EIR Economics

Produce Water, or Fight Over It, Is the Real Issue in the West

by Dennis Small and Paul Gallagher

One of the incoming U.S. President's greatest economic challenges, will be to work with Mexico and Canada as friends to produce new water-supply resources for the Great American Desert and surrounding areas of the continent, to allow economic progress and defeat an unprecedented drought. It is like the task taken on by Franklin Roosevelt's great "Four Corners" projects which still anchor *production* of North America's water.

Arizona and New Mexico are called "battleground states," in that they are hotly contested as to whether they will vote Democrat or Republican on Nov. 2. But they are also battleground states—as is the entire U.S.-Mexico border region—in a more fundamental sense. Here what is contested is a decisive policy issue: Whether a Bush-Cheney victory will lock in place a continuation of the last 40 years of "free trade" economic policies, and their extreme expression in NAFTA over the last decade, with its attendant destruction of the physical economy on both sides of the border; or whether a Kerry win will open the door to Lyndon LaRouche's American System policies of cross-border cooperation around great infrastructure projects, such as the Great American Desert development program laid out in *EIR*'s May 9, 2003 issue.

The North American West, from the Northern Rocky Mountains region to Mexico's northern tier of states, is in drought—the seventh or eighth year of what scientists are beginning to warn may be a drought with no precedent in the region for 500 years. Although some rains in August and September have reduced somewhat the number of rivers and streams whose flow is down to critical levels, the largest reservoirs in the West, such as Lake Mead and Lake Powell, are down to less than half their capacity, threatening hydroelectric power production. Already in 2000-2001, when this drought was four years on, it combined with the insane "electricity deregulation" policy of Cheney and Enron, to drive power prices to the stratosphere and—for example—shut down 25% of America's aluminum industry indefinitely.

The drought is equally ravaging irrigated agriculture in this most-irrigated region of North America: In western Colorado, for example, 300,000 out of the state's 3 million irrigated acres are being cut off from water by state and local officials, in order to preserve public water supplies for cities and towns for the next few years. Not only are all productive economic sectors threatened. The possibility is arising that people may have to flee regions of the North American West over this decade—unless, finally, the United States, Mexico, and Canada *take the first actions since FDR's New Deal 70 years ago to increase the continent's water supplies, to produce water.*

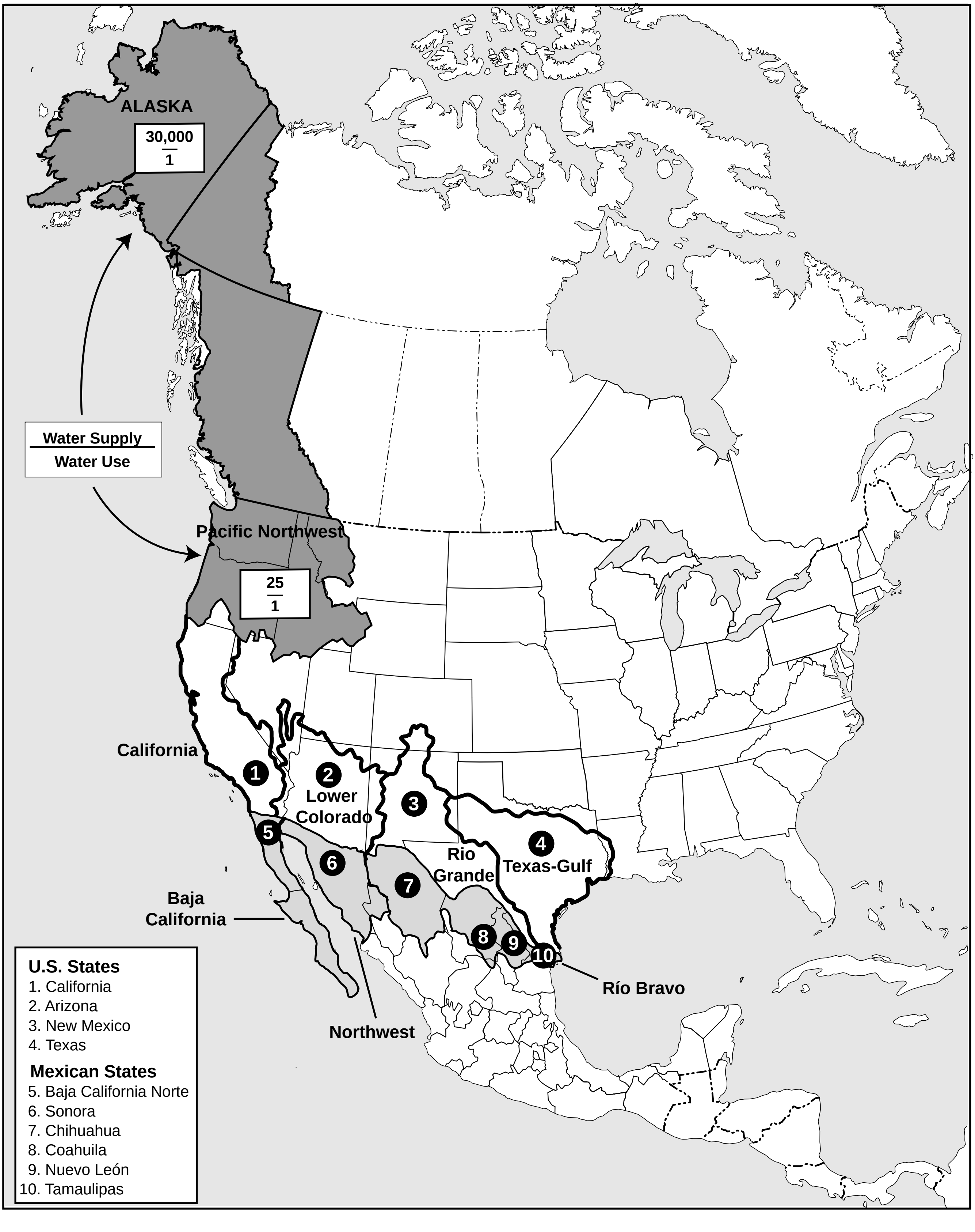
President Bush ludicrously called this challenge, a problem of "doing something about lawns"—making clear he is not a leader who could take appropriate actions. Circles of influential elected officials like Rep. Duncan Hunter (R.-Calif.), House Majority Leader Tom DeLay (R.-Tex.), and Sen. Pete Domenici (R.-N.M.) have long put off any significant actions for desalination of large amounts of water; they have let farmers fight cities over water as in Hunter's case (see page 58); and have encouraged southwesterners *to blame Mexico's so-called "water debt"* for the problem.

A 'Water Grid' from Alaska to Mexico

A look at the map (**Figure 1**) shows that huge volumes of potential surplus fresh water do exist in the Northwest of the continent, most of all in Alaska, whose rivers carry a renew-

FIGURE 1

Hydrologic Regions of U.S.-Mexico Border Drought, and Water- Abundant Regions of Northwest



Sources: National Water Commission (Mexico); U.S. Geological Survey able supply equal to more than twice the water withdrawals of the entire country. Alaska alone has 37% of all the fresh water runoff in the United States; together with the Pacific Northwest hydrological zone, it has 46%. The areas of northwestern Canada between them are also richly burdened with surplus runoff. The "Fifth Corner" to FDR's "Four Corners" was envisioned in detail already in the 1950s, as the North American Water and Power Alliance (NAWAPA). With less than 20% of the Alaskan river flows, the rest of the western half of the continent down to northern Mexico could receive increases in current water use ranging from 25-200%.

Along with rapid development of high-technology, high-volume desalination plants for brackish water and seawater of the Pacific and Gulf of California, NAWAPA is a unique, Vernadskyan path to production of new water supply along and around the Great American Desert.

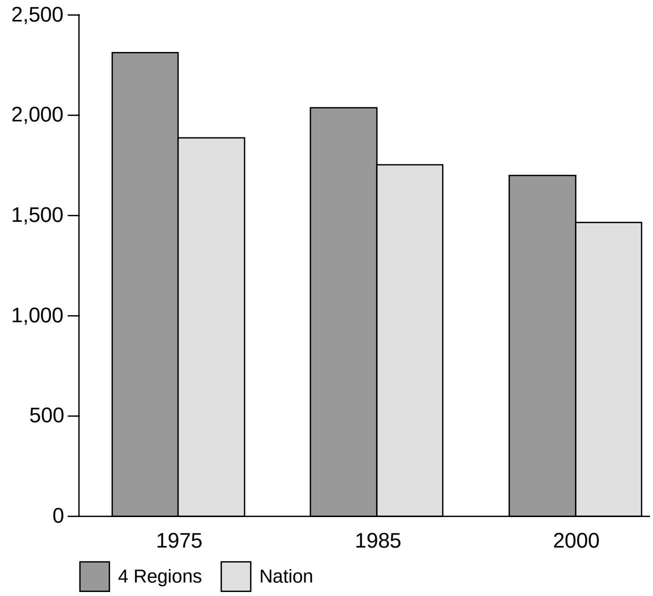
NAWAPA involves producing a "continental water grid" by connecting river basins and constructing a huge new storage reservoir in the Rocky Mountain Trench, with water pumped up to the Trench by large and powerful pumping stations. Building NAWAPA might cost as much as is being burned up in two years of occupying Iraq, and would show how real, productive wealth is actually created.

Since the 1970s, both financial powers and "environmental" organizations have tried to impose a more and more strict, worldwide avoidance of *any* transfers of water flows from one river basin to another. To overcome this for a great project which is both essential to economic recovery and progress, and a work worthy of mankind's dominion over nature, is an urgent diplomatic task for the new President.

FIGURE 2a

Total Water Use/Capita in U.S. and in 4 Border Hydrologic Regions

(Gallons/Capita/Day)



Source: U.S. Geological Survey; *EIR.*

Sam Huntington vs. Hispanics

Over the last few years of regional drought, in particular, a virtual *water war* has broken out between the United States and Mexico. This is Harvard/Trilateral fanatic Samuel Huntington's cultural war scenario applied to physical economy. Huntington, in *Who We Are*, presented Hispanics—Mexican Americans in particular—as the new enemy image. Now, Huntington's co-thinkers are saying that water shortages in California, Arizona, New Mexico and Texas, result from Mexico withholding its "water debt" to the United States, under the 1944 International Water Distribution Treaty.

Screaming headlines are becoming commonplace. *Poder* magazine in June 2004 wrote: "[Mexico's] foreign debt is relatively under control. But there is another debt that—in the medium and long-term—may have serious consequences: the water debt. . . . Mexico now owes the United States 293 billion gallons of water, or 1.11 billion cubic meters of the valuable liquid." The Texas House of Representatives Research Organization, back in 2002, put Mexico's water debt not at 293 billion gallons, but at 450 billion gallons of water. A Texas A & M University study concluded that "Mexico's water debt to the U.S. has cost an estimated $1 billion to the Lower Rio Grande Valley economy during the past 10 years and caused 30,000 job losses." And Texas Agriculture Commissioner Susan Combs has said: "It's time for Mexico to pay up their water debt and stop all the science fiction and fairy tales."

According to the 1944 treaty which governs both the Colorado and the Grande (Bravo) Rivers, the United States is to receive from Mexico one-third of the water flow from the Conchos, San Diego, San Rodrigo, Escondido, and Salado tributaries of the Grande; the United States keeps all the water from its tributaries. This is to equal at least 350,000 acre-feet per year. As for the Colorado, Mexico is to receive 1.5 million acre-feet per year from the United States.

Mexico's water obligation to the United States under the Treaty is 114 billion gallons per year, from its tributaries to the Rio Grande (called the Río Bravo in Mexico), and going entirely to Texas—and this is less than 1% of Texas' total annual water use. Mexico is paying the current water obligations promptly, but is not using *water management* to collect relatively less saline, more desirable water for Texas. The United States, in "paying" Mexico, is doing the same thing; just letting the Colorado's highly saline end-flows go into Mexico. The problem is not either side stealing water—it's the need for new water management infrastructure, and newly made water resources.

The telltale is that these charges, and more violent ones, are

FIGURE 2b

U.S.-Mexico Border States—Major Rivers and Cities

Source: *EIR.*

flung throughout the region's press and officialdom, when in the American states and hydrologic regions bordering Mexico—and for the United States as a whole—total withdrawals and use of water are *lower than 25 years ago.* **Figure 2a** shows the dramatic declines *per capita;* but in California, in the Lower Colorado region including Arizona, in the Rio Grande region including New Mexico—as in the whole country (see **Figure 3a**)—even the absolute amounts of water withdrawals are below those of 1975-80. Only in the Texas-Gulf hydrologic region are they higher. This is *not* due to drought, but to long-term collapse of the United States physical economy—such that less agriculture, and much less industry, use less water than a generation ago, despite the American population being 80 million higher—and to relative exhaustion of the nation's water infrastructure.

In fact, as long ago as the 1970s, a United States Geological Service report assessed that the Rio Grande hydrologic region, for example, had reached the limit of economical use of existing water resources, and could only *develop new water resources*, or gradually use less water. The report has proven true for the entire border area. Mexico has also suffered a drop in water use, by 8% per capita from 1991-2002 (see **Figure 3b**).

'NAFTA Water'

Now, seven to eight years of severe drought have worsened an underlying dramatic shortage of water on both sides of the border, precisely because necessary great infrastructure projects have not been carried out. In Mexico, water use was at 9,880 liters per day per capita in 1970; by 2003, it had plummeted to 4,547—a 46% drop in 33 years.

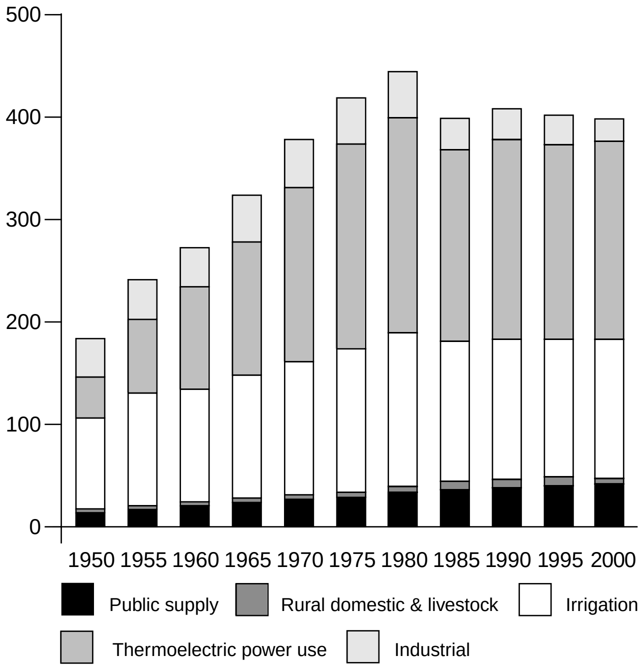
Arizona typifies what's happened to U.S. agriculture all along the border under NAFTA. From 1992-2002, its farmland fell from 35 million to 26 million acres; cropland fell by the same percentage; the average size of farms fell. And since 78% of Arizona's water use has been for irrigation and agriculture, in recent years the state, according to its Department of Water Resources, has not even been using a big part of its priceless annual treaty allotment of Colorado River water!

What's happened? Under NAFTA, *Mexico has, in fact, been exporting vast amounts of water to the United States,* in ways not even contemplated by accountants and free-trade ideologues. How? For example, by the production of Heinz ketchup and other food products, which has moved from California to Tijuana. Water flowing in Mexico is exported as skyrocketing Mexican exports of vegetables, citrus, and other food; as water used in assembly of industrial goods in Mexico's *maquiladora* border sweatshops for re-export to the United States; as water used in supporting and raising the 10 million Mexicans who've fled to the United States to escape the desperate impoverishment of the NAFTA period in Mexico. With these exports, Mexico generates the foreign exchange to pay its gigantic (and largely illegitimate) foreign debt. And with them, the United States buys, cheap, "NAFTA water" it no longer produces and uses in industry and agricul-

FIGURE 3a

U.S. Water Usage, Total and by Sector, 1950-2000

(Billions of Gallons Per Day)

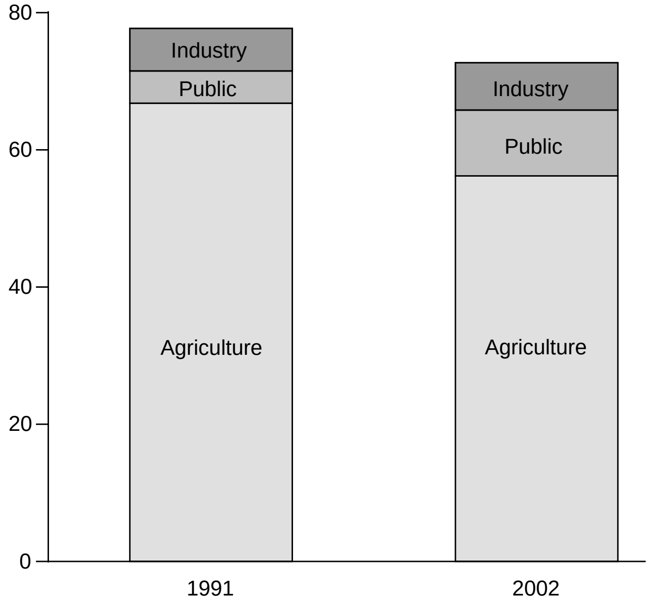


Source: U.S. Geologic Survey.

FIGURE 3b

Mexico: Water Usage, by Sector

(Billions of Cubic Meters)



Sources: National Water Commission (Mexico); www.worldwater.org.

TABLE 1

Mean Annual Rainfall, U.S./Mexico Border States

(Millimeters/Year, 2000)

United States	Rainfall
California	569
Arizona	330
New Mexico	330
Texas	670
National Average	**742**
Mexico	**Rainfall**
Baja California Norte	203
Sonora	428
Chihuahua	423
Coahuila	316
Nuevo Leon	589
Tamaulipas	766
National Average	**772**

Sources: INEGI (Mexico); U.S. Meteorological Service.

ture in the U.S. productive economy.

As the Texas House of Representatives Research Organization put it in an April 2002 report, there has been in northern Mexico, "an increased planting of high-return and water-intensive crops such as alfalfa, corn and pecans." Other important export crops include wheat, cotton, sorghum, oats, citrus, and fresh vegetables which are grown in the border area. While the *maquiladora* assembly plants have increased dramatically during the NAFTA decade, the same Texas House report notes: "Although Mexico has a policy supporting expanded industrial development [sic] in northern Mexico as part of the NAFTA, the industries involved use only a fraction of the water used by agriculture."

It quickly becomes evident that Mexico's so-called "water debt," like its foreign financial debt, is illegitimate and has been paid many times over. Those are the physical economic facts—as opposed to the free trade mumbo-jumbo which dominates the discussion today.

The solution also lies exclusively in the realm of physical economy: The region needs *much more water infrastructure* or it will not survive.

The Border Region

The challenge of watering this border region has two aspects, as **Figure 1** and **Figure 2b** show. There are the four U.S. border states (California, Arizona, New Mexico, and

TABLE 2

Annual Water Withdrawals, 2000

(Cubic Meters)

U.S. State	Total Withdrawals	Per Capita	Per Sq. Kilometer Area	% from Groundwater
California	69.8 billion	1,954	169,185	30%
Arizona	9.2 billion	1,174	30,675	52%
New Mexico	4.5 billion	2,424	11,080	27%
Texas	40.4 billion	1,935	58,305	30%
United States Total	**555.8 billion**	**1,970**	**59,380**	**21%**
Mexico Hydrologic Region (2002)				
Baja California	3.8 billion	1,300	25,400	50%
Northwest	6.4 billion	2,860	29,400	40%
Río Bravo	7.6 billion	830	20,270	49%
Mexico Total	**72.6 billion**	**721**	**37,250**	**35%**

Sources: INEGI (Mexico); National Water Commission (Mexico); U.S. Geological Survey.

Texas) and the six Mexican border states (Baja California Norte, Sonora, Chihuahua, Coahuila, Nuevo León, and Tamaulipas. But it is also useful to look at the hydrologic regions in this same area.

In the case of Mexico, these are the Hydrologic Administrative Regions I (Baja California), II (Northwest), and VI (Río Bravo), as classified by the governmental National Water Commission. On the U.S. side, the hydrologic regions are California, Lower Colorado, Rio Grande, and Texas-Gulf.

This bi-national area covers roughly the same region as the Great American Desert although it is not identical. The mean annual rainfall in all these states are significantly below the respective national averages (**Table 1**). Areas with rainfall below 500 millimeters (20 inches) per year are officially classified as arid or semi-arid. Baja California Norte's 200 mm/year qualifies it as a desert, with agricultural areas in that state, such as the Mexicali Valley, getting a meagre 50 millimeters of rainfall per year.

Table 2 compares annual water withdrawals (use, plus water losses in use) in the United States and Mexico, and in the corresponding border areas. In Mexico, the border regions withdraw relatively large amounts of water per capita, compared to the national average, but the volume per square kilometer is extremely low, and gives us an indication of the problem. On the U.S. side the use of water per area (except in very sparsely populated New Mexico) is higher, as normally dry areas need higher water withdrawals to be productive. And they are less dependent on underground aquifers than in Mexico.

Aquifer depletion afflicts both sides of the border. In many parts of Mexico, especially the arid North, aquifers are being depleted more rapidly than recharged. For example, the area of the El Paso/Ciudad Juárez border cities relies on two aquifers for drinking water. On the U.S. side, the underground water is expected to last 30 years at current rates of consumption. On the Mexican side, in Ciudad Juárez, it will be depleted in five years—a true emergency. El Paso is currently building the largest desalination plant in North America to deal with the brackish water from the aquifer.

Mexico has a total of 113 aquifers along the border area, 71 of them in the Río Bravo hydrologic region. These 71 are being recharged at the rate of 5 billion cubic meters per year, while being drawn down at the rate of 4.12 billion cubic meters per year. The average may sound acceptable, but the fact is that 20 of these aquifers are currently being overexploited—i.e., more water withdrawn than is being recharged. The same problem exists in the U.S. West.

Table 2 shows that Mexico withdraws only about 13% as much water as the United States; whereas the per-capita discrepancy is not as great (37%); and per square kilometer, Mexico uses about 63% the American level. This is surprising at first, given the disparity between the two economies, but points to two critical questions. First is water *loss,* which in the case of Mexico is extremely high, as a result of primitive infrastructure: in agriculture 28% is lost, although in some crucial areas, such as the Mexicali Valley, the situation is worse—the efficiency of irrigation there is barely 40%. In fact, the National Water Commission reports that the overall national efficiency of irrigation is about 50%. As for public use in cities, 40% is lost on average: in Chihuahua, 54%; Ciudad

TABLE 3

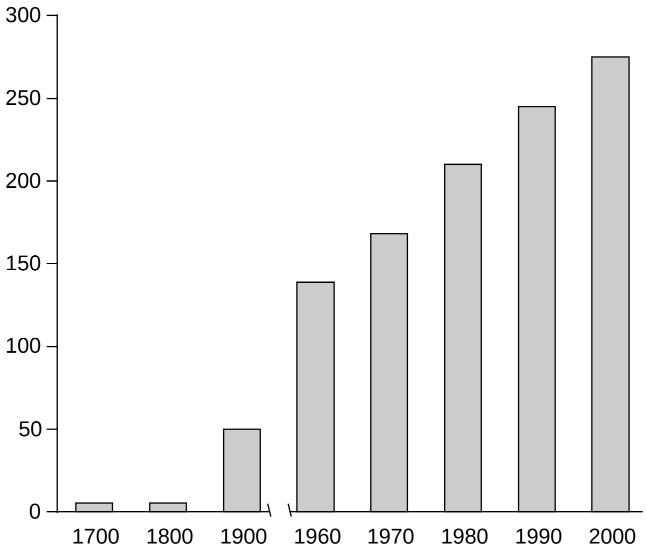
Water Use by Sectors, U.S. and Mexico

(Percent of Total Use)

U.S. State	Agriculture Use	Public Use	Industrial Use
California	61%	12%	27%
Arizona	80%	16%	4%
New Mexico	88%	10%	2%
Texas	30%	15%	55%
United States	**35%**	**11%**	**53%**
Mexico Hydrologic Region			
Baja California	82%	11%	7%
Northwest	86%	13%	1%
Río Bravo	88%	9%	3%
Mexico	**77%**	**13%**	**10%**

Sources: National Water Commission (Mexico); U.S. Geological Survey.

FIGURE 4
World Irrigated Land
(Millions of Hectares)



Sources: FAO; National Institute of Ecology (Mexico).

Juárez, 35%; Nuevo Laredo, 32%; Saltillo, 57%. In the United States, water loss represents only about 7% of all uses.

A second crucial issue is the *usage* of the withdrawn water. In Mexico, 77% is used in agriculture, only 10% in industry; but the majority, 53%, of U.S. water withdrawals (though dropping) are for industry and power, characteristic at least of a formerly industrialized economy. **Table 3** shows Mexico's border states use even more, well over 80%, of scarce water withdrawal for agriculture. Little is used, for example, for sanitation in the cities, which is abysmal.

The Rio Grande Basin

The Rio Grande is the fourth-longest in North America, running 1,885 miles (or 3,033 kilometers). The basin is 467,000 square kilometers; all of it is arid or semi-arid; and, as of 1990, 13 million people depended on the river, according to the Rio Grande/Río Bravo Basin Coalition. The main crops grown are cotton, citrus, and vegetables.

The river is actually divided in three sections: the upper Grande, from its Colorado headwaters to El Paso, on the border with Mexico; the middle Grande, often referred to as the "Forgotten River" because there is virtually no flow from El Paso to Presidio, Texas, where the Conchos tributary brings a new flow of water; and the lower Grande, from that point to

FIGURE 5
Portion of Farmland Irrigated, by County: A Western Phenomenon

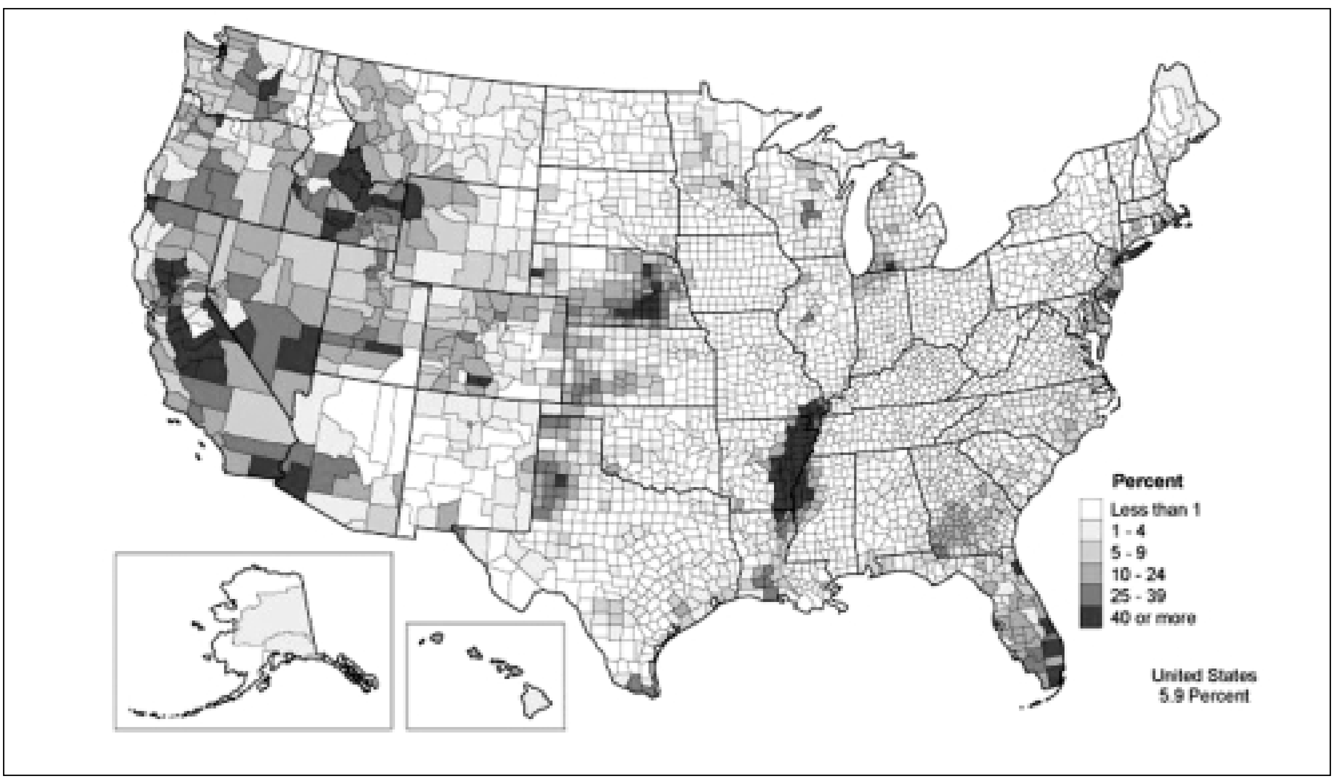
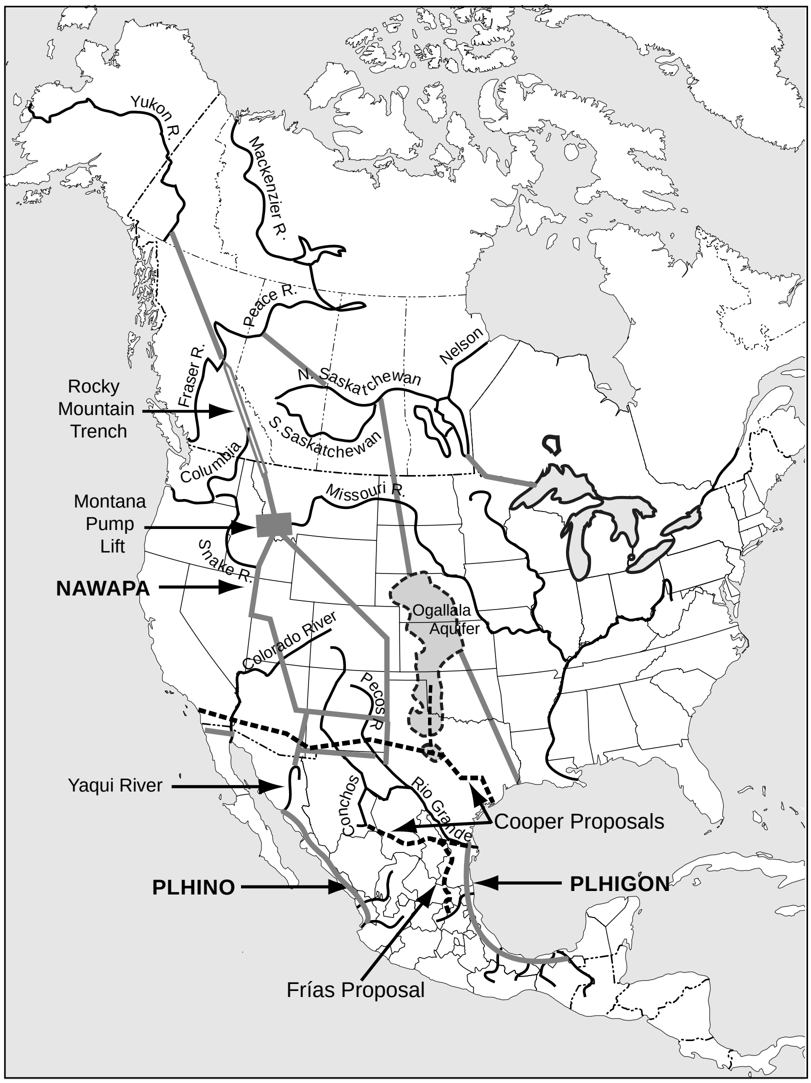


FIGURE 6

Great Water Projects: ‘North American Power and Water Alliance-Plus’



Sources: Parsons Company, *North American Water and Power Alliance Conceptual Study,* Dec. 7, 1964; Hal Cooper; Manuel Frías Alcaraz; *EIR.*

TABLE 4

NAWAPA Additions, Compared to Current Annual Water Withdrawals

(Billions of Cubic Meters)

U.S. State	**Current Use**	**NAWAPA**	**% Added**
California	52.7	12.3	23%
Arizona	9.3	12.3	132%
New Mexico	4.5	11.1	246%
Texas	34.3	14.8	43%
4 Border States	*100.8*	*50.5*	*50%*
United States	**476.9**	**98.7**	**21%**
Mexico Hydrologic Region			
Baja California	3.8	5.3	140%
Northwest	6.4	11.7	184%
Rio Bravo	7.6	7.7	101%
3 Hydrologic Regions	*17.8*	*24.7*	*139%*
Mexico	**72.6**	**24.7**	**34%**

Sources: INEGI (Mexico); U.S. Geological Survey; Parsons Engineering Co.; *EIR.*

the Gulf of Mexico (two-thirds of the water in this stretch comes from the Conchos). There is so much silt at the mouth of the river, that “currently, water from the Rio Grande does not reach the Gulf of Mexico,” in the words of the Texas House of Representatives Research Organization. In 1962, the average annual flow at the mouth was just under 3 million cubic meters of water. As of 1990-1995, it was zero.

There are a number of bi-national dams on the river, including the Falcon (1953) and the Amistad (1968) Reservoirs. Mexican water in reserves along the Grande are today at less than 10% of capacity, while along the Conchos tributary, in Mexican territory, they are at less than 20%. Since the signing of the 1944 Treaty, Mexico has built five reservoirs along the Conchos, which have helped increase agricultural production in the state of Chihuahua significantly. Between 1990 and 1999, agricultural output in Chihuahua rose 37%, with yields rising 36%, principally to meet the export demands of NAFTA.

U.S. water in the bi-national reservoirs is at the lowest levels since they were built. In January 2001, they were at 43% of capacity; by January 2002, it was 32%.

Raising the Productivity of Mankind

Figure 4 shows the trend of irrigated land on a world scale, over the last three centuries. It is estimated that in 1700, there were about 5.3 million hectares of irrigated land—which corresponded to about 2% of the world’s arable land at the time. By 1900 the amount under irrigation had increased ten-fold; but the real technological leap occurred in the second half of the 20th Century—including the Green Revolution—and brought 275 million hectares under irrigation by 2000 (about 20% of today’s arable land). It is noteworthy that about two-thirds of that world total lies in Asia.

Irrigated cropland is more productive than rain-fed agriculture. These breakthroughs in irrigation have allowed the expansion of the world population, although large portions of the planet still endure hunger and even starvation.

A working scale-model of the "North American Water and Power Alliance-Plus" great projects of water transfer, built as a teaching and organizing device by members of the LaRouche Youth Movement for a conference in California. In the foreground of the photo are two urgent major water projects within Mexico—known by acronyms PLHINO and PLHIGON—to transfer water from the rainy South of the country to the arid North.

Ecologists and other anti-scientific sorts look at this evidence, and conclude from it that "this kind of agriculture has ecological limits." Such is Alejandro Toledo's essay, *Water in Mexico and the World.* Or, take the official National Hydraulic Plan of Mexico's current Vicente Fox government, which calls for a change in water strategy from policies designed to increase supply, *to those emphasizing the efficient use of a diminishing amount of water.*

There is no need for this. There is more than enough fresh water available to irrigate as much land as will feed the world. It can come, first of all, from large water transfers from one basin to another. This is critical in the Indian Subcontinent, and it is key in Central Asia to take rivers flowing north through Siberia into the Arctic Ocean, and channel some of their flow into the Central Asian desert. And this is the key for the Great American Desert as well. Take 17% of the water run-off from various Alaskan and Canadian rivers, and channel them south and east across the continent, through NAWAPA (**Figure 6**).

This great project's 900-mile Rocky Mountain Trench reservoir could hold 450 million acre-feet (150 trillion gallons) of water in storage, which would then flow southward through the western United States' natural and artificial rivers to Mexico, and eastward through Canada. It would provide Alaska, a source, with several gigawatts of new hydroelectric power; benefit the Columbia and Fraser River Basins, also sources, by regulating their seasonal flow fluctuations and providing new hydroelectric power; supply 20 million acre-feet annually to California and half that to Arizona; and produce a 60% increase in available water for withdrawals across the whole four-state U.S. border area (**Table 4**).

In Mexico's border regions, the new water resources produced, would more than double available water for withdrawals in the three northern hydrologic regions.

Producing this new fresh water supply—at the cost, perhaps, of an Iraq war—would not only alleviate the present crisis, but allow for the flowering of the desertified Southwest. It exemplifies the "FDR-style" *physical-economic recovery policy,* as Lyndon LaRouche has put it, which the incoming U.S. President must have.

Manufacturing Fresh Water

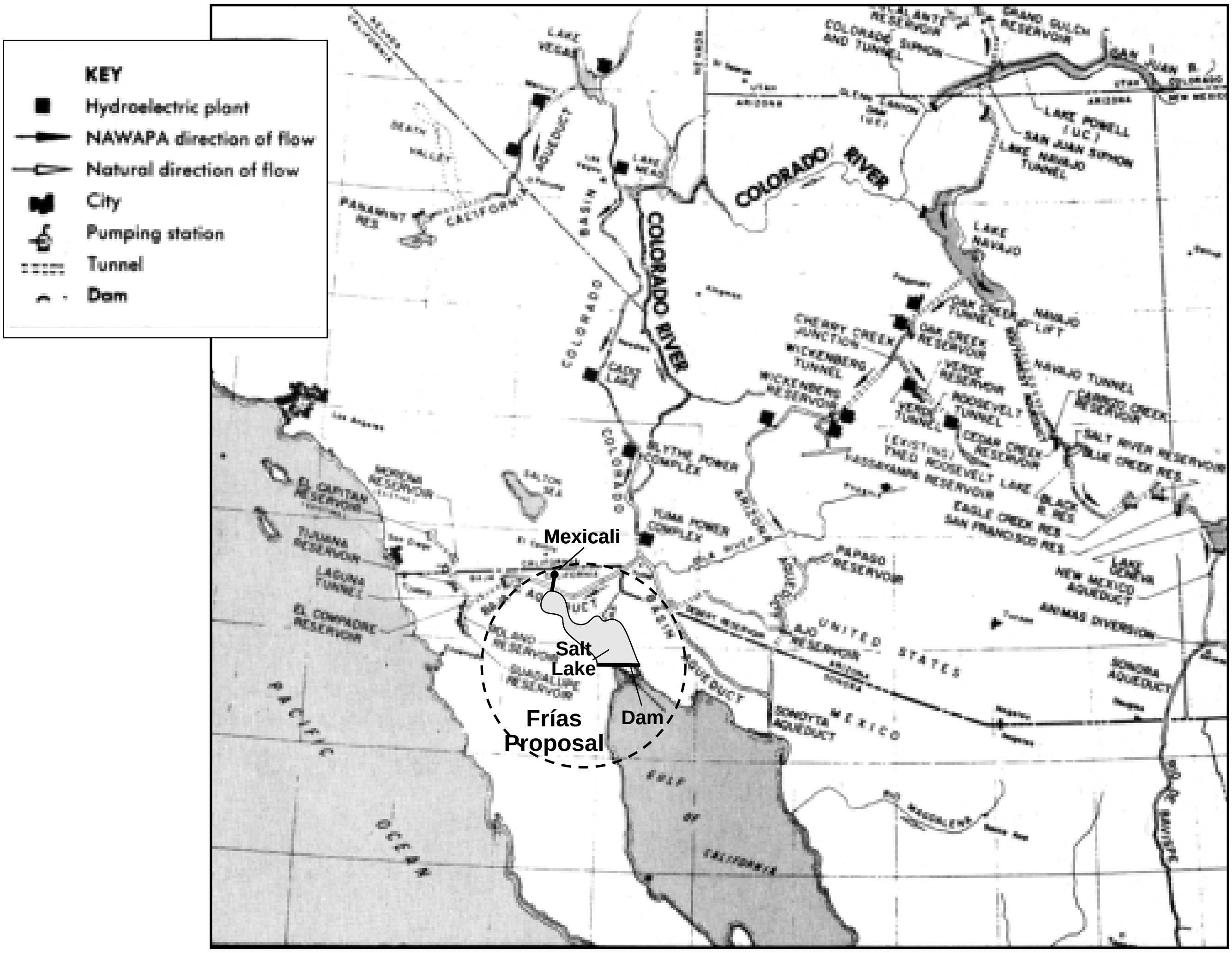
The water mankind uses is produced by mankind, in cooperation with nature, through advances in infrastructure. This is obvious in the use of desalination technology—the primary fresh water source for all uses in at least one country, Saudi Arabia. The arid and now drought-stricken U.S.-Mexican border region is surrounded by Pacific and Gulf saltwater and intruded by brackish water in many areas. Oil extraction also brings up salt water, as in the Permian Basin in Texas and New Mexico, which could be de-salted with electrical power.

But in the United States, while total power production per capita has levelled off with "deindustrialization" and "deregulation," power capacity for desalination has simply not been built, and the same is true in Mexico.

A complex of power plants with about 1,400 megawatts total capacity, coupled to a multi-stage flash distillation desalination plant, can generate about 400,000 cubic meters of fresh water daily, enough to supply half of San Diego with water which now comes from the Colorado River, lately in part at the expense of Imperial Valley farmers. The best power source to drive such desalination is nuclear power: and particularly, advanced high-temperature gas-cooled reactors (HTGRs), four of whose small power modules would produce that much fresh water and more than 400 megawatts of surplus power as well.

In the 1980s, Southern California Metropolitan Water District planned such nuclear desalination, but the projects were never built (see article following). Starting now, 20 HTGR desalination complexes built over five years within

FIGURE 7
The Flow of NAWAPA Water in the Lower Colorado Basin



the U.S. and Mexico border states, could increase the total available fresh water for use by a significant 3% for the entire area.

Water Projects on the Border

The United States and Mexico also require cross-border cooperation in projects which aid economic productivity and restore economic sufficiency on both sides.

One useful such project, which is clearly complementary with NAWAPA, has been proposed by the distinguished Mexican engineer Manuel Frías, who has called it the Montague Tidal Project (available on his website at www.mexicotm.com). **Figure 7** is picked up from the Ralph M. Parsons Engineering Company's NAWAPA proposal, on which we have overlaid Frías's proposal.

The Montague Tidal Project would be located 125 kilometers southeast of Mexicali. It would consist of the construction of a 7.5 meter high, 48 kilometer long road-dam, which would prevent the intrusion of Gulf of California salt water inland (which, due to tidal flows, now reach 50 kilometers in from the Gulf); and create a large inland lake with the downstream flows of the Colorado. Frías notes that the construction of the Hoover and other dams on the U.S. portion of the Colorado in the 1940s, diminished downstream flows to Mexico and dried up a salt lake which existed in Mexico.

This would increase the water storage capacity of the existing reservoir-marsh from 5 billion cubic meters today, to about 8.6 billion cubic meters. Additionally, a canal would be constructed from the northeastern tip of the new lake, to the city of Mexicali, which would then be linked to the Gulf of California by a 138 kilometer long waterway, transforming it into a major inland port.

Frís emphasizes the importance of carrying out this project