California Water Plan: A Topic of National Conservation Interest

WILLIAM S. KERR III, University of Oklahoma, Norman

Many areas of the United States, lacking the cognizance of some European countries, lagged behind in early water management. In the 20th century, one of the first to realize the need for water conservation was the state of California. California's size, elongated shape, diversity of climate, topography, economic problems, and population increase have all contributed to its water uncertainties. These factors have compelled the "Golden State" to harness and redistribute the water supply in an effort to satisfy the demands of its lands and people.

After many years of research, California has formulated a seemingly workable program called the California Water Plan. Fundamentally, the plan is a supplement to existing schemes for resource development. It is a compilation of previous ideas and studies. In essence, the project is the end result of a long chain of events in the state's water management evolution. The California Department of Water Resources has transformed this promising plan into one of the largest nonfederal water management enterprises in the world.

The main theme of the state water project is the transference of water from areas of abundance in the north to regions of paucity in the south. The many facets of the project include: water supply, power development, flood control, fish and wildlife enhancement, and recreation.

California is slightly more than half way through a ten-year construction period. It remains to be seen whether this bizarre experiment is successful. Evaluation must be considered, not only from a financial point-of-view, but from a conservation standpoint as well. The success of this project, if it is forthcoming, could provide an urgently needed influence to other parts of the United States which have lacked water management initiative.

Water Problems in California—Water problems have been a part of California's history since the 16th century when settlement began with the movement of Spanish padres northward from Baja California. Today, these problems are similar, but much more diverse and complicated.

Four mountain ranges in the northern portion of the state, the California Coastal Range, the Klamath Mountains, the Cascades, and the Sierra Nevada, receive copious quantities of precipitation. This rainfall, associated with a Mediterranean regime, normally ranges between 50 and 100 inches annually. Approximately 70% of California's runoff occurs north of the 38th parallel which nearly bisects San Francisco Bay. Below this line, 77% of the state's water demand is located.

Increasing Water Demands—California's population growth rate, with few exceptions, has doubled every two decades since 1860. Such an influx has resulted in a present population of 19,000,000 people. The massive growth has profoundly influenced urban water requirements, and irrigation crop expansion. Industrial growth, and a corresponding water demand, has also been continuous since 1945.

Agricultural activity, however, overshadows all others in its water needs. Ninety to 95% of California's agricultural land is irrigated. While a substantial loss of fertile agricultural acreage has been due to urban expansion, new arable land has been made available in the semiarid to arid southernmost basins of the Central Valley. Since 1955, nearly one million acres of additional farmland has been brought under cultivation. Naturally, more water will be needed to support this regional shift of arable land.

Another problem of considerable dimension is the depletion of the ground water resource. The coalescing alluvial fans on the western slope of the Sierra Nevada have produced hundreds of aquifers traversing north to south along the Sacramento and San Joaquin basins. The overdrafting predicament may be alleviated by water importation into the aquifers and controlled pumping procedures. Future demands, therefore, will necessitate an increase in domestic and irrigation water supply. In fact, by 1975, this supply must be increased 26% to maintain a proper balance.

State Water Project (Figure 1)—The California Water Plan was formulated as a multipurpose transbasin system to meet the immediate water needs on a statewide basis. The basic idea of the project is to store water in large reservoirs in the northern section of the state. Water will be conveyed by aqueduct system 444 miles from the Sacramento-San Joaquin River delta to Southern California reservoirs. The entire project, costing 2.5 billion dollars, will be completely defrayed via water contracts, electric power profits, and recreational fees.

Significant Features of the Plan—It is difficult to ascertain the key features among the 20 dams, eight power plants, and 24 pumping facilities. Three significant constructions come most clearly to mind: the Oroville Dam-Thermalito Afterbay Complex, the California Aqueduct, and the Tehachapi Pumping Plant.

The Oroville Dam-Thermalito Afterbay is the major supplier of water to the entire project. Oroville Dam, the highest earthen structure in the Western Hemisphere, will be complete by 1968. Its benefits include flood control, recreation, and power for the pumping stations to the south.

One hundred fifty miles from Oroville Dam, near the confluence of the Sacramento and San Joaquin Rivers, is the California Aqueduct. This canal, which is the longest in California, traverses the western portion of the San Joaquin Valley for over 400 miles. The aqueduct will convey water into the lower part of the agriculturally oriented Central Valley as well as provide additional water to several Southern California cities. As an integral part of the entire water plan, recreation in the form of fishing, aquatic parks, horseback riding, bicycling, and hiking trails are being established along the canal.

The third, and in a way the most complex of the major features, is the Tehachapi Pumping Plant. Swiss engineers were confronted with the task of transporting water over the Tehachapi Mountains, a maximum elevation of nearly 2,000 ft from the San Joaquin Valley in the north. Although conventional power will provide the necessary energy to run the pumps, nuclear-powered generators will eventually assume the responsibility.

Future Water Resource—In the early 1990's after only 20 years of use the state water project will reach full maturity. With California's population increasing to an astronomical 54,000,000 people by the year 2020

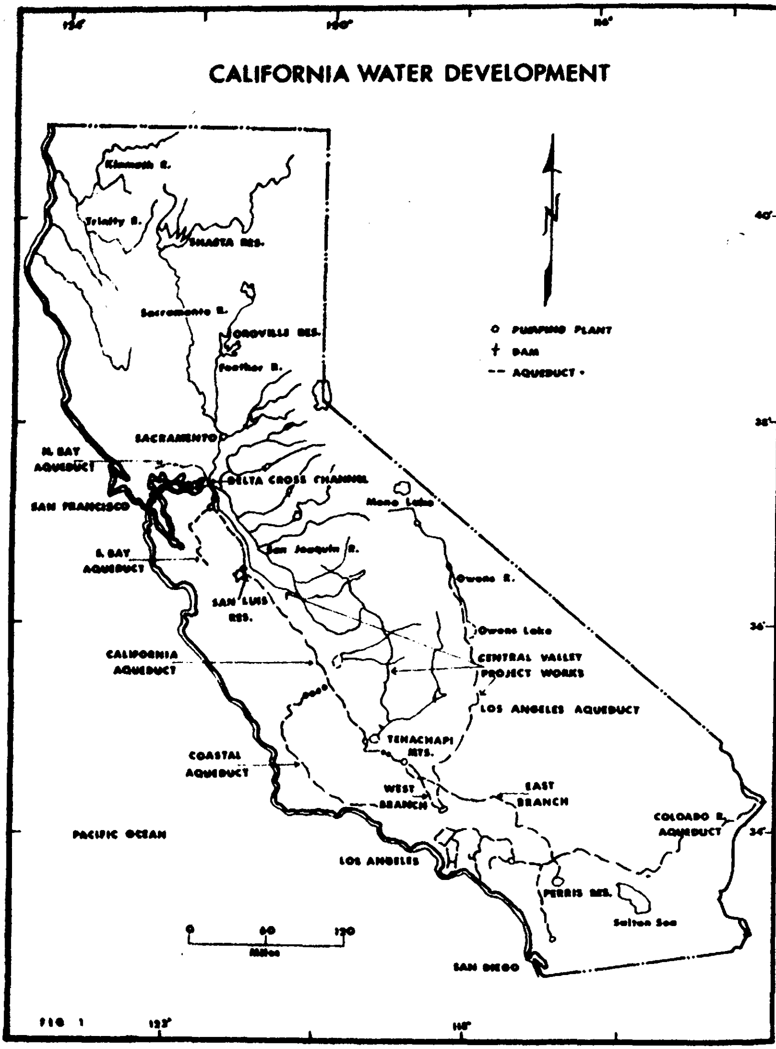

Figure 1

A. D., it is obvious that new avenues of supply must be found. Additional sources will include the following: (1) The northwest drainage basin where precipitation is abundant and several streams with steep gradients are available. (2) One of the main aspirations for the future is the development of nuclear dual-purpose desalting and power plants along the coastal fringe. Desalination at the present time, however, costs twice as much as the conveyance of water from the Oroville Dam to the Perris Reservoir. One nuclear plant is now under construction in the Los Angeles Basin. (3) Possibly the less expensive alternative for long-range water development is the regional importation of water on a multistate basis. This program would involve the participation of 11 western states. There is, unfortunately, a great deal of opposition intensified by the fear that California will dominate the proceedings.

In the process of striving for a more efficient society, often with selfish motives in mind, man has failed to grasp important concepts. He has lost sight of the fact that an equilibrium must be maintained between water and man. Mankind is the primary factor in the diversity of water problems. Without him as the alien element, water would be just another of the earth's compounds which might be called "neutral stuff." California has found, just as have previous civilizations of subhumid areas, that people developing and expanding in new areas of settlement must assume certain risks. When communities are built along flood plains, inundation may occur such as in the Sacramento River Valley. If a large metropolitan area continues to grow in a semiarid environment, which might suggest Los Angeles, water demands may expand out of proportion to the supply available. When man exploits valuable aquifers, for example that in the Central Valley, it is only logical to assume that water problems may be forthcoming. In many ways, the problem of human leisure time in an urban society is of equal importance to some water problems. To cope with this challenge some erudite leaders in California formulated recreation plans on both land and water. The management of water resources then, is associated with the wise manipulation of the hydrosphere so that man can obtain the best possible water services without its maltreatment.

The climate of this western state compels its people to practice water conservation or fail in their attempt to remain prosperous. Californians have made many mistakes, but man is a fallible being everywhere, not just in California. The difference between California and other areas, with equal problems, is that this state seems to be doing something to rectify its mistakes.

In the 116 years since California became part of the United States it has built over 1,100 dams, irrigated 8.5 million acres of land and provided water for 19,000,000 people. These statistics suggest that California is, indeed, a leader in the field of water resource management.

It would seem that California has proven at least one thing to the country as a whole. The United States possesses the necessary tools to develop and manage its water supply, but so far, the means and the determination are not in balance.

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