Long-term visions and goals for western water resource management, with time horizons of 10 to 20 years or more, are necessary to meet our future water supply needs. These efforts, which will require substantial and sustained investments with long-term benefits, need to go forward and be fulfilled. For a growing number of western states and metropolitan areas, however, the crunch is not coming in another decade or two…it is here today. For these areas, the question is not merely how to institute sustainable water management for the next quarter century, but how to get through the next five years.

Large-scale, long-term options offer hope, but can take decades to accomplish. We urgently need an agenda of achievable short-term strategies for improving water resource conditions in the West while longer-term projects and policy changes are developed and implemented.

The proposals included here have relatively low capital costs and are complementary. Policymakers and water resource managers could proceed with any combination of these suggestions in any order or even simultaneously, and no single proposal makes the others less effective or worthwhile.

Near-term actions include the following:

• **Develop system interties and mutual-aid agreements in every watershed and metropolitan area.** Interties (interconnections between public water systems) increase the flexibility of system operations to respond to weather, natural disasters, and other similar events. Intertie projects can be completed in short periods (often a year or less) and at a fraction of the cost of other supply augmentation projects. Their benefits, in terms of water supply reliability, can be substantial and long-lasting.

• **Meet realistic water conservation targets.** Among the greatest water management success stories over the past 20 years has been progress in water conservation, especially in fast-growing metropolitan areas. If every metropolitan area in the western United States achieved the annual per capita water consumption of Tucson—104 gallons per capita per day—water supplies could be extended for many years into the future. This decrease in consumption will likely require a combination of equipment upgrades and replacement, landscape replacement, distribution system

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**Part of Denver Water’s recycled water system.**
improvements, and economic incentives, such as aggressive conservation pricing. Even those that require financial outlays are relatively cheap compared to many other supply-enhancement alternatives.

- **Promote uses of recycled water** where it is already available. Using more recycled water in locations already served by such facilities can provide a significant water resource. In the West, recovered wastewater is being used for applications such as landscape irrigation and industrial cooling. Expanding these uses—and extending them to construction areas, urban amenities, and agricultural irrigation—can create substantial gains. In such cases, financial savings often result from substituting recycled water for potable water. Infrastructure modifications, and in some instances modification of rules governing the use of recycled water, may be required, but both the short- and long-term benefits of acting now are likely to be substantial.

- **Store more water underground** at all feasible sites. Although long practiced in the West, underground storage of water supplies still has not approached its full potential as a tool for enhancing water supply reliability. Feasible sites for underground storage remain available throughout the western states. Advantages of underground water storage include smaller evaporation losses compared to surface reservoirs, relative ease and efficiency of water distribution and extraction, and lower cost and environmental disruption than constructing new surface storage facilities.

- **Establish water banks** in every state. Some western states have experimented with water trading institutions (which are referred to as “water banks” whether there is a physical storing of water or only an exchange of rights) to facilitate short-term exchanges of water supplies during drought or similar circumstances. All western states could establish and maintain water banks. They expedite the temporary shift of water supplies from rights holders with available supplies to users with more acute demands. A water bank can be a win-win solution in circumstances where depositors preserve their rights and have a claim for future withdrawals, while those who draw upon the system are able to meet emergency demands.

- **Create interstate water banks** in every interstate river basin. Some states have already led the way in this regard, particularly in the Lower Colorado River Basin. Arizona, California, Nevada, and the Bureau of Reclamation have had an agreement since 2000 on the storage of available Colorado River flows in groundwater basins in Arizona. There are many other interstate river basins in the West where such arrangements could increase the flexibility of water supply use without risking long-term forfeiture of adjudicated or pending state water right claims.

- **Expedite water rights adjudications.** One key to improved conservation and efficiency of water use is the assignment of quantified rights. Water users with assured and specific usage rights are better positioned to make long-term investments in efficient use and to engage in water banking and transfer programs that help stretch scarce water supplies across many potential uses. In some locations, however, and especially with respect to groundwater, such rights do not yet exist and the “beneficial use” or “rule of capture” doctrines continue to apply. Water rights determinations are lengthy and difficult processes. The assignment of rights could be expedited by using a flexible formula that weights population by a per-capita water consumption target appropriate to the region and allocates irrigation water use based on cultivated area and the water duty of the most commonly grown crop in the basin. This would be a useful step toward curtailing overuse, promoting water transfers, and enhancing long-term water sustainability.

- **Adopt and maintain assured water supply requirements.** The question of how to balance development with concerns about the adequacy and availability of water supplies has been controversial in the West. One successful response has been the adoption of assured water supply (AWS) requirements, whereby developers show that water supplies are available and sufficient to support proposed development, as a condition of receiving permits or other forms of approval to proceed. AWS legislation has been adopted in some states. California, for example, enacted a statutory scheme in the 1990s that incorporated AWS demonstration into the land-use and development-permitting processes.

- **Build the information infrastructure** for more effective management. As with physical infrastructure that is needed to facilitate efficient and effective flow of everything from water and transportation to telecommunication, an information infrastructure of databases and research supports effective decision-making to balance water supply and demand in any region over any planning period. In western water management, gaps remain in the information infrastructure that impede the ability to effectively manage water resources.

- **Build the organizational infrastructure** for more active management. Water resource management in the West is more than a full-time job and requires full-time management organizations—water agencies, special districts, joint-powers authorities, and the like. State laws establish the frameworks within which the organizational infrastructure of water resource management can be built, and states can take actions to promote or facilitate the creation of water management structures where they do not yet exist. For instance, counties in Texas are currently involved in establishing
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Alamos-type” centralized research effort to assist water utilities. And a consortium of eight major entities (UCAR, 2008) released a list of specific actions needed to respond adequately to climate change, including the need to “evaluate approaches to ensure that investments are done in the best interest of the nation.” These actions, which will underpin the national water plan, include:

- Fully fund our ground- and satellite-based observing systems;
- Greatly increase computer power for research;
- Support fundamental and applied research in weather, climate, and their impacts;
- Support education and training of water managers in using and understanding research tools, data, and models; and
- Implement effective leadership, management, and evaluation of the entire U.S. research effort on climate change.

Energy and Water Are Unique
It is clear that water and energy are the critical problems of climate change. Just as we need a national energy plan to minimize greenhouse gases emitted from every sector of our economy, we also need a national water plan to coordinate our responses to the water-related impacts of climate change that will affect all sectors of our economy. Only through the development, funding, and follow-through of such a plan will the nation be able to meet the challenge of preparing for the water-related impacts of climate change.

Brad Udall is the director of the Western Water Assessment, a NOAA-funded RISA program at the University of Colorado. He is a lead author of the U.S. Climate Change Science program’s overarching synthesis, “Global Change Impacts in the United States,” to be released in early 2009. Contact him at Bradley.Udall@colorado.edu. Kristen Averyt is a research scientist with Western Water Assessment; contact her at Kristen.Averyt@noaa.gov.

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universities have the most successful track record in working with diverse groups of stakeholders in their regions, and also in forming successful working partnerships with all the other key players: local, state, and federal agencies; the private sector; nongovernmental players; tribes; and relevant international partners.

Stakeholders and their university partners should also be front and center in any integrated climate change adaptation and mitigation program for three other very important reasons. First, the successful program must be designed to learn and shift strategies on the go, and only at universities do we have the disciplinary and interdisciplinary critical mass, as well as a sufficiently broad workforce, to make large routine shifts in focus. Second, rapid innovation will be needed to speed up research and application—a challenge that requires both the cutting-edge research capabilities and stakeholder partnerships at which universities excel. Lastly, successful climate change adaptation and mitigation will need a rapid build-out of a next-generation workforce, and this can only happen in large stakeholder-oriented universities.

The advantages of an aggressive U.S. climate change adaptation and mitigation program go beyond saving our own skin. The technologies and knowledge systems required for successful adaptation and mitigation will be in demand worldwide, and thus aggressive action could propel the United States—and those regions of the United States most threatened by climate change—to global market leaders in this rapidly expanding sector of an increasingly intertwined global economy. Opportunities realized could be just as important as the threats that are diminished, and the former could quite possibly pay for the latter. Failure to act quickly and aggressively on climate change could cede economic opportunity just as it could cripple prospects for sustained economic growth and a vibrant quality of life in the West.

Jonathan Overpeck is co-director of the Institute for Environment and Society at the University of Arizona, where he is also a professor of geosciences and of atmospheric sciences. He was a coordinating lead author of the Nobel Peace Prize-winning 2007 Intergovernmental Panel on Climate Change Report. Contact him at jio@s.arizona.edu.

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Short Term, continued from previous page  
groundwater conservation districts, and in Arizona legislation was enacted in 2007 to establish a local water district in the San Pedro River watershed.

Even while federal, state, and local policymakers and water managers work on long-term visions for 2020, 2030, and beyond, short-term and comparatively lower-cost actions can yield beneficial results while enhancing—not impeding—the success of those longer-term projects and programs. Fully recognizing the need for and supporting the importance of long-range planning, policy makers and water managers in the West should review available short-term actions and implement as many as possible. Federal policymakers can undertake or assist with a number of these short-term actions, especially with regard to interstate initiatives, the development of additional information resources, and participation in water rights adjudications. Even where policy changes are initiated at the state and local level, there is a vital role for federal agencies and policymakers in cooperating with and supporting those changes. The task is large and the time short, but progress and success are clearly within reach.

These recommendations are based on a 2007 NWRI White Paper, “Water 2010: A ‘Near-Sighted’ Program of Water Resource Management Improvements for the Western United States,” by William A. Blomquist. Blomquist is a professor of political science and dean of the School of Liberal Arts at Indiana University-Purdue University Indianapolis. Contact him at blomquis@iupui.edu. Jeffrey J. Mosher is executive director of the National Water Research Institute (NWRI), a 501(c)(3) organization that sponsors projects and programs to manage water resources, address water quality and water scarcity, and protect public health and the environment. Contact him at jmosher@nwruiusa.org.