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**The Colorado River and Bi-national
Issues with Mexico**

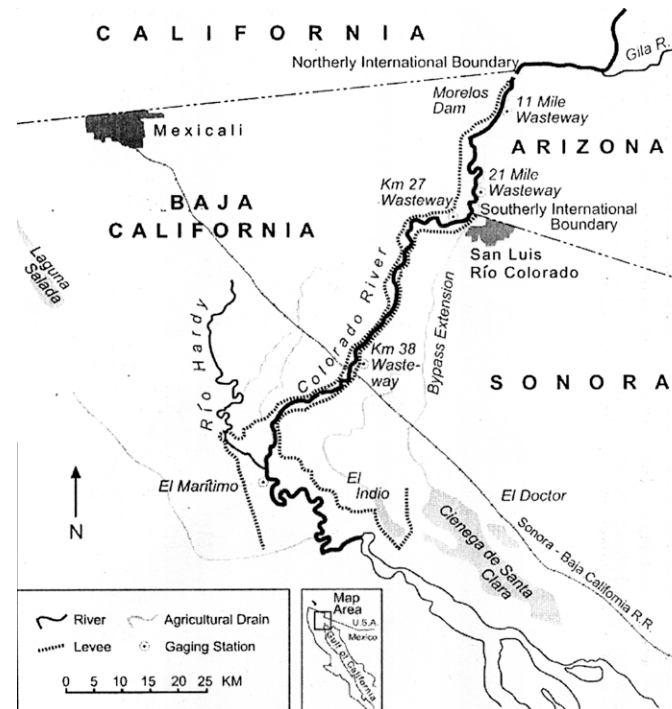


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“Learning from Regions: A Comparative Appraisal of
Climate, Water, and Human Interactions in the Colorado and
Columbia River Systems”

The Colorado River and Binational Issues with Mexico



Roberto Sanchez
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Binational Issues with Mexico

Water Quantity

Water Quality

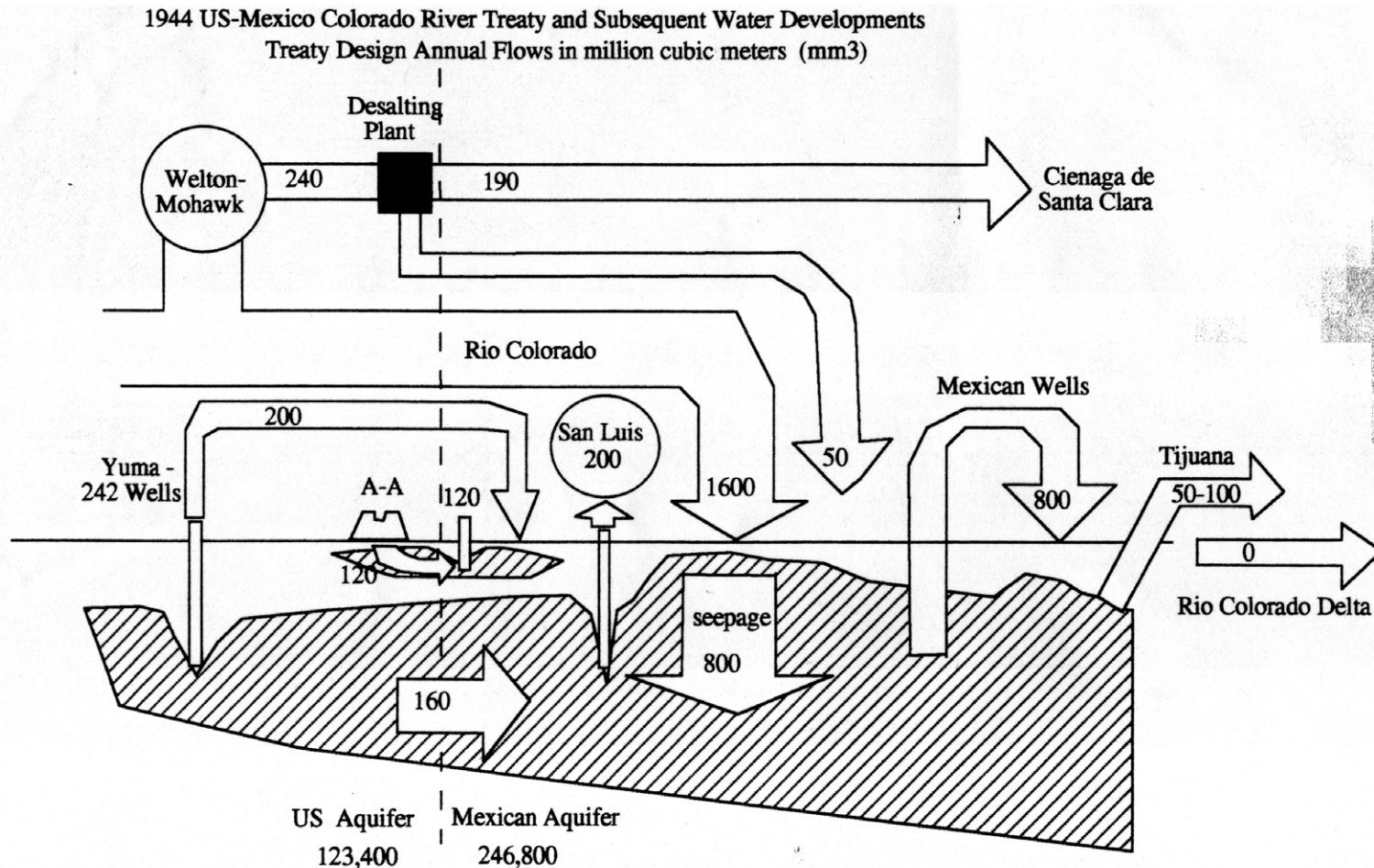
Environmental Uses

Future Perspectives



Water Quantity

- History
 - Asymmetric interdependence*
- 1944 Treaty
 - 1.5 maf
 - IBWC
- Binational issues
 - Increasing demand
 - The All American Canal
 - Other Border issues
 - Agromaquila
 - New negotiations?
 - New institutions?



Notes: 1 million cubic meters equals 810 acre feet

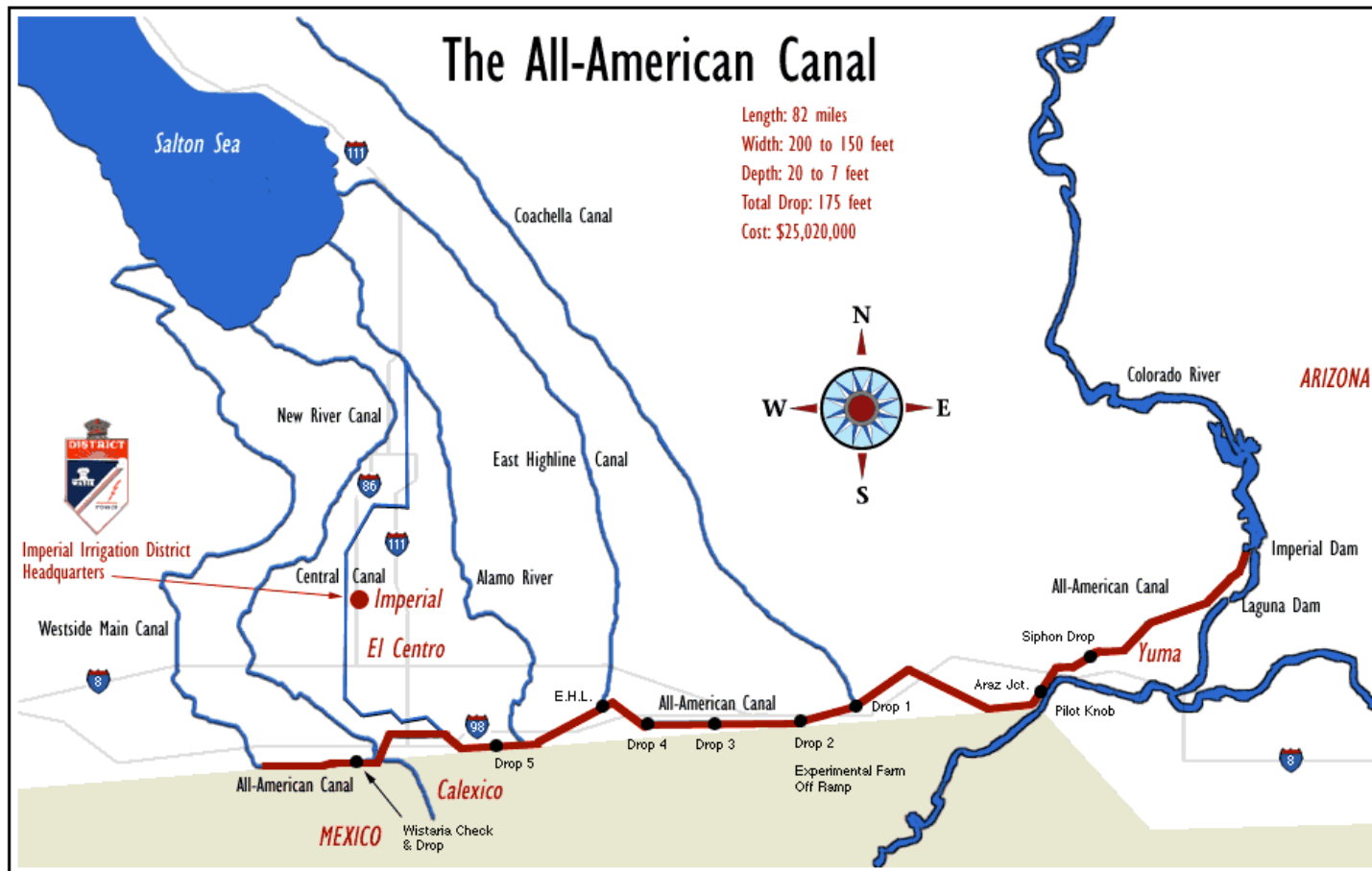
The San Luis and Yuma 242 well fields are exactly opposite and are limited by Minute 242 to 200 mm³

The 120 mm³ of seepage from the All American canal will reduce to 32 mm³ when the canal is lined

The 1944 Mexican allotment is 1850 mm³ of surface water with a salinity no higher than at the last major US diversion

The seepage rate for the Mexicali Valley is a gross estimate based on a 50% irrigation efficiency. The Desalting plant is presently out of commission and may not ever operate at full capacity. Mexico is guaranteed 1850 mm³ of surface water and gets an estimated 160 mm³ of ground water recharge in an average year. In wetter years, Mexico gets up to 250 mm³ of surface water as well as more ground water recharge. In drier years, the surface water is the same but ground water pumping on both sides is greater and transborder flow is probably less. Localized high water tables are a common problem in Rio Colorado Irrigation District. Water quality (salinity) not quantity is the most important problem. Dropping ground water tables are most problematic for the shallow wells.

William Stewart, Pacific Institute for
SIDES, August 1993



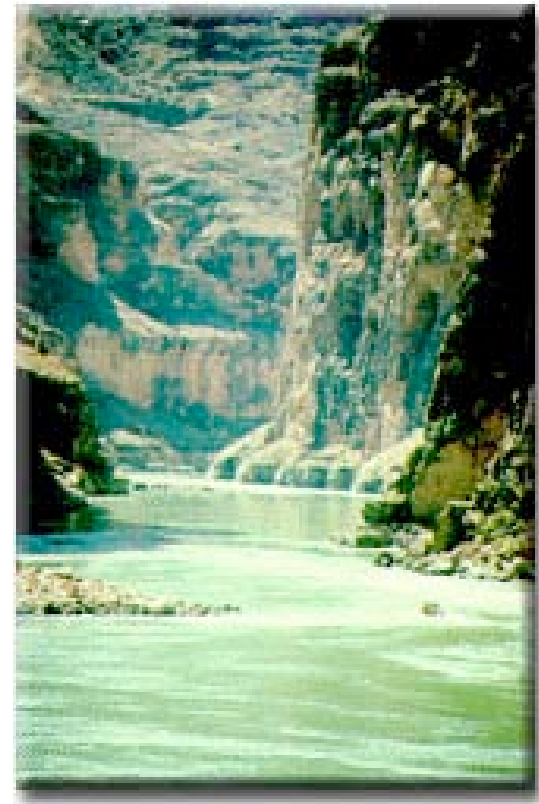
- Agreement between Imperial Valley and San Diego
- Conditions
- Problems
- California 4.4 plan (2015)- “Interim Surplus Guidelines”
- Quantification Settlement Agreement
- Mexican concerns

Water Quality - Salinity

- A basin problem
- 1961 Increase in salinity
- 1944 Treaty
- Diplomatic tension
- The “pump war” in Yuma and San Luis Rio Colorado
- Minute 242 (1973)
- Regulates groundwater use
- Establishes annual average of 115 ppm (+/-30) higher than those levels in Imperial Dam
- Yuma Desalinization Plant
- Not a complete solution
- Daily monitoring to avoid extreme concentrations

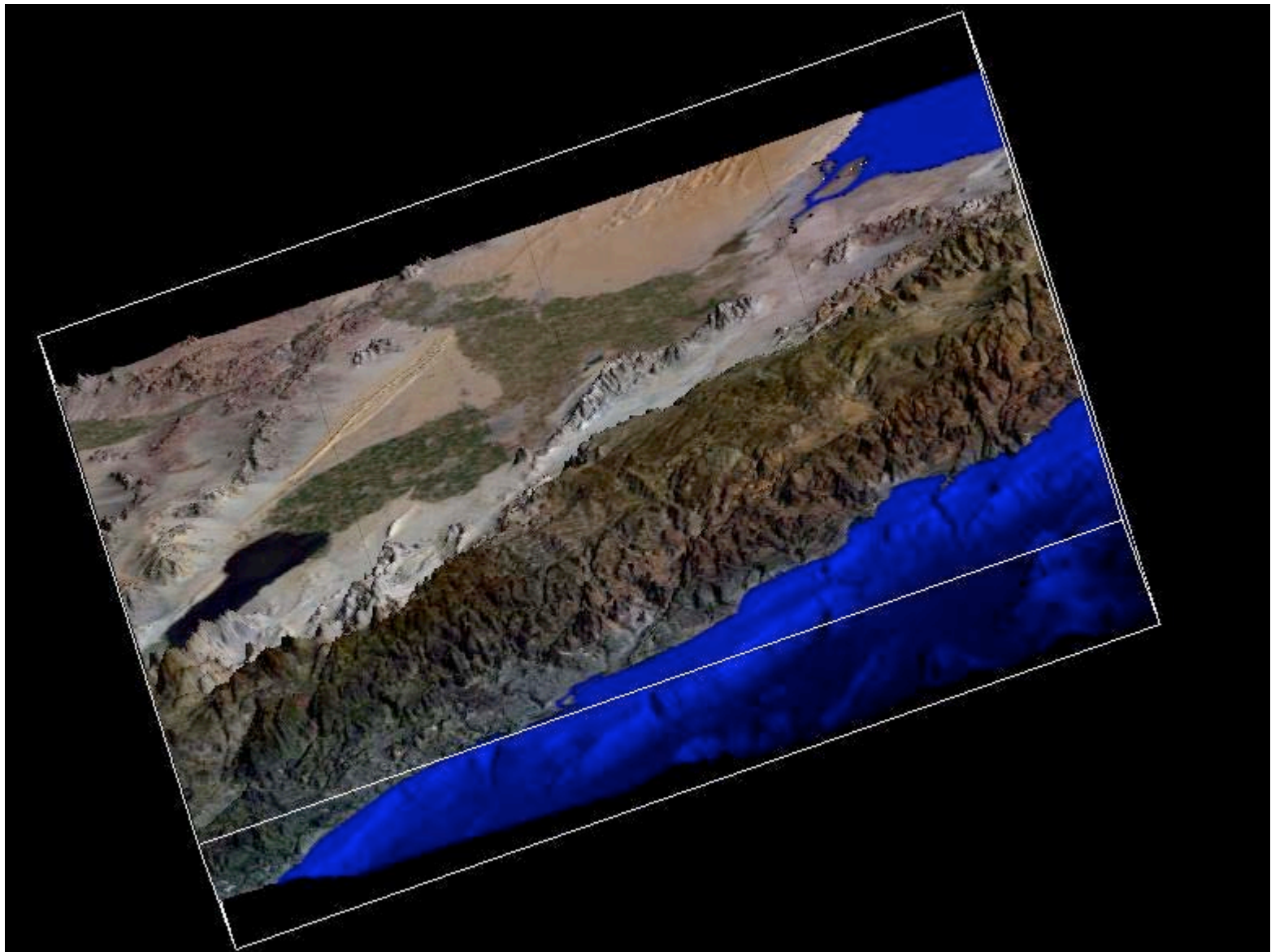
Environmental Issues

- The Delta
- The Cienega de Santa Clara
- Binational coalition of Environmental groups and academic institutions
- Rich ecosystem
 - Reserve of the biosphere
 - Endangered species
- IBWC- Minute 306
- Mexico
 - Recent proposal to modify the Federal Water Law (April 2003) to include environmental uses of water
- How much water is needed?
- Salton Sea



Delta Río Colorado 1985





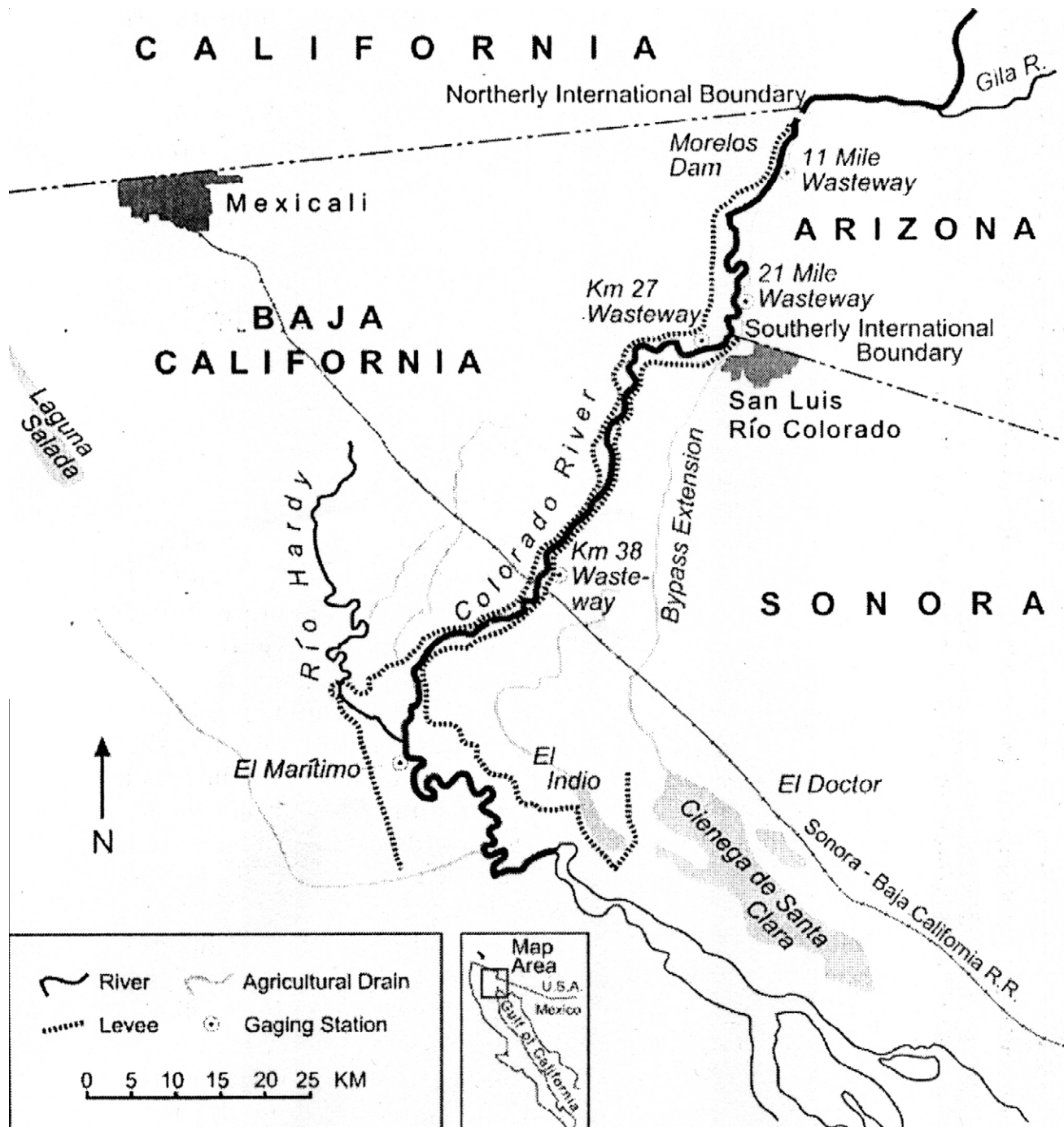
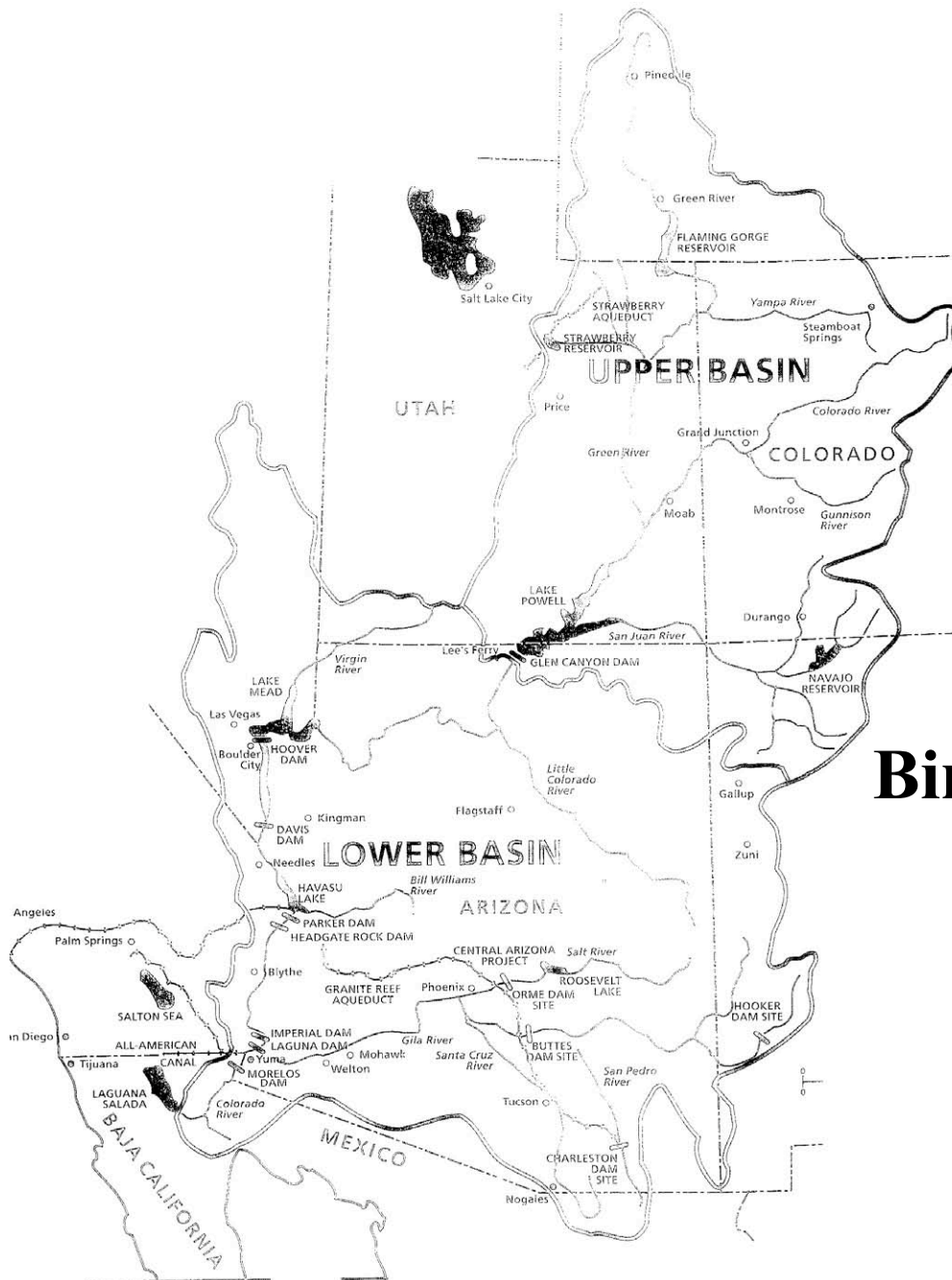


Figure 1



Binational Issues with Mexico

- Mexico as a partner?
- New institutions?
- A new approach for water management in the basin?

Preparing for the future?

Legal Constraints

Law of the River (legal, economic, political and technical factors)

1922 Colorado River Compact

1928 Bolder Canyon Project Act

1948 Upper Colorado River Basin Compact

1956 Colorado River Storage Project Act

1963 California v. Arizona Supreme Court Rule

1992 Gran Canyon Protection Act

- Legal framework not responding to a new social economic and environmental reality
 - “First in time, first in right”
 - Regional changes (economy and population)
 - Other water uses (Indian Tribes, environment)
- Intra and interstate transfers

Table 4Colorado River Basin Allocations in Normal Flow Years \aStateMillion CubicMeters \bAcre-feetl

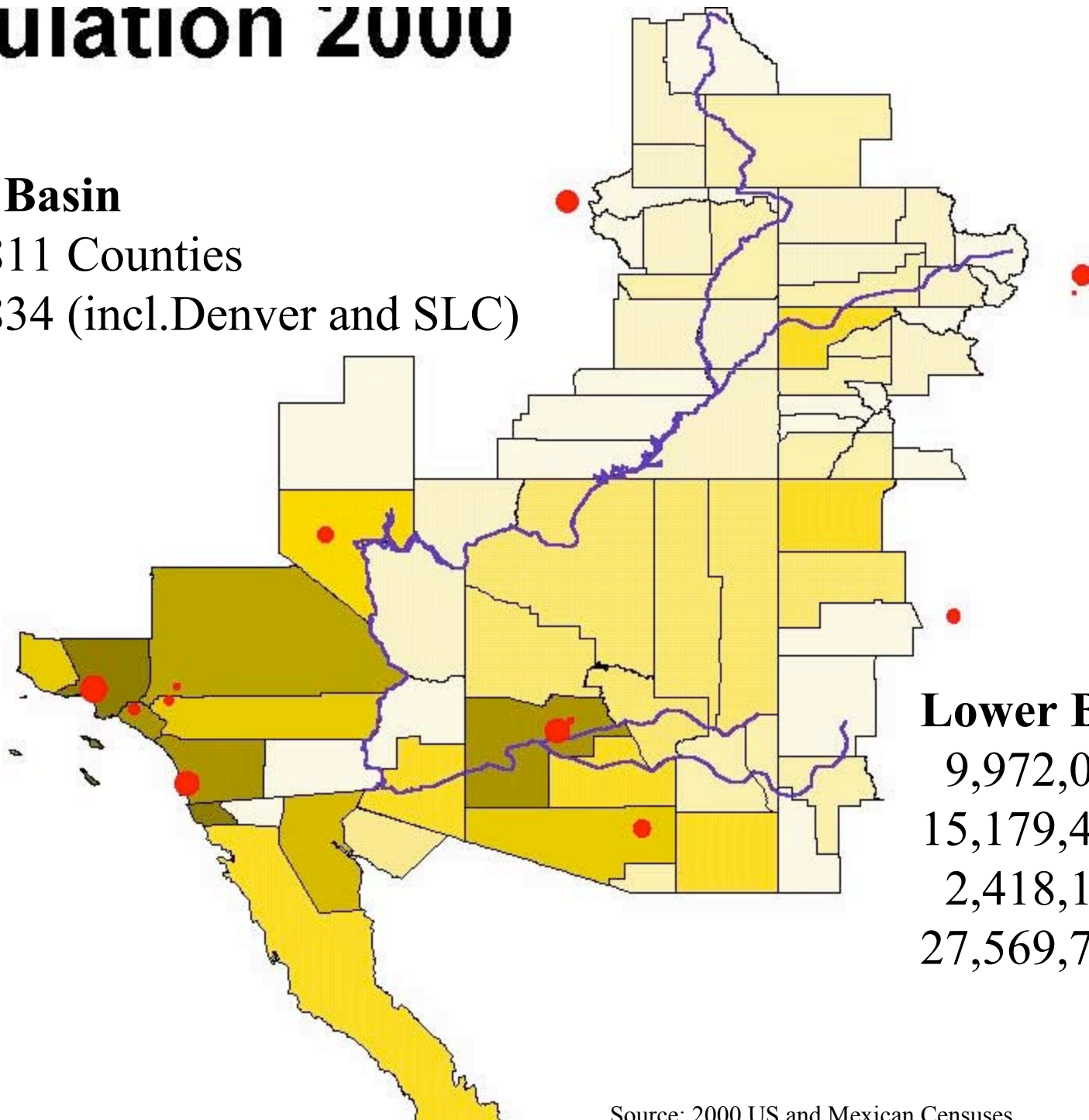
Source: Morrison and Gleick, 1997

Population 2000

Upper Basin

1,051,811 Counties

2,504,834 (incl. Denver and SLC)



Lower Basin

9,972,095 Counties

15,179,460 SCMWI

2,418,188 Mexico

27,569,743 Total

Source: 2000 US and Mexican Censuses

Table 1. *Water use by water and municipal and agricultural sectors and percent earnings for agriculture and manufacturing and services (after Luecke, 2000)*

	Municipal & industry	Agriculture	Service & manufacturing	Agriculture
	1990 Water use (percent of total, and, in brackets, in millions of gallons/day)		1990 percent earnings	
Arizona*	18 [1181]	82 [5389]	90.6	1.4
California*	19 [6789]	81 [28,311]	91	1.8
Colorado*	7 [938]	93 [11,762]	89.8	2.2
Nevada*	19 [654]	81 [2826]	86.5	0.6
New Mexico*	9 [308]	91 [3032]	87.6	2.6
Utah*	17 [756]	83 [3624]	90.9	1.6
Wyoming*	9 [723]	91 [7187]	73.9	2.5
Mexico ^{†‡}	7 [164]	93 [2035]	87.4	8.6
(Sonora and Baja California)				

* Riebsame *et al.*, 1997.

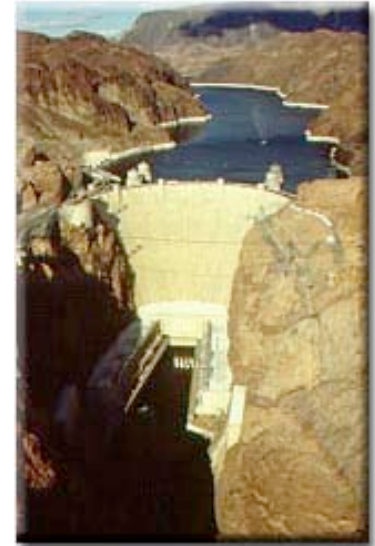
[†] Pacific Institute, 1996.

[‡] INEGI, 2000a, b.

Source: Pitt 2001

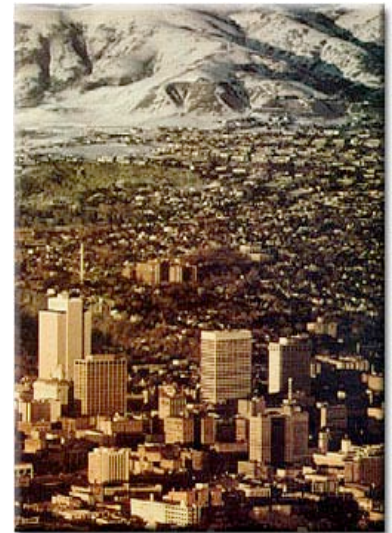
Table 13Estimated Total Water Consumption by Selected Crops in Arizona, 1994CropArea HarvestedTo

Table 14Mexicali Valley Agriculture 1990Crop TypeArea PlantedTotal Consumptive Use(hectares)(million ci



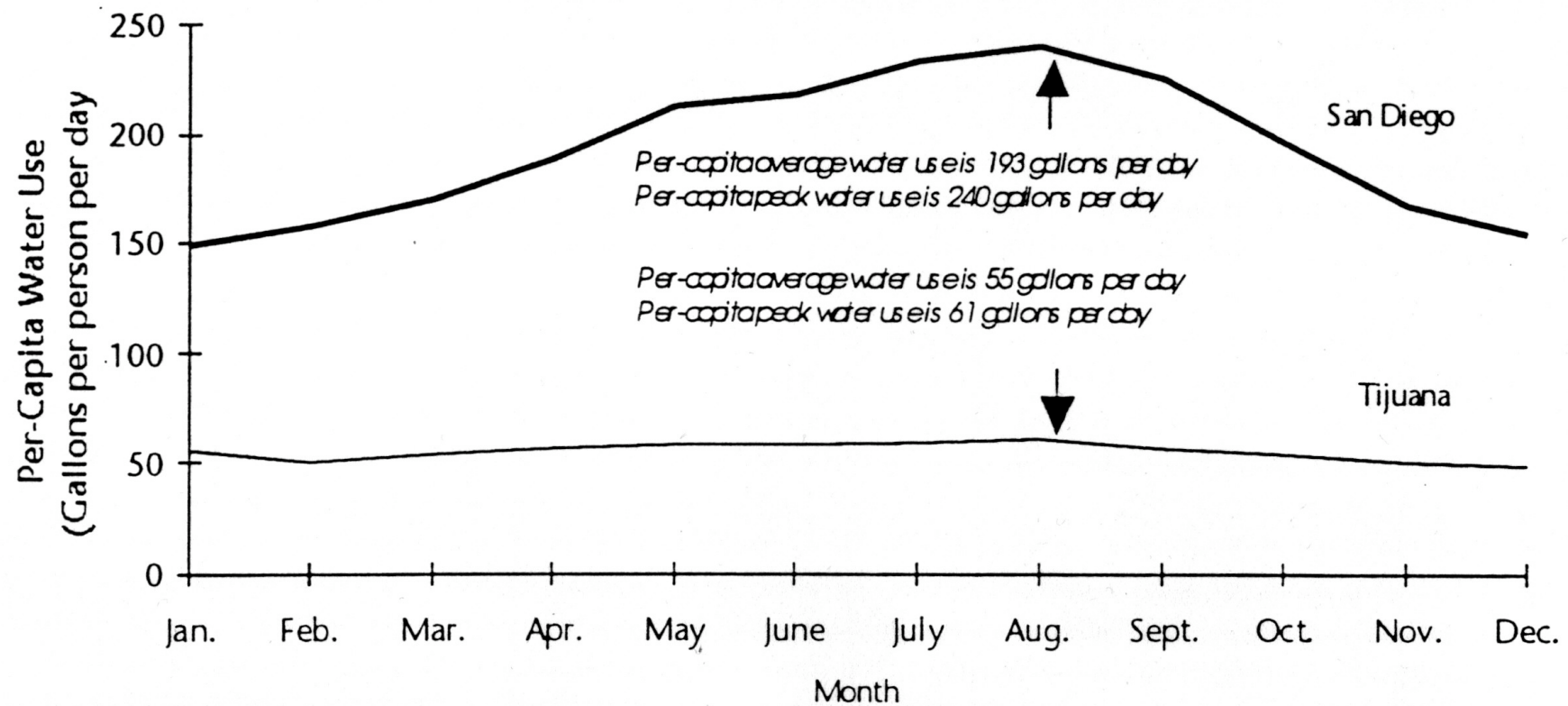
A new Culture of Water?

- Water uses
 - Technology- Efficiency
 - Conflict between economic and social uses
 - within societies and between societies
- Managerial Approach (subsidies)
- Social, Economic, Political, Environmental and Technical Dimension



Equity Issues

Figure 2: Per-Capita Variability in System-Wide Water Use for San Diego and Tijuana



Source: CESPT 1995, DWR 1994.

Source: Gomes 1994

How to move forward?

- Incremental steps towards a balance among the social, economic, political, environmental and technical dimensions of water
- The impact of crises
- Create processes that will help us archive long term goals
- New institutions

Table 2
Colorado River System Reservoirs and Their Active Capacities

Reservoir	State	Active Capacity (million cubic meters)	Active Capacity (thousand acre-feet)
Fontenelle	Wyoming	426	345
Flaming Gorge	Utah/Wyoming	3,940	3,194
Starvation	Utah	315	255
Taylor Park	Colorado	131	106
Blue Mesa	Colorado	1,024	830
Morrow Point	Colorado	144	117
Crystal	Colorado	22	18
McPhee	Colorado	470	381
Ridgeway	Colorado	68	55
Navajo	New Mexico	2,025	1,642
Powell	Utah/Arizona	30,164	24,454
Mead	Nevada/Arizona	33,304	27,019
Mojave	Nevada/Arizona	2,220	1,810
Havasu	California/Arizona	764	619
Total		75,017	61,375

Source: Harding et al. 1995.