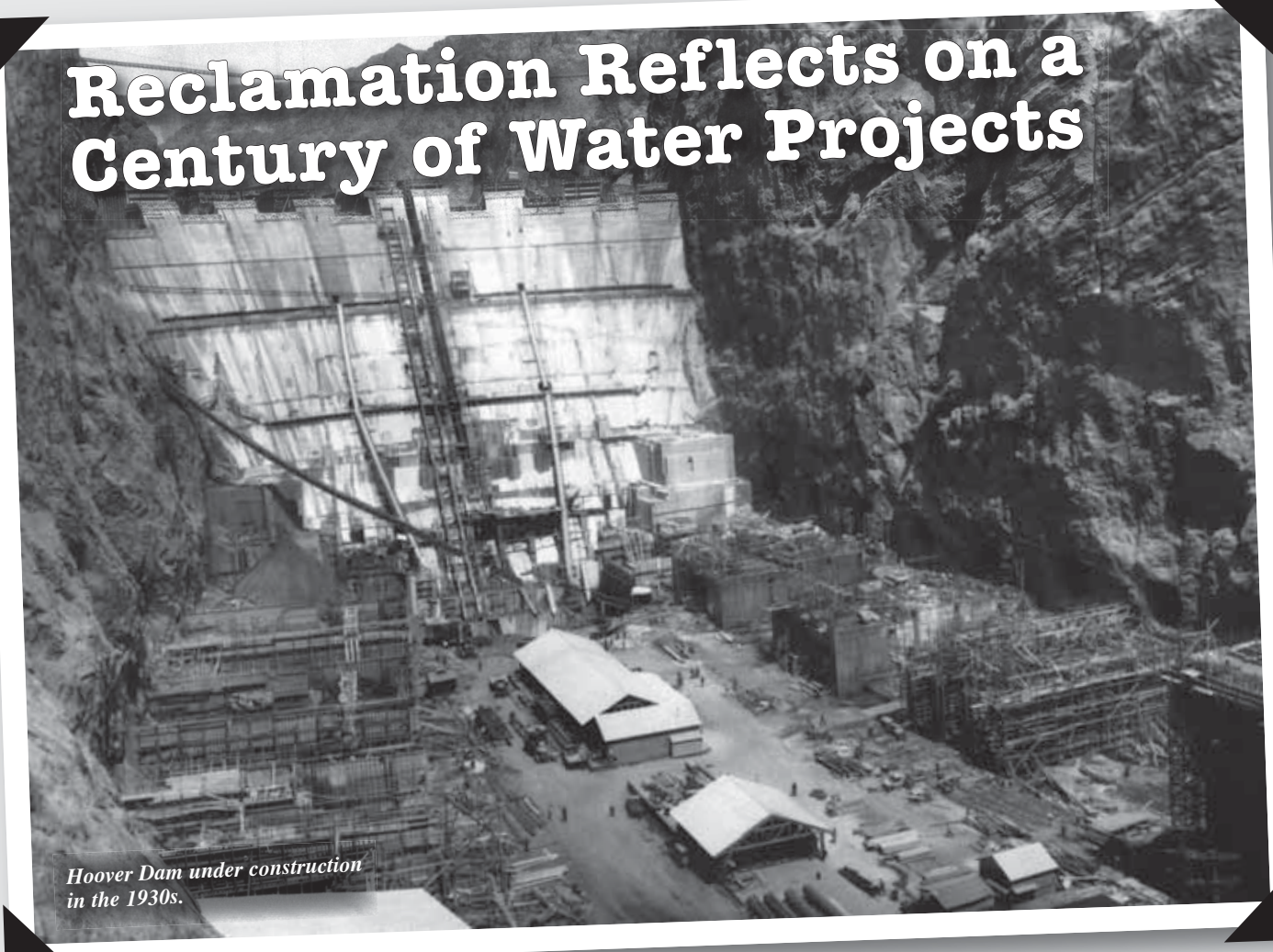
Reclamation Reflects on a Century of Water Projects



Hoover Dam under construction in the 1930s.

Photo: U.S. Bureau of Reclamation

***Betsy Woodhouse** – Southwest Hydrology*

The U.S. Bureau of Reclamation has been a leading player in western water projects since 1902, when President Roosevelt signed the National Reclamation Act, paving the way for water reclamation projects to enhance settlement of the American West. Two decades later, the era of big water projects began in earnest when Reclamation constructed Hoover Dam on the Colorado River.

Soon thereafter, Reclamation initiated several projects to move water from where it was plentiful to where it was needed. Work on California's massive 7 million acre-feet per year (afy) Central Valley Project was started in 1937 and construction of the 260,000-afy Colorado-Big Thompson project in Colorado began in 1938.

By the early 1970s, the San Juan-Chama Project in Colorado and New Mexico (110,000 afy) and the Central Arizona Project (1.5 million afy) also had been authorized by Reclamation, along with a second big dam on the Colorado River, Glen Canyon Dam. Collectively, these projects now transfer nearly 9 million acre-feet of water per year.

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Southwest Hydrology recently spoke with the Commissioner of the Bureau of Reclamation, Robert Johnson, about how planning, operation, and management of big water transfer projects have evolved over the last century.

Without doubt, Johnson thinks the big projects have all been very successful. "The benefits they provide are tremendous, and I don't think the West or the areas they serve would be what they are, were it not for these projects," he said. Have there been lessons learned? According to Johnson, "I don't know if it's lessons learned as much as there's a different set of public values and concerns out there now from when these projects were constructed."

A Shift in the '70s

In the 1970s, the magnitude and number of new water transfer projects began to drop. This was partly because the big systems already were in place, particularly the Colorado River and California projects, and partly due to the passage of environmental regulations, said Johnson. "Most of these projects were built before the National Environmental Policy Act and the Endangered Species Act and the Clean Water Act—all the environmental laws reflect changes in public values over time. These changes caused us to look differently at the development of water projects."

Considering the needs of all water users has become increasingly important. For example, the Animas-La Plata project in southwestern Colorado was authorized by Congress in 1968 for transfer of 191,200 afy. However, construction was held up for 34 years to address and settle Indian water rights claims and protect endangered species in the Animas River. Ultimately, the project was scaled down to 108,800 afy and irrigation uses were eliminated.

Perhaps nowhere have environmental needs impacted operations of water projects as much as in California's Sacramento-San Joaquin Bay-Delta, through which both Central Valley Project and California's State Water Project water flows (see page 24). A 2007 federal district court imposed limits on the amount of water that can be pumped by the projects in order to protect endangered fish. As a result, 2008 water deliveries will be significantly reduced.

Less Federal Money

Federal agencies today have less money available for big water projects, thus partnering with nonfederal agencies is becoming more common, according to Johnson. One example he cites is the Drop 2 Reservoir, a small (8,000 acre-feet storage) reservoir to be constructed in southeastern California to store Colorado River water that currently goes unaccounted for to Mexico. The reservoir is being funded entirely by nonfederal agencies—Southern Nevada Water Authority (SNWA), Metropolitan Water District of Southern California, and the Central Arizona Water Conservation District—although Reclamation is constructing it. Johnson says Reclamation's involvement in Drop 2 is based on the agency's history of working on Colorado River projects and its expertise, but there is no requirement for the agency's involvement.

Johnson says Reclamation's technical and financial involvement on water projects is determined on a case-by-case basis according to the type of project, its needs, and the interests of other partners. Projects that do call for greater federal assistance are difficult to classify, he said; it is not simply a matter of scale. For example, federal programs have been established to provide specific assistance with wastewater re-use and rural water projects.

The Future of Big Projects

Will our big water projects continue to serve us in the future? According to Johnson, "their structural integrity will be maintained. They're too important for the areas they serve not to have that occur."

U.S. Bureau of Reclamation Commissioner Robert Johnson.

However, says Johnson, "most of these projects have had significant changes in the way they're operated from when they were originally authorized...and there will continue to be change that may affect these projects and how they operate." He foresees future changes in operations particularly in response to two needs: managing the impacts of climate change, and incorporating new sources of water into existing water transfer systems. New infrastructure may also be needed in some situations, but Johnson believes we are not likely to see any on the scale of 20th century projects.

Preparing for Climate Change

Johnson says that climate change impacts could change the amount of water that is available in systems, which may require adjustments in their operations. "An example that is frequently given is that with a warmer climate, you're likely to see earlier spring flows and maybe higher peak flows, then lower flows later in the summer. If that's going to be the pattern of runoff, then the way you operate the facility may change. You need to preserve more flood control space earlier than you had previously reserved. You may or may not need new infrastructure to do that."

Johnson looks at the ratio of available storage to annual flow of a system as an indicator of its susceptibility to drought. The Colorado River system has a high storage-to-flow ratio, at about 4:1 (60 million acre-feet storage capacity to 15 million afy flow), meaning four years of flow can be stored—"probably the best storage-to-flow ratio of any system in the western United States," says Johnson. On the other hand, he roughly estimates California's storage-to-flow ratio at about 0.5:1 (not including snowpack in storage capacity), making that area much more vulnerable to drought, as well as floods. California currently is evaluating ways to add storage to its system.

Incorporating New Sources

The need to incorporate additional sources of water also may bring about new ways of operating water transfer projects. Johnson sees the big projects losing some primacy as *the* source of water for municipalities and becoming more part of their overall water portfolios. Desalination and water reuse are especially likely to provide an increased proportion of municipal water supplies. Johnson says that through water exchanges and the existing water transfer infrastructure, desalination on the Pacific Ocean through either California or Mexico could ultimately provide water for interior cities such as Denver, Salt Lake City, and Las Vegas, as well as coastal cities.

The water transfer projects of the 20th century have performed their function well—water has been delivered to areas where it was scarce, enabling agriculture, industry, and municipalities to flourish. Increasing environmental awareness, expectations of climate change and population growth, and shifts in available funding are now bringing about changes in their operations, but they likely will continue to play a central role in water for the West.

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