



FROM *the* Director

Perhaps the most fundamental difference between the West and the rest of the country is water. Differences begin with precipitation. In non-western cities, average annual precipitation levels (in inches) include New Orleans—61.9; Atlanta—50.9; New York—47.3; Boston—41.5; Houston—46.1; and Chicago—35.8. In comparison, precipitation levels in western cities include Las Vegas—4.1; Phoenix—7.7; Albuquerque—8.8; San Diego—9.9; Los Angeles—12.0; Boise—12.2; Cheyenne—14.4; Denver—15.4; and Salt Lake City—16.5. The consequences are immense. Western rivers and lakes are few, far between, generally small and are often seasonal. Groundwater supplies, which could be used to augment scarce surface water, tend to diminish quickly and recharge slowly. Resource and especially water scarcity has resulted in western population densities being much lower than in the rest of the country. The West has even developed a set of water laws, based on prior appropriation, that are different from the rest of the U.S.

Through the years, Herculean efforts have been exerted and vast sums of money spent to cope with water shortage problems in the West. Massive dams have been built on western rivers to catch the spring runoff and thousands of miles of canals have been constructed to transport this water to western farms and communities. Tunnels have been drilled through mountains and water pumped uphill for hundreds of miles from the Colorado River to the desert cities

of Phoenix and Tucson. As a result of these efforts, many western communities thrive and the West has been the nation's fastest growing region for several decades. Yet, limitations imposed by water scarcity remain. One day while driving across the Arizona desert, I crossed a canal. This canal was carrying water from some distant source to farmers' fields and perhaps to other municipal and industrial uses. The canal was obviously not intended to provide life along its path, but simply to transport this life-giving water as efficiently as possible to its intended destination. Much of the canal was cement-lined to avoid water loss to seepage, and also to prevent plants from growing along the banks, which might then extract some of the precious liquid. Thus, there were no green plants along the banks of the canal. There were no fish or ducks or other animals splashing in the cool water. There were no fishermen standing on the bank, nor were any families camped by the water's edge. In fact, the canal was nothing more than a line of blue water surrounded by the reds and browns of the desert. After driving a few more miles, I reached the agricultural fields that were the destination for some of the canal's water. The transition from the desert to irrigated farmland was profound. The irrigated fields were luxuriant and the corn growing in these fields was tall and green. Yet, mere feet from the fields where the irrigation water did not reach, there was barely a living plant and the red and brown desert stretched to the far horizon. The absolute dependence of the arid west

on transported water was striking. Take away the life-giving water for even a few weeks and the corn would wilt in the blistering desert sun; remove the water for a season and the land would quickly be reclaimed by the desert. From the luxuriant cornfields in the Arizona desert, one can drive for hours and see no other signs of viable agriculture and even little evidence of human habitation.

Rapid economic and population growth is making the water problems of the west even more pronounced. Simply put growing demand exceeds supply. Potential users desiring western water include farmers, utility companies, industry, residential users, and those desiring water for wildlife, biodiversity, amenity and recreation purposes. Farmers need water to grow crops because throughout much of the West, crop production is risky to impossible without irrigation. Resulting from past efforts, millions of acres in the West are now irrigated and western agriculture is a multi-billion dollar industry that employs thousands. Based largely on irrigated agriculture, California is the nation's most important farm state. With increased demand from other users, many farmers are now unsure if they will have irrigation water from one year to the next. The utility companies want water to turn their turbines to generate cheap and carbon-free power. However, if too much water is removed from reservoirs for agriculture, industry or residential purposes, their capacity to generate power is reduced. The rapidly

growing population in the West means increased demand for water for industrial and residential purposes. More people mean more water for drinking, bathing, brushing teeth, flushing toilets, washing clothes and dishes, and keeping suburban lawns green. Additionally, there is growing pressure to retain water in lakes and streams for wildlife, biodiversity, amenity and recreational purposes. Biodiversity concerns have intensified with the recent listing of some species as threatened or endangered.

The already severe water problems of the west may be even worse in the future. Global climate change is projected by many to further reduce water supplies because of lower precipitation and increased evaporation. Thus, as James Powell discusses in this issue, the flow of water in the Colorado River for the past decade has averaged only 68 percent of normal. There are also concerns about the aging and eventual decline of the western hydrological system as reservoirs continue to fill with silt thus reducing their capacity; and infrastructure deteriorates. Furthermore, there are water quality concerns as intensive irrigated agriculture and suburban landscaping often leads to salinization and high levels of toxic chemicals in water supplies from fertilizers and pesticides.

There is no question that major changes are required relative to western water. In this issue, experts and scholars on western water issues help clarify issues and explore alternatives for addressing these issues. After reading these articles, two facts are clear. First, conservation is not an option but a necessity. If available water was used more efficiently by all users, there would be much more available for everyone. Some significant conservation strides have been made, and articles here discuss additional promising alternatives. Second,

it is essential that all interested parties find a way to sit around the same table and work toward building a consensus. Historically, water law and decisions about the distribution of water have been made in courts of law where the decisions were often unsatisfactory to everyone. Open dialogue may be a better approach. Water scarcity is here to stay and we are all in this together. ■

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