TIME FOR TRANSFORMATIVE THINKING IN WESTERN WATER

By Bill Swanson

Ongoing water shortages in the Colorado River basin and elsewhere in the Western U.S. underscore a widespread reality: water resources management in the West has reached a critical juncture, and profound change is on the horizon.

We've seen expansive growth in the West over the past century, and it's evident that much of the water infrastructure developed will not meet future needs, particularly if practices from the past are followed.
The world today is dramatically different from the era when major water supply projects in the West were envisioned and constructed. Our climate is changing, demand for water is growing, facilities are aging, and societal expectations of water resource management are evolving. Implementing changes and financing large capital investments to address these needs will challenge established institutional frameworks. Adapting water infrastructure, management practices, and project financing to meet the needs of tomorrow will not be possible by doing more of the same.

We need transformative thinking.

The Effects of Climate Change

The changing climate amplifies the variability that has long defined water supply in the West. While large water projects were designed based on hydrologic conditions that reflected historical variability known at the time, the frequency and intensity of the extremes has increased, and the trend is projected to continue.

Most large reservoirs were designed to provide multiple benefits—such as water supply, flood protection, and hydropower generation. Flood reservation pools sized to manage rainfall inflow during winter months gradually decreased during spring months as snowmelt inflow coincided with large agricultural demand patterns. Changes in precipitation patterns due to a warming climate produces less snowpack, which serves as the largest reservoir in the West, and causes earlier runoff that can require flood releases. As a result, inflow exceeds storage capacity and less water is available.

To provide more real-time management information and balance flood risk with increased water conservation storage, Forecast-Informed Reservoir Operations (FIRO) strategies are being developed. However, longer and more intense droughts accelerate the depletion of stored surface water supplies, increasing reliance on unsustainable groundwater pumping or water transfers, which are costly during times of extreme water shortage.

Less Supply, More Demand

Population growth and overallocation has increased water demands on many projects to levels that meet or exceed sustainable levels. In addition, for some projects, regulatory and legal actions require changes in project operations or water use that result in less available supply than expected when projects were constructed, adding to the growing gap between supply and demand. Many Western water managers attempt to balance water supply availability and demand management through a portfolio strategy that includes surface and groundwater supplies, reuse and treatment of impaired water sources (including desalination), water banking and acquisitions, and conservation requirements. But the rapid pace of change in demand and water availability often exceeds the pace of adaptation.

In some areas of the Western U.S., groundwater pumping to narrow this gap has caused land subsidence that reduces the conveyance capacity of large canal systems to move water when it is most available, or caused other undesirable effects.

For example, in the California Central Valley, implementation of the Sustainable Groundwater Management Act (SGMA) will require significant reductions in groundwater pumping to address adverse effects in eight severely overdrafted groundwater basins. SGMA requires compliance by 2040, meaning additional overdraft is expected to continue while actions to reduce groundwater use are pursued. Recent studies by the Public Policy Institute of California reveal that overdraft far exceeds available local supplies, and extensive land fallowing is likely.

Addressing Aging Infrastructure

The imbalance between supply and demand is occurring at a time when many facilities are aging, which has created a unique opportunity.
Most large water supply projects in the Western U.S. were developed between the 1930s and 1980s, and many need extraordinary maintenance, repair, rehabilitation, or replacement. Simply rebuilding or replacing old infrastructure as originally designed may not be the

best approach. Corrective actions to aging facilities that restore or preserve originally authorized benefits should anticipate and design for climate change effects, supply, and demand. Any action taken should also address the need for modernization to offer improved forecasting capabilities, meet environmental protection objectives, coordinate with other water projects, and integrate with renewable power systems.
Recently, the Bureau of Reclamation was authorized $3.2 billion for extraordinary maintenance in the Bipartisan Infrastructure Law and additional funding through the Inflation Reduction Act, which provides a downpayment on corrective actions to Reclamation-owned facilities. This fund is almost fully reimbursable, and far more is needed for both federal and non-federal projects, creating a significant funding and financing challenge for water users throughout the West.

Solutions for Western water will also test existing institutional frameworks. Long-term solutions to water supply shortages in some areas may involve funding projects in one area to benefit users in another location. For example, constructing seawater desalination projects in coastal areas could allow for the use of surface water at inland locations through exchange and operations agreements. The development of such a project could require changes in water rights or contracts, long-term financing plans, and operating commitments to assure water supply and quality is provided over many decades, as expected.

Transforming water management infrastructure, policies, and financing will be a significant endeavor and will require deep understanding and agreement among a diverse set of participants. Decisions on water management are decisions on the allocation of this precious resource. Over the past few decades, decision-making regarding water resources has become more complex in recognition of human, environmental, social, and economic implications. While many agencies actively engage diverse viewpoints in decision-making, more work is needed to build coalitions.

Over the next several years, we will see many important decisions made regarding Western water management that will shape the remainder of this century. Our ability to address the past and prepare for the future will depend on the extent that we are willing to transform our infrastructure, institutions, and financing of water projects.

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