the construction of ARCT II in 2006. Other proposals include increasing the aqueduct's capacity from 1,050 g/s to 1,400 g/s with certain modifications, such as two long-term options that would ensure a delivery of up to 1,850 g/s for Baja California's northwest region.[16]

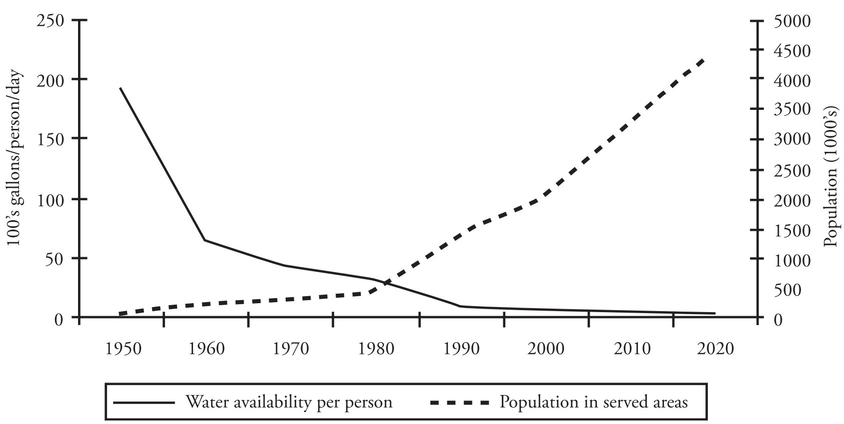
Figure 2 shows the historic relationship between the Colorado River water supply and the state's urban population served from the signing of the 1944 Water Treaty when the allocation of 1.5 MAF annually for Mexico was established. Figure 2 also incorporates the urban population forecasts previously discussed, as well as the Colorado River water supply coverage objectives for the state's urban centers in the next 20 years. The information shown there provides an idea of the effects relevant policies to increase supply coverage had on Colorado River water availability. One important change in this sense occurred in the 1980s when ARCT began operating, adding the cities of Tecate and Tijuana to the served population. Another important turning point is expected to take place in this decade, when Ensenada will have access to Colorado River water via the expansion of the Morelos aqueduct to the area known as El Hongo.

Some Conclusions

The ultimate objective of this chapter has been to transcend in some measure the lining of the AAC itself and instead draw attention to a fundamental state problem whose long-term solution is uncertain: Urban water demand. This discussion of hypothetical scenarios in no way pretends to be definitive in relation to the future of water resources in the state. The elements addressed in this chapter outline the complexity that will continue to surround decision-making on this issue. For the time being, this reflection has identified some critical points that should garner attention in light of the future of water availability in the state. These are described below.

1. The lining of the AAC will affect the availability of urban water in the Mexicali Valley because future alternatives slowly incorporate aquifer water.

Figure 2. Water Supply vs. Population



The most important volume of water for urban uses in the Mexicali Valley is the volume managed by CESPM. The present origin of this volume assumes that the AAC project will not have significant short-term effects. However, this scheme will need modification when the utility uses any allocation of underground water, because this would imply an additional load that will have to be addressed with a supply that, in reality, would be lower because of the AAC lining. The project contemplated by CESPM to access its original water allocations from CNA in the Mesa de Andrade offers an interesting opportunity to test and prove (or disprove) the described conditions.

2. The valley's use structure may undergo profound changes in the future.

The utility's present practice of purchasing water rights may acquire the character of an official resource assignment mechanism through institutional changes. This would eventually accelerate the process of change in water use from non-urban to urban activities. Moreover, the formal existence of a water marketplace between uses in the state could facilitate the transfer of Colorado River water from the valley's agricultural use to other regions of the state that may have an urgent need for it.

3. Colorado River water will continue to be the basis for future supply expectations of the region's governments.

Though supply-and-demand scenarios posed here have a marked dependence on Colorado River water. At this time, discourse at different levels of government in the state already includes the consideration of alternative measures to deal with future requirements, such as paying particular attention to maintenance programs to reduce losses in the potable water network, the reclamation and reuse of treated wastewater, or the promotion of programs to raise public awareness of water conservation. In spite of the foregoing, these elements will still require a long process to come to fruition—a process that includes considerable investment yet can nonetheless compete with the investments required to increase Colorado River water volume.

4. The problem of future water availability in the state must be addressed, and officials must act in an integral, all-inclusive manner.

One obvious conclusion is that the state needs a new process for prioritizing the available water supply. The planning and management of water resources in Baja California has had a history of delayed actions on the one hand, and a lack of concern about its availability on the other. Currently, the lack of concrete planning actions to confront the long-term demand conditions by different levels of government seems to be a partial result of this historic inertia. Certainly the lining of the AAC is one more aggravating element in the uncertain panorama the state faces to ensure the supply of water for generations to come, but this event could also be a catalyst if it increases awareness within the governments and parties involved in the management and planning of the resource. It could lead them together to act collectively while bearing in mind that the water supply will at best remain fixed for the coming decades and that the strategic importance of the Mexicali Valley must be understood and given preference over local planning proposals.

Endnotes

[1] Despite the fact that Tijuana owed its surge to the establishment of the new border between Mexico and the United States in 1848, its distance and isolation from the rest of the country did not allow it to grow beyond a modest settlement for more than 50 years (Arreola and Curtis 1993).

[2] As opposed to Mexicali, whose geographic proximity to the Colorado River historically allowed it to ignore water supply problems, Tijuana's dependency on seasonal flows like the Tijuana River and available underground sources was a permanent catalyst to search for options to meet the growing urban demand. The completion of the Abelardo L. Rodríguez Dam in the mid-1930s generated limitless mid- and long-term expectations for the city, which plummeted with a prolonged drought in the region the following decade (Tapia 1989).

[3] The agricultural sector was an important promoter of growth for the city of Ensenada after its beginnings as a Customs port of entry at the end of the 19th century. Since the 1940s the city has shown sustained growth, which continues to this day. Throughout this process, authorities have moved from total dependence on subterranean sources close to the urban area to a combination of seasonal surface flows that are captured in the Emilio López Zamora Dam, as well as on water coming from more distant aquifers, such as the Guadalupe Valley and from Maneadero, whose volumes are conveyed via pipelines.

[4] The Treaty on the Utilization of the Bravo, Colorado and Tijuana Rivers, was signed by the governments of Mexico and the United States on February 3, 1944.

[5] The number of direct jobs in the *maquiladora* sector of Mexicali increased from 10,876 in 1975 to nearly 25,000 in 1995 (Lorey 1999).

[6] There have been other federal mechanisms whose effects have undoubtedly contributed to the city's urban development in the direction implied here, especially in the commercial sector. Among these are the Programa Nacional Fronterizo (PRONAF, in English National Border Program) in 1961 and the "loss-leader articles" program put in place during the Luis Echeverría Administration.

[7] This quota was established as part of the 1944 Water Treaty.

[8] The Colorado River water is likewise a source for recharging the Mexicali Valley aquifer, whose use provides an additional 570,000 AF to the available supply for the valley's urban and agricultural uses. This source is also the main supply for the neighboring municipality of San Luis Río Colorado, Sonora (CEABC 2003).

[9] The Comisión de Servicios de Agua del Estado is a decentralized agency of the state government whose functions include moving water en mass through the aqueduct system to supply the communities and negotiating and coordinating between the diverse agencies responsible for supplying water for urban and rural uses (Castro and Sánchez 2001).

[10] CESPM is one of the 760 clients of irrigation module 016 in the Mexicali Valley. As such it receives a direct allocation of Colorado River water from CNA.

[11] This is according to Comisión Estatal de Servicios Públicos de Mexicali (CESPM) (2000).
[12] This information was gleaned in an interview with engineer Luis Manuel Venegas of CESPM on March 29, 2001.
[13] These include continuing to purchase water rights from farmers, or the possibility of reclaiming water that is part of the original CNA allocation to the area known as Mesa de Andrade, east of the city.
[14] Thus, it is quite feasible that within this timeframe both federal and state legislative frameworks will consider the necessary modifications to make water markets possible between different uses in the country.
[15] In what is considered the AAC's area of influence on the Mexican side, 60% of agricultural consumers depend exclusively on aquifer water for their needs. Another 27% depend only on Colorado River water, while the remaining 13% use a combination of both (Cortez Lara and García Acevedo 2000).
[16] For this horizon two options stand out: building a second aqueduct with strictly local funding and building a binational aqueduct that would transport water from the Imperial Valley through Mexican territory to San Diego, California. This was promoted by private industry and could have transfered up to 3,170 g/s for the City of San Diego, as well as complied with delivery goals for Baja California. However, this proposal has since died on the U.S. side.

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