



The Water Report™

Water Rights, Water Quality & Water Solutions in the West

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~~~~~ INTEGRATING WATER AND LAND USE PLANNING ~~~~~

STRATEGIES TO BRIDGE THE GOVERNANCE GAP

by Sarah Bates, Center for Natural Resources and Environmental Policy
University of Montana

INTRODUCTION

Historically, land use and water planning have occurred separately from one another. In most States, land use planning and decision making is the responsibility of local officials, while water allocation happens through the cumulative decisions of many individuals who develop water based on their immediate and projected needs. State officials exert control over water use indirectly, through their administration of water rights; federal agencies play a role through their management of large water storage and delivery projects and through implementation of federal environmental laws.

With few exceptions, land use planners have addressed water in a fairly cursory fashion, if at all. Planners assumed water would be available for all projected growth and would not be a limiting factor. Increasingly, however, land use decisions run headlong into concerns about the sustainability of water supplies and the impacts of withdrawals on aquatic ecosystems, recreational resources, and other important public values.

In some cases, existing uses are depleting finite water supplies, raising questions about their future reliability. For example, in some fast-growing rural areas of Arizona, homeowners draw their water from wells that prior to construction the State Engineer's Office declared “not reliable” due to insufficient underground supplies. Some homeowners did not realize the tenuous nature of their water supplies and have been forced to construct cisterns and pay for trucked-in water for domestic use.

Elsewhere, officials are beginning to face the high social, environmental, and economic costs of obtaining water to meet rising urban demands. Urban growth around Phoenix, Denver, and Boise has been fueled by voluntary, market-based reallocation of water from farms to cities, which will continue in the future. But public outcry over Las Vegas' long reach into rural Nevada signals renewed concerns over the impacts of large-scale water transfers, both on the rural communities from which the water is taken and on the pocketbooks of the consumers receiving it.

Water security issues are more visible in the arid western States, but they are emerging throughout the country. For example, fast-growing Atlanta, Georgia, ran into conflicts with neighboring States in the 1990s when its diversions from Lake Lanier threatened the downstream States' ability to receive the hydroelectric and water supply benefits they counted on. In a 2009 ruling, federal Judge Paul Magnuson ruled against Atlanta and the US Army Corps of Engineers (which operates the dam and reservoir from which Atlanta draws its water), but stayed his ruling for three years to allow the parties to work out their differences (*In re Tri States Water Rights Litigation*, 639 F. Supp. 2d 1308, 1355 (M.D. Fla. July 17, 2009)). They have failed to do so, and thus the conflict is likely to flare up again soon. The judge noted in his opinion that local governments — motivated by the promise of increased tax revenues — encourage unchecked growth but “do not sufficiently plan for the resources such unchecked growth will require. Nor do individual citizens consider frequently enough their consumption of our scarce resources” unless faced with an imminent loss of water as was the case in Atlanta in 2007.

Water & Land Use Planning

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Although absolute water shortages may provide a hard barrier to growth only in isolated places, the failure to connect land use and water planning will have far-reaching and increasingly unacceptable consequences throughout the country. The report on which this article is based describes this problem as a “governance gap” — i.e., a lack of integration in planning processes and a failure to examine and communicate the consequences of both land use and water choices at various levels of government. An earlier version of the report, published in 2007, provided background on the governance gap between water and land use planning, summarized emerging strategies to better integrate the two, and suggested options to improve land use and water governance to address the pressures of growth while ensuring sustainable water supplies for the future. See http://cnrep.org/documents/collaborative_governance_reports/bridging_the_gap.pdf.

This update and expands upon the earlier report, providing more concrete examples of emerging strategies and policy options. It also includes more information about the projected impacts of climate change on water supply reliability, the role of public lands in meeting urban water needs, and the implications of the economic downturn on water demand projections. In the three years since the first report was published, there has been widespread recognition of the need to integrate land use and water decisions, but progress toward that important goal remains sporadic.

A California water law symposium convened in 2010 provided an excellent overview of the accomplishments and challenges of that State’s ambitious effort to link land use and water through a combination of development approval and environmental review processes. See Golden Gate Univ. Environmental L.J., 4, no. 1 (2010): *Symposium Edition: Real Water: California’s Land Use-Water Law Turns Ten*. The symposium organizers noted that various “wet growth” initiatives have emerged throughout the country, but there is little agreement about what we are trying to achieve with these efforts. Are we seeking to minimize water depletions and thus protect and restore functioning aquatic ecosystems, or is the emphasis on achieving water security for a growing population in the face of climate uncertainty? This important question — toward what end? — is useful to keep in mind in evaluating the emerging strategies and policy options.

A SHIFTING LANDSCAPE

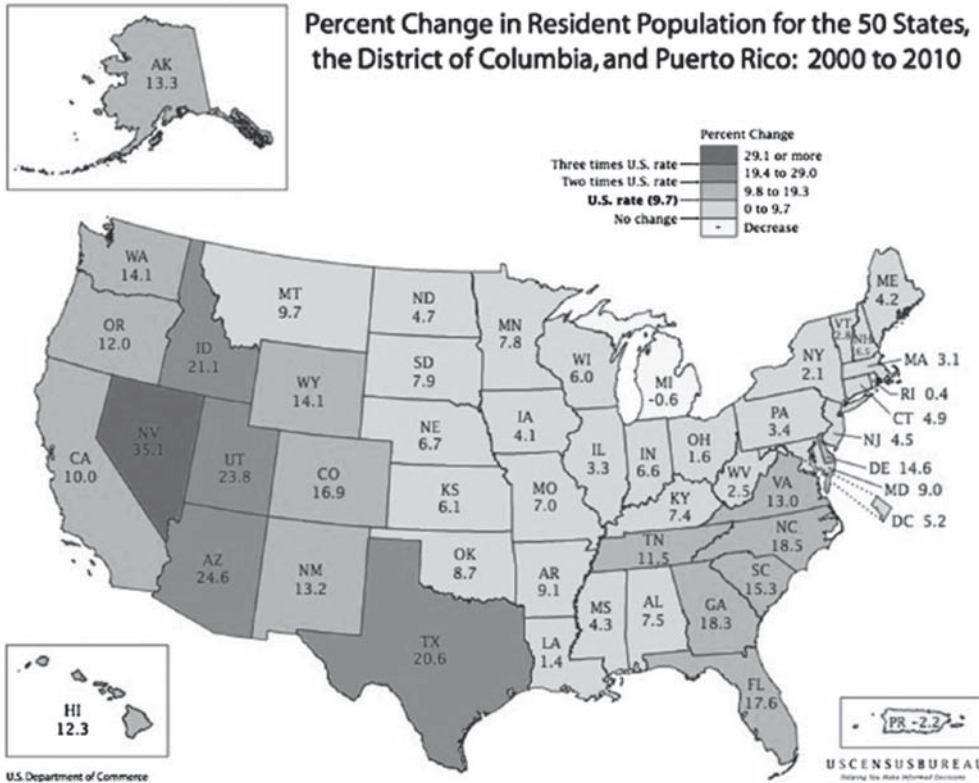
Water and land use decisions take place within the context of a landscape that is dynamic in every sense. Dramatic changes in population growth patterns and lifestyle choices bring new and different demands for (and impacts on) land and water. Moreover, heightened public concerns about the consequences of land and water decisions have resulted in new laws that require additional disclosure and protective measures. Understanding these factors is an important first step in appreciating governance challenges and the need for more integrated land and water strategies in the future.

Where the People Are

People are drawn to scenic, warm parts of the country. As demonstrated by information gathered in the US Census (see map), much of the fastest growth is occurring in areas with the most limited water supplies. Initial figures released from the 2010 Census revealed that the US population continues to grow and migrate from the Northeast and Midwest to the South and West. The West experienced a 13.8 percent growth rate between 2000-2010, making it the second fastest growing region behind the South, which grew at a rate of 14.3 percent. All five of the States with the highest growth rates are located in the West: Arizona (24.6 percent), Idaho (21.1 percent), Nevada (35.1 percent), Texas (20.6 percent), and Utah (23.8 percent).

Growth patterns are at least as important as absolute numbers of people, and the trend is toward larger houses spread farther apart from one

Percent Change in Resident Population for the 50 States, the District of Columbia, and Puerto Rico: 2000 to 2010



Water & Land Use Planning

Continuing Migration

Forecast Aspects

Water Use Efficiencies

Per Capita Use

Population & Water Demand

Supply Options Changing

another. A US Department of Agriculture analysis concluded that developed land in the contiguous US increased 34 percent between 1982 and 1997. During the same 15-year period, population grew by about 15 percent. Thus, our footprint is getting bigger: land consumption occurred at more than twice the rate of population growth. Additionally, as the US Environmental Protection Agency (EPA) noted in presenting this information, more than a quarter of all the land conversion from rural to urban and suburban uses since European settlement occurred in this same 15-year time period (EPA Watershed Academy Web, <http://cfpub.epa.gov/watertrain/index.cfm>).

The development slowdown that accompanied the Great Recession dampened the rate of growth but not the overall trends. Thus, we can expect to see continued migration of people to the warmer, drier parts of the country in coming decades.

Water Demand Forecasts

So far, lack of water has not prevented urban areas from expanding, but cities such as Las Vegas face formidable physical and political obstacles in their continuing efforts to meet future demands. Part of the challenge is accurately forecasting these demands, which are not linked as tightly as one might expect to population and economic growth figures.

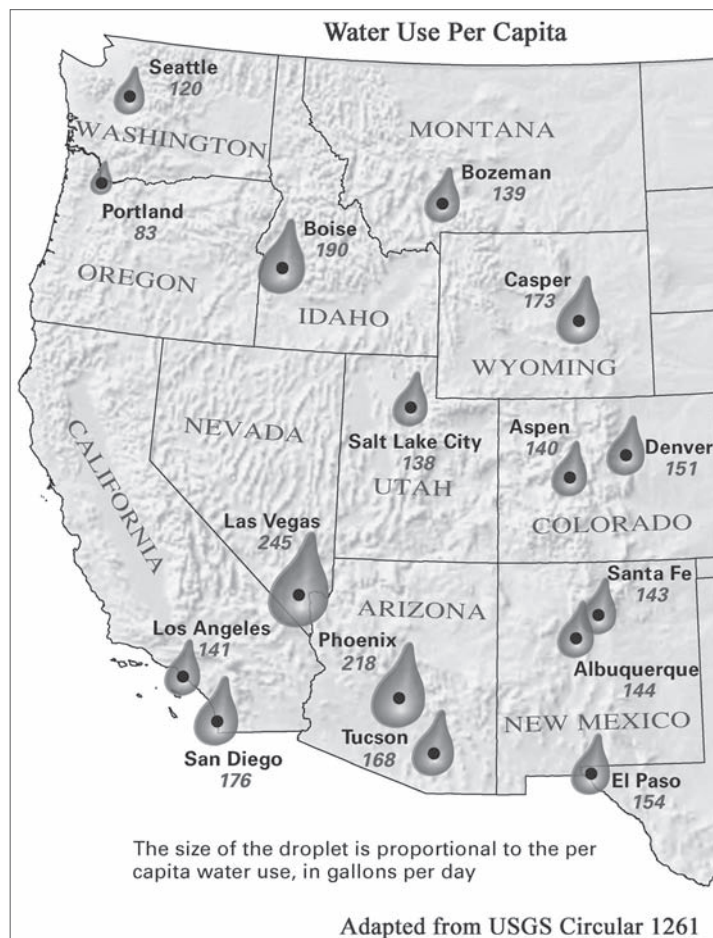
According to the US Geological Survey (USGS), the US as a whole currently uses less water now than it did in 1975, largely because of more efficient agricultural and industrial practices. Indeed, as a 2009 interpretation of the USGS data put it, "the U.S. now produces far more wealth, with far less water, than at any time in the past." Researchers analyzing the "economic productivity" of water (dollars of Gross Domestic Product per unit of water used), concluded that this metric has nearly tripled since the 1970s, to \$8.45 of GDP produced per hundred gallons used from only \$3.18 in 1975 (in 2005 dollars). See Pacific Institute Fact Sheet (2009).

About 86 percent of Americans depend on public supplies for their domestic water; most of the others rely on private wells. USGS found that the total amount of water withdrawn for public water supplies increased by just two percent between 2000 and 2005, during which time our national population expanded by five percent, reflecting gains in urban conservation and efficiency.

Per-capita water use varies tremendously, however, with the highest rates occurring in the dry western States where more than half of each household's water is used to water lawns and gardens. Thus, to a large

extent, efficiency gains in individual households will be offset by the ongoing migration of people to drier States and the trend toward larger houses on bigger (landscaped and irrigated) lots. A 2005 study of water and growth in California concluded that growth trends in that State indicate an increase in water demand by 40 percent between 2000 and 2030 if per capita use remains constant. Even if per capita use is reduced aggressively, urban water demand will increase by 1.5 million acre-feet, requiring water suppliers to look to a wide range of options, including: groundwater banking; recycling; conservation measures; and water transfers (Hanak 2005).

Indeed, water suppliers increasingly turn to the market to purchase water already developed for agricultural irrigation, or invest in conservation and wastewater re-use technology. Some cities in coastal areas are exploring options for desalting ocean water or treating brackish groundwater. The search for "new" water is no longer limited to looking upstream for a suitable dam site, or drilling a deeper well.



Water & Land Use Planning

Climate Trends

Climate Change Vulnerability

Climate Change as the Wild Card

Complicating the water supply picture, global climate change offers a new set of challenges and uncertainties. As climate change researcher Brad Udall testified before Congress in 2010, “water will be the delivery mechanism for many of the important impacts of climate change.”

Scientists warn that the very regions experiencing the fastest growth are likely to suffer the greatest impacts from a warming atmosphere. Current predictions agree that this warming trend will continue.

SCIENTISTS ARE CURRENTLY DOCUMENTING CLIMATE CHANGE TRENDS WHICH INCLUDE:

- Snowlines moving to higher elevations, with more precipitation falling as rain instead of snow in the winter, and earlier, “flashier” runoff patterns
- Flooding and erosion during high-runoff events, causing murkier rivers and damaging riparian habitat
- Low streamflows during the hottest months of the summer and early fall, with related fish kills, water quality problems, and competition among water users
- Drier western forests with more extensive insect infestations, leading to tree deaths and more frequent and intense fires.

The Colorado River Basin, which provides hydroelectric power and supplies drinking and irrigation water to 30 million people, may be especially vulnerable to these impacts. The Western Water Assessment concluded in a 2009 report that the reservoirs of the Colorado River could be dry up to half of the time if current demand projections are accurate and if Colorado River flows decline by 20 percent as some studies suggest (Rajagopalan et al. (2009)).

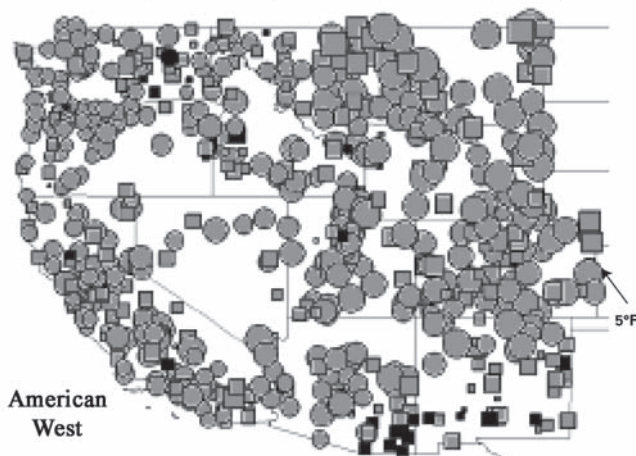
Water suppliers recognize their vulnerability and are exploring a variety of avenues to ensure water security in a less certain future. For example, in 2008, eight of the nation’s largest water utilities formed

the Water Utility Climate Alliance (WUCA), aimed at combining resources “to improve research into the impacts of climate change on water utilities, develop strategies for adapting to climate change and implement tactics to reduce their greenhouse gas emissions.” For its part, the Colorado Water Conservation Board sponsored a climate vulnerability study to help water managers understand and prepare for climate change impacts on shared watersheds (<http://cwcb.state.co.us/environment/climate-change/Pages/main.aspx>).

Some of the newest information on climate change illustrates a less-obvious connection between land use and water resources. Real estate development and recreational activities on desert lands in the Southwest generate large clouds of dust that travel to the high-country headwaters of the Colorado River, coating the winter snow with a dark, heat-absorbing layer. This results in faster snowmelt, which reduces the amount of water available to fill basin reservoirs by 5 percent. While this increases the vulnerability of the desert States to water shortages, few expect political leaders in Arizona or Nevada to restrict such activities for the sake of protecting high-country snowpack.

Similarly, recent analyses of the steep energy costs of developing, treating, and moving water have underscored the important link between water use and climate change. Water conservation initiatives thus do more than stretch that limited resource further; they also reduce the demand for energy and lower greenhouse gas emissions, thus providing some mitigation benefits.

Trend in March Average Minimum Temperature on Days with Precipitation (1949–2004)



Trend in March average minimum temperature on days with precipitation (1949–2004, the latest data available at the time of analysis). GREY indicates an increase in temperature and BLACK indicates a decrease. The size of the circle is proportional to the temperature change. For scale, the arrow indicates a 5°F change. The circles represent statistically significant findings and the squares are not significant. (from Knowles et. al. 2006)

Adapted from: “Climate Change in Colorado” CU-Western Water Assessment, 2008

WATER AND LAND USE PLANNING: THE HISTORICAL DISCONNECT

The persistent disconnect between water and land use planning arises from the separate legal bases for each area of governance. Water allocation occurs through thousands of individual decisions, with water rights administered by State agencies, while land use planning is within the authority of local officials. Generally speaking, water planning is subordinated to land use planning. That is, water planners obtain water to meet the demands of expected population growth; local land use planners do not constrain development in response to limited water supplies. It is important to understand these distinct legal authorities before considering options to bring the two closer together.

Water: Individual Actions, Limited State Oversight

Historically, States have taken the lead in recognizing and protecting private claims to use water. Distinct rules for water rights in the eastern and western States reflect different precipitation levels, land use patterns, and other traditions. Eastern States adopted the riparian rights approach, a rule based on shared use of streamflows by owners of adjacent lands. In the drier western States, a self-help rule based on the principle of “first come-first served” developed into what is now known as the Prior Appropriation

Land Use Planning Predominate

Private Rights

Water & Land Use Planning

States' Administration

Inadequate Groundwater Regulation

"Exempt" Wells

Development Water Use

Public Water Private Decisions

Water Quality & Quantity Linkages

Environmental Flows

Protecting Water Supply

Colorado's Statewide Planning

Doctrine. Importantly, the Prior Appropriation Doctrine separates water rights from land ownership. A few States retain a combination of these two principles, sometimes called a hybrid system of water rights. For more information on the complex administration of water rights, see Bates, et al. (1993).

State water administrators or judicial officials preside over complicated systems of water rights. In some States (such as Colorado), these rights are fully quantified, but many States are a long way from completing their adjudication procedures, so water rights holders are uncertain as to the amount of water they are legally entitled to use. Federal agencies and tribal governments participate in the State administrative processes through their assertion of "reserved water rights" — claims that date back to the establishment of national forests, national parks, and other federal reservations, as well as the recognition of Indian nations' sovereign authority over lands and waters within their territory.

Groundwater is an increasingly important source of water for growing cities in the urbanizing West. Groundwater laws vary by State, and — with a few notable exceptions — generally do a poor job of regulating withdrawals or recognizing the connection between aquifers and surface water. In addition to large public water providers that depend on finite aquifers to provide long-term water supplies, a virtual explosion of private domestic wells raises concerns about impacts on surface water supplies, water quality, and public safety.

In most cases, private domestic wells are "exempt" from any State controls, other than a requirement that the State be notified when a well is drilled. This lack of regulation and frequent lack of information about the extent of groundwater extraction is problematic, especially in rapidly growing rural and exurban areas throughout the country, many of which depend on individual wells rather than public water systems. In some cases, county officials continue to approve low-density housing developments in areas with limited or declining water tables, forcing homeowners to deepen their wells or face conflicts with senior water rights holders whose access to surface water is compromised by the proliferating domestic wells.

"Perhaps the single most common administrative challenge is the preference of some developers to use exempt wells to supply their subdivisions with water as a way of circumventing the permitting process needed to build community or public water systems. In some cases, such developers often install hundreds of wells in dense, concentrated subdivisions, and in many cases, these 'exempt' subdivisions are located in closed basins where water supplies are already limited." Nathan Bracken, Western States Water Council, *Exempt Wells in the West* (2010). See Bracken, *TWR* #74.

Water is a quintessentially public resource: many State constitutions provide that the water itself remains the property of the State, and water rights guarantee only the right to use it under particular conditions. Regardless of this, water use is loosely "managed" in a highly decentralized aggregation of mostly private decisions. State officials, who legally operate as trustees for the public's resource, exercise limited authority over the allocation and use of water. They generally step in only when there is a proposed change in use requiring approval or a conflict between several existing water users requiring a determination of whose rights will prevail.

States historically managed water rights administration separately from water quality protection. Increasingly, however, they are recognizing that the two are closely linked. On the one hand, polluted water is less useful for domestic supplies, irrigation, and recreation, so all water users have a clear stake in maintaining safe and sanitary water supplies. On the other hand, water diversions themselves may lead to the concentration of natural salts and chemicals and subsequent water quality problems — a fact that the legal system addresses inadequately, if at all. Despite the physical realities of water use and quality, California is the only western State with a single administrative body (the State Water Resources Control Board) that considers the two together.

In addition to minimizing the discharge of pollutants into surface waters, resource managers may seek to dilute contaminants through streamflow protection measures. Recreationists and other instream users benefit when streamflows are maintained for water quality protection. Conversely, water quality is a benefit not often recognized when justifying environmental flow protection programs for fish, wildlife, recreation, and scenic purposes. Alaska, Idaho, Oregon, and Washington are among the few States that provide for environmental flow protection specifically aimed at water quality protection.

State agencies responsible for water rights administration often engage in planning efforts to balance long-term supplies for their residents with protection of the public's water resource in its rivers, lakes, and aquifers. State water planning has historically focused on maximizing water use and fostering economic development. It rarely considers the value choices inherent in choosing among competing demands for water or allows for dialogue about the desired future conditions of public resources affected by water use.

In a promising move, the State of Colorado convened nine Basin Roundtables involving diverse local leaders and stakeholders in a statewide conversation about water choices in 2005. This collaborative approach emerged from a Statewide Water Supply Initiative, and aimed at involving diverse groups of people to learn about and provide input on water planning. The 2005 legislation also created a 27-member Inter-Basin Compact Commission to facilitate conversation within and among the State's river basins. The Roundtable process is a work in progress, and some are frustrated by the lack of concrete outcomes, but it offers the starting point for a dialogue and shared learning progress that is lacking in most States.

Water & Land Use Planning

Local Water Priorities

Local Land Use Administration

Typical Planning Aspects

Water Supply Uncertainties

Water Resources Assessment

Federal Sidebars

Conservation Spurred

The need for planning was noted in a letter from the Colorado Interbasin Compact Committee to Gov. Ritter and incoming Gov. Hickenlooper (Dec. 2010): “Status quo will likely lead to large transfers of water out of agriculture resulting in significant loss of agricultural lands, more dried-up streams threatening ecosystems and recreation-based economies, water-inefficient land use decisions, and continued paralysis on water supply projects.”

Some States do not conduct statewide water planning at all. Maryland, for example, leaves long-term water supply planning to its river basin commissions, which only cover portions of the State. For a comparative analysis of Maryland, Florida, New Jersey, and Oregon, see Cohen (2004).

Importantly, many critical water decisions occur at the local level, as municipal and regional water suppliers seek and hold water rights that enable them to ensure consistent deliveries into the future. While State agencies may be responsible for large-scale planning, the long-range plans of these local water suppliers play a key role in determining where water will come from and where it will be used in the future. This jurisdictional proximity to local land use planners offers the opportunity for more coordinated efforts, but such collaboration is not uniformly pursued.

Land Use: A Local Concern

In contrast with State-led water rights administration, land use decisions occur at the local level, though often under the guidance of State law. Unlike water law, land use planning explicitly embraces public values beyond a single resource use. Land use regulations significantly restrict the exercise of private property rights in favor of benefiting public interests identified in a comprehensive plan and in other public documents.

A community’s long-term vision is set out in its comprehensive (or general) plan, a policy document intended to guide specific land use decisions in the future. The comprehensive plan thus provides a blueprint for growth, defining the parameters within which development should be allowed and articulating priorities for community amenities.

Several aspects of a typical comprehensive plan relate closely to water planning. First, the plan typically assumes full build-out of available land in predicting population numbers, which are in turn used by water suppliers to forecast future demands. Second, the comprehensive plan includes a water infrastructure element, looking at the facilities necessary to serve projected development. This does not typically include a broad assessment of alternative sources of water or of development patterns that might minimize impacts on aquatic resources. The comprehensive plan is implemented through land use decisions specific to particular areas and proposed developments. Typically a development permit is conditioned on a certification of water availability, which may be issued by the local utility or a State agency administering water rights.

In some cases, development is allowed even in the face of uncertain water supplies. For example, outside the highly regulated “Active Management Areas” of Arizona’s most developed cities are numerous fast-growing communities in which development is proceeding in spite of documented insufficient groundwater to serve their domestic wells.

As described in more detail below, some States and local governments are requiring more rigorous assessments of the reliability of water necessary for new development. Although an encouraging trend, such “show-me-the-water” requirements occur late in the land use planning process. Accordingly, some land use experts are now calling for a more meaningful assessment of water resources earlier in the process, at the comprehensive planning stage.

THE FEDERAL OVERLAY

Federal Environmental Laws

Local land use and water decisions take place within the sidebars laid out by federal environmental statutes. The two most influential legal mandates with respect to local land and water decisions are the Endangered Species Act (which requires any action involving a federal permit to assure protection of listed species) and Section 404 of the Clean Water Act (which requires a permit for dredging and filling waters of the United States). These laws, enacted by Congress to provide a base level of protection for aquatic and other resources, mandate standards and processes with which local decisions must comply.

In 1990, for example, the EPA vetoed a federal permit for the proposed Two Forks Dam on Colorado’s South Platte River, intended to augment long-term water supplies for Denver and surrounding communities. EPA Administrator William K. Reilly determined that there were other, more acceptable sources of water that would not destroy valuable wetlands, wildlife areas, and a scenic canyon in a gold-medal trout stream. The dam was never built, and Denver has since implemented aggressive water conservation and reuse measures, water purchases and leases from farmers, and innovative arrangements to maximize coordination of surface and groundwater.

Water & Land Use Planning

Federal Land Management Impacts

Forests & Water

"Ecosystem Services"

Priority Watersheds Restoration

Landscape-Scale Approach

In addition to this important regulatory role, federal agencies also provide incentives, in-kind support, and information to support sustainable land use planning and practices. For example, the EPA's promotion of a watershed approach includes extensive on-line resources such as a "Watershed Academy" and support for local governments, landowner groups, and nongovernmental organizations wishing to plan for watershed protection and restoration. *See, e.g.* EPA's "Healthy Watersheds" program, <http://water.epa.gov/polwaste/nps/watershed/index.cfm>

Federal Public Lands

This discussion focuses on public processes that influence decisions about water and private lands, but it is important to bear in mind the importance of federally managed public lands — particularly national forests — in any discussion of the water-land linkage.

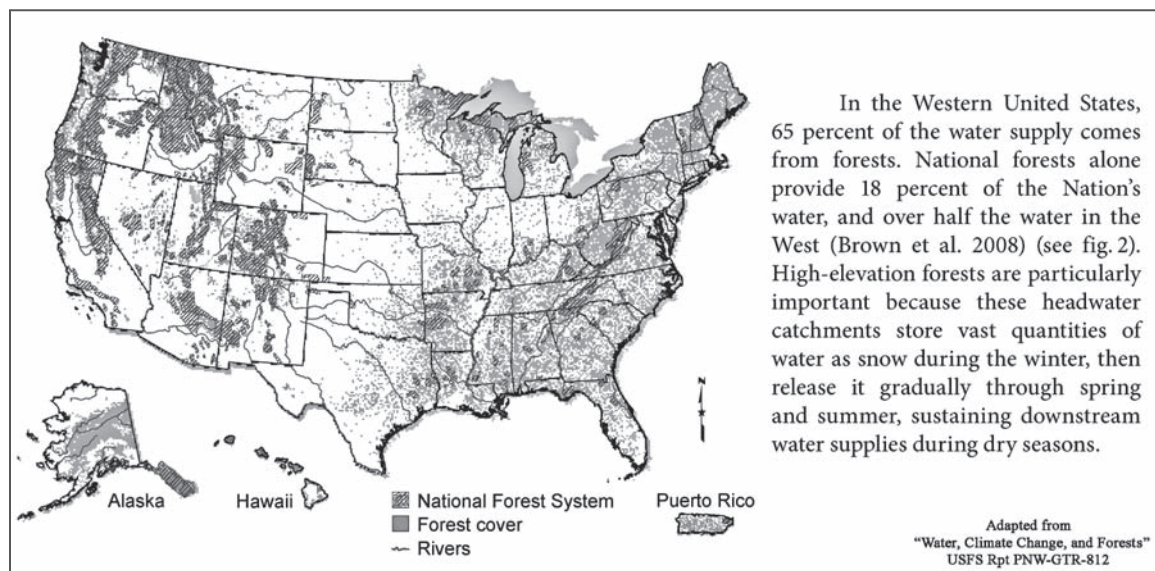
Congress authorized the creation of the national forests more than a century ago, in part, "for the purpose of securing favorable conditions of water flows." Today, the US Forest Service (within the Department of Agriculture) manages 193 million acres of public forestland, much of it in the high-country headwaters of our nation's major river systems. Former Forest Service Chief Mike Dombeck described water as the "forgotten forest product" but that is beginning to change with a growing awareness of the critical importance of these watersheds.

National forests provide water to 66 million people in the United States, including a high proportion of those in the western part of the country. For example, national forests supply over half of Wyoming's water yield, more than two-thirds of Colorado's water yield, and over 70 percent of the water used in Colorado's public water systems. As noted by the Forest Service, national forests compose only 17% of the land area in eight Inland West States, but deliver 62% of their water, making them the water towers of the Inland West.

In addition to providing the source of water to downstream water users, national forests furnish critical "ecosystem services" — such as: preventing erosion; filtering sediment and pollutants; replenishing aquifers; moderating floods and high runoff flows; and protecting water quality. Water flowing through national forests also supports ecologically valuable wetlands, meadows, and riparian corridors, as well as lakes and streams that provide economically important recreational opportunities. Some of these services can be quantified and assigned dollar values; others are less easy to measure. As described in more detail below, however, national forest managers are working together with municipal water suppliers to explore innovative partnerships to maintain and enhance these valuable services.

The Forest Service's new draft planning rule (released in February 2011) requires national forest planners to identify priority watersheds for maintenance or restoration early in the assessment process. The draft rule further requires each Forest Plan to include "components to maintain, protect, and restore public water supplies, groundwater, sole source aquifers, and source water protection areas" located on national forest lands (76 Fed. Reg. No. 30, 8480, 8491 (2/14/11)).

The Obama Administration's "America's Great Outdoors" report recognizes the critical role that public lands play in providing clean and sustainable water supplies, although the report focuses far more on water's importance for recreation and fish and wildlife habitat. It urges a landscape-scale ("all-lands") approach to coordinated management across jurisdictional lines to protect and restore healthy river systems (<http://americasgreatoutdoors.gov/>).



EMERGING STRATEGIES TO LINK LAND AND WATER

Water
& Land Use
PlanningLand/Water
Connections
RecognizedResponsible
GrowthEmerging
StrategiesCoordinated
Resources
ManagementWater
Availability
AssurancesWater Supply
GoalsApproach
Variables

Despite the many disconnects between water and land use planners, there is now widespread recognition of the need to think about these resources in a more integrated way. The number of recent public policy statements and actions illustrate how this awareness is emerging at many different levels of government.

RECENT “LAND AND WATER” DEVELOPMENTS INCLUDE:

- Responding to the disconnect between water resources and land use decisions, California’s Local Government Commission established a “First Stop Shop for Water Resources,” a clearinghouse for information and resources related to co-management of land and water resources (<http://water.lgc.org>).
- A 2008 report of the Western Governors’ Association included four specific recommendations for member States to integrate land use and water planning.
- The US Departments of Interior and Agriculture each announced national water initiatives linked to public land management, explicitly acknowledging the role of public lands as watersheds and calling for management practices aimed at ensuring sustained supplies of clean water for downstream urban residents and others.
- British Columbia’s 2008 “Living Water Smart” and “Green Communities Initiative” together articulate a policy framework and implementing actions aimed at settlement patterns aligned with sustainable use of water and other resources.
- At the Fifth World Water Forum in 2009, international discussions of “water security” included responsible growth as a critical component of achieving this goal.

Although these developments are encouraging, implementation remains a work in progress. The discussion that follows highlights emerging strategies in two broad areas: 1) land-use planning and decision processes; and 2) water supply planning and management. Each section begins with a proposed vision statement of what we might aim at achieving (the “toward what end?” question mentioned in the introduction), followed by specific examples of approaches that are moving us in that direction.

WATER-CONSCIOUS LAND-USE PLANNING

Vision: *Land use decisions take into account where the necessary water will come from, and at what cost (economic, environmental, and social). Land use decisions are coordinated on a large-landscape scale across jurisdictional boundaries. Land use planning is mindful of water supply constraints, and prioritizes development that is most consistent with maintaining water quality and ensuring sustainable supplies.*

“Show Me the Water”

Before approving proposed development, many States and municipalities require assurance that water is available to meet projected demands. In many cases, this is a cursory “check-off” step, but sometimes this evaluation proves an important opportunity for local land use officials to take a hard look at development options and impacts. A survey conducted by the Western Water Assessment concluded that nine of the eleven western States have some form of assured water supply statute; Utah and Idaho address this issue only through local initiatives (Klein and Kenney (undated)). Another study found that only two States outside the West — Vermont and Florida — have such statutes. *See Davies, “East Going West?” (2010).*

GOALS OF ASSURED WATER SUPPLY STATUTES INCLUDE:

- Protecting homeowners by preventing “high and dry” subdivisions
- Protecting taxpayers and other water customers by ensuring that developers cover the cost of new service
- Directing growth to minimize environmental impacts

The States’ approaches vary a great deal, as do their standards for what constitutes “adequate” water for new development. Although many have written on this subject, University of Utah Law Professor Lincoln Davies provided the most comprehensive framework for comparing the various approaches. He categorized the laws in terms of certain design elements (See Davies (2007)).

VARIABLES IN ASSURED WATER SUPPLY APPROACHES INCLUDE:

- **COMPULSORY REQUIREMENT:** Whether there is a strict requirement for all development defined by the statute or an option for local governments to require such review
- **STRINGENCY:** Whether the law requires substantial proof of “wet water” rather than paper rights, and whether the law defines the scope of hydrological review
- **UNIVERSALITY:** Whether it applies statewide or just in particular designated areas

Water & Land Use Planning

Non-Universal Approach “AMAs”

- **GRANULARITY:** Whether the law applies to all development or only those exceeding a threshold size or category
- **INTERCONNECTION WITH OTHER PLANS:** Whether the required analysis must explicitly link to existing water planning processes or documents

No State in the country has enacted an assured water supply law that incorporates all these design elements. The examples here illustrate the widely varying approaches among the States that have enacted some form of legislation to ensure adequate water for new development.

Arizona, which enacted the first such law in 1980, provides the best example of a non-universal approach. There are vastly different requirements for development within or outside of the State's five major urban areas, which are designated as “Active Management Areas” (AMAs) for groundwater conservation. (See Ariz. Rev. Stat. Sec. 45-401 et seq. (1980 Groundwater Management Act) and the implementing regulations at Ariz. Dept. of Water Resources, R. 12-15-703(b)). Within an AMA, development must be conditioned on proof of an “assured water supply” for 100 years. In the many fast-growing communities outside the AMA, development may proceed in the face of a certification from the State Engineer's Office that the water source is “not reliable” due to insufficient supplies.

California has pursued an aggressive — but highly decentralized — approach. Legislation enacted in 2001 requires: (1) an “early warning” in the form of assessment of water supply reliability for large residential, commercial, and industrial development as part of the environmental impact reports at the initial stage of development approval, prepared under the California Environmental Quality Act (CEQA); and (2) written verification of the availability of water for any project meeting these criteria and subject to CEQA (later in the process at the subdivision map stage). S.B. 221, ch. 642, 2001 Cal. Stat. 88; S.B. 610, ch. 643, 2001 Cal. Stat. 94.; for a more detailed description of how these laws are implemented, see Hanak (2010).

California does not prohibit developments from proceeding in the face of uncertain water supplies, but it does require rigorous assessment of water availability and impacts of necessary mitigation measures — essentially mandating a risk assessment as part of the development approval process. The California Supreme Court articulated guidelines for water adequacy analysis in *Vineyard Area Citizens for Responsible Growth v. City of Rancho Cordova*, 40 Cal. 4th 412 (2007); for a detailed analysis of this and related decisions, see Moose (2010). This is a good example of Davies' “stringency” element, as the statute spells out fairly explicit criteria for assessing the actual availability of water required by the proposed subdivision “during normal, single-dry, and multiple-dry years within a twenty-year projection.” Calif. Govt. Code Sec. 66473.7(a)(2).

The California approach integrates land use decisions with water planning by explicitly referencing urban water management plans as part of the process — and thus has resulted in more effective communications among planners from these different sectors.

The main objection to the State's approach is that too many projects escape scrutiny; the 500-unit threshold means that it does not meet the “granularity” element. The water verification mandate also does not apply to such big water users as industrial parks, hotels, or office buildings.

Some States with universal requirements, such as Nevada, require that a developer obtain certification of water availability from the State Engineer's Office. This is a more centralized approach than in California, but does not necessarily result in a more rigorous analysis of water reliability or necessary mitigation. The New Mexico State Engineer's Office examines proposed subdivisions in unincorporated areas to make sure that county plans will fulfill the anticipated maximum water requirements. This review includes analysis of both anticipated water demand and water availability (including water rights and hydrology) over a 40-year planning period.

Colorado's subdivision regulation statute (Colo. Rev. Stat. 30-28-133) provided the authority for El Paso County to enact a stringent regulation requiring developers to secure a 300-year water supply for each proposed subdivision. Colorado municipalities lacked the authority to enact such requirements until 2008, when H.B. 1141 specifically granted municipal governments the same authority as counties to require that developers show an adequate water supply, calling for professional assessment under “various hydrologic conditions.” Colo. Rev. Stat. 29-20-303. H.B. 1141 also only applies to subdivisions exceeding 50 units, and local governments have complete discretion in their evaluation of water adequacy.

Florida incorporates water needs into local planning by requiring each municipality to adopt a ten-year Water Supply Facilities Work Plan, which must project the local government's needs for the coming decade, identify and prioritize the water supply facilities and source(s) of water that will be needed to meet those needs, and include capital improvements identified as needed for the first five years. Florida's program is described in Cohen (2004). This “concurrency” review requirement effectively integrates land use and water supply planning, although it does not impose as strict an evaluation or balancing requirement as the California model.

California's Approach

Rigorous Supply Assessment

Effective Communication

Missed Water Uses

Nevada & New Mexico

Colorado Municipalities

Florida Supply Plans

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Assured-Supply Results

Evaluating the effectiveness of assured-supply laws is tricky, given all the variations in their design, but Davies, (*Assured Water Supply Laws in the Sustainability Context* (2010)) concluded that these statutes have succeeded in several aspects.

ASSURED-SUPPLY LAWS SUCCEEDED IN:

- Protecting consumers
- Improving local planning by requiring consideration of water supplies
- Encouraging coordination among water and land use planners
- Providing valuable early warning of legal and other uncertainties that might make water supplies vulnerable in the future
- Promoting water conservation, as developers have an incentive to reduce projected demands by incorporating water-saving measures into the new homes

Western States Assured Water Supply Laws

Arizona	1980 Groundwater Management Code established Active Management Areas (AMAs) where groundwater use is strictly regulated. In an AMA, the Assured Water Supply program applies. Anyone who offers land for sale or lease generally must demonstrate that "water of sufficient quantity and quality is available to sustain the proposed development for 100 years" before marketing the land. In 1995, the Arizona Department of Water Resources adopted rules that require new developments to be sustained predominantly by renewable supplies such as surface water. Outside of the AMAs the Adequate Water Supply program applies. Developers must obtain a determination from the state concerning the quantity and quality of available water but may still sell lots even if the water is found to be inadequate as long as the inadequacy finding is provided to prospective buyers. In 2007 local governments were granted authority to require a 100-year water adequacy determination before developers could sell lots in new subdivisions. ¹³
California	2001 SB 610 amended Cal. Water Code sec. 10910-12, to require that a water supply assessment be included in environmental reviews for projects of over 500 units. 2001 SB 221 amended Cal. Govt. Code sec. 66473 to provide that cities and counties cannot approve a subdivision map of more than 500 units unless a water purveyor provides written verification of a sufficient and reliable water supply. ¹⁴ Section 66473.7(a)(2) defines "sufficient water supply" as "the total water supplies available during normal, single-dry, and multiple-dry years within a 20-year projection that will meet the projected demand associated with the proposed subdivision, in addition to existing and planned future uses, including, but not limited to, agricultural and industrial uses."
Colorado	The 1972 Subdivision Act (SB 35) provides that counties must adopt subdivision regulations requiring developers to provide "adequate evidence that a water supply that is sufficient in terms of quality, quantity, and dependability will be available to ensure an adequate supply of water for the type of subdivision proposed." CRS sec. 30-28-133(3)(d). No subdivision may be approved unless the subdivider provides evidence of a sufficient water supply. CRS sec. 30-28-133(6a). HB 1141, enacted May 2008, created CRS sec. 29-20-301-306 which requires local governments to determine whether an applicant for a development permit for more than 50 units or single-family equivalents has satisfactorily shown an adequate water supply exists.
Idaho	No statutory provisions. Many local governments reportedly require that developers show adequate water rights or an adequate water supply. ¹⁵
Montana	MCA sec. 76-3-601 and 76-3-622 require that applications for new subdivisions include evidence of adequate water availability for new water supply systems, unless cisterns are proposed.
Nevada	Prior to approval, any division of land into five or more lots must show evidence of "the availability of water which...is sufficient in quantity for the reasonably foreseeable needs of the subdivision" as certified by the Nevada State Engineer. NRS sec. 278.349(3), sec. 278.377(1)(b). For division of land into four lots or less, the local body "may" require proof of water supply prior to approval. NRS 278.462. ¹⁶
New Mexico	The New Mexico Subdivision Act, NM Stat. Ann. sec. 47-6-9, requires that counties adopt regulations specifying requirements for "quantifying the maximum annual water requirements of subdivisions, including water for indoor and outdoor domestic uses;" "assessing water availability to meet the maximum annual water requirements of subdivisions;" and "water conservation measures." ¹⁷
Oregon	OR. REV. STAT. §§ 197.015(6) and 197.175(2)(a) (2005) require local governments to adopt comprehensive general plans governing local land use decisions and require that the water-land use connection be addressed including specifically taking into account the availability of water systems. State law leaves the details largely to localities. As a result, most localities have adopted ordinances incorporating water availability into their development regulations and ordinances, but there is a wide range of variability in how strictly the laws are applied.
Utah	No statutory provisions. Developers generally show local authorities that the State Engineer has approved the use of water, or provide a "will serve" letter from a water distributor agreeing to provide service.
Washington	RCW 19.27.097 provides that "Each applicant for a building permit of a building necessitating potable water shall provide evidence of an adequate water supply for the intended use of the building." RCW 58.17.110 requires that adequate provisions be made for potable water supplies before a subdivision can be approved.
Wyoming	Wyoming Statutes sec. 18-5-306 requires that each application for a subdivision permit produce "a study evaluating the water supply system proposed for the subdivision and the adequacy ... of the system."

Adapted from: B. Klein and D. Kenny, "The Land Use Planning, Water Resources and Climate Change Adaptation Connection"

Davies strongly cautioned, however, that such laws have little impact on sprawl and do not ensure meaningful consideration of environmental, equity, or economic considerations. If poorly designed, he concluded, these laws could do more harm than good, by encouraging over-estimation of water needs (and thus depletion of natural sources) and by misleading the public into believing that their community's water use is sustainable.

Importantly, assured-supply laws are not the only approach to assessing the reliability and impacts of obtaining water for projected growth. State legislatures could encourage this analysis earlier in the process by strengthening the requirements for a water resources element in comprehensive plans. For example, strengthening assured-supply law requirements might require:

- Identifying the known supplies of water for future development
- Quantifying the demand that would result from projected population growth
- Analyzing how demand will be met by available supplies (or what additional water will have to be obtained)

This level of analysis at the broader planning stage may prove more useful than asking for assurances that water is immediately available once a particular development is under consideration. It would be particularly useful if land use planners worked in close cooperation with water planners in this exercise in long-term thinking, and if the public were involved in a broad dialogue about the choices inherent in such planning.

For a description of an impressively forward-looking water element in Yankeetown, Florida's comprehensive plan, see Juergensmeyer (2010) at 369. See also Santa Fe County's recently enacted Sustainable Growth Management Plan, which explicitly links water infrastructure to desired growth areas (www.santafecounty.org/growth_management/sgmp).

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Denying Approval

New Wells Ban

Thorny Issue in Washington

Nevada Growth Considerations

Watershed Impacts

New York City's Watershed Partnership

Forest Water Valuation

"User Contribution" Programs

Denver Program

Limiting Growth

Water adequacy issues also arise when municipal growth outruns available water supplies or the infrastructure to deliver water to new users. In some instances, local governments have taken measures to slow or halt new development if water supplies are inadequate or if there is a direct impact on water quality that cannot be mitigated. Courts will uphold a city's power to refuse service until an area is ready for development and to deny subdivision approvals for new subdivisions with water and sewer service that are inconsistent with a county's land use plan. These generally are temporary limits. For a detailed discussion of the legal issues raised by growth limits and moratoria, see Tarlock and Van de Wetering (2006) and Tarlock(2010).

In 2009, Washington State's Department of Ecology (Ecology) placed a 120-day emergency ban on new wells in part of Kittitas County, responding to developers' practice of stretching the exempt well rules to provide water for subdivisions without getting permits. This remains a thorny area for state-local authority, as documented in a 2010 Western States Water Council report (Bracken, 2010). In fact, despite the State agency's bold action, the scope of environmental regulators' authority to regulate domestic wells remains unclear. The Washington State Attorney General issued an opinion recognizing Ecology's power to close over-appropriated basins to exempt wells, but not to change the terms of the exemption — stating that only the Legislature may change the exempt-well standards. *See* Carswell, Cally. "Death by a Thousand Wells" High Country News, Oct. 26, 2009.

In 2008, Washoe County, Nevada, passed a ballot measure directing city and county officials to revise growth plans to not exceed a total population of 600,000, a number based on evaluation of available water supplies. In the following year, the State legislature considered, but did not enact, a bill that would have elevated this to State law and included stricter growth limits. The subsequent economic slowdown reduced pressure on Washoe County's water resources, and a 2010 assessment concluded that sustainable water resources of approximately 183,200 acre feet per year are more than adequate to serve a projected 2030 population of 590,500 based on the 2010 Census forecast. Traver, Jess. "Western Regional Water Commission Approves 2030 Sustainable Water Forecast" The Builders Magazine, 2010, at <http://buildersmagazine.com/2010/ja/water.htm>.

Protecting and Restoring the Source

Planners and local government officials are taking steps to address the watershed-wide impacts of their land use decisions. Some examples include zoning and subdivision rules aimed at protecting sensitive stream corridors, aquifer recharge initiatives, and clustered development to minimize impervious surfaces (streets, parking lots, and other hard surfaces that prevent precipitation from soaking into the soil). These measures protect water quality, enhance public safety, and provide amenity values such as community open space and greenways.

Protecting a local water source usually requires reaching well beyond municipal boundaries and includes forming partnerships with people and agencies that own the lands that provide valuable watershed services. For example, in 1997 New York City entered into an agreement with regional partners to protect its 2,000-square-mile watershed, which extends 125 miles north and west of the city. Collaborative work with a regional forum called the Watershed Protection and Partnership Council protects the city's drinking water quality and avoids the estimated \$8 billion price tag for a new filtration system plus \$300 million annual operating costs. The partnership also emphasizes economic opportunities for residents in the upstate watershed communities. *See* www.dos.state.ny.us/watershed/index.html.

Other cities are working directly with public land managers to protect their watersheds. A literature review conducted by the Sonoran Institute for the nonprofit Carpe Diem West concluded that the annual value of water produced by Forest Service lands alone is in the billions of dollars. Thus, the trend toward "payment for watershed services" (or, as Carpe Diem West describes it, "user contribution programs") illustrates a mutually beneficial partnership model. The literature review and a policy paper outlining key principles of User Contribution Programs are both available at www.carpediemwest.org. The program descriptions that follow draw heavily from the Carpe Diem West policy paper, dated October 2010, which also describes programs in Ashland (OR), Phoenix, Tacoma (WA), and Salt Lake City.

Denver's "Forest to Faucet" initiative is the largest example of such an approach. Large wildfires in 1996 and 2002 led to erosion and sedimentation in Denver Water's mountain reservoirs, forcing the municipal supplier to spend some \$30 million to dredge the muck from just one reservoir. To prevent such expensive impacts in the future, the agency partnered with the US Forest Service to assess and prioritize threats to the watersheds that supply the city's water. In August 2010, the two agencies signed a memorandum of understanding in which they agreed to equally share the \$32 million price tag of on-the-ground treatment projects over five years (see www.denverwater.org/SupplyPlanning/WaterSupply/PartnershipUSFS/).

Most of the projects contemplated by the Forest to Faucet agreement are aimed at reducing the risk and severity of wildfires on lands owned by the Forest Service and Denver Water, largely by thinning and

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Santa Fe Watershed Plan

Optional Watershed Fee

Ecosystem Services

prescribed burning. Additional measures may include road and culvert removal. Denver Water intends to pay for its share of the work with a modest rate increase for water customers, and reports that it does not expect significant customer resistance.

Santa Fe's watershed protection program predated Denver's, emerging in the wake of the Cerro Grande Fire in 2000. The fire prompted Santa Fe officials to address the vulnerability of their watershed on national forest land. Using a \$50,000 grant from the Forest Service's Collaborative Forest Restoration Program, the city developed a comprehensive watershed plan addressing water and vegetation management, education, and funding. The plan calls for a phased-in "ecosystem services" fee (estimated at \$4-\$8 per year) for water customers to support this work. View the full plan at www.santafenm.gov/documentview.aspx?DID=4354.

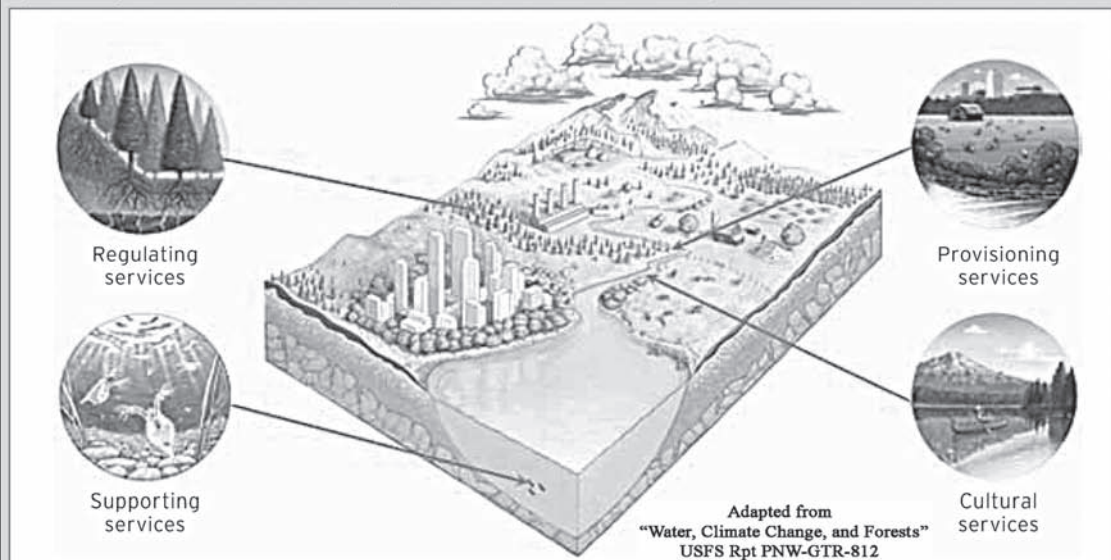
The nonprofit National Forest Foundation pioneered such programs by encouraging voluntary water user fee programs throughout the country. For example, in 2006 Snowbird Resort in Utah initiated an opt-out program that adds a one-dollar charge to each guest's bill to pay for watershed projects that will benefit the Little Cottonwood Canyon watershed. No guest has ever opted out of the charge. A three-member board (including Snowbird, the Forest Service, and the National Forest Foundation) determines how to spend the funds raised through this fee. The National Forest Foundation offers a 25 percent match for watershed protection funds raised through such partnerships.

River and watershed protection cannot be achieved solely by regulations and intergovernmental partnerships. Thousands of individual residents' choices and land use practices are equally important for

What are ecosystem services?

Ecosystem services are benefits obtained from nature that are critical to human health and well-being. These services are typically grouped into four categories: regulating, supporting, provisioning, and cultural (Millennium Ecosystem Assessment

2005). Watershed services are a subset of ecosystem services that are associated with water and watersheds (fig. 3). Definitions of these different types of services and examples pertaining to watersheds are provided below.



- **Regulating services** are benefits obtained from the regulation of ecosystem processes. Examples include flow regulation (surface and groundwater flow), erosion control, water purification, and water temperature control.
- **Provisioning services** include products obtained from ecosystems. Principal watershed services from forests include freshwater supply for domestic, agricultural, commercial, industrial, and other uses.
- **Supporting services** include the basic ecological elements and processes necessary to sustain ecosystems. These include processes like soil development, and nutrient and water cycling.
- **Cultural services** are nonmaterial benefits people obtain from forests through recreation, spiritual enrichment, reflection, and aesthetic experiences. Forests provide significant water-based recreational opportunities in the form of boating, fishing, skiing, camping, hiking, sightseeing, and other activities. They also offer education and interpretation opportunities and afford protection for culturally and historically important water resources.

These services are provided naturally by well-functioning ecosystems. They are immensely valuable, because if they are compromised, replacing them is often not possible or is very costly. Ecological economists have begun efforts to value some ecosystem services, with the ultimate goal of enhancing efforts to more efficiently use, maintain, and protect them. Provision of water is a vital ecosystem service provided by forests, so one might ask: **What is the value of water?**

Water is essential for life—The Nation's total supply of water and ecosystem services provided by healthy watersheds are priceless. Because forests provide so much of the country's water, they are of tremendous importance. A lower bound on the total value of water from national forests alone is estimated to be several billions of dollars per year (Brown 2004). An accurate estimate of the total value is impossible to achieve, however, because only some products and services are assigned an economic market value. Moreover, these values apply at the margin, whereas forests tend to provide a large (nonmarginal) portion of the total water supply (Brown 2004).

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the protection of any given watershed. Accordingly, agencies and nongovernmental groups direct a wide range of educational campaigns at landowners and urban residents to urge better practices — not dumping oil and other pollutants into stormwater drains, avoiding construction within an active river channel, and a variety of “water smart” landscaping practices to minimize runoff and contamination. The Clark Fork Coalition’s Stream Care Guide (http://issuu.com/clarkforkcoalition/docs/cfc_stream_care_guide) provides a good example. See also EPA’s watershed protection resources at <http://water.epa.gov/type/watersheds/index.cfm>.

Reclaiming Freshwater Sustainability

Reducing Our Water Footprint

We are coming to understand that our patterns of water use are not sustainable over the long run. Journalist Marc Reisner made a compelling case for the political folly of overreaching water projects and growth premised on a limited and declining resource in his 1986 book, *Cadillac Desert: The American West and Its Disappearing Water*. A quarter-century later, a group of 15 scientists revisited and applied quantitative measures to Reisner’s major observations, and found them prescient and accurate today (Sabo, et al. (2010)). These experts concluded that the key action step for “reclaiming freshwater sustainability” in the arid parts of the country is to reduce region wide human appropriation of streamflows by 16 percent, suggesting that significant gains could be achieved through improved urban and agricultural water use efficiency.

Building Code Actions

Local officials are increasingly incorporating conservation and efficient use requirements in building codes and similar measures. In some cases, the goal is “no net increase” in water demand through mandatory offsets for new uses. The City of Santa Fe’s Water Budget Program, for example, requires that the impact of proposed new development be offset either through conservation in existing development or transfer of water rights to the City (Harwood (2007)). In general, new development projects with lower water use may offset demand through transfer of water rights and/or through conservation achieved in existing development. New development projects with higher demand are only allowed to offset demand through transfer of water rights. Higher demand includes commercial projects that require five acre-feet per year (AFY) or more, residential projects that require 10 AFY or more, or mixed use projects that require 7.5 AFY or more.

Efficiency Incentives

It’s not surprising that the strictest water conservation ordinances match up with the driest part of the country. The high-desert city of Prescott, Arizona, for example, enacted mandatory standards for new construction and replacement fixtures in existing homes. The city offers substantial incentives (monetary awards reflected as credits on homeowners’ water bills) for homeowners installing more efficient fixtures and water-saving systems such as rainwater cisterns.

Mandated Use Reduction

Other parts of the country are feeling the water pinch as well, and many are taking steps to reduce water demand through building codes and other local ordinances. For example, in 2008 the City Council of Alpharetta, Georgia mandated a 10 percent reduction in water use, which has since been implemented through water conservation permit requirements. A developer must submit a water reduction plan with the application for a construction permit, referencing a matrix to determine the amount of water normally consumed by a commercial building (including landscaping).

Rainfall Harvesting

In other cases, communities are updating building codes to encourage people to capture rainfall in order to reduce stormwater runoff (a major source of pollution) and store water for landscape irrigation. Rainfall harvesting is growing quickly in popularity throughout the country, with practices ranging from simple home rainbarrels to elaborate catchment systems on commercial buildings, as well as “green roofs” capable of absorbing rainfall and storing it for later use. The City of Portland, Oregon, pays incentives to residents who disconnect their homes’ downspouts and redirect rainwater from the storm sewer to their gardens instead. Albuquerque requires new homes to be constructed with rainwater collection systems. See Glennon (2009) at 191.

“Smart Growth” & Construction

Conservation and “smart growth” groups provide many suggestions for how to incorporate water-saving measures into new construction (see Western Resource Advocates (2009) and the Rocky Mountain Land Use Institute’s Sustainable Community Development Code at: <http://law.du.edu/index.php/rmlui/program/sustainable-community-development-code-framework>). The US Green Building Council’s LEED certification includes a prerequisite of a 20 percent reduction in aggregate water use. Once this prerequisite is met, the developer may earn additional points for planting water-efficient landscaping, using innovative wastewater technologies, and reducing water below the initial 20 percent threshold. US Green Building Council, LEED 2009 for New Construction and Major Renovations. 2009.

Homeowner Covenants

Sometimes, the key is removing obstacles to water conservation, such as homeowner covenants that require minimum lawn sizes or restrictions on gray water reuse. Colorado amended its State law to allow rainwater harvesting in 2009 (Colo. Sen. Bill 09-080, codified at Colo. Rev. Stat. 37-90-105(f)). The bill, however, has serious limitations that do not allow this practice in urban settings or on commercial buildings. For a thorough treatment of the legal issues raised by rainfall harvest, see Juergensmeyer (2010); this article provided several of the examples cited above and is an excellent source on options for achieving conservation through local land use measures.

Water & Land Use Planning

Jurisdictional Transcendence

Partnerships to Authorized Entities

New Restoration Entities

Regional Collaborations

New Frameworks Proposed

Population Projections

COMMUNITY-CONSCIOUS WATER PLANNING

Vision: *Water planning and development decisions acknowledge that infrastructure availability often sparks growth (“build it and they will come”), and thus incorporate deliberative public dialogue about long-term land use priorities. Water suppliers seek to make the best use of limited resources, minimizing demands, and ensuring that the impacts of water development on highly valued landscapes are acknowledged and taken into account before final decisions are made. Residents are aware of the source of their water and the benefits of conservation and efficient use.*

Regional Water Planning and Collaboration

Very few river basins exist within a single political jurisdiction. More commonly, waterways traverse counties, States, and sometimes nations. Thus, water is shared among people living in places with different rules, visions, and practices. Water can be a source of extreme conflict or a connection that unifies people across these artificial lines. A thoughtful exploration of this concept, drawing upon experience in transboundary river basins throughout the world, is provided in Delli Priscoli & Wolf (2009).

Water- and growth-related challenges in places as diverse as Atlanta and Las Vegas illustrate the need for solutions that transcend jurisdictional boundaries. In some places, diverse groups of stakeholders and government officials have invented new forms of governance based on river basin and watershed coordination. Such initiatives range from informal cooperative partnerships to entities authorized by federal legislation and are often focused on endangered species recovery or other large-scale restoration goals. The discussion in this section is excerpted from Center for Natural Resources & Environmental Policy, “*Federal-State Collaborative Initiatives for Resource Management and Restoration*” — which includes details on the examples listed here (http://cnrep.org/documents/montana_policy_reports/Federal-State-Collaborative-Initiatives-12-2-09.pdf).

IN ADDITION TO HUNDREDS OF SMALLER WATERSHED ALLIANCES, THE LARGER FORMAL ENTITIES INCLUDE:

- Comprehensive Everglades Restoration Plan
- Chesapeake Bay Program
- Lower Colorado Multi-Species Conservation Program
- North Platte Endangered Species Implementation Program
- Missouri River Recovery Implementation Committee
- Shared Strategy for Puget Sound

Regional collaborative initiatives have emerged to bridge gaps in governance — situations in which no single entity has the full range of legal authority and political capital necessary to address difficult boundary-crossing issues. In short, parties engage in collaboration for the very practical reason that it often leads to better decisions with greater likelihood of implementation than more traditional approaches (notice-and-comment rulemaking, litigation, etc.). Merely applying scientific or technical knowledge to address economic, social, or environmental concerns cannot close the governance gap that prompts these initiatives. Nor is the answer simply a matter of managing land or water more efficiently.

At its core, regional collaboration is a question of how people can integrate the interests and concerns of multiple jurisdictions, government agencies, and public stakeholders to address complex regional issues. On the other hand, focusing entirely on building relationships will not restore a compromised river ecosystem or recover an endangered species. A successful regional initiative articulates clearly the measures by which success will be judged, and is prepared to adapt practices if necessary to achieve its goals.

Historically, federal efforts to encourage river basin-scale planning have not been successful, but a number of people are calling for a return to a more formal approach to watershed planning and coordination. Note the recommendations of the Western Water Policy Review Advisory Commission (1999). Legal scholar Janet Neuman, for example, proposed a planning framework that would start with a realistic assessment of sustainable water supplies and new sources, and would aim at producing more informed public decisions on water use (Neuman (2005)).

Projecting Ahead

There is a limited but potentially powerful role for water providers and State water agencies to help tie together land use and water planning. A 2005 master’s thesis identified the population projection process as a critical intersection of land use and water planning. The researcher also noted this process as an unrealized opportunity to question the assumptions that often lead to aggressive pursuits of water with little or no considerations of the tradeoffs of growth, alternative future scenarios, or whether residents are willing to pay for the infrastructure to support projected growth. *See Coulson (2005)).*

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Planning Reliability

A study of water for growth in California highlighted the importance of coordinated infrastructure planning that includes accurate population projections. That State's mandatory Urban Water Management Plans offer tremendous tools for local land use planners, especially when their demand projections look at both land use patterns and accurate population projections (Hanak (2005)). California's Urban Water Management Plan requires the State's 400 largest wholesale and retail municipal suppliers (those with at least 3,000 connections or delivering at least 3,000 acre-feet per year) to prepare 20-year Urban Water Management Plans every five years.

In October 2007, the Colorado Supreme Court interpreted the State water agency's responsibility for determining the appropriate water supply planning period and evaluating potential population growth and water demands during that period. It questioned the reliability of a planning period that exceeds fifty years, noting that projecting water needs over such a long period may lead to speculation in water, which is not allowed under Colorado water law. *Pagosa Area Water and Sanitation Dist. v. Trout Unlimited*, 219 P.3d 774 (2009).

Efficient Use

Limiting and Mitigating for Water Use

It is no longer possible to "build our way out" of complex water disputes, but we can reduce or avoid some conflicts by reducing demands and ensuring more sustainable long-term water supplies. State water laws have evolved to recognize the value of encouraging more efficient uses of water (e.g. salvage laws; conjunctive management of surface and groundwater; water banking; tiered pricing). Economics and environmental concerns are encouraging a great deal of movement in this direction.

Conservation Incentives

Since conservation is the cheapest source of new water, municipal and other suppliers find it worthwhile to provide direct incentives for reduce customer demand and thus alleviate the need for costly new infrastructure. The Southern Nevada Water Authority's "Cash for Grass" program pays \$1.50/square foot of irrigated lawn converted to less water consumptive landscaping. In 2007, nearly 5,400 homeowners converted 6.5 million square feet of grass under this program, while 468 businesses removed more than 12 million square feet of grass. *Las Vegas Sun*, June 17, 2008.

Use Limits

In some instances, water providers have responded to limited water supplies by pursuing much stricter limits on water use — essentially declaring "no net increase" in water usage, regardless of expanded demand. (See discussion above about similar goals set by local land use officials in communities such as Santa Fe.) California's East Bay Municipal Utility District (EBMUD) considered the likely increased uncertainties of its water sources and determined that all new service would be conditioned on "water-neutral" development, achieved by developer-paid investments in water conservation, both on-site and off-site.

"Water Neutral" Development

In the first development approved under this provision, EBMUD required the developer to demonstrate that twice as much water would be conserved through various efficiency measures as would be required to serve the development's needs. Developers achieved on-site water saving with efficient appliances, water-efficient landscaping, and recycled water for common areas. Developers paid a "Water Mitigation Fee" (which was approximately \$8,600 in 2009) to finance off-site conservation measures. For more information on EBMUD's experience, see Kanouse and Wallace (2010).

Mitigation Credits

A similar program in Washington State requires homeowners in certain heavily used groundwater basins to purchase a "groundwater mitigation credit" prior to building a home that depends on a shallow domestic well. Monies generated by this fee go toward acquisition of senior water rights to enhance instream flows that otherwise would be impacted by the cumulative impact of multiple "exempt" wells. Information on the pioneering program in Walla Walla County and several others emerging in the region is available in Bates (2009).

Treatment & Reuse

Far more aggressive means of stretching limited water supplies will become attractive as supplies tighten. Tucson has been treating and reusing wastewater for landscape irrigation for more than two decades, and other cities are following suit, including: San Diego; Las Vegas; San Antonio; Boca Raton; Long Beach; St. Petersburg; Los Angeles; and parts of New York City. Some communities are experimenting with programs to treat wastewater to a high enough quality to supply indoor use, including drinking water. Glennon (2009) explored this concept in a chapter titled "Shall We Drink Pee?" In California, Orange County's "Groundwater Replenishment System" recharges the groundwater basin with 70,000 acre-feet per year of highly purified recycled water for storage and reuse (Hanak (2005)).

Pricing Strategies

Finally, water providers can reduce overall water usage by using pricing mechanisms — such as tiered pricing or rebates for conservation — that provide penalties for profligate use and incentives for reduced consumption. Studies of existing programs indicate that price signals need to be aggressive enough to encourage new behavior; people will save water if it saves them money.

Water & Land Use Planning

Marketing Issues

Ag-to-Urban Transfers

New Options

Instream Flow Actions

Water Law Flexibility

Population & Climate Change

Broadening Interest

Key Policy Options

Moving Water to Meet New Needs: Transfers and Markets

Water managers face many challenges today: recurrent drought and projected impacts of climate change; fierce and diverse challenges to new dams, pipelines, and other infrastructure; and rising costs for the energy necessary to move water to where it's needed. In response, it simply makes good sense to explore flexible institutional arrangements to ensure reliable water supplies in cooperation with others.

Water banks, water leasing arrangements, regional drought contingency plans, and other initiatives suggest that measures encouraging voluntary transfers of water from lower to higher-valued uses may provide an important means of ensuring sufficient water supplies over time. As legal scholar Robert Glennon puts it, "water marketing lessens the pressure to build new dams, divert additional surface water, and drill more wells." However, he also notes that: "Resistance to water marketing is visceral in some quarters, an ideological response rooted in opposition to markets, especially for water." Glennon (2009).

Given the large proportion of water commanded by irrigators in the western United States, transfers from agricultural to urban uses are likely to continue and expand. Historical bad practices — such as the "buy and dry" strategy of acquiring vast tracts of farmland for its water — left a deep distrust among many rural residents and environmentalists. New approaches that respect these concerns include dry-year lease options, "smart fallowing," and requirements that any transfers include dedication of water for instream flows. A growing literature describes the important role that water transfers will play in meeting future water demands. *See, e.g.,* National Research Council (1992), Glennon (2005), and Colby & Jacobs (2007).

Moreover, the market serves environmental interests by allowing State agencies and nongovernmental groups to purchase or lease senior water rights and convert those diversions to instream flows, restoring important fisheries or recreational rivers. These voluntary transactions often involve relatively small amounts of water, but this can make a tremendous difference to the viability of a tributary stream that otherwise would be dried up during peak irrigation season. Montana's Clark Fork Coalition — an advocacy group whose focus includes clean-up and protection of impaired waterways — recognized several years ago that full restoration often includes a "just add water" step, and thus expanded its toolkit to include water leasing and flow restoration (*See* www.clarkfork.org/stream-renewal-initiative/flow-restoration.html).

As noted by Colorado Supreme Court Justice Greg Hobbs, one of the advantages of the prior appropriation system of water rights in the western US is the opportunity it provides to move water from one use to another: "Flexibility emanates from the fact that the right of use can be transferred to another, subject to the requirement that other appropriators not be injured by the change." Hobbs (2007). This flexibility offers an important tool to address the challenges of matching water demand with sustainable supplies, especially in the arid western U.S.

CONCLUSION

POLICY OPTIONS TO BRIDGE THE GOVERNANCE GAP — TOWARDS A SUSTAINABLE FUTURE

This article has described the historical disconnect between water supply planning and land use decision processes. Despite the obvious relationship between where and how people live and the water they need to do so, our institutions have been slow to encourage decision-makers to think about land and water use together and to engage in a dialogue with affected publics about the consequences of those decisions. The dual pressures of population growth and climate change (along with impacts of energy production) are prompting a more urgent look at this connection.

Fortunately, in the four years since we published the first edition of a report on these issues, we have observed far broader interest in this subject and many new initiatives aimed at overcoming the disconnect. The strategies profiled here offer ideas of how to integrate consideration of water resources into land use planning, as well as examples of State water and land use policy reforms that may encourage more integrated approaches in the future.

Based on our experience and discussions with the people on the front lines of this work, a few key policy options that would encourage better overall integration of water and land use planning have been identified.

KEY POLICY OPTIONS FOR INTEGRATING WATER AND LAND USE PLANNING INCLUDE:

- Evaluating broad questions related to water supplies and quality early in the planning process (e.g. comprehensive plan) and requiring a hard look at the sustainability of anticipated water sources for proposed new development prior to approval
- Tightening the exempt wells loophole to discourage its use in subdivision development and implementing appropriate measures to mitigate for the impacts of groundwater pumping on streams and aquifers
- Valuing and protecting the ecosystem services of key watershed lands, source aquifers, and other landscape components that enhance water supplies and quality

Water & Land Use Planning

Facing Consequences

- Evaluating development implications of alternative water supply scenarios and ensuring consistency with land use priorities
- Reducing overall demands and stretch existing supplies by mandating and providing incentives for conservation and efficiency throughout the water and energy sectors

Facing the consequences of well-established growth patterns is not an easy proposition, but it is a necessary step in moving toward a sustainable future. We can no longer be indifferent to the environmental and other costs of our land use and water management practices. In taking the first step and thinking more deliberately about the consequences of growth, communities facing water security concerns will alter our course toward a more sustainable way to live in and with this landscape.

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WEBSITE: The original report “*Bridging the Governance Gap — Strategies to Integrate Water and Land Use Planning*” Policy Report No. 7 (2nd Edition) is available at the website of the Center for Natural Resources and Environmental Policy (http://cnrep.org/documents/montana_policy_reports/26910-Public-Policy-Water-Land-Use-Report-2011.pdf).

Author’s Note:

The report on which the above article was based builds on work done in partnership with a number of organizations and individuals involved in water policy and land use planning. The report is also being adapted for publication as a law review article in the *Natural Resources Journal*.

The first edition of the report, published in 2007, received wide distribution. We shared its findings in meetings convened by the American Planning Association (national and State chapters), the Lincoln Institute of Land Policy, the Council of State Governments-WEST, the Rocky Mountain Land Use Institute, the Oregon Association of Counties, statewide watershed coordinating councils in Montana and Colorado, the US Environmental Protection Agency, and the Universities of Colorado, Montana, and Wyoming; discussions with leaders of the Western Governors’ Association, the Western Planning Association, and the Western Interstate Region of the National Association of Counties; and in publications such as *Headwaters News*, *Environmental Law Reporter*, *The Water Report*, *Public Land & Resources Law Review*, and *Planning & Environmental Law*.

This informative dialogue highlighted the need to update and expand the 2007 report to reflect many emerging strategies to link land use and water throughout the country. This second edition reflects additional input from scholars and practitioners throughout the country, whose published work is listed at the end of the report. We are grateful for the perceptive, forward-looking observations of Douglas Kenney, Dan Tarlock, Lora Lucero, Conci Bokum, Scott Coulsen, Peter Pollock, Kimery Wiltshire, Jim Holway, Michael Campana, Brianna Randall, Barbara Hall, Mary Sexton, and Michelle Bryan Mudd, as well as the many organizations whose invitations to share this scholarship have enriched its content and reach.

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Water & Land Use Planning

INTEGRATING WATER AND LAND USE PLANNING

STRATEGIES TO BRIDGE THE GOVERNANCE GAP

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Water Sharing

Demand v. Supply

New Strategies

Work Group

Diverse Viewpoints

Transfers

Storage

General Agreements

Work Group Tasks

MULTI-SECTOR WATER SHARING

AGRICULTURAL - URBAN - ENVIRONMENTAL

INNOVATIVE STRATEGIES FOR THE COLORADO RIVER BASIN AND THE WEST

by MaryLou Smith, Colorado Water Institute, Colorado State University

INTRODUCTION

Throughout the world, demand is increasingly exceeding supply when it comes to fresh water for agriculture, for urban needs, and to sustain a healthy environment. Nowhere is this more evident than in the western United States, where the trend is for water to be permanently transferred from agricultural use, putting food security and the viability of rural communities at risk. Nicknamed “buy and dry,” almost no one thinks the trend is a good idea, even though virtually everyone acknowledges the right for agricultural producers to engage in “willing seller — willing buyer” transactions.

Among the communities that rely on the Colorado River, and elsewhere in the West, numerous new water sharing strategies have been launched in recent years. Numerous others are under development. Permanent “buy and dry” type transfers are beginning to give way to creative “water sharing” schemes that attempt to provide water for urban needs while maintaining agricultural and environmental benefits.

In 2009, under the leadership of the Colorado Water Institute at Colorado State University, the Agricultural/Urban/Environmental Water Sharing Work Group (Work Group) was formed. With funding from the Walton Family Foundation as part of its Colorado River Basin initiative, the Work Group set out to investigate innovative water sharing strategies being employed in the Colorado River Basin and throughout the West. The Work Group conducted interviews and convened a meeting of experts to identify and address the typical social and institutional barriers to multi-sector water sharing. The Work Group then presented recommendations to the Western States Water Council and other policy makers on how to address the identified barriers. This article will provide an overview of the Work Group’s process and findings.

BUILDING CONSENSUS: ADDRESSING DIVERSE VIEWPOINTS

The Work Group appreciated the value of bringing together stakeholders and experts with diverse interests to develop a comprehensive understanding of the issues. However, diverse interests necessarily entail diverse viewpoints.

One of the first issues the Work Group needed to resolve had to do with the very nature of water transfers. Some in the Work Group did not want to participate in any process that might encourage additional water transfers out of agriculture. An essential first step in building the collaborative process was to come to the decision that the Work Group would focus on ways to improve sharing of water between multiple sectors, and would not seek to find more ways to unilaterally transfer water out of agriculture.

Water storage was another area of divergent opinion. Faced with demands to provide water for urban growth and other beneficial uses, including agriculture, some members of the group identified themselves as pro-storage. Others remain leery of the potential adverse impacts and costs associated with some storage projects. Although the Work Group was able to agree on a broad range of other issues affecting water sharing projects, they also agreed that there was a need for additional dialogue on the role of storage.

The Work Group did generally accept the concept that there may be benefits to properly sized and located water storage projects under certain circumstances — especially when such projects are part of a larger, multiple-benefit strategy. The Work Group also generally agreed that when such projects have the support of multiple entities — including agricultural, environmental and urban players— the regulatory process for approval of such projects should be better integrated, more conducive to moving forward, and less embroiled in redundant actions by multiple agencies.

WATER SHARING WORK GROUP GOALS & ACCOMPLISHMENTS

Having worked through the initial issues described above, the Work Group secured funding to accomplish a number of tasks.

WORK GROUP TASKS INCLUDED:

- Interviewing key players involved or experimenting with innovative water sharing strategies to learn what did and did not work in terms of multi-use benefit
- Summarizing key water sharing strategies and innovations from throughout the West
- Convening a Workshop comprised of diverse experts to develop water sharing action recommendations applicable across the Colorado River Basin, including specific recommendations for how to tackle obstacles (policy, legal, institutional, and financial)
- Quantifying agricultural water use and transfers in the Colorado River Basin
- Summarizing and reporting these results to: the Western Governors Association via the Western States Water Council; the US Bureau of Reclamation (to inform its Colorado River Basin study); and to other key interests in the Colorado River Basin and throughout the West

Water Sharing

Successful Strategies

MULTI-SECTOR WATER SHARING: ELEVEN CASE STUDIES

The Work Group chose eleven water sharing scenarios to summarize in its final report. The case studies were selected to showcase innovation, geographic areas, and overarching obstacles.

SUCCESSFUL AND INNOVATIVE WATER SHARING STRATEGIES HIGHLIGHTED IN THE CASE STUDIES INCLUDE:

- Agricultural rotational fallowing to provide urban supply through leases
- Leasing of interruptible supplies for urban drought relief (option to interrupt use)
- Split year leases between agriculture and environmentalists to keep late season water instream for fish
- Storage projects to provide flexibility for maximizing potential to meet multiple needs — agricultural, environmental, and urban
- Conjunctive use of groundwater and surface water for maximum beneficial use for agriculture and cities
- Improvements in irrigation efficiencies to produce conserved water that can be transferred to urban areas
- Development of collaborative stakeholder processes to help review and speed processing of temporary transfers
- Groundwater banking and recharge projects
- Creation of new institutional and business forms to facilitate temporary transfers
- Development of a “best management practices” template to guide agricultural transfers
- State funding for research and experimentation of transfer methods as alternatives to permanent drying up of agriculture

Ag-to-Urban Water Transfers Template

DIVERSE STAKEHOLDERS IN COLORADO’S ARKANSAS BASIN PRODUCE TRANSFER GUIDELINES

The Arkansas Basin Roundtable is one of nine Basin Roundtables created by the Colorado State Legislature in 2005 to bring together stakeholders in each of the State’s major water basins to address the gaps between water supply and demand. The roundtables have brought a greater diversity of stakeholders to the table, such as environmental interests, who earlier were often left out of water conversations.

The Arkansas Basin, covering most of the southeast quadrant of Colorado, has lost some 15 percent of its irrigated agriculture to urban water transfers since 1950. Projections are for the basin to lose an additional 15 percent by 2030. Agricultural and urban stakeholders on this basin’s roundtable could not initially agree on what to do about “ag-to-urban” water transfers. To address this lack of agreement the Arkansas Basin Roundtable created a “Water Transfer Guidelines Committee” charged with answering the question: “If water is going to be transferred from agriculture, how can it be done without harming rural communities and other third parties to the transactions?” After two years of intense facilitated meetings this Guidelines Committee produced a template detailing factors to be taken into account if and when such water transfers take place — “*Considerations for Agriculture to Urban Water Transfers*” Sept. 10, 2008 (Template), available from: <http://cwcb.state.co.us/water-management/basin-roundtables/Pages/ArkansasBasinRoundtable.aspx>. State leaders cited the Template production as an exemplary process, with stakeholders on opposite sides of the table working out their differences to cooperatively tackle a significant “high stakes” issue.

The Template is intended for use by buyers and sellers putting together a water transfer deal, as well as by communities and other third parties who would be affected.

THE TEMPLATE IS STRUCTURED AROUND THREE FOCUS AREAS:

- 1) CONSIDERATIONS: Considerations to be addressed when contemplating a transfer range from effects on water quality, to the size of a transfer relative to an affected area.
- 2) QUESTIONS: Questions should be asked specific to each identified consideration, for instance: “Will the transfer reduce the tax base of the affected areas?”
- 3) MITIGATION: What mitigation is needed? An example of a mitigation strategy is: “Assist in agricultural modernization such as niche market development.”

The Arkansas Basin Roundtable adopted the Template, with virtually all members impressed with its breadth and depth. However, the Roundtable could not agree on what action should be taken in response to the Template. This lack of agreement primarily split into three points of view: 1) the guidelines should form the basis for new water transfer regulation — otherwise only “lip service” is being given to the rights of third parties such as rural communities; 2) the guidelines should not result in regulation because nothing should come between willing buyers and willing sellers of agricultural water transfers; and 3) given that the guidelines have raised consciousness about the negative effects of water transfers on agriculture and rural communities, attention should now shift to establishing creative incentives for keeping agriculture in the valley — thereby avoiding such negative effects.

Basin “Roundtables”

Farmland Loss

Transfer Considerations

Template Focus

Agricultural/Urban/Environmental Water Sharing Work Group

Nathan Bracken, Western States Water Council (UT)
 Todd Doherty, Colorado Water Conservation Board (CO)
 Bill Hasencamp, Metropolitan Water District (CA)
 Taylor Hawes, The Nature Conservancy (CO)
 Jonne Hower, Western Federal Agency Support Team (UT)
 Tom Iseman, Western Governors’ Association (CO)
 Dan Keppen, Family Farm Alliance (OR)
 Pat O’Toole, Family Farm Alliance (WY)
 Mark Pifher, Western Urban Water Coalition and Aurora Water (CO)
 Jennifer Pitt, Environmental Defense Fund (CO)
 Ron Rayner, Tumbling T Ranches (AZ)
 Reagan Waskom, Colorado Water Institute (CO)

Facilitator: MaryLou Smith — Colorado Water Institute (CO)

Water Sharing NEPA Objections Environment "Irrigation" Environment as Constituent New Policy Area ESA Concerns Collective Water Leasing Ag Studies & Projects Aquifer Recharge "Deficit" Irrigation Valuation Addressing Barriers	A Market Transaction Approach IRRIGATION DISTRICT AND ENVIRONMENTALISTS COLLABORATE TO FORGE STRATEGY A recent federal National Environmental Policy Act (NEPA) review of Rio Grande river management failed to satisfy either irrigators or environmentalists. The Elephant Butte Irrigation District (EBID) was not happy with the review's "preferred alternative" because it would reduce depletions from agriculture without acquiring agricultural water rights. Environmental groups, such as the New Mexico Audubon Society (NM Audubon), didn't consider it far-reaching enough. Believing they could come up with something better, the two groups began to collaborate on a variety of water sharing strategies. A key component was to simplify environmental water transactions within EBID's existing framework. Conceptually, irrigating for environmentally functioning habitat is like irrigating for a crop. So NM Audubon and EBID are currently developing an environmental water transaction program where NM Audubon can buy water rights to be used for habitat enhancement from willing sellers. NM Audubon asked EBID whether they could become an EBID constituent, just as if they were a farmer. EBID agreed. EBID routinely does surface water transfers from one farmer (EBID constituent) to another without permits from the State Engineers Office. EBID's water right is kept whole in the transfer, and they have the authority to approve or deny the transfers under existing district policies. They don't lose any water-righted acreage, it's just going to a different crop. [Editor's Note: The amount of irrigated acreage allowed under a water right is often used in determining the water volume allowed to be used by the water right holder. Thus, preserving the irrigated acreage amount is of prime importance to the water right holder.] There are many obstacles to this strategy, including endangered species issues, agency approvals, and funding. Ag-to-environment in-district transfers have not previously been allowed within the US Bureau of Reclamation's Rio Grande Project — which is a "single purpose" project authorized solely for irrigation. Although some precedent exists, EBID and NM Audubon are clearly moving into unresolved policy areas. In addition, some water rights NM Audubon acquires may provide habitat for species susceptible to being listed as threatened or endangered under the federal Endangered Species Act (ESA) — specifically, the Southwest Willow Flycatcher. EBID is worried that in dry years, threatened or endangered species will get precedence over agriculture. EBID and NM Audubon are working with US Fish and Wildlife to obtain assurances that if EBID takes these proactive steps now, they can be assured that water shortages will be shared in low water years. NM Audubon attempting to generate funding by establishing marketable credits based mitigation, water conservation, water quality, and/or "environmental services" generally. Encouraging Investigation of Alternative Transfer Methods COLORADO'S GRANT PROGRAM Since its inception in 2007, the Colorado Water Conservation Board (CWCB) Alternative Transfer Methods Grant Program has awarded \$1.5 million to water providers, ditch companies, and university groups to fund projects investigating technical, legal, institutional and financial incentives needed for successful alternatives to the traditional "buy and dry" water transfers. In the Lower Arkansas River Valley, grant funding is providing for continued economic and engineering analyses of the Super Ditch Company, which was recently incorporated to provide a venue for irrigators to collectively lease agricultural water to cities while maintaining long-term ownership of the water. Colorado State University Cooperative Extension is conducting a four-year study to assess various technical aspects of returning fallowed land to production and maintaining or improving crop yields on those lands. The study is ongoing through 2012 with test plots in the Arkansas River Basin. Another grant funded the Colorado Corn Growers Association, working with Ducks Unlimited and the City of Aurora, to develop three demonstration projects in the South Platte River Basin northeast of Denver. Two wetlands' projects are designed to recharge the alluvial aquifer, which can be used to augment out-of-priority groundwater pumping — i.e., in return for contributing to the aquifer recharge, participating water right holders will be allowed to pump groundwater even at times when their water right might otherwise be to "junior" to do so. The third demonstration project is creating a marketing mechanism and business plan for water transfers. An additional project in the South Platte River Basin, supported by the Parker Water & Sanitation District and Colorado State University, is a four-year study to quantify savings in consumptive water use from "deficit" irrigation. By reducing the amount of water irrigated crops consume, the difference between historic and future consumptive use can be computed. With approval of the State Engineer's Office, it is believed that this volume of water could be transferred to municipal use. A second round of grants in 2011, totaling an additional \$1.5 million, will fund activities which build on the first set of projects, digging deeper into obstacles and how they might be overcome. CWCB expects to fund projects which investigate: barriers to acceptance of alternative transfer methods by cities and farmers; further technical analysis of transferable consumptive use; administrative and legal barriers; institutional framework and water supply delivery options necessary to implement an alternative transfer method; and potential third party concerns.
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Water Sharing

Instream Flow Augmentation

Simplified Process

Conserved Water Access

Transfers v. Capital Projects

Buying and Leasing Water To Keep Farmers on the Land and Fish in the Stream

PACIFIC NORTHWEST: THE FRESHWATER TRUST

The Freshwater Trust works with landowners and irrigation districts in the Pacific Northwest to buy and lease water to transfer to instream flows. Their goal is to keep farmers on the land and more water in the streams. They also have funding — \$600 thousand to one million dollars each year is paid out by the Bonneville Power Administration as part of mitigation for its storage projects in the Columbia River Basin.

A typical Freshwater Trust deal involves connecting with local landowners who own key water rights in a given area. Initially there was a push to buy water rights, but they have learned that many projects don't require outright purchases.

One example of a water purchase scenario took place on the Austin Ranch along the Middle Fork of the John Day River where the Trust worked with rancher Pat Voigt (video available at www.thefreshwatertrust.org). Their strategy in this case was to get Voigt's agreement to stop irrigating on July 20th in perpetuity, ending hay production at that time instead of September. Although he loses his third cutting of hay, he keeps the first two most productive cuttings, and fish get the benefit of 10 cubic feet per second (cfs) of water when they need it, beginning on July 20th.

Navigating State requirements for changing water rights to instream flows, on a permanent or temporary basis, can be a complicated and lengthy process. In each case, the Trust is looking for ways to make the process less onerous for all involved. This was the challenge along the upper Lostine River. The Trust was looking to get more water instream, but was faced with six irrigation ditch companies and more than 100 landowners. Rather than contracting with each irrigator individually, the Trust decided to contract specifically with the six ditch companies, and came up with a management agreement to leave a certain amount of water in the river at specific times — without changing their water rights. Since the water rights weren't modified, State approval wasn't necessary, and the process was simplified. The Trust monitors upper Lostine River flows twice during the season, and after each sends a check to the irrigation districts. The project results in 15 cfs being left in the river.

These and numerous other projects are keeping the Trust focused on a clear objective to maintain and restore rivers' biodiversity, while preserving an understanding and appreciation for agriculture.

Agricultural Conservation and Transfers

SOUTHERN CALIFORNIA: IRRIGATION EFFICIENCY & CONSERVATION PROVIDES FOR URBAN USE

In Southern California, municipalities partner with irrigation districts and pay for irrigation delivery system improvements, on-farm irrigation efficiency enhancements, land fallowing programs, and environmental conservation. In return, the municipalities can use the conserved water.

As demands for Colorado River water increased in other States, California had to find a way to reduce its own deliveries from the river. For many years, more than half the water the Metropolitan Water District (MWD) supplied to southern California was water not needed by other Colorado River Basin States. In 2003, for the first time, California was limited to its annual Colorado River apportionment of 4.4 million acre-feet (AF) under the Colorado River Compact. Agricultural-to-urban water transfers, rather than significant new capital projects, were seen as the best method to voluntarily bring water into urban areas. Additionally, San Diego County Water Authority (SDCWA) was looking for independent supplies of water.

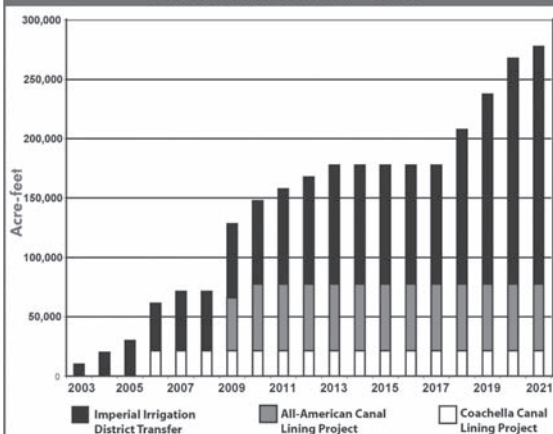
Given the Imperial Valley's geographic proximity to San Diego and the more than 3 million AF per year of water under the Imperial Irrigation District (IID) control, IID became a logical partner for SDCWA. IID already had an agreement where MWD would fund conservation measures and receive up to 110,000 AF annually, but additional conservation actions were available. It took 10 years and critical legislation, but by October 2003 a series of comprehensive water sharing agreements, called the "Quantification

Settlement Agreements" were completed to ultimately provide an additional 280,000 AF of water annually to the San Diego region and 103,000 AF annually to the Coachella Valley.

In the ramp-up period, conserved water would be provided by both fallowing and conservation measures. Following a 24-year ramp-up, all of the water will come from conservation measures. During the past seven years, IID has developed a detailed roadmap for how to conserve water for transfer, including water delivery system improvements and a voluntary on-farm incentive-driven irrigation efficiency improvement program.

The IID-SDCWA transfer is fundamental to the Colorado River Quantification Settlement Agreement and California staying within its 4.4 million AF apportionment. Over the life of the agreement's 45-year term, nearly 30 million AF of water will be moved from agricultural to primarily urban use. To date over 550,000 AF has already been transferred. Two remaining challenges are: 1) resolution of a legal issue concerning the constitutionality of the State backstopping funding for environmental mitigation; and 2) the State fulfilling its legislative obligation to restore the Salton Sea.

Water Transfers 2003 - 2021



Adapted from: San Diego Water Authority Fact Sheet, February 2011

Water Sharing

Surface Water for Groundwater

"Storage Credits"

Renewable Supply

Groundwater Banking

Irrigation and Groundwater Banking for Future Use by Cities

CENTRAL ARIZONA PROJECT SURFACE WATER ALLOCATIONS

In 1990, Arizona passed legislation to allow farmers to use Central Arizona Project (CAP) water allocated to cities, in order to leave more groundwater in place for future use by those cities. This supplemented CAP surface water supplies already available to irrigated agriculture. The idea was that cities with unused allotments on the Colorado River could make them available to Arizona farmers at an incentivized rate, instead of losing the water downstream to other users. Farmers who would otherwise be pumping groundwater to irrigate crops, agreed to use the cities' allotments of CAP water instead, and leave groundwater in place. Cities who sign onto this program gain "storage credits" which allow them to pump the "stored CAP water" in future years for drought mitigation or to supply urban growth. Farmers also participate in "in lieu recharge" programs through irrigation districts such as the Maricopa-Stanfield Irrigation & Drainage District (MSIDD) in south-central Arizona.

Before MSIDD built its canal system allowing farmers to access Colorado River water from the Central Arizona Project, farmers exclusively pumped groundwater to irrigate 80,000 acres in the project. Prior to CAP water availability, farmers in both MSIDD and its sister district, the Central Arizona Irrigation and Drainage District, each pumped between 300-400 thousand AF of groundwater per year. CAP was built largely to reduce groundwater pumping in those areas of the State where aquifer depletion was a concern, such as these districts, as well as to provide a supply of renewable water for anticipated growth.

When first made available to the irrigation districts, however, the cost of CAP water was high relative to the cost of pumping, so farmers continued to rely on their groundwater supplies. Over time, the various districts worked with CAP to develop pricing programs that would incentivize their collective use of Colorado River water in order to reduce continued groundwater pumping.

Banking groundwater for future use by cities became an additional tool. Some irrigation districts made deals directly with nearby cities. Others, like MSIDD, partnered with the Arizona Water Banking Authority (AWBA). AWBA, created by statute in 1996, acts on behalf of all municipal and industrial users who have a basic CAP allocation and wish to participate in these programs. AWBA is also responsible for administering in-lieu water storage for the State of Nevada. MSIDD has "stored" a significant amount of water on behalf of the AWBA and Nevada.

According to University of Arizona professor Bonnie Colby, the availability of CAP surface water creates a unique opportunity to provide credits in lieu of pumping groundwater — allowing groundwater in and around Maricopa to recharge. She points out, though, that the reality of increasing urbanization means this will be a temporary opportunity to manage resources.

WATER BANKS

In general, water banks act as a legal mechanism to transfer water from water rights owners that may not need water in a given year (lessor) and water users having an annual or short-term demand (lessee) versus a long-term supply need. Water banks may operate in a variety of ways.

IMPORTANT OPERATIONAL CONSIDERATIONS INCLUDE:

MODEL TYPE: Water banks may operate as a deposit/withdrawal model or as a clearinghouse model. In the first, anyone qualified may "deposit" and the bank subsequently manages "withdrawals." This may involve a commitment to keep water available for some length of time or until withdrawn. In the second model type, the institution functions as a broker that helps transferors and transferees find each other, usually imposing standard forms, information and assurance requirements, and rules.

FUNDING: The bank may act with its own funding and with its own specific objectives in mind, or act solely as a service provider (i.e., impartial to any water transaction).

PRICING: The bank may set prices at pre-defined levels, allow prices to float subject to a known index or market condition, or the parties may negotiate a price.

ARRANGEMENT DURATION: A transaction time between water "moving" among a transferor and a transferee can be short, as with banks that wheel direct flow waters, to indefinitely long, as may be the case for groundwater based banks.

Adapted from: "Alternative Agricultural Water Transfer Methods Grant Program Summary" — Colorado Water Conservation Board, May 2011

Storage to Mitigate Shortages

Dam Mitigation Efforts

Leveraged Funding

Water Supply Project and Diversion Structure Improvements

WYOMING: LITTLE SNAKE RIVER BASIN COLLABORATION BENEFITS AGRICULTURE AND ENVIRONMENT

In 1984, the Wyoming Legislature authorized a water storage project in the Little Snake River Basin to mitigate shortages caused by Wyoming's only large trans-basin diversion, which took place in the early 1980s and removed 21,000 AF of water from the basin. The mitigation, a 23,000 AF reservoir, took over 20 years to permit and build, but now provides a fishery, recreation, and late season irrigation water for ranchers in this Colorado River headwaters basin.

Wetland and stream channel impacts had to be mitigated in order for the High Savery Dam and Reservoir to be permitted. In addition, the Little Snake River Conservation District also significantly enhanced environmental attributes along the river corridor to maximize the benefits of the stored water. They installed multiple structures and restored stream channels and riparian zones to enhance fisheries and terrestrial wildlife habitat for 25 miles along Savery Creek from the dam to the Little Snake River. In the end, they will have modified every diversion structure in the Little Snake Basin for fish passage.

These efforts resulted from building a broad coalition among the agricultural community, wildlife and conservation organizations, and government entities — local, state, and federal. They also leveraged construction funds from multiple sources, including: the US Department of Interior, Natural Resource Conservation Service; the Wyoming Wildlife & Natural Resources Trust Fund; the US Fish and Wildlife Service (Partners for Fish & Wildlife (PFW) program); and the Wyoming Water Development Commission.

Water Sharing	Project proponents feel that the High Savery Dam and Reservoir Project can provide a template for how to bring in all the players to work together, and how water storage can give a community the flexibility it needs to support local fisheries, improve agricultural irrigation, and provide a buffer against energy and municipal water demands. The story of this storage project is instructive not only for the multiple hurdles it overcame, but also as an example of how even small projects can leverage resources and build relationships to make watershed improvements that benefit both agriculture and the environment.
Land Management Tie-In	Land Management, Crop Rotation and Water Supply Program CALIFORNIA: PALO VERDE IRRIGATION DISTRICT In 2001, the Palo Verde Irrigation District partnered with the Metropolitan Water District of Southern California (MWD) to develop a land management, crop rotation, and 35-year water supply program providing up to 111,000 AF of agricultural water per year for urban use. Participants committed to stabilize the farm economy in the Palo Verde Valley and support the \$800 billion economy of Southern California. An important component of the transfer involves funding community improvement programs to help mitigate third party impacts from the program.
Fallowing	Fallowing is a key component of this water transfer strategy. The program stipulates that approximately 6,000 to 26,500 acres will be fallowed every year district-wide. District fallowing amounts vary year to year, depending on MWD's water demands, but annually there is a minimum of seven percent of the district's acreage fallowed, with a maximum of 29 percent.
Payments	For participation in the program, farmers received a one-time payment of \$3,170 per encumbered acre. In addition, they are paid an annual payment of \$602 per non-irrigated acre for first year, with an agreed upon price escalation for the following years. On an average 100-acre farm, this translates into cash payments of \$91,930 for the one-time sign-up and annual payments ranging from \$4,124 to \$17,458. Landowners have to allow a fallowing easement on up to 29 percent of their farm, fallow lands based on MWD's call, implement land management plans, provide program-related data, and pay irrigation district water tolls and taxes.
Stakeholder Group	Impacts of land fallowing can reach far into a community, and cannot be accurately predicted. To address these concerns and help compensate the Palo Verde community as a whole, in 2002 a nine-member Community Improvement Program was created from a cross-section of local business and community leaders. The group oversees distribution of some six million dollars provided by MWD for community improvement programs such as education and job retraining of workers impacted by the fallowing.
Drought Response	In response to a drought emergency declared by Governor Schwarzenegger in 2009, Palo Verde Irrigation District also agreed to participate in a one year, short-term supplemental fallowing program, separate from the existing 35-year program. Farmers voluntarily fallowed up to an additional 15 percent of their irrigated land in return of a one-time payment of \$1665 per non-irrigated acre. The one-year program terminated in 2010.
Preserving Rights Meeting Needs	Quick and Efficient Water Transfers During Drought WASHINGTON: YAKIMA BASIN WATER TRANSFERS WORKING GROUP The State of Washington has long been interested in developing effective ways to facilitate the voluntary transfer of water while preserving existing water rights and providing water for presently unmet and future needs. Transfers are seen as achieving a variety of water resource management objectives, including drought response, improving streamflows, and reserving water supply for future uses.
Basin Enhancement Project	The Yakima River Basin Water Enhancement Project was established in 1994 to address the dual problems of salmon habitat degradation and inadequate dry year irrigation water supply, by facilitating ways of making water supply in the Yakima more flexible and responsive to current needs. An advisory committee was formed to consider innovative ways to free up water for current needs, such as water transfers, water banking, dry year options, and the sale and leasing of water for agricultural users and instream flows.
Water Transfer Facilitation	During the 2001 drought year, the water enhancement project advisory committee came up with the idea of the Yakima Basin Water Transfers Working Group (Yakima Group) and a process to facilitate quick and efficient temporary transfers. The Yakima Group would review proposed transfer requests and, if they met the Group's approval criteria, make recommendations to both the State Department of Ecology (Ecology) and the US Bureau of Reclamation who in turn would recommend water users' motions to the Superior Court for temporary transfers. Using this process in 2001, 40,000 AF were transferred in just four months. The process was repeated in 2005, with even better results. They not only transferred 50,000 AF in just two months, but the quality of proposals was better so that impairment and consumptive use issues could be more easily and quickly ironed out.
Voluntary Oversight Group	The Yakima Group is a strictly voluntary group of professional water managers, engineers, hydrogeologists, fisheries biologists, irrigation districts, law firms, and the like. There is no chartered attendance — they all go to the scheduled meetings as they wish and all the members are volunteers, there to review proposals, provide input, and identify and resolve problems. For instance, if there is a return flow

Water Sharing

Flood & Water Supply Project

Aquifer Restored

Water Transfers

No Fallowing

issue (water returning to a stream that has not been consumed by a crop), there is enough experience in the room to answer it. They all have sufficient knowledge of how the Yakima Project operates. The Working Group provides a venue for getting objectors together ahead of time to work out conflicts. Ecology's Director listens to the group and then decides what to recommend to the Superior Court or, in the case of permanent transfers, whether to approve, deny, or condition an application to change a water right. There is no statutory authority for him to impose what the group proposes, but the group clearly has credibility and exists because it is relevant. The Working Group continues to meet at least monthly.

Sustainable Surface and Groundwater Management

CALIFORNIA: THE LOWER YUBA RIVER ACCORD PROVIDES MULTIPLE BENEFITS

Yuba County in the heart of California's Central Valley has historically faced severe flood control and water supply problems. To confront these problems, community leaders established the Yuba County Water Agency (YCWA) in 1959 to serve not just farmers, but all of Yuba County. One year later, 92 percent of the voters supported a large revenue bond to build New Bullards Dam and Reservoir, as well as related facilities, to deliver surface water to local farmers and reduce the region's flood risk.

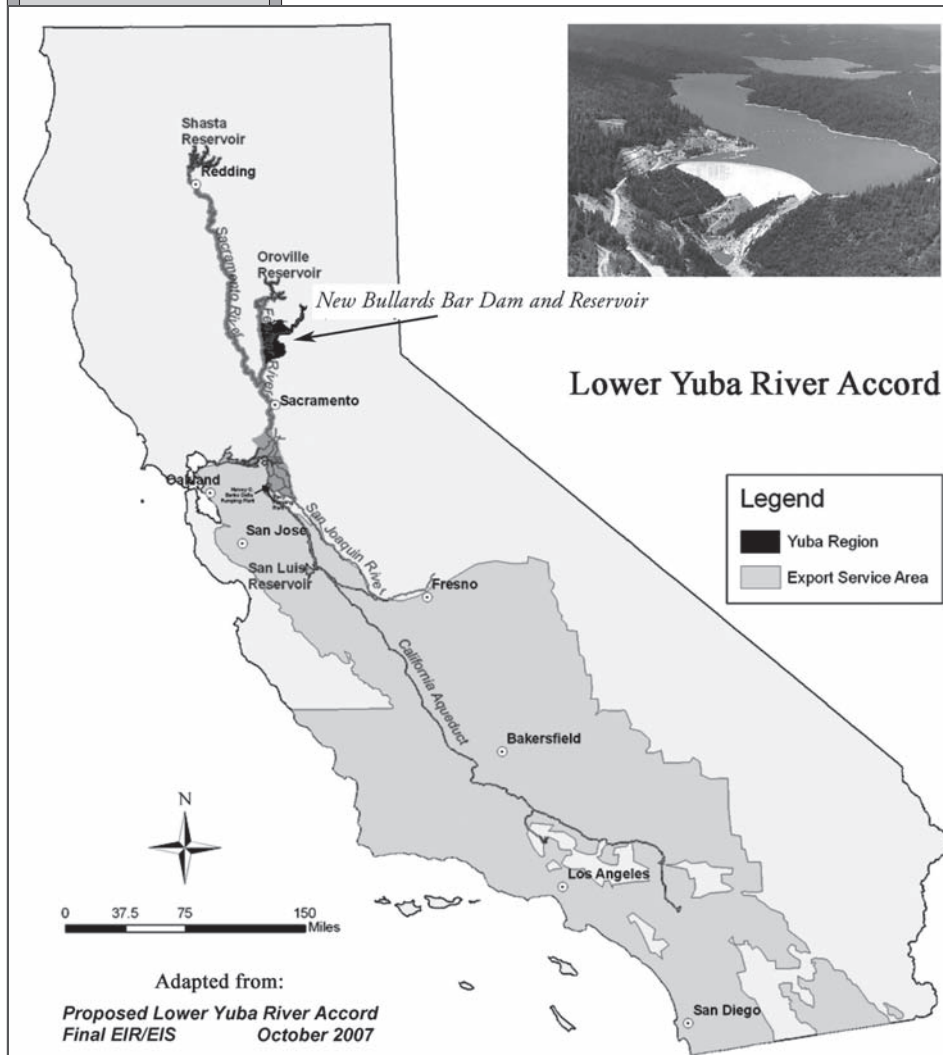
Completed in 1970, this dynamic project resolved issues related to the division of the county into north and south basins, with the north relying on surface water diversions from the Yuba River, and the south unsustainably drawing on groundwater. With new surface water deliveries to the southern part of the county, the groundwater aquifer was restored to historic levels. Farmers voluntarily agreed to forgo their surface water and this water was transferred to cities. Irrigators were paid for the transfer, and then pumped groundwater to irrigate their crops. While YCWA closely monitored the aquifer, agricultural production continued, and no land was fallowed. YCWA's progressive groundwater management plans have helped the agency pioneer the responsible transfer of water supplies from agricultural to urban uses.

In 1988, a fishing alliance complained that the project was reducing instream flows to the detriment of fish in the Lower Yuba River. The conflict was not resolved until 20 years later, when 18 entities entered into an interest-based negotiation and completed the Lower River Yuba Accord.

THE LOWER YUBA RIVER ACCORD HAS THREE MAIN AGREEMENTS:

- 1) **INSTREAM FLOWS:** The accord establishes significantly higher instream flows for wild salmon and steelhead on the Lower Yuba River, up to 170,000 AF of additional water annually. These higher flows are invaluable to one of the last wild salmon runs in California's Central Valley.
- 2) **WATER TRANSFERS:** The accord assures annual water transfers to California's Natural Resources Agency for fish and wildlife, and to cities and farms who receive their water supplies from the State Water Project and Central Valley Project. YCWA is currently transferring on average 150,000 AF of water annually, and using the revenues from transfers to improve fisheries habitat and strengthen flood control levees.
- 3) **CONJUNCTIVE USE AGREEMENTS:** The accord establishes a series of "conjunctive use" agreements with seven local irrigation districts. Actively managing both surface and groundwater resources enables YCWA and the districts to be better stewards of their water rights and water supplies, and strengthens agricultural productivity.

YCWA's leadership through the accord is an example of how agricultural, environmental, and urban water sharing strategies can be enhanced.



Water Sharing Farmland Loss Collective Water Leasing Water Rights Preserved "Super Ditch" Remaining Obstacles Unacceptable Status Quo Incentives & Guidance "Overarching" Obstacles "One-Stop" Permitting	Irrigators Negotiate Municipal Water Leases & Retain Ownership COLORADO: LOWER ARKANSAS VALLEY "SUPER DITCH" In the lower Arkansas Valley of Colorado, almost 80,000 acres of farmland have been dried up and the water transferred to cities since 1950 — about 15 percent of historically irrigated land. A similar amount was projected to be lost to "buy and dry" in the next 20 years. Concerned about economic and social effects in rural communities, voters formed the Lower Arkansas Valley Water Conservancy District in 2002 to address the issue. Inspired by Metropolitan Water District of Southern California's lease of water from irrigators of the Palo Verde Irrigation District, they set about to see if ditch company shareholders in the lower Arkansas Valley might agree to band together to lease water to municipalities as an alternative to further permanent transfers. They formed the "Super Ditch" — which is not actually a ditch at all, but instead a collective bargaining agent for irrigators to voluntarily cease irrigation on part of their land and temporarily lease their irrigation water to thirsty cities and others. Engineering and economic studies showed the concept to be feasible, and a steering committee of farmers began to work out the details. The foundation of the Super Ditch is for farmers to pool some of their water rights and lease it — not sell it — allowing them to reap the long-term appreciation of the water as an asset while benefiting from an ongoing lease revenue stream. An early obstacle was that ditch companies were hesitant to sign on without knowing what the leases would look like, but potential leases weren't likely until there was a leasing entity in place. The solution was for individual ditch company shareholders to incorporate the Super Ditch. Now, with two letters of intent in hand, efforts are underway to convince three of the ditch companies to change their articles of incorporation and/or bylaws to allow shareholder participation. Other remaining obstacles include county permits and the required State Water Court cases to exchange water to the point of delivery to municipalities and change the type and place of use of the water rights. These cases are expected to be complicated — perhaps the largest such cases ever filed in Colorado. To allow the leases to move forward, the Super Ditch expects to operate under a substitute water supply plan approved by the State Engineer while the cases are pending in water court, although the company is exploring a change in State law to allow an administrative approval of leases without water court adjudication. Despite these hurdles, Super Ditch participants are determined to stay the course. According to one stakeholder, "This is the best chance we have to save our water." WORKSHOP DEVELOPS RECOMMENDATIONS A key component of the Work Group's project was the convocation of a two-day focused workshop. The workshop brought together some of the best minds in the business to come up with practical solutions to the challenges of sharing water in a world with intensely competing needs, complex regulations, and a variable climate. They committed their time because they are convinced the status quo has to be changed. Thirty-five participants and facilitators met at a ranch above Castle Rock, Colorado, on August 12 and 13, 2010, and came up with the Action Recommendations summarized below. Each recommendation was carefully crafted and vetted to provide practical and concrete steps that States can take to improve and promote water sharing across watersheds. While it is clearly understood that this is not an exhaustive list, and that additional innovations may be necessary on a project-specific basis, it is thought to be the first such set of recommendations about how to remedy obstacles to innovative water sharing strategies in the Colorado River Basin and the West, while improving water availability in a sustainable manner. It is hoped that these recommendations will create incentive and guidance for policy makers who are concerned about how we can most effectively and fairly plan future water supply. The Work Group chose to make recommendations they deem critical to address the overarching obstacles facing all innovative strategies for sharing water for multiple benefits, regardless of the particular State or strategy involved. Participants provided specific action steps they believe the western governors and others could adopt. These action steps are not meant to be limiting, but instead, to be seen as exemplary of how we could move forward instead of staying stuck in a study mode. A full-length set of Action Recommendations, carefully word-smithed to meet the Work Group's consensus test, can be viewed in its entirety in the full body of the report (see web access info below). What follows is an abbreviated summary. Abbreviated Summary Action Recommendations Pilot an Expedited Water Sharing Program/Project Review Process In some cases, mutually beneficial water sharing programs which have broad support are delayed or abandoned due to lengthy and costly local, state, or federal review processes. Such programs include many beneficial infrastructure projects which could enhance supply reliability for a multitude of parties. Workshop participants proposed an improved "one-stop" permitting approach to improve efficiency, reduce costs, and ensure more timely approvals by reducing repetitive agency information exchanges.
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Water Sharing

Governors' Action Items

PARTICIPANTS RECOMMEND THE FOLLOWING ACTIONS:

- Governors, in collaboration with stakeholders, would identify a multi-use water sharing project or program, either structural or non-structural, which has broad support of all sectors (agricultural, urban, and environmental), to pilot an expedited review process
- Governors would appoint a State liaison to guide the project through the local, state and federal approval processes
- Governors would request that the federal government appoint a federal designate to be involved in all aspects of the review process
- The State liaison and federal designate would work together to initiate planning and coordination meetings, and facilitate concurrent review and permitting processes and sharing of state and federal approval resources.
- State liaison would report the outcome of the pilot process and suggest recommendations for improving the initiation, review, permitting, approval, and implementation of water programs
- Governors would convene a multi-state team of agency representatives and stakeholders to review and evaluate each State's pilot effort and seek to develop ideas and opportunities for improvement

Basin-Wide Viewpoint

Foster a Flexible Basin-Wide Approach

While cognizant of interstate water compacts and without promoting transfers of water between States or even between basins, the Work Group promotes looking at basins and systems as a whole, rather than piecemeal, when looking for water sharing opportunities.

SPECIFIC RECOMMENDATIONS INCLUDE:

- Support development of planning tools for real-time, on-the-ground decision making that could be used to develop better operational management and inform stakeholder driven efforts to consider mutually beneficial water sharing strategies. Basin-scale tools currently available model the Colorado River's mainstem and large storage projects, but don't let us see how we might connect the dots throughout the basin to manage water supplies for optimal cooperation.
- Governors would urge State and federal agencies to work cooperatively with stakeholders to identify and implement mechanisms, such as water banking or interruptible supply agreements, to help avoid economic and environmental disruption in times of water crisis.
- Promote and enhance Conservation Title funding to programs such as EQIP and AWEPP in the next federal Farm Bill. These programs are proven to encourage wise water use, improve water quality, and enhance the environment throughout the West.

Engendering Opportunities

Clear Obstacles to Implementation of Creative Water Sharing Strategies

States are experiencing varying types of obstacles to innovation and implementation. However, there are some overarching obstacles causing significant roadblocks for all the water sharing strategies identified.

ADDRESSING SOME OF THE MOST COMMON OBSTACLES SHOULD INCLUDE:

- Governors appointing a cabinet-level State Water Advocate responsible for empowering the success of water sharing programs with broad support.
- State Water Advocate and appropriate State agencies working to reduce the costs associated with temporary water sharing arrangements by providing incentives and pilot programs.
- Developing criteria and thresholds that define "best management practices" for transfers — much like a check list — that could be used to streamline regulatory approvals.
- State Water Advocate facilitating a cross-jurisdictional process for regional approaches to infrastructure sharing and development to facilitate voluntary, incentive-based water sharing.
- Encouraging State support for the creation of voluntary Water Resource Sharing Zones, similar to economic development zones. Within these zones, water and financial resources might be traded more freely for the benefit of multiple sectors. Other benefits could include: tax incentives, infrastructure sharing, or preservation of open-space values in agriculture.

Addressing Common Obstacles

Design Robust Stakeholder Processes for Multi-Benefit Water Sharing Solutions

The Work Group outlined characteristics of a robust stakeholder process, emphasizing that the design and implementation of such processes should be given as high a priority as we currently give to the design of engineering solutions to water problems.

RECOMMENDED STAKEHOLDER PROCESSES:

- Design structured, facilitated opportunities for diverse stakeholders to experience a constructive exchange of perspectives and ideas
- Initiate stakeholder involvement early, often before any "formal" process begins
- Define expectations and design a process to meet those expectations
- Groups should be given incentives, support and resources to engage effectively, such as analysis of previous collaborative efforts, decision support or funding for small projects and studies
- Implement effective, unbiased, research-based public education and outreach

Broad Participation

Water Sharing

Farming Stratification

Transfer Aspects

MaryLou Smith

is policy and collaboration specialist at the Colorado Water Institute, Colorado State University. She facilitates the efforts of the Agricultural/Urban/Environmental Water Sharing Work Group, and is the co-author, with James Pritchett, of the report, *Agricultural/Urban/Environmental Water Sharing: Innovative Strategies for the Colorado River Basin and the West*. Ms. Smith works with stakeholder groups throughout the West to facilitate dialogue about complex water policy issues. She will present a paper at the October, 2011 meeting of the International Committee on Irrigation and Drainage (ICID) in Tehran, Iran.

QUANTIFICATION STUDY

Part of the Work Groups funded project was to conduct a study to quantify Colorado River Basin agricultural water use and transfers. This work was performed by Dr. James Pritchett, Associate Professor of Agriculture and Resource Economics at Colorado State University.

The analysis showed that agriculture in the Colorado River Basin is valuable and diverse. Farms are increasingly stratifying into two types: small farms (which generally supplement household income) and large farms (that produce the majority of agricultural goods). Irrigated agriculture is becoming less prevalent near the urban-rural fringe. Farms are becoming more efficient in conveying and applying water. Farms in the Lower Colorado River Basin are more likely to make use of groundwater resources when compared to the Upper Basin.

Permanent water transfers follow the business cycle of urban development, but shorter-term leases are tied to climatic conditions. Transactions are more prevalent in areas in which physical and market infrastructure exists, and these transfers have smaller average size when compared to large-scale transactions. The greatest number of transactions occurs in Colorado, but the most water has been transferred in California and Arizona.

QUESTIONS REMAIN, INCLUDING:

- If farms are becoming smaller does this imply a fragmentation of water rights?
- If water rights are increasingly held by more people, will this tend to encourage or discourage transactions?

A complete description of this research can be found as a special report of the Colorado Water Institute at: www.cwi.colostate.edu/publications.asp?pubs=sr.

NEXT STEPS

As planned, the Work Group presented its report to the Western States Water Council, the water policy arm of the Western Governors Association, in the spring of 2011. The Council was unanimous in its desire to build on the foundation the report provided to determine it could work closely with its member States to further investigate what stands in the way of these water sharing strategies being undertaken throughout the West. In addition, the Western Governors Association has hired a summer intern who will be building on the information from the Work Group's Quantification Study to further the Governors' understanding of water transfers in the West.

Further, the report will be considered by the US Bureau of Reclamation in the second phase of its Colorado River Basin Study. The Options and Strategies Phase will be following the first phase which is almost completed (Supply and Demand Assessment Phase).

The Western Urban Water Coalition will be using information from the report as it strategizes about how its members can work with agriculture to prepare for the potential of having to operate under future compact calls on the Colorado River.

The report has been the topic of discussion at meetings of the Family Farm Alliance, Colorado Water Congress, and various conservancy districts and environmental groups. A set of webinars planned for the summer of 2011 will give agricultural, urban, and environmental stakeholders an opportunity to weigh in on their perspectives of these water sharing strategies.

The Work Group will continue to encourage action on the part of Western Governors and others, to advance the recommendations developed in their report. They will continue to investigate ways different States in the Colorado River Basin and the West can take water sharing successes and lessons learned from one area, and transfer them to another. A detailed comparative analysis of the numerous water sharing strategies currently in place may be encouraged for additional study. In addition, Work Group members will be addressing their respective constituent groups to further this work.

Special efforts will be made to identify laws and institutions that might be modified to provide more flexibility and effectively promote water sharing, while respecting and preserving individual water rights. Throughout their efforts the Work Group will continue to provide opportunities for stakeholders from the agricultural, environmental, and urban sectors to work together, instead of against one another, to meet multiple water use needs.

FOR ADDITIONAL INFORMATION:

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The Work Group's full Report, *Agricultural/Urban/Environmental Water Sharing: Innovative Strategies for the Colorado River Basin and the West* can be downloaded at www.cwi.colostate.edu/watersharing.

WATER BRIEFS

**AG TO URBAN TRANSFER CO
NO INJURY RULE & HISTORICAL USE**

On May 31, the Colorado Supreme Court (Court) issued a wide ranging 77-page decision authored by Justice Greg Hobbs addressing agriculture-to-urban transfers of water rights and the determination of historical use of the water rights being transferred. The case also dealt with questions concerning: direct flow; conditions necessary to protect against injury to other water rights (the “no injury rule”); return flow; Colorado’s “one-fill rule” regarding storage rights; and the effect of previous water court decrees and orders. In *Burlington Ditch, Reservoir and Land Co. v. Englewood*, No. 09SA133 (5/31/2011), the Court upheld the decision of the Water Court that limited the amount of water to be transferred based on historical consumptive use in order to prevent an unlawful enlargement of water rights. The appeal arose from several consolidated cases before the water court that involve a complex set of facts and a broad set of legal issues.

Among the findings of fact, conclusions of law, and decree of the water court which were upheld, the Court’s decision highlighted: 1) limitations of direct flow water rights based on the historically diverted and used for irrigation in order to prevent an unlawful enlargement of those rights; 2) a limitation of a storage right to average annual reservoir releases of 5,456 acre-feet historically used on lands for irrigation; 3) that seepage gains (return flow) as well as water collected through “toe drains” into a canal could not be counted towards historical consumptive use; 4) “historical releases” from a reservoir “rather than operation of the ‘one-fill rule’ constitute the proper measure of Companies’ storage rights”; 5) previously undecreed points of diversion “cannot be given credit in calculating historical consumptive use”; and 6) “the decree contains appropriate conditions to prevent injury to other water rights resulting from the change of water rights.” *Slip Op.* at 27-28.

The case naturally also deals with Colorado’s “anti-speculation doctrine” (*Id.* at 30): “The anti-speculation doctrine, which has existed in Colorado prior appropriation water law since its inception in Territorial and early-Statehood days, prevents unlawful enlargements, as well as curbs the appropriation of water not needed for actual beneficial use.”

This case requires a thorough reading by water practitioners interested in several aspects of Colorado water law. **For info:** Case available at: www.courts.state.co.us

**ESA IMPROVEMENT US
USFWS & NOAA FISHERIES EFFORT**

The US Fish and Wildlife Service (USFWS) and NOAA Fisheries Service recently announced a joint effort to identify and implement administrative changes to the federal Endangered Species Act (ESA) aimed at accelerating recovery of imperiled species, enhancing on-the-ground conservation delivery, and better engaging the resources and expertise of partners to meet the goals of the ESA. The Services are not seeking any legislative changes to the ESA, believing that implementation can be significantly improved through rulemaking and policy formulation.

EFFORTS WILL FOCUS ON:

- Clarifying, expediting, and improving procedures for the development and approval of conservation agreements with landowners, including habitat conservation plans, safe harbor agreements, and candidate conservation agreements
- Reviewing and revising the process for designating critical habitat to design a more efficient, defensible, and consistent process;
- Clarifying the definition of the phrase “destruction or adverse modification” of critical habitat, which is used to determine what actions can and cannot be conducted in critical habitat
- Clarifying the scope and content of the incidental take statement, particularly with regard to programmatic actions or other actions where direct measurement is difficult

An incidental take statement is a component of a biological opinion that specifies the impact of an incidental taking of an endangered or threatened species and provides reasonable and prudent measures that are necessary to minimize those impacts. Greater flexibility in the quantification of anticipated incidental taking could reduce the burden of developing and implementing biological opinions without any loss of conservation benefits.

For info: Chris Tollefson, USFWS, 703/358-2222; Connie Barclay, NOAA, 301/713-2370

Website: www.fws.gov/endangered/improving_ESA/reg_reform.html

**TRIBAL PROTECTION WA
EXEMPT WELLS MORATORIUM**

At the end of March, the Thurston County Superior Court ruled in favor of the Squaxin Island Tribe (Tribe) in a lawsuit filed last year in which the Tribe requested that the State of Washington impose a moratorium on drilling new wells until the State determines if water is legally available to supply such wells. In *Squaxin Island Tribe v. Gregoire*, No. 10-2-01243-2, Judge Paula Casey ruled that the State’s inaction (denying rule-making) was “arbitrary and capricious.”

The tribe petitioned the Department of Ecology twice in two years to stop new water withdrawals in the Johns Creek Basin until enough scientific information is available to quantify the environmental impacts of pumping water out of those newly drilled wells. The State rejected both requests, citing budget constraints.

“Every year since recordkeeping began in the 1950’s, Johns Creek has had less and less water, and in every one of those years, more wells have been drilled in the basin,” Andy Whitener, the tribe’s natural resources director, said. “Not only are minimum flows not being met, but the water shortage gets worse every year.” Since the State set minimum flows in 1984 (WAC 173-514), more than 200 “permit exempt” wells have been drilled in the Johns Creek Basin. State law allows these wells to be drilled without having to obtain a permit and consents to withdrawals of up to 5,000 gallons a day.

For info: Andy Whitener, Squaxin Island Tribe, 360-426-9781, awhitener@squaxin.us or www.squaxin-nr.org

**ENDANGERED RIVERS WY
NATURAL GAS DRILLING**

American Rivers released its annual list of “Most Endangered Rivers” on May 17 and included the Hoback River in Wyoming due to proposed industrial scale natural gas drilling. Plains Exploration and Production (PXP), a Houston-based energy company, intends to begin hydraulic fracturing, or “fracking” — a controversial natural gas extraction method that uses hazardous chemicals and known carcinogens, and produces toxics-containing wastewater — in the Hoback’s headwaters.

The Hoback River system provides clean drinking water for local communities and vital habitat for dozens of species, including large herds of elk, mule deer and pronghorn. Springs,

WATER BRIEFS

seeps, and wetlands characterize the Hoback's upper reaches, which flow through a roadless area of the Bridger-Teton National Forest. The lower eight miles of the Hoback downstream of the project area was designated as a Wild and Scenic river in 2009.

In its draft environmental impact study of the drilling proposal, the Bridger-Teton National Forest did not require a comprehensive baseline analysis of the area's groundwater prior to development. Scott Bosse, Northern Rockies director for American Rivers, fears that this omission could allow PXP to deny responsibility for pollution that he believes is sure to follow: "As things stand, no one is going to be held accountable for cleaning up what will most likely be a toxic mess."

American Rivers is calling on the US Forest Service to impose much stricter standards on the drilling proposal with the hope that PXP will seek a buy-out and leave the upper Hoback intact. The company has not yet expressed a serious interest in relinquishing its leases, however, so as a stopgap measure American Rivers has asked the Forest Service to exert stringent control over development, requiring baseline surface and groundwater studies before development, limiting the number of roads and well pads, establishing setbacks from surface waters, slowing the pace of drilling, and implementing monitoring and mitigation practices to protect surrounding communities.

For info: Scott Bosse, American Rivers, 406/ 570-0455 or sbosse@americanrivers.org

REASONABLE USE CA

AG WATER USE EFFICIENCY DOCTRINE

Craig M. Wilson, Delta Watermaster, presented a report entitled "*The Reasonable Use Doctrine and Agricultural Water Use Efficiency*" (The Reasonable Use Doctrine) at the January 19, 2011, State Water Board Meeting. According to the report, California will continue to face water supply challenges and only through the efficient use of water will all the segments of its economy, including agricultural, continue to prosper. California's agricultural economy is the largest in the nation and exceeds \$34 billion in revenue per year, much of this dependant on irrigation. The California Department of Water Resources' 2009 State Water Plan estimates that each year 9.2 million acres of farmland

are irrigated with approximately 34.2 million acre-feet of water, representing approximately seventy-five percent (75%) of California's developed water.

The report addresses how the State's Reasonable Use Doctrine (Doctrine) may be employed to promote more efficient water use in the agricultural sector. The report explains how the Doctrine is the cornerstone to California's complex water rights law and that all water use must be reasonable. It goes on to show that there is a wide array of irrigation practices in place today that result in the more efficient and therefore more reasonable use of water. The report concludes that the Doctrine may be employed to promote a wider use of such efficient practices. The report recommends that the State Water Board convene a Reasonable Water Use Summit and contains specific recommendations for consideration during the Summit. The recommendations range from a wider employment of efficiency practices such as improvements to the irrigation systems that deliver water to farms, weather-based irrigation scheduling, and more efficient irrigation methods.

For info: Report available at www.waterboards.ca.gov/board_info/agendas/2011/jan/011911_12.pdf

WATER RIGHTS TRANSFERS NV CONSUMPTIVE USE LIMITATION

On May 11, US District Court (Court), District of Nevada, Judge Lloyd George issued a decision concerning *Alpine Decree* water rights and three applications to change certain water rights to an area known as the Carson Lake and Pasture. *U.S. v. Alpine Land & Reservoir Co., et al.*, Case No. 3:73-cv-183-LDG (May 11, 2011). The issues in the case revolved around whether or not the change applications requested a change in the manner of use, as well as the place of use. The State Engineer of Nevada held that the change application did not request a change in manner of use, based on his finding that the proposed use of the water "for the provision of food and habitat for migratory wildlife" could "be described as irrigation." The petitioners, the Pyramid Lake Paiute Tribe and the US, argue that this conclusion was erroneous since the proposed manner of use of the water was for wildlife purposes which, as defined by Nev. Rev. Stat. §533.023, includes "the establishment and maintenance of wetlands." *Slip Op.* at 1-2.

The Court noted, "Whether the manner of use of the water at the new location is for irrigation or is for wildlife purposes is critical because '[c]hange of manner of use applications from use for irrigation to any other purpose shall be allowed only for the net consumptive use of the water right as determined by [the Alpine] Decree.' Alpine Decree, Administrative Provision VII, as amended by Order Entered September 29, 1986, Docket #688." Thus, the amount of water that ultimately could be transferred would be affected by the determination of the manner of use.

The Court vacated portions of the State Engineer's decision and reversed his grants on the amount of water to be transferred. "Pursuant to the *Alpine Decree*, use of *Alpine Decreed* water rights for irrigation is for the irrigation of cash crops and pasture on farmlands. The proposed manner of use for these water rights is for wildlife purposes on wetlands. The proposed manner of use for these *Alpine Decreed* water rights is not for irrigation under the *Alpine Decree*. The proposed manner of use is a change in manner of use. Pursuant to *Alpine Decree* Administrative Provision VII, the State Engineer could approve the change application from irrigation to wildlife purposes for only the net consumptive use water duty of 2.99 acre-feet per acre." *Id.* at 15-16.

For info: Case available from *The Water Report* — email: thewaterreport@yahoo.com

TRIBAL CWA AUTHORITY AZ HAVASUPAI TRIBE

EPA has approved the application from the Havasupai Tribe (located near the Grand Canyon in Arizona) to administer a water quality standards program under the federal Clean Water Act (CWA). The Havasupai Tribe becomes the 46th Tribe that EPA has found eligible for "treatment in a manner similar to a State" for this purpose. The Tribe is now working with EPA to develop and adopt the actual water quality standards for their waters. Once EPA approves the standards, which is expected to occur within the next year, all surface waters that the Tribe identified within the exterior boundaries of its reservation will be protected by Clean Water Act standards.

For info: <http://water.epa.gov/scitech/swguidance/standards/wqslibrary/approvable.cfm>

June 20-21 ID
Idaho Water Users Ass'n Water Law Seminar & Workshop, Sun Valley. Convention Ctr. For info: IWUA, 208/ 344-6690 or www.iwua.org/

June 20-22 CO
Integrated Water Resources Management: The Emperor's New Clothes or Indispensable Process - 2011 AWRA Summer Conference, Keystone. Keystone Resort. For info: AWRA, www.awra.org/meetings/Summer2011/

June 21 CA
Water/Energy Nexus in California Conference, San Diego. Sheraton Suites at Symphony Hall. For info: Law Seminars Int'l, 800/ 854-8009, email: registrar@lawseminars.com, or website: www.lawseminars.com

June 22-24 UT
Hydrologic Information System Users Conference, Logan. Utah State University. For info: <http://his.cuahsi.org/userscon2011/>

June 23 CA
Climate Change & Local Planning Strategies Course, Sacramento. Sutter Square Galleria, 2901 K Street. For info: UC Davis Extension, 800/ 752-0881 or www.extension.ucdavis.edu/landuse

June 24 WA
Solar Power Seminar, Seattle. For info: The Seminar Group, 800/ 574-4852, email: info@theseminargroup.net, or website: www.theseminargroup.net

June 27 OR
Risk Assessment, Fish Consumption & Portland Harbor Superfund Site Workshop, Portland. World Trade Center Two. For info: Environmental Law Education Center, 503282-5220 or www.elecenter.com

June 27-29 UT
2011 AWRA Summer Specialty Conference: Integrated Water Resources Management, Snowbird. Snowbird Resort. For info: American Water Resources Ass'n, www.awra.org/meetings/Summer2011/

June 27-30 NV
International Symposium on Bioremediation & Sustainable Environmental Technologies, Reno. Peppermill Resort. For info: www.batelle.org/conferences/bioremediation/

June 29-July 1 WS
4th Annual National Ecosystem Markets Conference: Making Them Work, Madison. Madison Concourse Hotel. Sponsored by World Resources Institute & American Forestry Foundation. For info: Todd Garner, WRI, 202/729-7843

June 29-July 1 ID
Western Governors' Ass'n Annual Meeting, Coeur d'Alene. Coeur d'Alene Resort. For info: WGA, www.westgov.org/

July 12-14 CO
2011 UCOWR/NIWR Conference: "Planning for Tomorrow's Water: Snowpack, Aquifers, & Reservoirs", Boulder. For info: Reagan Waskom, Chair, Reagan. Waskom@colostate.edu or www.ucowr.org

July 14-15 NM
Natural Resource Damages Seminar, Santa Fe. Inn & Spa at Loretto. For info: Law Seminars Int'l, 800/ 854-8009, email: registrar@lawseminars.com, or website: www.lawseminars.com

July 16 CA
American River: Ecology, Resource Management & Whitewater, Lotus. For info: UC Davis Extension, 800/ 752-0881 or www.extension.ucdavis.edu/landuse

July 18-20 CA
Wild & Scenic Tuolumne River: Ecology & Water Resources Management Course, Groveland. For info: UC Davis Extension, 800/ 752-0881 or www.extension.ucdavis.edu/landuse

July 18-21 FL
Membranes Are The Solution Conference & Exposition, Miami Beach. AMTA/SEDA 2011 Joint Conference. For info: American Membrane Technology Ass'n, 772/ 463-0820 or www.amtaorg.com

July 19-22 IL
National Assoc. of Clean Water Agencies Summer Conference, Chicago. For info: National Assoc. of Clean Water Agencies, 202/ 833-2672 or www.nacwa.org

July 20 CA
Agricultural Water Use Efficiency Workshop, Sacramento. Cal/EPA Bldg., 1001 I Street. Presented by State Water Resources Control Board. For info: Steve McMasters, SWRCB, 916/ 341-5716, smcmasters@waterboards.ca.gov or www.calepa.ca.gov

July 20-22 CO
36th Annual Colorado Water Workshop, Gunnison. Western State College. Presented by the Colorado Water Workshop. For info: Jeff Selen, CWW, 970/ 943-3162, jsellen@western.edu or www.western.edu/academics/water

July 21-23 NM
Rocky Mt. Mineral Law Foundation 57th Annual Institute, Santa Fe. Convention Ctr. For info: www.rmmlf.org

July 25-27 CO
National Water Resources Ass'n Western Water Seminar, Colorado Springs. For info: NWRA, 703/ 524-1544 or www.nwra.org/

July 25-27 CA
Wild & Scenic Tuolumne River: Ecology & Water Resources Management Course, Groveland. For info: UC Davis Extension, 800/ 752-0881 or www.extension.ucdavis.edu/landuse

July 27-29 OR
Western States Water Council Summer Meeting, Bend. The Riverhouse Hotel & Convention Ctr. For info: WSWC, www.westgov.org/wswc/166mtg.html

August 2-4 MT
Multiple Indicator Monitoring of Stream Channels & Streamside Vegetation Training, Miles City. BLM Office. First Come, First Serve. For info: Mike Philbin, BLM, mphilbin@blm.gov

August 4-5 NM
New Mexico Water Law SuperConference, Santa Fe. Inn & Spa at Loretto. For info: CLE International, 800/ 873-7130 or website: www.cle.com

August 8-9 CA
Groundwater: Cities, Suburbs & Growth Areas - Remediating the Past/Managing for the Future Conference, Los Angeles. Hilton Los Angeles Airport. For info: National Groundwater Ass'n, 800/ 551-7379 or www.ngwa.org/

August 11-12 AZ
Arizona Water Law Conference, Phoenix. Biltmore Spa & Resort. For info: CLE International, 800/ 873-7130 or website: www.cle.com

August 15 CA
Southern California Stormwater Conference, Los Angeles. TENTATIVE. For info: Law Seminars Int'l, 800/ 854-8009, email: registrar@lawseminars.com, or website: www.lawseminars.com



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CALENDAR

(continued from previous page)

August 15-17 **NC**

ASIWPCA Annual Meeting 2011, Charleston. Francis Marion Hotel. For info: Ass'n of State & Interstate Water Pollution Control Administrators, www.asiwpca.org/

August 17 **CA**

2011 Regulatory Summit: Managing Water Quality in Today's Regulatory Environment, Pasadena. Hilton Hotel. Sponsored by Ass'n of California Water Agencies. For info: www.acwa.com/events/

August 21-25 **CA**

10th Annual StormCon Conference & Exposition, Anaheim. Anaheim Marriott. For info: www.instreamflowcouncil.org/flow2011

August 21-27 **Sweden**

World Water Week: Responding to Global Changes - Water in an Urbanizing World, Stockholm. For info: www.worldwaterweek.org/

August 23-25 **MT**

Settlement of Indian Reserved Water Rights Claims Symposium, Billings. Crown Plaza Hotel. Sponsored by Western States Water Council and Native American Rights Fund. For info: www.westgov.org/wswc

August 25-26 **CO**

Colorado Water Law Conference, Denver. For info: CLE International, 800/ 873-7130 or website: www.cle.com

August 25-26 **CA**

CEQA Conference, San Francisco. Hotel Nikko. For info: CLE International, 800/ 873-7130 or website: www.cle.com

August 26 **CO**

Hydraulic Fracturing Conference, Denver. Grand Hyatt. For info: CLE International, 800/ 873-7130 or website: www.cle.com

August 31 **WA**

Environmental Crimes & Penalties Seminar, Seattle. For info: The Seminar Group, 800/ 574-4852, email: info@theseminargroup.net, or website: www.theseminargroup.net

September 11-14 **AZ**

Watereuse Symposium, Phoenix. Sheraton Wild Horse Pass Resort. For info: <http://watereuse.org/symposium>

September 13-14 **WA**

2nd Annual Pacific Northwest Climate Science Conference, Seattle. UW - Kane Hall. For info: <http://cses.washington.edu/cig/outreach/pnwscienceconf2011/>

September 15-16 **NJ**

Contaminated Groundwater Litigation Seminar, Newark. TENTATIVE. For info: Law Seminars Int'l, 800/ 854-8009, email: registrar@lawseminars.com, or website: www.lawseminars.com

September 18-21 **AK**

International Symposium on Erosion & Landscape Evolution, Anchorage. Sponsored by American Society of Agricultural & Biological Engineers. For info: Sharon McKnight, ASABE, 269/ 932-7033, mcknight@asabe.org or www.asabe.org/meetings/erosion2011/index.htm

September 22 **CA**

Continuing Legal Education for Water Professionals, San Diego. Hotel Solamar. Sponsored by Ass'n of California Water Agencies. For info: www.acwa.com/events/

September 22-23 **ID**

Idaho Water Law Conference, Boise. TENTATIVE. For info: Law Seminars Int'l, 800/ 854-8009, email: registrar@lawseminars.com, or website: www.lawseminars.com