2010

Colorado Review: Water Management and Land Use Planning Integration

Prepared by the Center for Systems Integration on behalf of the Colorado Water Conservation Board and the Colorado Department of Natural Resources

Contributing Authors:

Dr. Lyn Kathlene

Jewlya Lynn

Adam Greenwade

Wendy Sullivan

Quinn Lung

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Steering Committee

- *Jacob Bornstein*, Program Manager, Water Supply Planning Section, Colorado Water Conservation Board
- *Eric Hecox*, Section Chief, Water Supply Planning Section, Colorado Water Conservation Board
- *Julio Iturreria*, Long Range Program Manager, Arapahoe County, Colorado
- *Dave Merritt*, Senior Water Resources Program Leader, HDR Engineering
- *Peter Nichols*, Attorney, Trout, Raley, Montano, Witwer & Freeman, PC

Advisory Committee

- *Clark Anderson*, Colorado Legacy Program Director, Sonoran Institute
- *Steve Aquafresca*, Mesa County Commissioner
- *Gary Barber*, Manager, El Paso County Water Authority, Colorado
- *Beorn Courtney*, Director of Water Resources Eng., Headwaters Corp.; & Colorado WaterWise
- *Jim Culichia*, Cherokee Metro District
- *Kathleen Curry*, State Representative, Colorado Speaker Pro Tem
- *Alexandra Davis*, Assistant Director, Colorado Department of Natural Resources
- *Jennifer Gimbel*, Director, Colorado Water Conservation Board
- *Steve Harris*, President, Harris Water Engineering, Inc.; and Water Chairman, Club 20
- *Andy Hill*, Sustainable Community Development Office, Colorado Department of Local Affairs
- *Tom Iseman*, Program Director, Water Policy, Western Governors' Association
- *Tracey MacDonald*, Statewide Planning Unit Manager, Colorado Department of Transportation.
- *Gerry McDaniel*, Attorney, Action 22
- *Simon Montagu*, Customer Resource and Support Director, Denver Regional Council of Governments
- *Tim Murrell*, Water Resources Planner, Douglas County, Colorado
- *Mark Pifher*, Director, Aurora Water, City of Aurora, Colorado
- *Thomas Ragonetti*, Attorney, Otten Johnson Robinson Neff + Ragonetti, PC
- *Pat Ratliff*, Colorado Counties Inc.
- *Kevin Reidy*, Office of Water Conservation & Drought Planning, Colorado Water Conservation Board
- *Doug Scott*, Vice President, Shea Properties
- *Gary Severson*, Executive Director, Northwest Colorado Council of Governments (NWCCOG)
- *Don Van Wormer*, City Manager, Monte Vista, Colorado
- *Ruth Wright*, Former Majority Leader, Colorado General Assembly

Section 1: Introduction

Adequate supplies of fresh water will be the number one resource scarcity issue of the 21st Century, globally and here at "home" in the western United States. To meet our consumptive and non-consumptive water needs, both demand side and supply side strategies will be needed (Colorado Water Conservation Board [CWCB], 2009b). The integration of land use planning and water supply planning is, therefore, a key component of managing our society's future demand for water.

Colorado and the West have integrated land use and water supply in many areas and arenas. This is especially the case with ensuring adequate water supplies for new developments. The focus of this report, however, is on the *water demand management components of land use planning and practices*. Demand management is a broad strategy for meeting the water requirements of Colorado's growing population by reducing the water needed to sustain each household and person. Ways to reduce future demand include building denser communities, infilling existing urban environments, following low impact development standards, and using water wisely. Many of these demand management strategies have a land use component which will be explored herein.

Understanding what has already been accomplished, where we might go, and how we can continue to move forward is the purpose of the report. The report does not set the course but rather sets the stage for communities, planners, and policymakers to move forward armed with information about policies, statutes, and strategies that exist in Colorado and the West.

Water Scarcity

Water shortages in the West are the result of multiple stressors, including rapid population growth, economic conditions and employment levels, energy demands such as oil shale development, agricultural irrigation, climate change, increased hydrological variability in major watersheds, and interstate compact obligations (CWCB, 2009b). Land development, like water demand, is being driven largely by residential, business, and industrial growth. Arizona, California, Colorado, Idaho, Nevada, Texas and Utah – all Western states – are experiencing the highest population booms in the country (Tarlock & Van de Wetering, 2006). Among these, Colorado is ranked as the third fastest growing state in the U.S. and is expected to double its population from 4.8 million in 2005 to a projected 8.7 – 10.3 million people in 2050 (CWCB, 2009a). Moreover, Colorado counties are growing quickly; eight of the top eighteen fastest growing counties nationwide are in Colorado (Nichols, Murphy, & Kenney, 2001), and almost 40% of Colorado counties are projected to more than double in population by 2050 (CWCB, 2009a). By the years 2035-2050, most of the state's population will live along the Front Range in the South Platte and Arkansas Basins (CWCB, 2009a).

Natural and human created elements drive population growth in the West. The dry climate of the West and robust economies are attractive to potential employers and residents. Colorado's sunshine has long beckoned newcomers and a recent poll by the Pew Research Center finds Denver and its metropolitan area tops the list of cities people want to live in (Taylor, Morin, Parker, Cohn, & Wang, 2009). In addition, Colorado's diversified economy, which has weathered the economic recession better

than most states (MetroDenver Economic Development Council, 2009), will continue to fuel population growth and in turn increase the amount of municipal and industrial (M&I) water needed. M&I water demands include water for residential, commercial, light industrial, non-agricultural related irrigation, non-revenue water, and firefighting (CWCB, 2009a). Statewide, M&I water demand is projected to increase from 1.1 million acre-feet (maf) in 2008 to 1.8 to 2.2 maf in 2050 (CWCB, 2009a).

We are in an era where the Federal government is reducing its role in building water supply infrastructure, leaving the state and its localities with the challenge to supply water for its increasing population and economic activities (Tarlock & Lucero, 2002). According to recent draft reports put forward by the Colorado Water Conservation Board, this will need to be done through a combination of developing new water supplies, reallocating existing supplies, and demand management (CWCB, 2009b).

Water Demand Management

According to Brooks (2006), water demand management is central to addressing water scarcity. This is further underscored by *Colorado's Water for the 21st Century Act* processes, which include the Interbasin Compact Committee (IBCC) and nine basin roundtables. The work of the IBCC members, data gathered in the basin by basin needs assessments, and research in the Statewide Water Supply Initiative (CWCB, 2004) all point toward the need for multiple strategies to meet our 21st Century water requirements. Demand management will now be as important as supply management and, in fact, the two must go hand in hand. Water demand management includes any method -- technical, economic, administrative, financial or social – that addresses one or more of the following five issues (Brooks, 2006: 524):

1. *Reduce the quantity or quality of water required to accomplish a specific task.*
2. *Adjust the nature of the task or the way it is undertaken so that it can be accomplished with less water or with lower quality water.*
3. *Reduce the loss in quantity or quality of water as it flows from source through use to disposal.*
4. *Shift the timing of the use from peak to off-peak periods.*
5. *Increase the ability of the water system to continue to serve society during times when water is in short supply.*

Land use planning is one important method in the tool box of demand management strategies. In fact, many of the same practices can fall under both "land use" and other types of conservation programs, which include "green programs" such as xeriscaping, water-efficient appliances, and reuse and recycling. Land use refers to building new infrastructure (e.g. houses and neighborhoods) that have conservation methods built into them. Other conservation practices focus on retrofitting existing infrastructure. Figure 1.1 depicts the relationships between demand management strategies and Table 1.1 provides a breakdown of various demand management methods and potential water savings.

Figure 1.1. Demand management practices and tools.

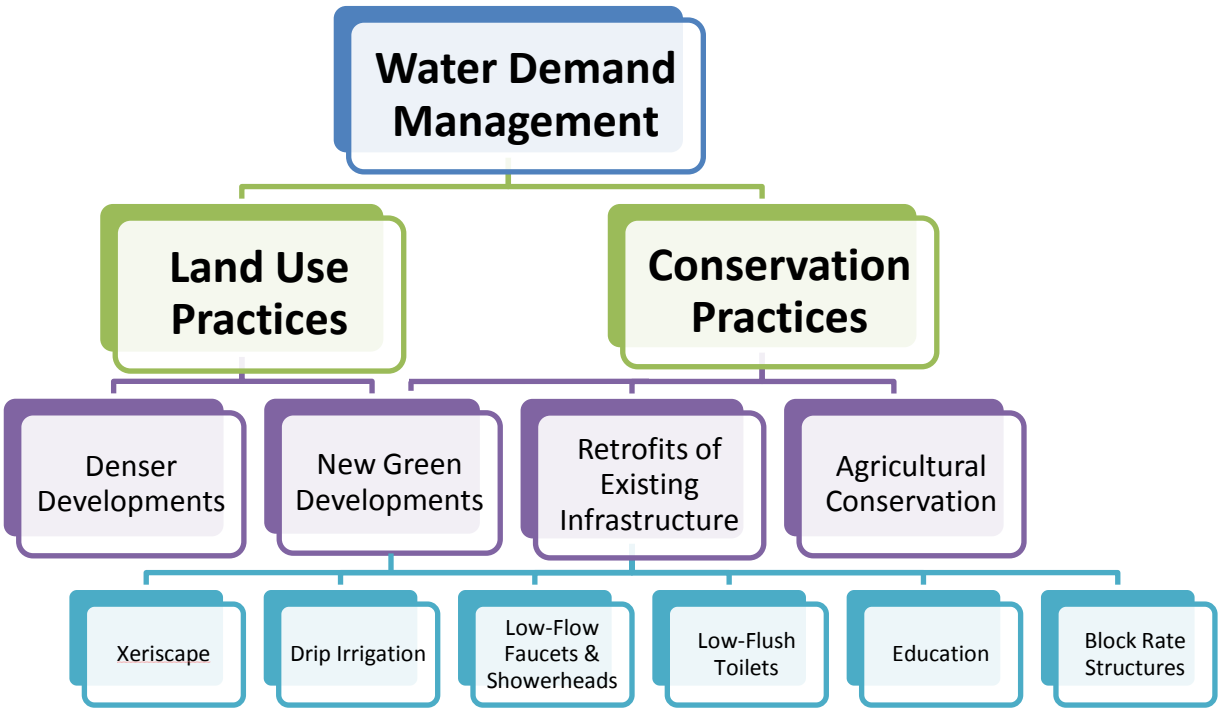


Table 1.1. Water demand strategies and potential water savings in Colorado.

General Approach	Examples	Estimated Implementation Level by 2030	Projected Long-Term Water Savings (acre feet/year) by 2030
Structural-Operational	Household appliances		
	• Toilet rebates	80%	55,800
	• Washer rebates	80%	17,000 to 40,200
	Utility water loss reduction	90% of public providers	52,000 to 86,700
	Residential indoor audits	25% residential customers – targeted at high users	2,300 to 6,900
	Commercial indoor audits	25% commercial customers – targeted at high users	800 to 3,800
	Residential landscape audits	25% residential customers – targeted at high users	3,800 to 11,500
	Commercial landscape audits	25% commercial irrigators – targeted at high users	1,500 to 5,800
	Sub-metering in multi-family housing	20%	1,800 to 5,200
	Cooling towers increased cycle concentration	50%	3,100 to 24,500

General Approach	Examples	Estimated Implementation Level by 2030	Projected Long-Term Water Savings (acre feet/year) by 2030
Socio-political	Turf replacement	25% single family home	125,800 to 211,700
	Rebates for landscape retrofits other than turf	2.5% residential customers	3,100 to 18,400
Economic	Conservation oriented water rates (increasing block rates, water budgets, etc.)	100% municipal customers	30,675
TOTAL (not including duplication)			**286,900 to 458,600**

Adapted from Colorado Water Conservation Board (2007, November). *Colorado's water supply future: Statewide water supply initiative – phase 2*. Denver, CO: Colorado Department of Natural Resources, Table 2-1, pp. 2-6 - 2-8.

Some conservation practices, such as education or in home audits, are critical to fully realizing the savings capacity of new efficient infrastructure. As demonstrated in a June 2009 article, many new neighborhoods in Denver such as Stapleton and Lowry are using more water per square foot of lawn than many other Denver neighborhoods, despite having timed sprinkler systems and xeric landscaping (Nathan, 2009).

Ultimately, to fully utilize the potential of water demand management requires (1) cooperation among all those involved in delivering water as well as policy makers and other key stakeholders; and (2) measurements and data to track which efforts are most effective (Brooks, 2006).

Colorado Context

In 2003, the Colorado General Assembly authorized the Colorado Water Conservation Board to implement the Statewide Water Supply Initiative (SWSI). This was the first step in undertaking a comprehensive assessment of Colorado's current and future water needs. The water supply shortfalls were estimated for the state and for the water basins, resulting in an identified statewide gap of 20% between supply and demand in the year 2030. The first SWSI report was released in November 2004 (CWCB, 2004). CWCB recently projected M&I water demands out to 2050 (CWCB, 2009a) and is in the process of updating the basin gap analysis.

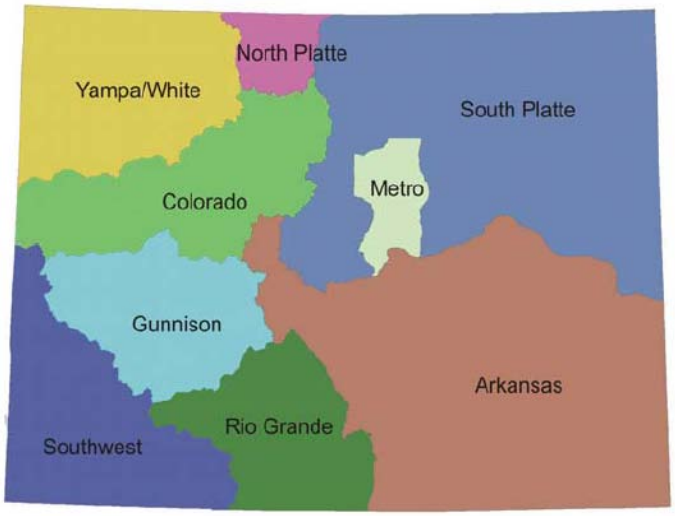


Figure ES-1. Colorado's Nine Basin Roundtables

Overall, Colorado's population is expected to double by 2050 with the highest growth rates on the West Slope but the majority of people migrating to the Front Range. The three fastest growing basins are on

the West Slope: the Colorado, the Dolores/San Juan /San Miguel, and the Gunnison, where the population will nearly triple by 2050 (CWCB, 2009a). The more highly populated basins are the Arkansas and South Platte, where nearly 80% of Colorado's population resides. The eleven most populated counties are located in these two basins – the South Platte and the Arkansas. The South Platte Basin consists of ten counties -- Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, Elbert, Jefferson, Larimer and Weld – with a total population of 3,357,218 in 2008. The Arkansas Basin has two counties -- El Paso and Pueblo – home to 754,638 people in 2008 (Colorado Department of Local Affairs, 2008a). To accommodate the projected growth, Colorado will need almost 1 million acre feet of additional water for municipal and industrial (M&I) uses if current demand rates continue (CWCB, 2009a).

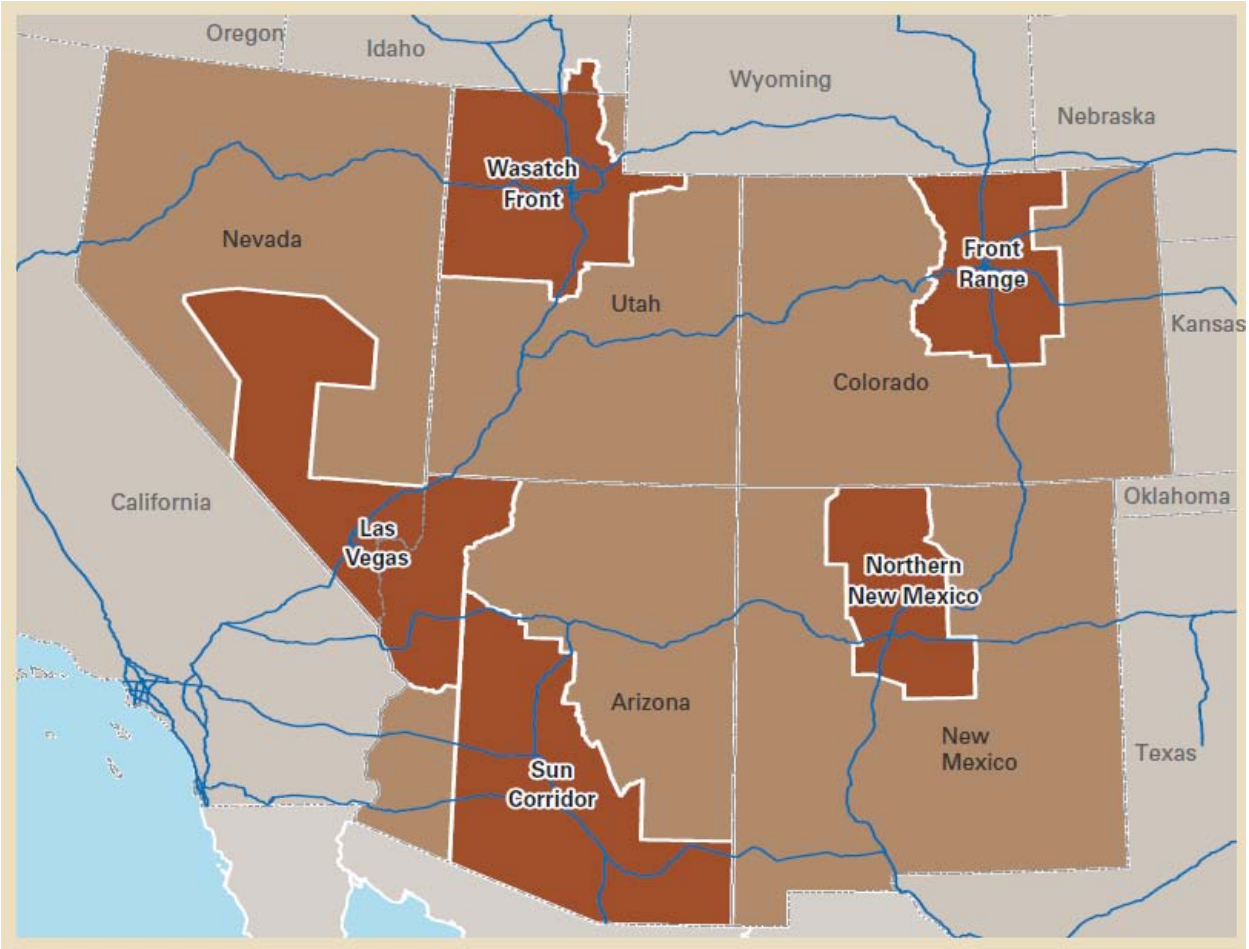
Local governments are placed in the position to accommodate the needs of their growing urban populations. The state of Colorado has given the majority of land use responsibility and control to counties and municipalities through enabling legislation (Colorado Department of Local Affairs, 2001). In addition, local governments have the ability to become "home rule" cities and counties, allowing greater autonomy from the state and flexibility to address local problems. Home rule is intended to ensure cities and counties can make decisions on expending funds, incurring debt, building and maintaining public goods such as roads, parks, hospitals, and firehouses, and undertaking other activities to meet their local growth and urbanization needs. Colorado also allows for local special districts, which are governing entities that oversee specific services, such as schools, libraries, fire, and water. The districts also have autonomy to solve local problems using local funds to create local solutions (Linz, 2009).

Land planners and developers must also consider Colorado water laws. Colorado water laws for surface water and tributary groundwater are based on the doctrine of prior appropriation, which is outlined in the Colorado Constitution. Prior appropriation doctrine is often referred to as "first in line, first in right" because it allocates water rights based on the time when a right was first asserted. In order to claim a water right, an application to Colorado water courts is required. The application requires a description of how the water will be used as well as the amount to be used. Properly assessing water use becomes particularly important because in times of drought, those with senior water rights can receive their complete allocation even if it results in junior rights holders being left with no water. Surface water and tributary groundwater are common sources of water, but other types exist as well. Designated, nontributary, and Denver Basin ground water are regulated by laws such as the 1965 Groundwater Management Act (CRS 37-90-101 through 143) and the 1983 Geothermal Resources Act (CRS 37-90.5-102 through 108). Use of these additional types of water is also regulated by state agencies, and land planners must be aware of these requirements in order to plan appropriately. For more information on Colorado water law, see the Colorado Foundation for Water Education's *Citizen's Guide to Colorado Water Law* (2009).

Colorado's Front Range – Fort Collins, Boulder, Denver and Colorado Springs along the I-25 corridor – is one of five emerging intermountain west "Mega Regions" according to the Brookings Institution 2008 report (See Figure 1.2 below). The five regions are experiencing rapid population growth and job creation that far exceeds the national average. With growth comes the challenge of providing adequate infrastructure, including energy, water, transportation, housing units and commercial/industrial space to

serve new residents and workers. By 2050, the Front Range housing stock will have doubled and half of the existing stock will have been replaced or upgraded (Brookings, 2008).

Figure 1.2. Five megapolitan areas emerging in the Intermountain West.



Source: Brookings Institution. (2008). Mountain Megas. Washington, D.C.: Author. p.17

While rapid growth brings a host of challenges, it also brings opportunities. By 2050, 75% of the residential and commercial infrastructure will be new or retrofitted units which could largely be built with energy and water efficiencies in mind if green practices were incorporated in the near future. Indeed, Colorado is ranked 5th in the country for the percentage of its residential and commercial infrastructure that is energy-efficient (e.g., LEED certified, see section 4 of this report for more information; Miller, Spivey & Florance, 2008). Couple these current market efforts with the Colorado Governor's Energy Office commitment to the ENERGY STAR New Homes Program,[1] the state has both the economic and political foundation upon which to pursue sustainable growth measures that are mindful of water demand and its relationship to land use planning.

[1] See http://www.colorado.gov/energy/index.php?/residential/

It is critical to keep in mind that most of the integration of land use planning and water planning in Colorado that has occurred is at the local level. Although attempts at top-down regulation have been made in the past (Ingram & Hong, 2009), the most successful measures have been permissive rather than mandatory, enabling local governments to implement a variety of tools in planning their communities. This report remains mindful of Colorado's political history and legal context as it examines the opportunities and barriers to integrated water and land use planning.

Structure of the Report

Section 2 provides basic information on the methodology of the three types of research conducted for the report: literature reviews, statutory analysis, and a survey of key stakeholders in Colorado. The section also includes an overview of the *Water & Land Use Planning* symposium that helped inform the recommendations in this report.

Section 3 provides an analysis of the statutory opportunities and barriers related to the integration of water and land use planning. It includes a chart with information about relevant statutes.

Section 4 provides an analysis of the many types of strategies for integrating water and land use planning, as identified by the literature review, survey respondents, and the steering committee. It includes a chart with examples of how the many strategies have been implemented in Colorado and elsewhere at the state and local level. It has survey results throughout, with quantitative and qualitative findings on Colorado stakeholder's opinions and ideas related to the different strategies. The section also includes case studies presented at the Western States Water Council fall 2009 symposium *Water & Land Use Planning for a Sustainable Future: Scaling and Integrating.*

Section 5 specifically explores survey results that ask about the role the state could or should play in the integration of water and land use planning. The chapter pulls examples from throughout the rest of the report on the types of strategies available to the state, and discusses potential opportunities, including those identified by survey participants and symposium attendees.

The appendices provide more information about the survey and legal context of the state.

Section 2. Research Methods

The report pulls together information from three main sources. (1) Colorado statutory and policy research, (2) primary data through a statewide survey, and (3) literature of best and promising practices in Colorado and elsewhere.

Statutory and Policy Research

A search of Colorado statutes related to water and land use planning, enabling statutes that grant authorities to municipalities and counties, governance structures, and quasi-governmental structures was conducted. Understanding the planning authority at local, regional, and state levels of government and their interaction is important when considering options to address water demand management through land use planning. In addition, the State of Colorado has several state agencies and legislatively-created organizations that offer assistance and resources for governments related to land and water planning issues. These are important resources that could assist with land use planning and water demand management.

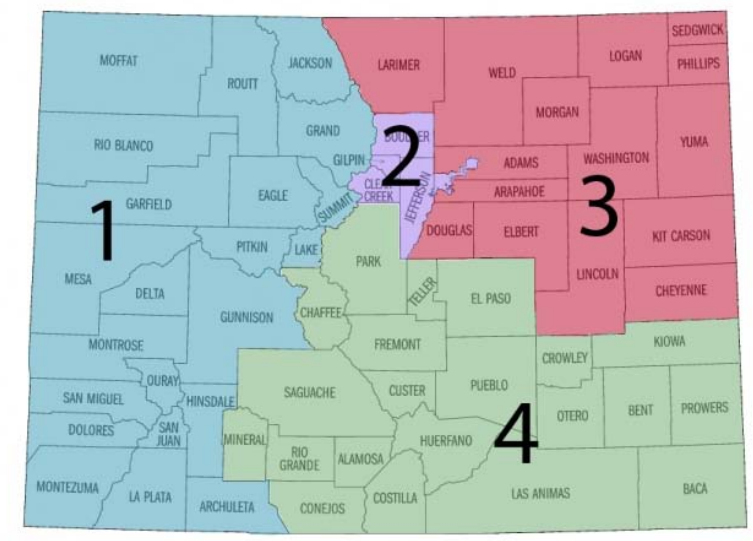
Section 3 reports on the lay of the legal landscape in Colorado. At the end of the section is a table that compiles the statutes into policy categories and summarizes key components that are relevant to land use and water planning.

Survey Design and Methods

A statewide survey was conducted to better understand the opportunities and challenges to integrate land use planning and water demand management in Colorado. The survey (see Appendix I) was sent to a broad range of stakeholder groups across the state of Colorado, including those involved in land use planning, land development, water management, water law, resource conservation, and business. Participants were recruited through professional organizations that sent out an email to their members endorsing the survey and requesting member participation (see Appendix H for email text).[2] A follow-up reminder email was sent two weeks after the first email announcement.

[2] Organizations were: Colorado Chapter of the American Institute of Architects, Colorado Chapter of the American Planning Association, Colorado Coalition of Land Trusts, Colorado Office of Smart Growth and Sustainable Communities Initiative, Colorado Realtors, Colorado Special District Association, Colorado Water Conservation Board – Interbasin Compact Committee, Denver Water, and Horizon Uptown.

Figure 2.1. Regions in water and land use planning survey.



For survey purposes, the state was categorized into four large regions as shown in Figure 2.1. It was important to delineate boundaries that did not unduly lean toward water interests (e.g., water basins or watersheds) or land use interests (e.g., Planning and Management Regions). Regions 1, 3, and 4 coincide with regional advocacy organizations Club 20, Progressive 15, and Action 22, respectively.[3] Region 2 captures the Denver-metropolitan area. While the regions generally correspond with the regional organizational boundaries, the organizations were not named or identified anywhere in the survey.[4]

A total of 345 people took the survey. Overall, one quarter of the respondents were affiliated with a water provider, one fifth were involved in real estate in some fashion, 15% were in land use planning departments, and 15% were affiliated with special districts. More detail is shown in Table 2.1 below.

[3] Generally, each of the regional organizations' missions is to promote economic and policy issues of mutual concern to their region. Activities include marketing, advertising, public education, policy work groups, meetings, events, and political action.

[4] The counties in the regions are:

Region 1: Archuleta, Delta, Dolores, Eagle, Garfield, Grand, Gunnison, Hinsdale, Jackson, Lake, La Plata, Mesa, Moffat, Montezuma, Montrose, Ouray, Pitkin, Rio Blanco, Routt, San Juan, San Miguel, Summit

Region 2: Boulder, Broomfield, Clear Creek, Denver, Gilpin, Jefferson

Region 3: Adams, Arapahoe, Cheyenne, Douglas, Elbert, Kit Carson, Larimer, Lincoln, Logan, Morgan, Phillips, Sedgwick, Washington, Weld, Yuma

Region 4: Alamosa, Baca, Bent, Chaffee, Conejos, Costilla, Crowley, Custer, El Paso, Fremont, Huerfano, Kiowa, Las Animas, Mineral, Otero, Park, Prowers, Pueblo, Rio Grande, Saguache, Teller

Table 2.1. Survey respondent affiliations by regions.

	Percent All Respondents[a]	Percent within Regions in Colorado[b]				Percent Statewide & the West
Affiliations		**1**	**2**	**3**	**4**	
Water provider	25.6%	28.3%	17.4%	34.2%	24.1%	5.9%
Real estate	21.1	20.4	24.6	12.7	25.3	11.8
Land use planning department	15.4	13.3	21.7	21.5	10.1	2.9
Special district	15.4	15.9	2.9	21.5	20.3	--
Consulting firm	15.1	18.6	14.5	15.2	16.5	41.2
Non-profit	8.7	7.1	8.7	7.6	5.1	23.5
Environmental organization	7.5	8.8	4.3	10.1	6.3	11.8
Engineering firm	7.5	7.1	10.1	10.1	8.9	29.4
Land development company	6.0	8.8	4.3	7.6	1.3	2.9
Legal firm	3.3	1.8	7.2	2.5	3.8	8.8
Research institute/University	2.4	2.7	1.4	3.8	1.3	2.9
Other affiliations, including immediate past affiliations[c]	15.1	18.6	13.0	15.2	13.9	29.4
N=	332	113	69	79	79	34
Missing	13					
TOTAL	**345**					

[a] More than one affiliation could be selected therefore the percentages sum is greater than 100% and the sum of Regions, Statewide, and the West are greater than the total of All Respondents.

[b] See Figure 2.1 for breakdown of regions.

[c] Other and immediate past affiliations not represented in the table included citizen advocates, farmers and ranchers, media, elected and appointed government officials at the federal, state, and local level.

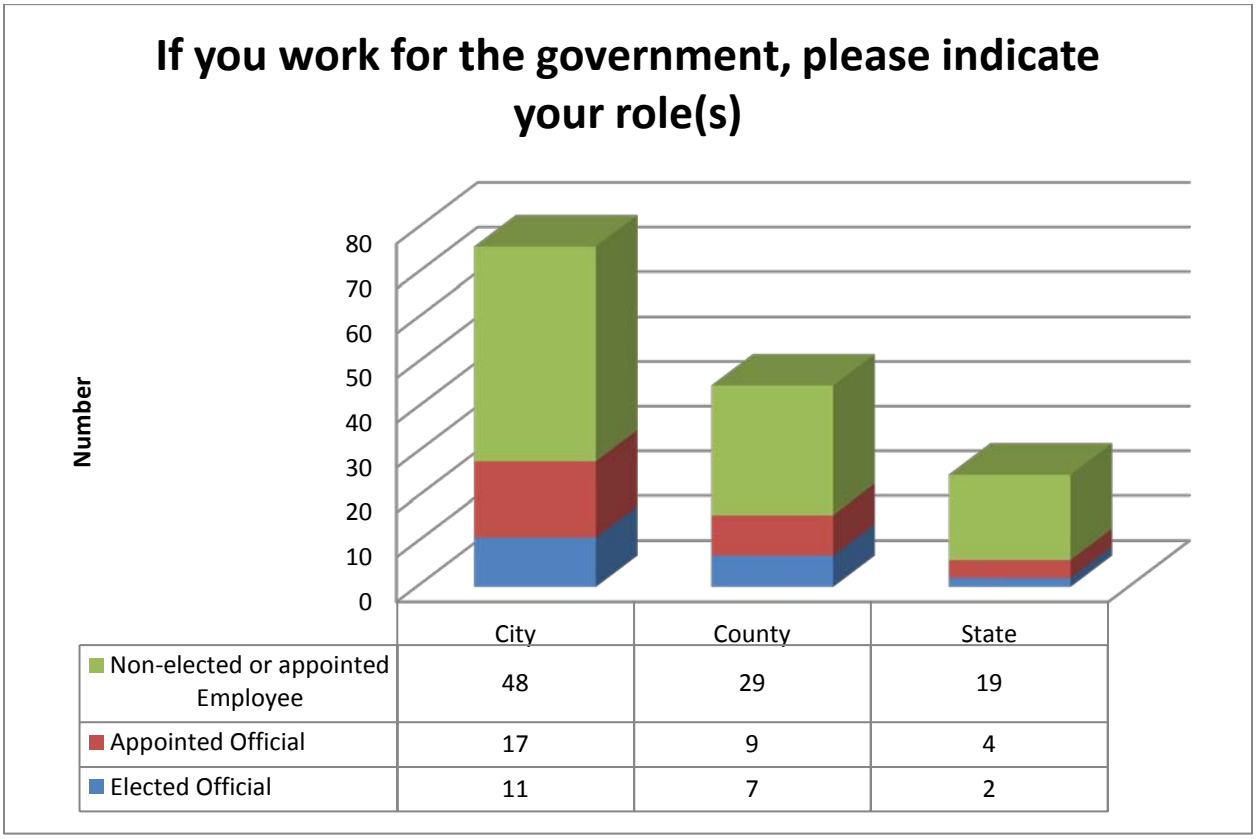
Survey respondents were knowledgeable about water planning, land use planning, or both. As shown in Table 2.2, a plurality identified as being well-informed about both water and land use planning. One fifth reported their expertise as land use planning only, while 36% were mostly knowledgeable about water planning only.

Table 2.2. Survey respondents self-reported knowledge.

Type of Knowledge	Response Percent
Most knowledgeable about water planning.	36.0%
Most knowledgeable about land use planning.	20.9%
Knowledgeable about both water and land use planning.	43.2%

Thirty-nine percent (n=136) of the survey respondents worked for the government. One-third were either elected or appointed. The remaining two-thirds were government employees. Ten people held two government roles simultaneously. Most were affiliated with a municipality (52%), followed by county level officials/employees (31%) and finally the state (17%).

Figure 2.2. Number of survey respondents who work for the government by role and level.



Beyond the demographic data, respondents were asked to assess land use planning tools as methods by which to reduce water demand, and rank stakeholder groups' interest and involvement in using land use planning to reduce water demand. A series of open-ended questions gathered information about the

opportunities and barriers to integrating water and land use planning, efforts that had/were happening in the state, notable efforts in other states, and whether the state of Colorado should be involved in efforts to reduce water demand through land use planning.

Quantitative data was analyzed with the statistical package SPSS. Open-ended questions were coded and sorted in NVivo, a qualitative software program.

Literature Review

A great deal of research has been conducted in the last five years on land use as it relates to water – both quantity and quality. Many different efforts have been implemented across the country, including gaining water consumption efficiencies via building standards, e.g., LEED, and increased density, e.g., LID, Smart Growth, New Urbanism, etc. In addition, there are multiple studies comparing water consumption in different types of land use from exurban developments to low density single family homes to high density mixed use developments to industrial/commercial areas. Research has also examined the effectiveness of water consumption efficiency programs such as internal water meters, xeriscape rebate programs, high efficiency appliance rebate programs, and identified best practices. Many studies focus on the arid/semi-arid Western states, and several of these studies have examined Colorado's Front Range cities. In addition, there are different types of regional governance structures and intergovernmental planning processes that have been tried and evaluated. Educational campaigns are also commonly implemented.

To understand which combination of policies, strategies and tools will work best in Colorado, it is important to examine lessons learned and best practices elsewhere. The literature review serves to identify possible strategies (some of which are mentioned by survey respondents and some which are not), provide an assessment of the outcomes, and identify opportunities and barriers for Colorado.

Stakeholder Leadership

The project gathered input from key stakeholders through three venues. (1) A Steering Committee, composed of five individuals, was formed at the beginning of the project to provide direction on key issues and identify stakeholder organizations to recruit survey participants. (2) An Advisory Committee, composed of 23 individuals, provided diverse expertise and represented key interests: geographical, water or land use, and business, government, and non-profit. The Advisory Committee met twice during the fall of 2009 to review report drafts, help identify speakers for the symposium, and prioritize "next steps." (3) The Western States Water Council and the Colorado Water Conservation Board co-hosted a symposium *Water & Land Use Planning for a Sustainable Future: Scaling and Integrating*, September 28th-30th, 2009, which brought together 150 stakeholders in the water and land use planning communities to tackle issues related to integrated planning (a copy of the agenda is in Appendix A, panel presentation notes are in Appendix B, and table discussion notes are in Appendix C). The symposium included working breakout sessions on roles, responsibilities, and opportunities for integrated planning at the state level, local/county level, and non-profit/private sector level. On the last day, symposium participants began the process of prioritizing issues in nine broad categories derived from the work done in the breakout sessions:

1. Data
2. Education
3. Communication
4. Coordination
5. Integration
6. Implementation
7. Regulation
8. Regionalization
9. Incentives/Market Solutions

Post-conference, the Advisory Committee and Steering Committee met together to flesh out ideas from the symposium participants. These recommendations are discussed in Section 5 of the report and in Appendix D. The names of the Steering Committee and Advisory Committee members are listed at the beginning of the report.

Section 3. Colorado Statutory Context

Land use planning authority, like water planning authority, is derived from statutes, rules and regulations. Few Colorado statutes explicitly integrate land planning with water planning, although several tools are in place to encourage this and permit it to happen voluntarily. This section reviews the legal context that allows for land use planning, including municipal and county powers, intergovernmental cooperation, and special districts. It also covers state agencies and legislatively-created organizations that provide assistance and resources related to land and water planning issues to local and county governments. A table at the end of the section summarizes the key statutes related to land use planning and cross-jurisdictional authorities as well as statutes addressing water conservation, quality, supply, management, and water law that are relevant to integrating land use and water planning.

Opportunities for integrated planning are already available. For example, counties and municipalities are required to adopt a master plan for the physical development of their jurisdictions, which *may* include a water supply element (Colo. Rev. Stat. §§ 30-28-106 and 31-23-206); water efficiency and conservation is encouraged through public project landscaping guidelines (Colo. Rev. Stat. § 37-96-101 et seq.); and one statute, which passed in 2008, requires developers to demonstrate to local governments that they have an adequate water supply to serve their proposed development (Colo. Rev. Stat. § 29-20-301 et seq.). Statutes also allow for water and land use integration to occur through intergovernmental agreements and other regional collaborations. Also, local governments may address water demand issues through local ordinances and design standards, in addition to the few mandates from state statutes. However, even with mandated requirements, often the implementation and oversight of the program is left to local control.

Despite some effort to address water demand management through land use planning, the majority of state statutes related to water planning targets water suppliers, water quality, and water project development. Further, although state statutes support and permit intergovernmental cooperative agreements on water, planning, and service issues, coordination and sharing of information between local governments and water suppliers are largely voluntary. As water becomes scarcer in Colorado, the necessity of this collaboration becomes more apparent given the regional nature of water resources and the impact of local land development and uses on the resource.

To understand the statutory context that enables integration of water and land-use planning, this section provides:

- Descriptions of the primary statutes related to local and state roles in land use planning and water management;
- Explanation of statutes related to special districts, who play a unique role in Colorado's land and water management systems;
- A chart of the primary statutes that contribute to local land planning authority and state statute attempts at integrating water demand matters.

Land Use Planning in Colorado

Understanding the planning authority at local, regional, and state levels of government and their interaction is important when considering options to address water demand management through land planning. In Colorado, authority for most local government programs comes from three possible sources: general home rule powers, specific statutory authorizations, or implied authority from general land use planning, zoning, and subdivision laws (Duerksen, Hobbs, Elliott, Johnson, & Miller, n.d.). The source of land use authority within a local government's jurisdiction depends on whether the government is classified as a home rule city or town, home rule county, statutory city or town, or a statutory county (Elliot, 2006). Additional authority accrues when local governments form multi-jurisdictional agreements with other governments, called intergovernmental agreements (McGrath, 2006). Finally, special districts may be formed as governmental entities with specified functions. Some primary considerations are summarized below. A more thorough review of governmental land use authority is provided in *Colorado Land Planning and Development Law, Seventh Edition,* edited by Donald L. Elliot (2006).

Local Governments: Home Rule and Statutory Powers

Local governments in Colorado receive their authority from an explicit or implied grant of authority from the state (Elliot, 2006). This approach historically interfered with local municipalities' ability to respond to local problems. In the late 19th century, municipal governments were granted greater autonomy in the form of "home rule" government (Lorch & Null, 2005); thus, local governments are classified as either "statutory" or "home rule," which in turn affects the ability of a municipality or county to regulate matters within its borders. Most of Colorado's population lives in a home rule municipality as shown in Table 3.1 below. A list of statutory towns, cities, counties and home rule municipalities can be found in Appendix E.

Table 3.1. Population by structure of Colorado municipal governments.

Structure	Population	% of Population
Home Rule	3,328,930	93.30%
Statutory	237,819	6.67%
Territorial Charter	1,108	0.03%

Source: Colorado Municipal League, http://www.cml.org/pdf_files/muni_facts.pdf

Statutory governments: Statutory governments have only those powers explicitly or impliedly given to them by state statute (Elliot, 2006). The extent of implied powers, especially on the county level, can be contentious and sometimes determined by courts.[5] Towns, cities, and counties can all be considered

[5] Cases addressing the issue of county powers include: Stermer v. La Plata County, 5 Colo. App. 379, 38 P. 839 (1895); Colburn v. El Paso County, 15 Colo. App. 90, 61 P. 241 (1900); Farnik v. Weld County, 139 Colo. 481, 341 P.2d 467 (1959); Dolores County v. Love, 172 Colo. 121, 470 P.2d 861 (1970); Bainbridge, Inc. v. Douglas County, 964 P.2d 575 (Colo. App. 1998)

statutory governments. As of August 1, 2009, there were 13 statutory cities, 165 statutory towns in Colorado, and 60 statutory counties (Colorado Department of Local Affairs, 2009).

Statutory example: The Local Government Land Use Control Enabling Act (Colo. Rev. Stat. § 29-20-101), which was adopted in 1974, granted counties and municipalities the authority to plan for and regulate the use of land within their respective jurisdictions, with no restrictions or procedures proscribed for local governments (Colorado Department of Local Affairs, 2001). Because home rule municipalities already had these powers under Article XX of the state Constitution, the effect of this statute was to grant these powers to statutory cities and counties without limiting the flexibility of local governments to address planning needs (Ingram, Carbonell, Hong, & Flint, 2009).

Home rule municipalities: A home rule municipality has the power to create its own charter, ordinances, and laws on "matters of local concern." This means that a home rule city or town may override state law in matters of local concern, whereas a statutory government would be bound by state law (Duerksen et al., n.d.). An example of this is the City of Englewood's Ordinance 26, Series of 1963, which addresses zoning "with the intention of superseding, within the territorial limits and other jurisdiction of the city, any general law of the State of Colorado." The legality of this ordinance was affirmed by the Colorado Supreme Court (Roosevelt v. City of Englewood, 1971). However, home rule authority varies depending on whether governmental matters are classified as a purely local concern, statewide concern, or mixed local and statewide concern. State regulations govern areas of purely local concern if the home rule municipality has not adopted legislation on a particular matter; otherwise home rule charters supersede state regulations.[6] Areas of mixed concern may be regulated by both the state and local legislatures, but state legislation will supersede local legislation if there is a conflict between the two levels of legislation (Elliot, 2006). Finally, state statutes govern areas of statewide concern. As of August 1, 2009, there were 90 home rule municipalities in Colorado.

Home rule counties: State statutes list the services that must be provided by all counties, but home rule counties have more freedom to structure their government and designate who will perform county functions (Elliot, 2006). This ability to organize their government is the only additional freedom that home rule counties have over statutory counties (Lorch & Null, 2005). Thus, home rule counties have little substantive powers not already afforded to statutory counties (Elliot, 2006). This is in contrast to home rule municipalities, which can have broader powers and services over statutory municipalities (Lorch & Null, 2005). Home rule counties include Pitkin and Weld Counties.

Areas of Mixed Concern

Issues can be a strictly local matter, a state matter, or a mixed area with both state and local implications (Elliot, 2006). As described in the section above on home rule municipalities, local laws can supercede state laws on local matters (Roosevelt v. City of Englewood, 1971). However, when an issue is of mixed local and statewide concern, state laws take precedence over local laws. Zoning and land use are typically local matters (Elliot, 2006), but exceptions exist and are determined on a case-by-case

[6] Cases where home-rule charters superceded state regulations are: Anema v Transit Construction Authority, 788 P.2d 1261 (Colo. 1990); Artes –Roy v. City of Aspen, 856 P.2d 823 (Colo. 1993); Voss v. Lundvall Brothers, 830 P.2d 1061 (Colo. 1992); Moore v. City of Boulder, 484 P.2d 134 (Colo. App. 1971).

basis. For example, when the City and County of Denver sought to construct and operate a major new domestic water system outside of its jurisdictional boundaries, the Colorado Supreme Court found this construction, and the efficient utilization of municipal and industrial water projects, to be matters of mixed state and local concern (City & County of Denver v. Board of County Commissioners, 1989), meaning that local regulations would be upheld only if they were not inconsistent with state law.

Government by Districts and Authorities

Services and programs can be provided through quasi-governmental corporations and improvement districts. Over 1,800 of these special purpose districts and authorities exist in Colorado. These districts can be organized to address any public service or development issue and typically have the power to tax, bond, sue, and enforce its policies (Lorch & Null, 2005). Since they are considered a form of local government, special purpose districts can receive technical assistance and other services from the Colorado Department of Local Affairs Division of Local Government. Typically, the term "special district" refers to an entity organized under Title 32 of the Colorado Revised Statutes, but land and water use planning can be addressed via other types of districts as well.

Title 32 Districts: A Title 32 district includes a variety of public improvements or services such as water service and delivery, fire protection, public transportation, health services, and more; the term "special district" is usually understood to mean an entity organized under Title 32 of the Colorado Revised Statutes, commonly referred to as the Special District Act. These districts can be organized to provide one service or multiple services. Title 32 districts have the authority to construct, operate, and maintain facilities to provide services but overall have little land planning authority. Some types of Title 32 districts are:

- *Water District*. A water district supplies water for domestic and other public and private purposes by any available means and provides all necessary or proper reservoirs, treatment works, and related facilities and equipment.

- *Water & Sanitation District*. A water and sanitation district provides both water district and sanitation district services.

- *Metropolitan District*. A metropolitan district provides two or more of the following services: fire protection; mosquito control; parks and recreation; safety protection; sanitation; solid waste disposal facilities or solid waste transportation and collection; street improvement; television relay and translation; transportation; and/or water.

Other Water Districts: In total, Colorado has over 150 water and sanitation, water conservancy, and water districts in Colorado, plus 1,210 metropolitan districts.[7] In addition to Title 32 districts, districts organized under other statutes (Title 29 and Title 37) that also affect water use include:

[7] See Colorado Department of Local Affairs, available online at: http://www.dola.state.co.us/dlg/local_governments/lgtypes.htm

- *Drainage District*. A drainage district is designed to benefit agricultural landowners in the same drainage system.

- *Ground Water Management District*. A groundwater management district manages a designated ground water basin; designation is made by the ground water commission.

- *Water Authority*. A water authority contracts among any combination of municipalities, special districts, or other political subdivisions that are authorized to own and operate water systems or facilities or drainage facilities to develop water resources, systems, or facilities or of drainage facilities. Local governments create water authorities through contracts to provide service to both jurisdictions. Water authorities are political subdivisions of the state, separate from the parties to the contract, giving them the ability to issue its own debt, among other powers (McGrath, 2006). Examples include the Aurora-Colorado Springs Joint Water Authority, which serves areas of Adams, Arapahoe, and El Paso counties, and the Metropolitan Denver Waste Water Authority, which serves areas of Arapahoe, Denver, Douglas, and Jefferson counties.

- *Water Conservancy District*. A water conservancy district has authority to set rates to the board of directors. Doing so requires no further procedures, such as seeking public utilities commission approval of these rates.

- *Water Conservation District (river water)*. A river water conservation district has the authority to make contracts, acquire property, conduct surveys, and exercise implied powers to conserve river water.

Table 3.2. Water and metropolitan districts in Colorado: August 1, 2009.

Type of District	Defining Statue	Number in Colorado
Drainage Districts	37-20-101	12
Ground Water Management Districts	37-90-118	13
Water Authorities	29-1-204.2	22
Water Conservancy Districts	37-45-101	52
Water Conservation Districts (river water)	37-46-101 to 37-50-142	4
Water Districts	32-1-103	78
Water & Sanitation Districts	32-1-103	128
Metropolitan Districts	32-1-103	1,210

Source: Colorado Department of Local Affairs (DOLA), http://www.dola.state.co.us/dlg/local_governments/lgtypes.htm

Improvement Districts: Community developers can create districts as a means of financing infrastructure and development. Several types of improvement districts are commonly used by cities and counties to fund construction: county local improvement districts, county public improvement districts, municipal special improvement districts, municipal general improvement districts, and business improvement districts (Kron, 2006). Generally, these districts are not used for ongoing operations and maintenance.

- *County Local Improvement District (LID)*. An LID oversees "any public improvement that the county is authorized to provide" (Kron, 2006, p. 210), including financing, construction, and operation. Funds are raised by charging special assessments to property owners in the district.

- *County Public Improvement District (PID)*. A county PID is similar to an LID, but funds come more often through property taxes rather than user fees or special assessments.

- *Municipal Special Improvement District (SID)*. An SID operates similarly to an LID but on a municipal rather than county level. Funds are raised by charging special assessments to property owners in the district.

- *Municipal General Improvement District (GID)*. A GID operates similarly to a PID but on a municipal rather than county level. Funds come more often through property taxes rather than user fees or special assessments

- *Business Improvement District (BID)*. A BID operates entirely within a single municipality and focuses on business-oriented public improvements or services. No residential or agricultural lands can be included in a BID (Department of Local Affairs, 2009). Funds are raised through any combination of property taxes, special assessments, or fees on its district.

Intergovernmental Cooperation

By enabling and encouraging voluntary collaboration among all governmental agencies, the state permits a variety of opportunities for local governments to reach local and regional goals for services, land use development, and other matters. Such regional agreements can expand the legal authority of local governments to effect regional matters through collaboration.

Intergovernmental Agreements: Counties, municipalities, and special purpose districts have express authority to cooperate with each other through intergovernmental agreements (IGAs). IGAs can cover a variety of issues, such as the creation of joint comprehensive plans, shared development review in specified areas, revenue sharing, urban growth boundaries, and more (Ingram, Carbonell, Hong, & Flint, 2009). However, governments can only use these plans to expand geographic authority, so a county cannot join a comprehensive development plan unless it has the same authority within its borders. Thus, counties are somewhat limited in the type of agreements they can make with cities and districts. According to a 2004 survey conducted by the Colorado Municipal League, however, land use IGAs are increasingly popular. By 2004, 57% of the reporting municipalities had entered into an agreement with a neighboring governmental entity (Colorado Municipal League [CML], 2004b) and 67% of the counties had done the same (CML, 2004a). Approximately half of the counties used an IGA for cooperative

planning purposes such as setting urban growth boundaries and joint development review. The counties most likely to use IGAs are urban counties, rapidly-growing counties, or resort/mountain counties that are growing quickly (CML, 2004a). Although joint development plans can be made "mutually binding and enforceable" among the parties to the IGA (McGrath, 2006), they are typically voluntary collaborations and advisory in nature. However, this voluntary regional approach over the past 20+ years has helped Colorado achieve many of the same land planning objectives as other states. For example, Colorado and Oregon both had relatively small increases in land consumption between 1982 and 1997, but Oregon's growth was mandated through top-down systems while Colorado's voluntary collaboration resulted in bottom-up regulation (Ingram, Carbonell, Hong, & Flint, 2009). Colorado's voluntary IGAs have also found success in planning for natural resources and environmental quality, transportation, and affordable housing.

Regional Planning Commissions: Regional planning commissions may be created through collaboration of municipalities, counties, or both and are empowered to perform planning functions similar to those performed by county planning commissions, C.R.S. §§ 30-28-105 (McGrath, 2006). The regional planning commission makes and adopts a regional development plan for the region but each respective government can decide whether or not to adopt the regional plan. Currently, there are five regional planning commissions in Colorado as shown in Table 3.3 below. Since regional planning commissions can address any number of planning areas, including water, land, and transportation, they do not always share the same priorities.

Table 3.3. Regional planning commissions and members.

Commission	Members
Denver Regional Council of Governments	Adams, Arapahoe, Boulder, Clear Creek, Denver, Douglas, Gilpin, and Jefferson Counties
Northwest Colorado Council of Governments	Grand, Pitkin, Routt, Eagle, Jackson, and Summit Counties
Pueblo Area Council of Governments	City of Pueblo, County of Pueblo, Board of Water Works, School Districts 60 and 70, Pueblo West and Colorado City Metropolitan Districts, and Salt Creek Sanitation District
Region 10 Regional Planning Commission	Delta, Gunnison, Hinsdale, Montrose, Ouray, and San Miguel Counties
Pikes Peak Council of Governments	El Paso, Park, and Teller Counties

Source: *McGrath, 2006, p. 32; and Pueblo Area Council of Governments (www.pacog.net)*

Regional Service Authorities: Regional service authorities (RSA) are authorized by the state to encourage the utilization of a single governmental entity to provide a single service or function for services that cross local governmental boundaries. C.R.S. §§ 32-7-102, 106-108, 113, 114. Service authorities must include all the territory of at least one county and may encompass multiple counties. Each service to be provided must be approved by majority vote from each participating jurisdiction.

Regional service authorities prepare and adopt a comprehensive development guide for the service area, which is used to maintain consistency among local land use plans in the area with regard to services provided (McGrath, 2006). Specific to RSA is the ability to levy a tax. The use of RSAs has been limited because its taxing ability requires under TABOR (Taxpayer's Bill of Rights) a vote of affected residents. Currently, there is one RSA -- the Ouray County Regional Service Authority, which is a hospital authority with a mill levy that generates revenue for the future construction of a clinic.[8]

Examples of Collaborative Efforts:

- IGAs have been used to pursue joint planning goals by several local governments in Colorado. Aspen and Pitkin County have formed a joint planning agency through intergovernmental powers. The City of Boulder and Boulder County have preserved open spaces around the city through an IGA, which includes restricting new development to only those areas where the city and county agree to provide urban services. The City of Durango and La Plata County have used IGAs to restrict annexation in some areas where joint land use and development plans have been adopted and to provide for joint review of subdivision requests in designated areas (Duerksen et al., n.d.).

- Some water districts have begun voluntary collaborations, including the South Metro Water Supply Authority (SMWSA). SMWSA includes 13 individual water providers in Douglas and Arapahoe Counties that collectively address water issues. Since its inception, SMWSA members have funded nearly $350 million in water projects. In 2007, they released a master plan outlining strategies to reduce dependence on nonrenewable water sources.

- Another voluntary collaboration is the Front Range Water Council. The Front Range Water Council has been meeting since December of 2004 and currently includes Denver Water, the Northern Colorado Water Conservancy District, Colorado Springs, Aurora, Pueblo and the Southeastern Water Conservancy District. Among its achievements includes compilation of a 50-year vision statement for addressing water needs within and among the participating districts (Woodka, 2009).

Existing State Agencies and Legislatively-Created Organizations

The State of Colorado has several state agencies and legislatively-created organizations that offer assistance and resources for governments related to land and water planning issues. These are important resources that could assist with land use planning and water supply planning. These organizations include, but are not limited to:

Department of Local Affairs, Division of Local Government: Within the Department of Local Affairs (DOLA), the Division of Local Government provides technical, financial, and research assistance to local government agencies (Colorado Department of Local Affairs, 2009). Among the services to local governments are:

[8] Email correspondence with Andy Hill, Colorado Department of Local Affairs, August 24, 2009.

- *Financial Assistance Programs.* DOLA offers both formulary and discretionary grant and loan programs for public service projects. These range from community development efforts to conservation and planning programs to volunteer firefighter pensions.
- *State Demography Office*. The State Demography Office is the primary state agency gathering data on population and demographics. Data is available to the public and can be used for forecasting and planning. The office also works in partnership with the US Census Bureau to provide analysis and estimates via Geographic Information Systems.
- *Office of Smart Growth and Sustainable Communities Initiative* (see section four, Regional Structures, for more information). The Office promotes voluntary adoption of sustainable and smart growth practices within Colorado jurisdictions.
- *Technical Assistance Programs.* DOLA provides technical assistance through "workshops, publications, individual consultations and on-line resources. Technical assistance topics include: budgeting and financial management, land use planning, special district elections, general government administration, purchasing, personnel, and water and wastewater management."

Colorado Division of Water Resources, Office of the State Engineer: The Office of the State Engineer oversees the administration of all surface and ground water rights in Colorado and is responsible for implementing court decisions. In addition to regulatory functions such as reviewing water permit applications and making site visits, the office also has research and advisory functions that are vitally important to local governments (Colorado Division of Water Resources, n.d,). Division staff includes engineers and geologists who collect and analyze data on water supply which can be used for forecasting and planning purposes. Local governments with questions on water supply adequacy can contact the State Engineer to review subdivision applications and other land use documents; thus, the office is a key technical resource for land planners and local decision-makers.

Colorado Water Conservation Board: The Colorado Water Conservation Board (CWCB) is part of the state Department of Natural Resources, created by Colo. Rev. Stat. § 37-60-101 et. seq. CWCB was created to help conserve, develop, protect and manage Colorado's water for present and future generations. CWCB achieves this through programs such as surface and groundwater studies, water basin collaboration, water project management, financing, and state water policy recommendations. Some of CWCB's recent efforts include:

- *Office of Water Conservation and Drought Planning.* OWCDP promotes water use efficiency through public information, technical assistance, and financial assistance for conservation planning. Additional activities include encouraging and assisting communities to prepare and implement drought mitigation plans, monitoring drought impacts, informing the public and state officials, maintaining a clearinghouse to disseminate information to the public, and providing leadership through the Water Availability Task Force.
- *Statewide Water Supply Initiative (SWSI).*
  - The CWCB oversaw development of the November 2004 completion of the first phase of the Statewide Water Supply Initiative (SWSI), which was initiated by Senate Bill 03-110SWSI. The

report contains an analysis of state's water supplies, demand, and development strategies through 2030. This report is the first comprehensive look at the state's overall water situation. (Sibley, 2009).

- The CWCB is overseeing SWSI phase II. This includes water management and development options that could be used to meet future water needs, such as water conservation and efficiency, agricultural and urban partnerships, environmental and recreational needs, and development of water supply alternatives to meet the gap between current supplies and future needs.[9]

- *Water Supply Protection Section.* CWCB is responsible for helping the state to utilize and develop its water entitlements in accordance with state water law. The section achieves this through participation and coordination of the nine interstate compacts and two equitable apportionment decrees it is party to, as well as involvement in the Colorado River Salinity Control Program, endangered species water needs programs, settlement of federal reserved water rights, and advising the Water Courts on Recreational In-Channel Diversion water right applications.
- *Water Supply Planning Section (formerly Intrastate Water Management and Development).* This is the section responsible for providing technical support to the Basin Roundtables and the IBCC, and manages the Water Supply Reserve Account Grant Program.
- Conducting a Colorado River Water Availability Study to help Colorado make wise resource management decisions. The study is intended to answer the question: "How much water from the Colorado River Basin System is available to meet Colorado's current and future water needs?"[10]
- Overseeing the Water Project Loan Program and the Non-Reimbursable Project Investments Program:
  - The Water Project Loan Program provides low interest loans to qualified borrowers for raw water projects that develop and/or preserve waters statewide. Eligible projects for financing include new construction or rehabilitation of existing raw water storage and delivery facilities, such as reservoirs, pipelines, water rights purchases, and flood control projects.[11]
  - The Non-Reimbursable Project Investments Program provides funds from the Construction Fund and the Severance Tax Trust Fund Operational Account. These funds are distributed primarily for projects or studies of statewide impact or importance and feasibility studies and projects designed to address statewide, region wide, or basin wide issues. The CWCB Board examines whether such studies will result in new loans.[12]
- Identified Best Management Practices (BMPs) in partnership with Green Industries of Colorado (GreenCO), the Metro Mayors Caucus, and Colorado WaterWise Council. These recommended

[9] See the Colorado Water Conservation Board (CWCB) http://cwcb.state.co.us/IWMD/SWSITechnicalResources/
[10] See CWCB, http://cwcb.state.co.us/
[11] See CWCB, http://cwcb.state.co.us/Finance/LoanProgram/
[12] See CWCB, http://cwcb.state.co.us/Finance/InvestmentProgram/nonReimburseProjInvestProgram.htm

practices are aimed at reducing water consumption and improving water use efficiency indoors and outdoors.[13]

- Resuming the Water Efficiency Grant Fund, managed by CWCB's *Office of Water Conservation and Drought Planning*. Unspent monies from previous fiscal years are diverted to this fund, which assists the water conservation projects of communities, water providers, and related agencies. Eligible activities include conservation planning, drought mitigation planning, and public outreach. Grant guidelines are outlined in Colo. Rev. Stat. § 37-60-126.

Interbasin Compact Committee: The Interbasin Compact Committee (IBCC) was created by House Bill 05-1177, the Colorado Water for the 21st Century Act (adopted as Colo. Rev. Stat. § 37-75-101 et. seq.). Committee members represent all eight of the state's major river basins and the Denver Metropolitan Area, with some appointments made by the Governor. The committee is staffed by the Water Supply Planning Section of the CWCB. Their task is to negotiate interbasin compacts regarding use of Colorado's water resources, facilitating conversations among the Basin Roundtables, which were created by HB05-1177. Each basin roundtable is to develop a basin-wide water needs assessment, building upon information from the SWSI effort by CWCB, mentioned above.[14] These needs assessments are to include analysis of the basin's consumptive water needs, nonconsumptive water needs, available water supplies, and proposed projects and methods to meet their water needs. CWCB is in the process of updating its basin gap analysis. Recent released reports, which can be downloaded from the CWCB website,[15] include:

- *Strategies for Colorado's Water Supply Future*: The IBCC, CWCB, and the Basin Roundtables underwent a Visioning Process to evaluate water supply strategies. This report presents an analysis of three water supply strategies: conservation, agricultural transfers, and new water supply development.
- *State of Colorado 2050 Municipal and Industrial Water Use Projections*: The 2050 update of M&I water demands forecasts will assist the Basin Roundtables in completing their consumptive needs assessment.
- *Non-Consumptive Needs Assessment (NCNA) Priorities Mapping*: Phase I mapping on each Basin Roundtable's assessment of nonconsumptive water needs that includes a set of objective, science-based maps that represent where Colorado's important water-based environmental and recreational attributes are located.

Water Resources Review Committee: The legislature created this standing committee in 2001 as a forum through which the general assembly shall review the administration and monitoring of Colorado's water resources. The purpose of the committee is to contribute to and monitor the "conservation, use, development, and financing of the water resources of Colorado for the general welfare of its inhabitants

[13] See CWCB, http://cwcb.state.co.us/Conservation/Conservation/BestManagementPractices/BestManagementPractices.htm
[14] See Interbasin Compact Committee, http://ibcc.state.co.us/
[15] Go to CWCB's Colorado Water Supply Future http://cwcb.state.co.us/IWMD/COsWaterSupplyFuture/CosWaterSupplyFuture.htm

and to review and propose water resources legislation" (Colo. Rev. Stat. § 37-98-101 et. seq.). During the summer and fall months, the committee meets to consider making recommendations to the general assembly as well as to tour water facilities and areas that may be affected by proposed laws. For the 2009 legislative session, the committee recommended Senate Bill 09-015, which changed the jurisdiction of the White River Drainage Basin. Committee members also reviewed hydroelectricity and precipitation collection legislation (SB 09-080 and HB 09-1129) and toured acequia irrigation systems affected by House Bill 09-1233, which allows the formation of acequia ditch corporations (Water Resources Review Committee, 2008).

Matrix of Colorado Statutes

Following is a compilation of the land use and governance statutes discussed in the text above along with statutes pertaining to water that are relevant to creating integrated land use and water planning processes. Some of the statutes authorize an entity. Local government refers to municipalities and counties. With respect to water authorities, these are included because they are involved in providing and operating water supplies and will be the partners in integrated land use and water planning. The statutes are organized into five categories:

1. Land Use Planning
2. Water Conservation
3. Water Quality, Supply, and Operation
4. Water Law and Management
5. Inter-jurisdictional and Cooperative Powers

For each statute, the title, its code section, and year enacted (or amended) are provided. A summary provides an overview of the key components. Within the summaries, bold font highlights integration occurring and arrows point out opportunities or limitations.

Table 3.4. Matrix of Colorado statutes

Category	Title	Code section (or Bill number)	Year enacted (or amended)	Summary
Land Use Planning (Cities and Counties)	Local Government Land Use Control Enabling Act of 1974	§§ 29-20-101 through 205	1974	Grants counties and municipalities broad authority to plan for and regulate the use of land, with no specific procedures proscribed for local governments to follow.[16] → Does not specifically mention regulating land use in conjunction with water supply and availability.
	Subdivision regulations (County)	§ 30-28-133	1972	Requires counties to adopt subdivision regulations, including **"adequate evidence that a water supply that is sufficient in terms of quality, quantity and dependability will be available,"** subject to state review. Evidence includes: ownership or use of water right, estimated yield of water right, amenability to change in use, etc. → Subdivisions creating lots 35 acres+ in a County are exempt from subdivision ordinances.
	Local Government Land Use Control Enabling Act – Adequate Water Supply (Curry Bill, HB08-1141)	§§ 29-20-301 et. seq.	2008	Requires a local government to make a determination as to whether an applicant for a development in excess of 50 units or single-family equivalents, or fewer as determined by the local government, has **demonstrated that the proposed water supply is adequate to serve the proposed development.** → Sole determination of the local government as to the adequacy of the water supply; local government implements and oversees. → Excludes cluster developments.
	1041 powers	§ 24-65.1-101	1974	Allows local government to identify, designate, and regulate (through a permitting process) 21 statutorily defined "areas of state interest," including: ... **site selection and construction of major new water and**

[16] "Land Use Planning in Colorado," Colorado Dept. of Local Affairs, http://dola.colorado.gov/dlg/osg/docs/LandUsePlanningInColorado.pdfhttp://dola.colorado.gov/dlg/resources/publications.html#smart_growth

Category	Title	Code section (or Bill number)	Year enacted (or amended)	Summary
cont. from previous **Land Use Planning** (Cities and Counties)				**sewage treatment systems; major extensions of existing domestic water and sewage treatment ... systems**.[17] Allows some local control over matters of statewide interest.
	Master plans	§§ 30-28-106; 31-23-206	1939 through 2007	Counties and municipalities meeting certain growth standards are required to adopt a master plan (comprehensive plan) for the physical development of their jurisdictions; MUST include a recreation and tourism element; extraction commercial mineral deposits. **MAY include a "water supply element." If included, the county or municipality needs to coordinate with the local water supply entities** – does not mention coordination with other city/county plans. Master plans are considered advisory only and not binding upon the zoning discretion of any legislative body. Master plan components are implemented through zoning, subdivision, or land use regulatory powers.[18]
	Subdivision notification	§ 30-28-136	1972 through 2005	Requires counties to submit a copy of preliminary plans for subdivisions to affected governments, including school districts, special and other districts, counties and municipalities located within two miles of the proposal and other agencies.
	Impact Fees	§ 29-20-104.5	2001	Grants broad impact fee authority to counties and statutory municipalities to have new development pay for certain costs associated with growth; home rule municipalities always had this authority through their constitutional home rule powers. (Colorado Department of Local Affairs, n.d.). Nearly half of Colorado's cities have implemented impact fees. **The most commonly used fee is for water (40%) and sewer (27%).** (Colorado Municipal League, 2004b). Impact fees may only be used to offset the impacts of new development on existing infrastructure and capital improvements and may not be used to pay for improvements needed to correct existing deficiencies in levels of service (Elliot, 2006).

[17] "Land Use Planning in Colorado," Colorado Dept. of Local Affairs, http://dola.colorado.gov/dlg/resources/publications.html#smart_growth

[18] Duerksen et al. (n.d.). Managing Development for People and Wildlife: A Handbook for Habitat Protection by Local Governments. Chapter 6. Colorado Division of Wildlife. Retrieved July 2009 from http://ndis.nrel.colostate.edu/handbook/chapter6.html#VI

Category	Title	Code section (or Bill number)	Year enacted (or amended)	Summary
Water Conservation Measures	Water Conservation in State Landscaping	§§ 37-96-101 to 103.	1989; amended 1991, 99.	Requirements for **public project landscaping to promote water efficiency and conservation.** Any governmental or quasi-governmental agency of the state and political subdivision of the state that receives state financing for a project or facility is subject to the requirements.
	Water Metering Act	§§ 37-97-101 to 37-97-103.	1990; 2004	Every water service supplier providing water in this state shall **provide a metered water delivery and billing service to its customers – residential, commercial and industrial.** New construction will have meters installed at time of construction. Existing construction are to have had meters installed by Jan. 1, 2009 (some exemptions).
	Homeowner Association Restrictions	§ 37-60-126(11)(a)	2003; 2005	Homeowners associations cannot enforce restrictive covenants that prohibit or limit xeriscape, installation or use of drought-tolerant vegetative landscapes, or require cultivated vegetation to consist exclusively or primarily of turf grass
	Water conservation plans	§§ 37-60-124 and 37-60-126	1991 - 2004	Creates the Office of Water Conservation and Drought Planning under the CWCB to promote water conservation and drought mitigation planning. The Colorado Water Conservation Act of 1991 (House Bill 91-1154) requires that all water providers with annual demands of 2,000 acre-feet or more have an approved Water Conservation Plan on file with the State, with new or revised plans to be submitted per adoption of HB 04-1365. Providers must have an approved plan on file prior to receiving loans from the Colorado Water Conservation Board (CWCB) or the Colorado Water Resources and Power Development Authority.[19] Required plan elements cover a wide range of water saving strategies, including indoor and outdoor water efficiencies, reuse systems, rebate programs, water rate structures that encourage lower water use, public education, etc.[20]

[19] http://www.hydrosphere.com/services/WaterConservationinColorado.htm

[20] http://www.chieftain.com/articles/2009/02/01/news/local/doc4985361ec3f79194930855.txt, http://www.michie.com/colorado/lpext.dll?f=templates&fn=main-h.htm&cp=

Category	Title	Code section (or Bill number)	Year enacted (or amended)	Summary
cont. from previous **Water Conservation Measures**	Water Conservation Planning Grants	§ 37-60-126.5	2004	Provides financial assistance to covered entities (those delivering retail water of 2,000 acre-feet or more) that are seeking to develop or update their water conservation plans. Monies can be used to offset staff and other internal costs or to engage the technical assistance of a water conservation professional or consultant.
	CWCB Water Efficiency Grant Fund	§ 37-60-126	2009	Creates the water efficiency grant program for purposes of providing state funding to aid in the planning and implementation of water conservation plans to promote the benefits of water efficiency. Funds are continuously appropriated to the CWCB for this purpose, to be available until the programs financed by the grants have been completed.
Water Quality, Supply and Operation	Water Conservancy Act	§§ 37-45-101 to 37-45-153.	1937+	Forms water conservancy districts to construct, pay for, and operate water projects. There are 52 districts in Colorado, many of which are listed at http://waterknowledge.colostate.edu/cnsvancy.htm
	Water Resources and Power Development Authority Act	§§ 37-95-101 to 37-95-123.	1981+	Declares the public policy of the state is "to preserve, protect, upgrade, conserve, develop, utilize, and manage the water resources of the state, to promote the beneficial use of waters of the state . . ., to create or preserve jobs and employment opportunities . . ., and to assist and cooperate with governmental agencies in achieving such purposes." The Colorado water resources and power development authority is created by this article to "initiate, acquire, construct, maintain, repair, and operate projects . . . and may issue its bonds and notes payable solely from revenues to pay the cost of such projects." → Potential to use funds to assist in water and land use planning efforts → Potentially has data on water use/needs in different areas to assist communities interested in implementing growth management, design standards, etc.
	Waterworks	§ 31-15-707	1975 - 1981	Allows municipalities to construct waterworks outside its boundaries and protect the waterworks and water supply from pollution (up to 5 miles

Category	Title	Code section (or Bill number)	Year enacted (or amended)	Summary
				above the point from which the water is taken). → Potential to work to do cross-jurisdictional planning
	CWCB Water Project Loan Program	§§ 37-60-121 through 125	1971	The Colorado Water Conservation Board Loan Program provides low interest loans to agricultural, municipal, and commercial borrowers for the development of raw water resource projects in Colorado.
cont. from previous **Water Quality, Supply and Operation**	Colorado Healthy Rivers Fund (formerly the Colorado Watershed Protection Fund)	§39-22-2403)	2002; title amended in 2008	Creates a Fund be added to the Colorado Individual Income Tax Refund Check-off Program to give taxpayers the opportunity to voluntarily contribute to watershed protection efforts in Colorado. Moneys in the Fund are available through a grant program jointly established by the Colorado Water Conservation Board, the Water Quality Control Commission, and the Colorado Watershed Assembly. There are two categories of grants: (1) Project grants that support the improvement and/or protection of the condition of the watershed. (2) Planning grants for to support development of plans for restoration or protection projects. (Colorado Healthy Rivers Fund, 2009)
	Water Quality Control Act	§§ 25-8-101 through 703	1963-; substantive portions repealed and reenacted 1981.	Wastewater management plans guidelines; creates water quality control commission to ensure provision of continuously safe drinking water by public water systems; permit system for pollutant discharge; violations, remedies, penalties; construction of domestic wastewater treatment works. Covered governmental entities include "any regional commission, county, metropolitan district offering sanitation service, sanitation district, water and sanitation district, water conservancy district, metropolitan sewage disposal district, service authority, city and county, city, town, Indian tribe or authorized Indian tribal organization or any two or more of them which are acting jointly in connection with a sewage treatment works" (§§ 25-8-103 Definitions).
	Water Supply Reserve Account	§ 39-29-109(2)(c)	2006	Creates the water supply reserve account ("account") in the severance tax trust fund - $10 million each year. The Colorado Water Conservation

Category	Title	Code section (or Bill number)	Year enacted (or amended)	Summary
cont. from previous **Water Quality, Supply and Operation**				Board oversees the fund and makes loans or grants for water activities approved by a basin roundtable, including: Competitive grants for environmental compliance and feasibility studies; Technical assistance regarding permitting, feasibility studies, and environmental compliance; Studies or analysis of structural, nonstructural, consumptive, and non-consumptive water needs, projects, or activities; and Structural and nonstructural water projects or activities → Potential to extend funding to support local community water and land use planning.
Water Law and Management	Water Right Determination & Administration Act of 1969	§§37-92-101 to 37-92-602	1969	Water right process and enforcement for tributary waters by appropriation.
	Ground Water Management Act	§§ 37-90-101 to 143	1957; entire section amended 1985; amended 2003	Defines use and appropriation of tributary and non-tributary groundwater. State engineer can approve permits for wells serving no more than 3 homes, <=50 gpm, and for normal residential use, no more than 1-acre irrigated, without regard of other provisions of this article.
	Precipitation collection	HB09-1129; § 37-60-115 Pilot projects	2009	Allows developers to apply for approval to be one of ten statewide pilot (subdivision) projects that harvest rainwater from impervious surfaces for beneficial, but non-essential use.
		SB09-080; § 37-92-602 Residential precipitation collection	2009	Collection of precipitation from residential rooftops permitted with full augmentation; strict guidelines as to which residences may do this and for which uses. → This changes a 19th-century law in which precipitation could not be captured because it belonged to water rights holders. Helping to prompt the change was a study which found that 97% of

Category	Title	Code section (or Bill number)	Year enacted (or amended)	Summary
cont. from previous **Water Law and Management**				rainfall evaporated or was consumed before it reached streams and rivers.[21]
	Water Source Protection (municipalities)	§ 31-15-707	1975 through 1981	Provides municipalities (city, town, home rule city or county, and quasi-municipal corporation such as a sanitation district) with statutory authority to protect the quality of its water supply, giving municipalities jurisdiction as necessary over the use of land within five miles above the point from which their water is taken to protect the quality of the local water supply (Duerksen et al., n.d.)
Inter-Jurisdictional and Cooperative Powers	Office of Sustainable Development (in DOLA) comprehensive planning disputes (mediation)	§ 24-32-3209	2001	Requires jurisdictions intending to adopt or amend a master plan to submit to neighboring jurisdictions for review - may compel the planning jurisdiction to participate in mediation, prior to litigation, if they object to the plan, to settle the dispute.
	Intergovern-mental agreements (IGAs) encouraged	§§ 29-20-105 to 107	1974 through 2001	Enables and encourages formation of IGAs. Under the terms of those statutes, all local governmental entities in Colorado are encouraged "to make the most efficient and effective use of their powers and responsibilities by cooperating with and contracting with" other local governmental entities.[22] → Joint comprehensive plans created through an IGA have the enforcement of law, and is not just advisory like local master plans.

[21] http://www.lcni5.com/cgi-bin/c2.cgi?036+article+News+200904070360001048

[22] Duerksen et al. (n.d.). Managing Development for People and Wildlife: A Handbook for Habitat Protection by Local Governments. Colorado Division of Wildlife. Chapter 6, Section 7. Retrieved July 2009 from http://ndis.nrel.colostate.edu/handbook/chapter6.html#VI

Category	Title	Code section (or Bill number)	Year enacted (or amended)	Summary
cont. from previous **Inter-Jurisdictional and Cooperative Powers**	Cooperative service provision	§ 29-1-204.2 (water, drainage authorities); § 32-7-101 et. seq. (regional service authorities)	1977 – 2001 (water, drainage authorities); adopted 1972 (regional service authorities)	Allows separate governmental entities for providing water and wastewater services among multiple jurisdictions to be created, called water or drainage authorities. These authorities are able to issue their own debt. Regional service authorities may be created to provide a service that crosses local governmental boundaries. Regional service authorities prepare and adopt a comprehensive development guide for the service area, which is used to maintain consistency among local land use plans in the area with regard to services provided.
	Regional planning commissions	§ 30-28-105	1939 - 1972	Regional planning commissions may be created through collaboration of municipalities, counties, or both. These are independent political and corporate bodies that may perform planning functions similar to those performed by county planning commissions. The regional planning commission makes and adopts a regional development plan and reviews area plans for consistency with the regional plan. Its recommendations are not required to be adopted by the local government. (Elliot, 2006).

Section 4. Tools and Strategies for Integrating Water and Land Use Planning

The Interbasin Compact Committee (IBCC) Visioning Process identified the importance of integrating water and land use planning to help meet Colorado's projected water shortage. Specifically, water basins saw a need to "promote cooperation between water supply planners and land use planners" to address "growth, land use, and density development" (CWCB, 2009:1-4 – 1-5). With this in mind, the current project began by engaging a wide range of Colorado stakeholders to determine the extent to which land use planning efforts could be, or have been, implemented to assist in water demand management and planning in Colorado. This ranges from purely local efforts, such as subdivision and zoning regulations; regional efforts through, for example, intergovernmental agreements and cooperative master planning; and state supportive efforts, such as statutory support for intergovernmental agreements, local discretion for community planning, and master plan development. This section brings together these perspectives gathered through the survey with tools and strategies implemented in Colorado and other states.

States, regional councils, and local governments throughout the country are undertaking a wide variety of strategies to decrease water usage and tie water usage to land use planning decisions. The strategies range from mandatory requirements on government agencies and/or individuals and business to voluntary and public education approaches.

Many of the strategies listed below are most appropriate to land use planning focused on new development, while some others are more likely to be used with existing development. However, all strategies are relevant to integrating water management with land use planning. Survey respondents spoke often about the need to educate the public about water wise living and provide the information, tools, and incentives to support it. Everything from public education to drought management to rebate programs helps establish the public mindset of water use reduction. Whether one moves to a new "green" development or lives in an existing neighborhood, conservation strategies and education are equally needed. Similarly, the policymakers and implementers responsible for local level decisions on water conservation for old and new development are often the same people, thus their education on strategies should not be limited to one type or the other. Nor should policies focus entirely on new development, as new development quickly becomes existing development, where policies that helped in establishing water efficiency practices must be maintained. Research has found water efficiencies are easily lost when homeowners replace their new home's low flow showerheads with higher flow fixtures and do not know how much water is necessary to sustain a xeriscaped yard (Addink, 2005).

Many strategies are multifaceted and, for that reason, in the list of strategies below there is overlap among categories. The descriptions to follow provide an overview of the types of strategies, evidence of their success where research has been tracking outcomes, and examples of policies that may be applicable to Colorado. Table 4.2 at the end of this section provides a compilation of the tools and strategies discussed below.

Water Supply Assessment

Description: Although not explicitly meant to decrease per capita water demand, one strategy for connecting water and land use planning is to require new developments to "prove" there is enough legal and "wet" water available to serve the new residential, commercial, and/or industrial area. Theoretically, this requirement could drive development into areas already served by municipalities and away from suburban or exurban environments, thus encouraging denser development patterns that require less outdoor watering than a few acre plot might. Currently, nine out of eleven westernmost states have created such laws (Klein & Kenney, 2009), some directed at local jurisdictions and others targeting larger developments;[23] however the laws vary widely from requiring a full blown assessment to prove available water supply to merely acquiring a "will serve" letter from the water provider. Davies (2008) identified five design elements that are necessary for an effective assured water supply law. As described by Klein & Kenney (2009), the policy must be:

1. Compulsory – not voluntary
2. Stringent – proof of real "wet" water rather than "paper" water
3. Universal – applied in all circumstances, and applied uniformly
4. Granular – covers all or most developments
5. Interconnected – with other water planning efforts

Examples of state laws of assured water supply include Colorado 2008 legislation (House Bill 08-1141) which requires local governments to make a determination of adequate water supply for new development applications of 50 or more units (see Table 3.4 and CRS sec 29-20-301-306, for statutory detail).[24] Arizona's Assured Water Supply program requires proof of 100 year water sufficiency of land offered for sale or lease that is located within areas where groundwater is strictly regulated.

Water supply assessment policies can also be enacted and implemented as local land use policies, such as Colorado's El Paso County policy requiring all new subdivisions in unincorporated areas to be based on a 300-year water supply. The intent of the El Paso policy is to discourage development reliant on the Denver Basin aquifer and encourage the use of renewable surface water (Mayo, 1990; Hanak & Chen, 2007). Douglas County, Colorado pursued similar goals but through imposing stricter limits on the development of areas with low groundwater reliability thereby in effect created hydrological zone development (Hanak & Chen, 2007). Some policies place the requirement on developers to document adequate water supply, although in the El Paso County "paper" water may be the form of documentation; while other policies place the requirement on city officials to determine whether the city is able to provide sufficient water to the proposed new development. Frederick, Maryland has an ordinance requiring its own city officials to review the proposed developments and determine if the city can provide the necessary water. The ordinance also mandates how surplus water is distributed among residential, commercial, and other uses (McKinney, 2003). California combines the two strategies: a statewide policy passed in 2001 mandates that large developers prove there is available water before

[23] The nine Western states with some type of assured water supply laws are Arizona, California, Colorado, Montana, Nevada, New Mexico, Oregon, Washington, and Wyoming. Idaho and Utah do not have statutory provisions.

[24] The statute does not define "adequate" nor does it specify who is responsible for doing the assessment.

final approval (SB2001-221), while another policy (SB2002-610) mandates that cities and counties making land-use decisions consult with their local water providers to determine if water is available (Scattone et al., 2001).

Case Study 1: New Mexico's Subdivision Water Supply Review Process

Like Colorado, New Mexico water law is based on the doctrine of prior appropriation, or "first in line, first in right" doctrine. Municipal and industrial uses have been developed more recently and as a result generally have junior water rights as compared to the senior rights of agricultural users. The population of New Mexico is currently an estimated 2 million, and projections show that it will grow by an additional 1 million in the next 30 years. Most of this growth is expected to occur in the middle Rio Grande where there is no more water available. In addition to addressing water supply for new growth, legal complications are now being encountered because the state is now recognizing the water rights of Indian nations, tribes and pueblos, which date back as far as 1349.

New Mexico statues require a review of the state water plan every five years. The plan is a broad policy document but is only advisory in nature, and water planning remains the authority of local governments. The state recognizes the need for the integration of land and water planning but rather than mandating a water plan, the state has provided a forum for consideration of public welfare concepts and discussion of regional issues. For example, the 2007 state legislature directed the state engineer to create a water stakeholder group to discuss a proposed 40 year planning statute that would provide regulations for water authorities, energy authorities, quasigovernmental agencies, and water utilities. The stakeholder group made some progress in developing standards, but lack of funding for the stakeholder group prevented any final recommendations.

Planning authority, including zoning and provision of water, is generally divided between municipalities and counties; municipalities have jurisdiction within their boundaries while counties have jurisdiction over unincorporated areas. The Subdivision Act (NMSA 47-6-1 to 47-6-29), however, allows for counties and municipalities to have shared authority over certain areas. The county commissioners or city councils approve new subdivisions in their respective jurisdictions after considering opinions from the state engineer. In addition, the state engineer issues permits for water utilities, which generally provide service within municipal areas. Local water development plans provide a way for municipalities to hold unused water rights for future use, which can complicate regional planning efforts.

In areas of joint authority, counties and cities must agree on who retains jurisdiction for land and water planning. Counties sometimes defer to cities because of funding reasons, but cities rarely defer to counties. One exception to this is the Albuquerque Bernalillo County Water Utility Authority, which was created by the state legislature in 2003. The authority oversees water and wastewater services in the entire county, including rate-setting and water conservation efforts. The governance board of the authority consists of three county commissioners, three Albuquerque city councilors and the Albuquerque mayor, three Bernalillo county commissioners, and a non-voting representative from the Village of Los Ranchos. However, the water quantity requirements adopted by this board conflict with the recommendations of the state engineer's office. This is illustrative of the type of problems

associated with dual authority. Inconsistent requirements, service area disputes, and other issues present unique challenges in implementing a cohesive water plan.

For more information: Wilson, B. C. (1996). Water conservation and quantification of water demands in subdivision: A guidance manual for public officials and developers, available at http://www.ose.state.nm.us/publications/tech_rpts/rpt-48/rpt-48.pdf; Rodey Law Firm. (2004). Doing business in New Mexico: A guide for investors and businesses, available at http://www.lexmundi.com/images/lexmundi/PDF/guide_newmex.pdf.
Source: John Longworth, New Mexico State Engineer's Office. Presentation at the symposium Water & Land Use Planning for a Sustainable Future: Scaling and Integrating, September 28, 2009.

Outcomes: Some of the policies enacted at the state and county levels are not achieving their goals of limiting development in areas where water is not readily available. Some researchers argue they have caused development to become more expensive, resulting in "creative" approaches to water acquisition that may or may not be proof of long-term water supply. In states that have domestic well exemptions such as Colorado and New Mexico, adequacy laws may have caused an increase use of exempt wells. In New Mexico, 15% of all households are on well systems, while in Colorado it is 6% statewide. However, certain areas such as Douglas County, Colorado, that is water starved and has strict water adequacy requirements, have nearly one-quarter of its households on exempt wells (Hanak & Chen, 2007). Not all adequacy policies have the same effects, however. In Colorado counties that adopted the 300-year water supply adequacy rule, there has been a 20% or greater increase in domestic exempt wells. Conversely, Douglas County's land use development restrictions by hydrogeologic zones have resulted in a 33% decline in wells since its implementation. In both New Mexico and Colorado, adequacy restrictions in unincorporated areas have moved some new development into neighboring cities (Hanak & Chen, 2007). The key is the proper mix of policies for a given area. Some states have created more flexibility within their laws, possibly leading to greater success. For example, Arizona applies different water supply laws to developments in different management areas. Other limitations have been found with respect to the design elements. Those that do not have the five design elements described by Davies (2008) will not be as broadly applied (Klein & Kenney, 2009). For example, California's large development (500 unit equivalent) and Colorado's House Bill 08-1141 exemption of cluster developments and those with fewer than 50 units do not meet the "granular" criteria.

Even where policies have been adopted requiring developers to assess and report on water supply, the policies may not make a meaningful difference. For example, opponents of the California requirements note that the mandate on developers does nothing to ensure the water management plans are timely and updated and assessments are accurate. Another potential limitation of assessment requirements is a technology barrier. Water supply and efficiency assessment tools were designed to assess efficiencies on a smaller local scale, not regional impact. When water assessment moves to a regional level, the tools need to be adapted to match the context or new assessment tools used. Failure to do so not only creates misleading results, but may fuel conflict over the "real" numbers (Haie & Keller, 2008).

Barriers to Adoption and Implementation: Opponents of assessment mandates include developers and the lawyers and contractors associated with new developments. Critics of the California bills have complained that they "add several significant hoops to the planning and development process," and fail

to address the more pressing statewide issues of limited water supplies (Sheppard, Mullin, Richter, & Hampton, 2002). One of the complaints is that the burden is on the wrong parties; the state or local jurisdictions should hold responsibility for solving the water supply problem, not asking developers to do it for them.

Rather than mandate assessments on a development by development basis, a strategy that may have greater impact is to mandate land use planning in advance of development that addresses water supply issues. The State could "require that such plans identify the known supplies of water for future development, quantify the demand that would result from projected population growth, and analyze how demand will be met by available supplies (or what additional water will have to be obtained)" (Van de Wetering, 2007, p.9). This approach would address the barriers identified by developers, who complain that they are being asked to answer questions local communities should have already addressed.

Relevant Survey Results: Survey respondents provided 18 examples of water supply assessments, though there was overlap particularly related to requirements on large developers statewide. The 18 examples represented 19% of all strategies mentioned by survey respondents, and were evenly split in terms of perceptions of success. Nine survey respondents reported the water supply assessment strategy decreased water usage, while nine others were uncertain of its outcome. Survey respondents specifically mentioned El Paso County's requirement that developers demonstrate 300 years of water availability, which the respondents reported had limited some development and reduced the density of developments, which appears to have the unintended consequence of approving larger lots with higher per unit consumption of water over the long-term. Seen as successful by respondents is the Douglas County's ordinance requiring new development to meet supply and demand numbers, similar to the 300 year water supply standard in El Paso County.

Case Study 2: Douglas County, Colorado -- Three Challenges

Douglas County, Colorado is currently home to over 325,000 residents and projected to grow to 450,500 people by the year 2030. Centrally located between Denver and Colorado Springs, the county became a Front Range population center via its rapid growth in the 1990's. Much of the county overlays the Denver Basin, which is a collection of four deep ground aquifers of non-renewable water.[25] Most of Douglas County water users draw their water from the nonrenewable groundwater of the Denver Basin aquifers; however, some utilities hold senior water rights on surface and alluvial aquifers – both renewable supplies of water. Responding to the hydrological conditions of the area, Douglas County, Colorado created the Water Supply Overlay District, that along with the Water Supply Zones Map, requires new development and special districts prove that water supply is sufficient based upon geographic location and determines water demand standards based upon whether the proposal is for rural, urban, commercial, or other uses (Douglas County, 2009).

[25] Denver Basin aquifers are: Dawson, Denver, Arapahoe, and Laramie-Fox Hills.

Water development, supply and delivery are complex in the county. There are nineteen separate water providers,[26] formed under various statutory authorities including Title 32 Special Districts. At least one of the small districts has faced significant operating challenges, necessitating reorganization through bankruptcy in the 1970's and recently underwent renegotiations with city utilities outside of Douglas County to assure long term water supplies.[27]

In 1992, the Douglas County Water Resources Authority (DCWRA) was created to voluntarily coordinate the municipalities, water providers and County government's planning and delivery of water. DCWRA is dedicated to water resource conservation, education, public policy initiatives, and a forum to discuss issues related to water. South Metro Water Supply Authority descended from the DCWRA process, and was formed to focus specifically on the pursuit of water supply.[28] South Metro recently entered into an Intergovernmental Agreement (IGA) with Denver Water and Aurora to identify and pursue joint initiatives with regard to water supplies. While responsibilities differ, communication between the respective entities is both regular and robust.

In September, the Colorado Water Conservation Board (CWCB) acted upon a Metro Basin Roundtable request to grant DCWRA $500,000 to pursue if and how the Bureau of Reclamation's Rural Water Supply Program may be applied to the Douglas County region. The Metro Basin Roundtable had previously awarded $100,000 to DCWRA for this pursuit. An Intergovernmental Agreement (IGA) was then negotiated between Douglas County Government, DCWRA, South Metro Water Supply Authority and the Rural Water Authority of Douglas County to pursue this effort. The IGA was signed in December 2009. Representatives to this IGA committee were appointed in January 2010. The Bureau of Reclamation is currently reviewing Directives and Standards for the program. CWCB stands ready to contract with DCWRA. This effort should be underway in the first half of 2010.

DCWRA has pursued other grant opportunities to reach out to the three communities described below. Specifically, these opportunities are:

1. DCWRA partnered with Mid Continent Research for Education and Learning to pursue a $200,000 grant opportunity with the Environmental Protection Agency (EPA) for environmental education.
2. DCWRA has partnered with the Douglas County Community Foundation to pursue a $997,500 from the US Department of Agriculture for technical assistance and training on rural water issues.
3. Funding for these two grant opportunities should be announced in the summer of 2010.

[26] Water providers in Douglas County are: Arapahoe County Water and Wastewater Authority, Castle Pines Metropolitan District, Castle Pines North Metropolitan District, Town of Castle Pines, Castleton Water & Sanitation, Centennial Water and Sanitation District, City of Lone Tree, Cottonwood Water & Sanitation District, Dominion Water, Douglas County Government, East Cherry Creek Valley Water & Sanitation, Franktown Business Area Metropolitan District, Inverness Water and Sanitation District, Meridian Metropolitan District, North Douglas County Water and Sanitation District, Parker Water and Sanitation, Pinery Water and Wastewater District, Roxborough Water and Sanitation District, and Stonegate Village Metropolitan District.

[27] See "About Roxborough Water & Sanitation District" at http://www.roxwater.com/about.php#history

[28] See www.southmetrowater.org

Securing adequate water resources for new development in Douglas County is a challenge. Three recent cases provide insight into the means by which water can be secured and the difficult process that ensues. Importantly, each of these cases is helping build better processes for the future as DCWRA works with each entity to generate water planning templates for use by land use authorities in the region. The goal is that all land use planning efforts in Douglas County will include smart water planning from the very first conversations with land use applicants.

The Canyons (http://www.thecanyonsliving.com/)

Photo Credit: The Canyons website "The Community" at http://www.thecanyonsliving.com/theCommunity.php

Located 25 miles south of downtown Denver and nestled in the rugged canyon lands between the high prairie and the foothills, The Canyons covers 3,342 acres. At build out, which is expected to take 30 years, there will be up to 2,500 residences of various types integrated with a marketplace of mixed use shopping and services, 37 miles of walking and biking trails, and a working farm.

The landowners owned both the land and water rights sufficient to supply the development needs. In 2003, an agreement was made between The Canyons and Parker Water and Sanitation. The Canyons dedicated their water rights to Parker and, in exchange, Parker agreed to be the water provider to The Canyons. It was a win-win deal. The rights transferred were in excess of the amount needed for The Canyons to be approved, so while Parker will be obligated to serve more customers, the Sanitation District also immediately increased their supply beyond their new long term commitment.

Parker Water and Sanitation has an annual .7 acre foot single family residential water supply requirement. The water rights transferred fully cover the water needed to supply the mix of residential and commercial ventures. Yet, The Canyons expects the actual demand to be much lower – as low as .4 acre foot for a single family residence – because of the design standards indoors and out that promote water conservation. This includes small lots planted in native landscaping, limited active irrigated areas, and homes with high water efficiency plumbing and appliances.

Perhaps most interesting is the planned 340 acre community farm tended by a professional farmer. Building on the national interest in locally grown organic food, this unique feature is a recent addition to

the plan, replacing the proposed golf course and using its irrigation water to grow crops instead of fairways and putting greens.

Figure 4.1. The Canyons community farm

Source: The Canyons website "The Farm" at http://www.thecanyonsliving.com/theFarm.php

The Canyons acres have been annexed by the City of Castle Pines North. The next three years are dedicated to detailed planning and construction of development infrastructure. With the water in secured, the biggest hurdle has been cleared.

Sterling Ranch (http://sterlingranchcolorado.com/)

Water conservation is a process of continuously finding ways to use water more efficiently and effectively.

(Harold Smethills, Prinicipal, Sterling Ranch)

Located near Roxborough Park in unincorporated Douglas County, the 3,100 acre development has a vision of being a fully sustainable, livable community with single and multi-family housing clustered in villages, anchored by a community merchant center with medical clinics, retail/commercial space, schools, and recreational facilities. Throughout the development will be open spaces connected by hiking, biking and equestrian trails.

Sterling Ranch proposes state-of-the-art water conservation techniques. Indeed, only through cutting-edge methods can the development exist. Sterling Ranch proposes a water supply plan that would be considered inadequate according to the supply standards set by Douglas County. Yet, the developer submits that their Water Conservation Plan can reduce water demand to approximately one-third of the water currently required by Douglas County zoning regulations. The Plan is based on a study completed for the Colorado Water Conservation Board entitled *Holistic Approach to Sustainable Water Management in Northwest Douglas County* (Leonard Rice Engineers, Inc. et al, 2007), three years of experience gained from a nearby home that has implemented many water conservation retrofits, water use studies completed by the EPA and others, and relevant experience gained from water conservation projects in other states. The Plan includes water wise requirements for everything, from lot size, plant selection and irrigation methods to the size and design of neighborhood parks and community recreational spaces, to a Waterwise Home Certification program that requires all builders to meet requirements that generally exceed the EPA's WaterSense™ Single-Family New Home Specification in

terms of water conservation. Although not included in its current Water Plan, Sterling Ranch is submitting an application to become one of Colorado's pilot rainwater harvesting projects (House Bill 09-1129) to investigate how rainwater harvesting in Colorado can reduce demands for potable water supply.

The human element has not been overlooked. Aware that even the best designs can be undermined by uninformed or unmotivated residents, Sterling Ranch will employ a dedicated water conservation staff to educate residents and business owners, enforce covenants and restrictions and ensure residents and business owners understand how to minimize waste. "Given the knowledge and tools, the vast majority of people will conserve water" says Harold Smethills, managing partner and founder of Sterling Ranch. "For the outliers, we have them covered, too." Specifically, the Water Conservation Plan includes:

1. Architectural Control Committee that monitors landscaping and irrigation system regulations. For example, homeowners would not be allowed to remove waterwise landscaping and replant with bluegrass.
2. Contracts with builders that every home meets the Sterling Ranch Waterwise Certification Program standards.
3. Indoor and outdoor meters that make it clear to both the homeowner and the water provider where waste and savings are occurring.
4. Incentives for water savers in the form of water rebates for lower use and very high rates for water guzzlers. A sophisticated water billing system will show customers how their actual water use compares to the expected use for their lot size, with alerts about potential leaks and tips for reducing water waste. In the most egregious water waster instances, the District would have the right to impose fines or to even cut off outdoor use in extreme circumstances. Such action would occur only after multiple attempts to work with the water user to reduce waste.
5. Point of Sale audit that verifies water efficiency and identifies upgrades needed to bring home back into compliance under the Waterwise Home Certification program. If the sellers have replaced low flow shower heads with high flow shower heads, the home would not be certified although this would in no way stop a home from being sold. While the water district cannot force compliance, the information could be used by the buyer to make the needed changes or even to negotiate with the seller to meet the Waterwise Certification standards.

As of December 2009, Sterling Ranch and their water provider, Dominion Water and Sanitation District, submitted an appeal to Douglas County requesting their updated water plan be approved. Included in the appeal are letters from notable stakeholders that support the proposed conjunctive use system, which is composed of renewable tributary water supplies with non-renewable Denver Basin groundwater. Also in December 2009, the city councils of Aurora and Brighton and the water district, Dominion, approved agreements to provide renewable augmentation water sufficient for the earliest years of Sterling Ranch.

The Water Plan has stirred up a lot of interest – supporters and skeptics alike. Among the most vocal dissenters are the other water providers in the County who are concerned that Sterling Ranch will not be able to meet its ambitious water conservation goals, leaving future residents without adequate water supplies. If the development ultimately needs more water than available, the already stretched water

supplies in the County could be negatively affected. The Sterling Ranch Water Plan offsets this issue by providing increased reserves for water in early phases of development (i.e. a safety factor) with provisions that future phases of the development cannot advance unless there is sufficient water as proven by the actual metered water use data from earlier built homes.

Sterling Ranch is pushing Colorado to rethink how to plan for water efficient communities. Should water supply adequacy be based on water usage of the past or water usage that is possible? Much more than the approval of Sterling Ranch is at stake.

Jellystone Park (http://www.castlerockrvpark.com/)

Larkspur, Colorado, a small town of 1.4 square miles that is home to 234 residents, situated 3 miles from the I-25 Interstate, found itself embroiled in a development controversy when the local campground at the Interstate exist submitted plans to expand. Bear View development wants to expand the modest Jellystone Park campground into a family "outdoor experience" destination, with up to 500 camp sites, 90 lodging units, and 170,000 sq. ft. of non-residential use (retail space, recreation facilities, and offices). The challenges are many, not the least of which is a lack of an adequate water supply. The campground's current sources – two non-exempt groundwater wells – are insufficient to accommodate any notable expansion. The solution: have the town of Larkspur annex the property thereby using the town's water to meet the supply needs of the development.

On August 17, 2009, the town's planning department made a recommendation of denial to do a "flag pole" annexation to the campground. Four months later, on December 17, 2009, the Town Council voted to approve the annexation.

Figure 4.2. Rendering of Jellystone Park Entrance, Larkspur, Colorado

Source: The Outdoor Experience, Bear View Plan for Development, Calloway Corporation, http://bearviewpd.com/rendering.html

Prior to any city action, Douglas County's Community Planning & Sustainable Development office issued a review letter on May 21, 2009, in which numerous concerns were raised. Among these was the need to demonstrate an adequate water supply. The development as proposed also conflicts with the Douglas County Comprehensive Master Plan. However, none of these County concerns carry legal weight once the property is annexed to the town, a move the developers pursued rather than address the County's requirements.

While many county and town residents oppose Jellystone Park because of its potential to increase traffic and noise and have undue affects on the environment through light and land pollution, the impact on water has not been lost on the opposition. Larkspur Neighbors Unite Blog, launched on January 5, 2009, provides a glimpse into a grassroots uprising against the developer and now the Town Council.

As it stands now, the water supply has shifted from non-exempt wells to a municipal supply. However, flag pole annexations do not change the amount of water available. The water and sewer provisions are still subject to review by the Town of Larkspur, Perry Park Water & Sanitation District, the State Engineer's Office, Colorado Department of Public Health and Environment, and the Tri-County Health Department, depending on the type of development, water supply, and sewage treatment proposed. Whether or not the Jellystone Park expansion has found an adequate water supply is still to be determined.

Sources: Mark Shively, Douglas County Water Resource Authority. Presentation at the symposium *Water & Land Use Planning for a Sustainable Future: Scaling and Integrating*, September 28-30, 2009; Hoagland, J. (2009, Aug. 25). Sterling Ranch water appeal. Letter to Mr. Koster, Community Planner and Sustainable Development Department, Douglas County, Colorado. Retrieved on December 20, 2009, from http://www.douglas.co.us/planning/documents/SterlingRanchWaterAppealCoverLetter.pdf; Courtney, B.A., Douglass, C.S., & Roush, R.G. (2009, January). *Sterling Ranch Water Plan*. Golden, CO: Sterling Ranch, LLC. Retrieved on December 20, 2009 from http://www.douglas.co.us/planning/documents/SterlingRanchWaterPlan-2-12-09.pdf; Phone interview with Mark Nickless, P.E., LEED AP, The Canyons, January 22, 2010; Phone interview with Harold Smethills, Principal, Sterling Ranch, January 22,2010; Larkspur Neighbors Unite Blog, http://larkspurneighborsunite.wordpress.com/

Water Supply Development

Description: Even with the most aggressive water demand management strategies, water supply development will be needed as municipalities face growing populations. Water supply development strategies attempt to expand storage, expand delivery capacity, or increase water supply. Expansion of storage and delivery capacity strategies typically are attempting to meet increasing demands as local jurisdictions increase in density and size. There is not substantial evidence linking water supply development with land use patterns; however, water supply is an important component of meeting our future water demand. Some of these water supply methods are discussed below, with a special focus on those water supply practices that may interface more with demand management practices.

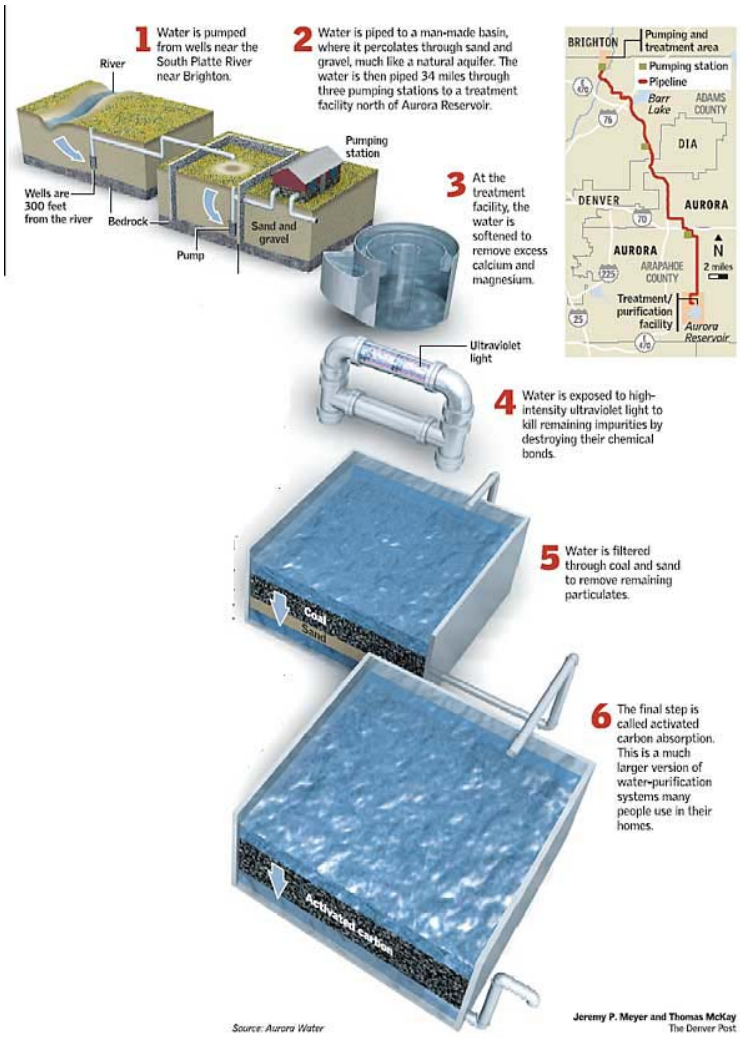
Traditional supply development: When jurisdictions determine that new water is needed, multiple strategies have been used to meet growing demands. New water is not a cheap option. Some municipalities and water districts (but generally not counties) have acquired new water rights or additional water rights formally used for other purposes, often agricultural. In addition to agricultural rights being used to supply increasing demands, they have also used them to meet augmentation obligations and increase water available downstream to other water rights holders (e.g. East Cherry Creek Valley Water and Sanitation District, 2008; Upper Arkansas Water Conservancy District, 2009).

Water districts may construct new dams or reservoirs, capturing unclaimed water or allocated water that is currently, inadvertently flowing out of the jurisdiction due to lack of means to capture it. These types of water storage projects are developed by water districts, counties, municipalities, and many different western states, and the extent to which they integrate water management with land use planning varies greatly. Water supply development can go hand in hand with land use planning. For example, growth management strategies can consider how water infrastructure may direct urban growth. The state of New Mexico is exploring how the placement of their proposed pipeline to transfer water to urban areas might result in different growth patterns over time (Van de Wetering, 2007).

Recapture and Precipitation Capture: Recaptured water, or **reuse** can be implemented either by an exchange of water right, which does not require new infrastructure, or through direct reuse, which does. The exchange potential in many areas can be limited, and new infrastructure is needed. This infrastructure is expensive, but can maximize a newly acquired water right if it is trans-basin water or a transferred water right. As a demand management strategy, direct reuse has typically been associated with the larger cities (e.g. Denver, Aurora) due to its expense.

Case Study 3: Prairie Waters Project

The Prairie Waters Project in Aurora is Colorado's first large-scale water re-use project. Constructed near Aurora Reservoir, the Peter D. Binney Water Purification Facility is a combination of concrete basins, buildings, and pumps that uses ultra-violet radiation to oxidize organic contaminants in the water, along with using softening, filtration, and additional means for purification. By 2011, 50 million gallons of water will be piped from riverbank wells along the South Platte River each day to the facility to be purified, and then distributed to more than 300,000 residents.



Rather than pursuing new water, the Prairie Waters Project relies on recapturing water already used in residential areas. The recaptured water will travel through 34 miles of pipeline to be purified in a six-step, 40-day process, combined with mountain water, and stored in the Aurora reservoirs until its distribution to residential households. The process exceeds federal and state standards for drinking water purification, a step deemed necessary due to the reuse of residential water. The treated water is projected to have a total dissolved-solids concentration of 400 parts per million.

The project was selected during the 2002 drought from 54 other options as the most environmentally friendly, long-term solution to meeting water needs. Originally expected to cost $754 million, Aurora has both cut costs by $50 million and kept ahead of schedule for completion. To finance the project, Aurora is using a combination of bonds and increased tap fees. After completion, the project will increase Aurora's water supply by 20%.

Sources: Goldstein, A. (2009, September 6). Water purification center work is under budget, ahead of schedule. *The Aurora Sentinel*; Meyer, J.P. (2007, January 23). Tapping used water. *Denver Post*.

Another strategy for increasing water supplies is to capture precipitation, displacing the demand on treating drinking water from irrigation and other outdoor uses. New Colorado legislation allows for (1) collection of rainwater and snowmelt for domestic well users with no other source of water (Senate Bill 09-80) and (2) a limited pilot project program that allows up to ten new development precipitation capture systems to study the potential water savings of rain harvesting (House Bill 09-1129). More expansive approaches like the City of Tucson, Arizona, include requirements that new developments have rainwater capture plans that provide at least 50% of annual landscape water (City of Tucson, 2008). Rainwater harvesting and graywater reuse educational resources are provided by both Tucson and the Texas Water Development Board to their constituents, encouraging the private sector to implement these strategies on their own (Tucson Water, 2009; Texas Water Development Board, 2005). At the individual resident level, Washington has granted Seattle residents the right to set up collection and storage systems without going through the permitting process required elsewhere in the state (Seattle Department of Planning and Development, 2008).

Case Study 4: Denver Water Recycling Plant

Denver Water operates the largest non-potable water recycling plant in Colorado. It treats 30 million gallons of effluent per day coming out of the Metro Wastewater Reclamation District Plant. The treated water is pumped back through the city in purple pipes to be used for industrial applications such as cooling towers at Xcel Energy Cherokee Power Plant, and for irrigation of landscapes at the Denver Zoo, Denver parks, golf courses, school systems and other outdoor areas. Previously, high quality municipal water was used for these applications.

Distinctive purple piping denotes recycled water in Denver Water's system

Recycled/reclaimed water is expensive to treat and pump back through the city; however, it is less expensive than acquiring new sources of water. Once the plant is running at full expansion capacity, it will save 17,000 acre feet of water per year or the equivalent of serving 35,000 households.

The project won the 2004 AAEE National Grand Prize for Design.

Sources: CH2MHill (2008). Water reuse solutions. http://www.ch2m.com/corporate/siww/assets/water/Broch_Water_Reuse_WFES.pdf; Carder, C. (2009). Water, water not everywhere. *Progressive Engineer.* http://www.progressiveengineer.com/features/denverwater.htm

Outcomes: Many of the large infrastructure developments that led to metropolitan areas having capacity to meet high water demands were supported by large federal grants twenty five or more years ago. At this point, capturing new water through reservoirs and dams or purchasing water rights is not only very expensive, but also complicated by the reality of limited supplies and increasing competition from many different jurisdictions and uses in need. To the extent that new sources of water are

captured, the outcomes of these supply side policies are difficult to assess on their own. For example, rainwater capture policies are typically implemented in partnership with other water conservation approaches, such as Tucson, Arizona's combined implementation of a water harvesting program with "Xeriscape requirements in the Land Use Code, another external water-use-reduction program that encourages the use of native, drought-tolerant landscaping" (Gunderston, 2009, p.1). Moreover, there are a lot of factors that direct growth including, for example, the quality of a school district. The cost to residents of even very expensive water will pale in comparison to the value of a good public education for their children.[29] Finally, there is little evidence that water supplies alone direct growth or determine the type of growth that will occur. Indeed, this is the reason for exploring better integrated land use and water planning efforts.

Barriers to Adoption and Implementation: Finding new supplies of water often requires taking water from another source. Not only is developing new water expensive, it also is decreasingly accepted that municipal water needs will be met by diverting water from agricultural uses or from trans-basin diversions. Even strategies to reuse or capture additional water supplies, as opposed to purchasing new rights, are not cheap strategies. Both require new infrastructure that may be difficult to retrofit to existing developments or face resistance to mandates in new developments. Some cities in other states have put these mandates in place, such as the above mentioned Tucson mandate, while others encourage the individual water user to take such measures by implementing demand side management strategies that strongly encourage decreased water use (see the next section). Rainwater capture programs also face ongoing debate as to their legality in the context of prior appropriation laws and fully or over-appropriated rivers. Even with Colorado's new law, the right to capture rainwater is limited to a defined population. This aligns with the interpretation from the State Engineer that has declared that users cannot "divert rainwater and put it to beneficial use without a plan for augmentation that replaces the depletions associated with that diversion" (Colorado Division of Water Resources, 2003:2). However, Colorado also passed a rainwater harvesting bill (HB09-1129) to study types of capture systems, amount of precipitation captured, and other factors that could affect existing water rights. Study results should help determine whether precipitation capture could be a new source of water for Colorado beyond very limited applications.

Relevant Survey Results: Fifteen of the strategies mentioned by survey respondents related to water supply development, representing 16% of all strategies mentioned. Ten of the respondents who reported water supply strategies were not certain whether the strategies have or would successfully address water supply issues, while four respondents reported the strategies were successful and one reported the strategy was not. The primary strategies discussed included many different versions of rainwater capture, as well as purchase of water rights, and development of new storage and transportation infrastructure. Two survey respondents described policies that require developers to purchase water rights for large new developments or provide the municipality with the funds to purchase the rights.

[29] Doug Scott's presentation "A Developer's Perspective" at the *Water & Land Use Planning for a Sustainable Future: Scaling and Integrating*, Denver, CO, September 28th-30th, 2009. See Appendix C Water & Land Use Planning Symposium: Table Discussion Notes on the panel "Private and NGO Efforts" for more information.

Rate Structures

Description: Structured impact fees and block rates are demand management strategies that seek to change consumer behavior through incentives, disincentives and/or education. Financial disincentives such as inclining block rate pricing increases unit price for water as the volume consumed by the household or business increases (Western Resource Advocates, 2004). Inclining rates and seasonal rates (e.g., higher rates in the summer) encourage conservation (Olmstead, Hanemann, & Stavins, 2005). These have been widely implemented in Western cities, including large cities such as Albuquerque, Santa Fe, and Denver. Justification for increasing water rates through any of these mechanisms comes from the argument that current water prices rarely reflect the actual costs of supplying water. Through water rate increases or impact fees, some of the social and environmental costs of water supply may also be addressed (Van de Wetering, 2007).

Impact Fees. One price-based strategy in local planning that can affect water development is impact fees. Impact fees defray the cost of infrastructure needed by new developments, including provision of additional water and sewer systems, roads, schools, libraries and parks and recreation facilities. Impact fees cannot be used for the ongoing expenses and maintenance of these facilities. The philosophy underlying impact fees is to avoid placing the cost of new development on all of the residents of a jurisdiction and instead assess the financial responsibility of the development on the developer (Kolo & Dicker, 1993). Although the fee is assessed on the developer, the costs are typically born by a combination of the residents of the new development through increased housing prices and the developers when the housing market cannot sustain the full increase in price needed to cover the fee. Impact fees can be controversial, with fears that developers will avoid jurisdictions with high fees that would cut into their profits, or fears that housing prices will be too high. However, even where impact fees have had a significant effect on housing prices, they also help provide infrastructure that is needed by new developments. "Cities and counties can realistically reduce their reliance on development fees and exactions only if alternative sources of funds are provided," (Dresch & Sheffrin, 1997) making impact fees an important tool in Colorado. On the Front Range, water impact fees average 4% of median home values and despite the significant increase to the cost of new development have not dampened growth (Hanak & Chen, 2007).

Structured impact fees can be used as a strategy to promote specific locations or types of development. Greeley, Colorado, a home rule city, has implemented a tiered road fee based on vehicular miles traveled, intended to increase costs for less dense developments that are further from the city core. Other communities have similarly used impact fees to differentially assess suburban development. For example, in Peoria, Arizona, tiered impact fees are intended to promote infill development; similarly, Scottsdale, Arizona, has higher fees in new growth areas and lower fees in older parts of the city (Rocky Mountain Land Use Institute, 2004).

Impact fees can also be used to stimulate “green” building by differentiating between the projected energy, water, sewage and transportation uses of conventional developments and smart growth LEED-certified developments. There is sufficient research on the energy and water savings of green buildings and compact developments to charge significantly higher impact fees for construction that is not water wise or energy efficient. Appropriately designed fees will incentivize developers and builders to build

green while ensuring the fees are upheld in court (Kingsley, 2008). In 2001, the City of Westminster, Colorado implemented water tap fees that reward water wise development and reflect better the annual water demand of different users, not just the maximum flow based on pipe size (see Case Study 5 below).

Case Study 5: City of Westminster Water System Development Fees

Cities have long charged one time tap fees for residential, commercial, and irrigation systems to be hooked up to a utility's water and sewer system. Typically, the water tap fee is based on the type of development (residential, multi-family, commercial, irrigation) and the size of the pipe, with the larger the pipe diameter the higher the fee.

In 2001, the City of Westminster, Colorado, took a major leap forward in calculating the cost of supplying water to new development. Instead of determining the cost using only the tap size, now the city charges a system development fee that is structured individually and calculated for each site by including projected water use. For example, schools, restaurants, and car washes may each install a two inch tap but their annual consumption of water will be different. Because a car wash will use significantly more water in a year than a restaurant, the annual demand on utility provider's water system is greater. The tap fees now reflect both the instantaneous demand on the system (the maximum flow of a pipe) and the projected annual consumption of water.

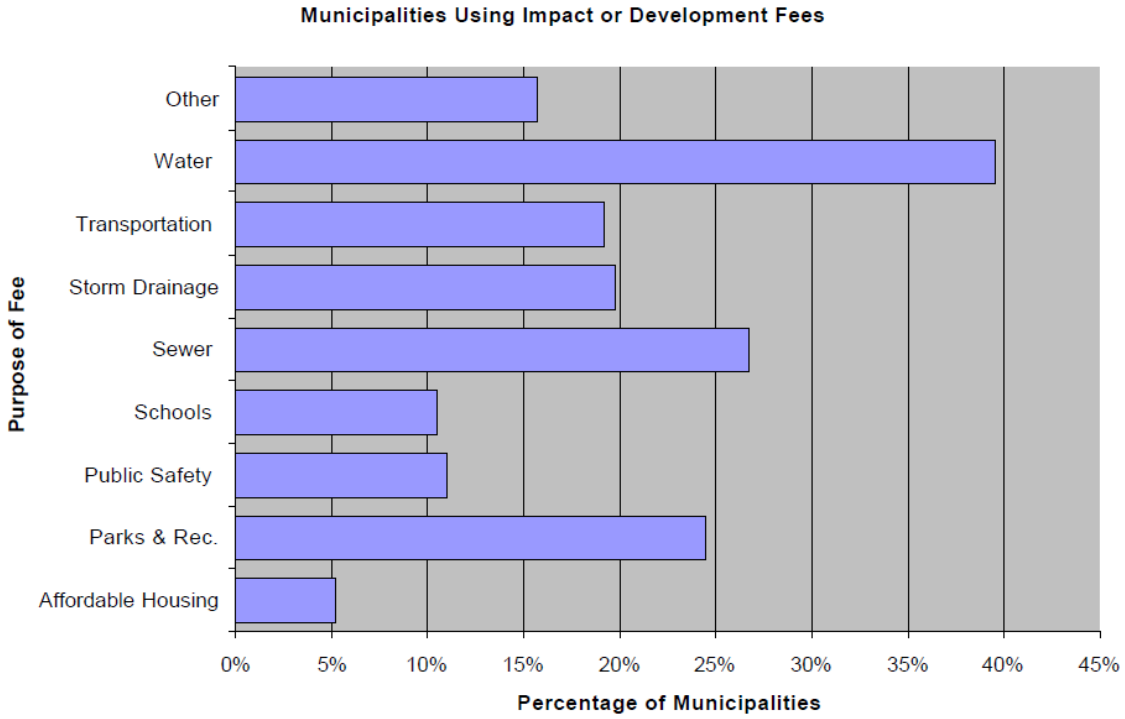
Today, the City implements structured tap fees based on landscaping demands and dozens of non-residential development categories including car washes, childcare centers, churches, grocery stores, hospitals, restaurants, retail stores, schools, and warehouses. Since its implementation, the actual water use versus the projected water use has dropped from 200% to 125%, thereby better reflecting the true cost and demand of different types of water users.

The first step is setting fees to accurately reflect consumption. The next logical step, according to Stu Feinglas, Water Resource Analyst for the City of Westminster, is to incentivize conservation within each user type. For example, two restaurants each using a two inch taps would pay different fees based on the equipment installed. The business that uses WaterSense™ appliances would pay less. These fine-tuned impact fees are the wave of the future.

Sources: Phone interview with Stuart Feinglas, January 22, 2010; *Water Regulations*, City of Westminster, Colorado, http://www.ci.westminster.co.us/code/888_1758.htm

Nearly half of Colorado's cities have implemented impact fees. The most commonly used fee is for water (40%) and sewer (27%). Small towns of less than 2,000 population are less likely to implement fees. However, more than two-thirds of the towns/cities over 2,000 population have adopted at least one impact fee (Colorado Municipal League, 2004b).

Figure 4.3. Colorado municipalities using impact or development fees, 2004.



Source: Colorado Municipal League (2004b). *2004 Colorado municipal land use survey*, p.5.

In contrast to cities, counties are less likely to adopt impact or development fees. As of 2004, only one third of the counties instituted these fees. The development of water was rarely assessed (2%) but 14% of the counties implemented a storm drainage assessment (Colorado Municipal League, 2004a).

Block Rates. Block rate structures are a conservation strategy, and are likely necessary for citizens who occupy new homes to adopt the behavior changes needed to reduce water consumption to the level such new developments allow. Colorado examples of an individualized water budget utilizing inclining block rates include the Highlands Ranch and City of Boulder approach, where unit prices for water are set through a *block volume threshold* customized to each water customer based on estimates of indoor usage and outdoor lot size requirements (Centennial Water and Sanitation District, 2005; City of Boulder, 2009). By accounting for lot size, all homeowners – not just those with large lots – are encouraged to conserve. Similar policies have been enacted by states, such as Georgia's mandate that both public and private water providers in its 24 coastal counties adopt and implement *conservation oriented rate structures* as a condition of all new or modified withdrawal permits. The state allows flexibility in how each water provider defines their rate structure, but provides a detailed manual to guide development of the rate structure (Georgia Environmental Protection Division, 2007). Although increasing block rate structures focus on conservation in existing developments, they may also serve as

an incentive for developers to create less water intensive new developments, an added cost savings benefit to the homeowners they hope will buy their homes.

Many water providers also institute restrictions on water use specifically during droughts, including water rationing, voluntary conservation measures, public education on the drought mitigation mandates, and issuing fines and citations (Scattone et al., 2001). For example, the home rule City of Aurora, Colorado implemented several demand management strategies simultaneously in response to the 2002 drought. These included restrictions on outdoor water use, incentive programs, and multiple changes in billing structures and rates (Kenney, Goemans, Klein, Lowrey, & Reidy, 2008). California's additional step in response to drought has included a Drought Water Bank that facilitates purchase of water among providers to ensure sufficient water in critical areas (Scattone et al., 2001).

Drought management strategies that utilize green requirements for limited periods of time have been found to be successful (Pint, 1999), though their focus is, by default, on existing developments and not new ones. In Colorado, the mandatory restrictions on outdoor water use along the Front Range in the summer of 2002 resulted in average per capita savings ranging from 18% to 56% compared to the two prior years. Where voluntary restrictions were used instead of mandatory, the savings was significantly lower, just 4% to 12% on average (Kenney, Klein, & Clark, 2004). These results match findings from California, where the mandatory water reduction policies had greater success at decreasing water consumption than voluntary and incentive-based demand reduction policies (Renwick & Green, 2000). Their additional value may come from the public education component of a mandatory restriction, helping raise awareness that leads to increased likelihood of homeowners implementing or maintaining a xeriscaped or limited turf landscape.

Case Study 6: City of Boulder Individualized Water Budgets

A water budget is the amount of water a customer is expected to need for a specific month. Each customer's water budget is customized based on their water needs.

Budgets vary by customer type: single-family residential, multi-family residential, irrigation only and commercial/industrial accounts. For most customers, the budget is the sum of indoor and outdoor water allocations for a particular month.

Calculating Residential Water Budgets:

Single-Family Residential Accounts: Monthly water budget = indoor allotment (7,000 gallons for a family of four) + outdoor allotment (based on customer-specific irrigable area and seasonal watering needs). Since the city is estimating a family of four for each single-family residence, residences with fewer family members may have a larger budget than needed.

Multifamily Residential Accounts: Monthly water budget = indoor allotment (4,000 gallons per dwelling unit with 1-2 bedrooms) + outdoor allotment (based on customer-specific irrigable area and seasonal watering needs). Dwelling units that have more than two bedrooms may receive an additional 1,000 gallons per month, but the total indoor allocation per dwelling unit may not exceed 7,000 gallons per month, which is the equivalent of five bedrooms.

Irrigable Area Calculation: The maximum amount of water allocated to each customer for outdoor use is 15 gallons per square foot of landscaped area. This figure is based on horticultural research that determined the amount of water needed for healthy bluegrass lawns in this climate is 18 gallons per square foot. 15 gallons per square foot per year was chosen to encourage water conservation and xeriscape improvements.

Table 4.1. Boulder's water budget & block rate billing

Billing Block	2008 Rates (per 1,000 gallons)	% of budget
Block 1	$1.95 (3/4 the base rate)	0% - 60%
Block 2	**$2.60 (the "base rate")**	61% - 100%
Block 3	$5.20 (2 x Base Rate)	101% - 150%
Block 4	$7.80 (3 x Base Rate)	151% - 200%
Block 5	$13.00 (5 X Base Rate)	Greater than 200%

Source: City of Boulder (2009, November 4). The basics of your water budget. http://www.bouldercolorado.gov/index.php?option=com_content&task=view&id=6243&Itemid=2039

Outcomes: Sensitivity to price changes varies considerably among water users -- high water users are more responsive to price. Responsiveness also varies between drought and non-drought periods (Kenney, Goemans, Klein, Lowrey & Reidy, 2008) and between summer and other times of the year, with increased water rates more successful at decreasing water usage during summer months (Renwick & Green, 2000). Sensitivity to changing water rates is also affected by the extent to which the rate changes are transparent to the users. For example, residential users whose HOAs pay for water may not respond to rate changes and research has also found when rates and rate blocks are not clearly indicated on the bills, that can limit the effectiveness of rate increases. Western Resource Advocates, after finding a close correlation between dramatically increasing block rate structures and low per-capita water demand, is endorsing the use of increasing block rate structures as one of the most effective ways to encourage efficient water use (2003). TischlerBise, planning consultants to utilities, also recommends inclining block or tiered rate structures to encourage water conservation (TischlerBise, n.d.). Research has found that increasing step rates, which applies the higher rate to all water used not just the excess over the previous blocks, are the most useful to reduce water use (Young, Kingsley & Sharpe, 1983). Nieswiadomy and Molina (1989) found increasing blocks were successful in lowering water consumption (1989). For short-term success in conserving water during the summer, however, water rate increases need to be known up-front by consumers, not buried in bills that arrive after the summer ends (Olmstead & Stavins, 2008). There are also similarities between water and energy billing opportunities.

One example from the Sacramento Municipal Utility District indicates that a bill comparing each household's energy use to the average of its neighbors and also to conservation-minded neighbors alone can reduce energy consumption by 2% (Charles, 2009).

In addition, differing rates for indoor and outdoor water use, as with the City of Boulder example, can significantly reduce outdoor water consumption.

Barriers to Adoption and Implementation: Citizens can be resistant to increases in water rates and proposals to set rates based on usage may face significant public opposition. In communities where water is subsidized and prices are particularly low, changes in water rates may be politically difficult even in the face of evidence of the true cost (Olmstead & Stavins, 2008). Water providers may also oppose conservation rate setting as they have a financial incentive to promote high water use and the new rate structures can result in a lack of revenue stability for the provider. When setting up rate structures, a balance is needed between the risk of negative impact on low-income customers, who disproportionately reduce water consumption in response to price increases compared to middle and upper income customers (Mansur and Olmstead, 2007), and the risk of negative impact on the revenue of the water provider. In an attempt to demonstrate that a well designed rate structure can avoid these barriers, Smith and Wang (2008) develop highly detailed water rate structures intended to decrease water use that can be implemented in a manner that does "not negatively affect water bills of the low-income group, are revenue neutral for the utility, and bring about significant water savings" (p. 109). In a macro level approach, the Las Vegas Valley Water District addressed this issue by enacting a policy that limited price increases at lower use levels, but increased by 500% over 18 years the water rates for users exceeding the 20,000 gallon a month threshold (Southern Nevada Water Authority, 2009).

Relevant Survey Results: Only a few survey respondents provided examples of rate related strategies, such as block rate structures and impact fees. Seven total examples were provided, with four of them viewed as successful at decreasing water usage, one as unsuccessful, and one respondent reported they were unsure whether it had been successful. Related to the concern noted above on the negative impact on utilities, one survey respondent reported that a Green Program resulted in such a decrease in water usage, that rate increases were implemented across all water users. While it is hard to know if the rate increases were due to reduced water demand, it does point out the importance of utilities implementing best practice rate structures to achieve water and revenue sustainability. One respondent described a surcharge on tap fees specifically related to lawn irrigation, rather than indoor and outdoor water usage combined. The respondent reported the policy as successful at decreasing water usage, primarily through decreasing lawn sizes and increasing density.

Comprehensive Planning Efforts

Description: Comprehensive planning efforts, such as land use master plans or water supply plans, is a method by which water management and land use can be addressed in a single document. It is a natural fit to include water infrastructure into a land use plan and water supply/demand projections are based on population projections, also components of comprehensive planning (Coulson, 2005). Comprehensive land use master plans are commonly used in Colorado. As of 2004, all of Colorado's large municipalities (over 10,000 population) and all but one municipality between 5,000-9,999 have

comprehensive plans. Approximately one-third of the city master plans addressed growth management and water supply (Colorado Municipal League, 2004b). Among counties, 93% had adopted comprehensive county master plans and nearly 100% reported having a planning commission. Unlike the city master plans, most county plans did not address water issues even though nearly half of the plans addressed growth management (Colorado Municipal League, 2004a).

In Colorado, Comprehensive Land Use Plans are already being used as mechanisms for addressing water demand. For example, the home rule City of Aurora released in August of 2009 a draft of its most recent comprehensive plan which includes a section on water conservation and demand management strategies. The bulleted list of strategies crosses many different areas, including public education, greening programs and incentives, and conservation pricing (City of Aurora, 2009). The 2008 Water Conservation Annual Report provides an update on the status of various water conservation efforts now incorporated into the 2009 Comprehensive Plan including plumbing fixture and appliance rebates, irrigation system and xeriscape rebates, indoor and outdoor audit programs, adult and youth education programs as well as teacher trainings. To support demand management planning goals, the Aurora Planning department partnered with the city's water conservation staff to revise existing landscape ordinances to include xeriscape requirements (City of Aurora, 2008).

When comprehensive plans explicitly address the integration of water and land, the desired outcomes of integration vary by jurisdiction and policy, but often include some combination of protecting water quality and/or quantity. When land use issues have been included in water management plans, such as the Newmarket, New Hampshire model, water quality was addressed by planning around open space, low-impact development, prohibiting high risk land uses, and restricting development on land served by septic tanks– issues that typically fall into a land use planners domain (Williams, 2008). At the statewide level, Oregon's approach is to specifically require water suppliers to explore such things as urban growth boundaries in an attempt to manage long-term water supply (Cohen, 2004) and Arizona's requirements are similarly focused on finding new water and sustaining long-term water supply (Bell & Taylor, 2008).

Where land use plans have been required to include water issues, they range from local jurisdictions requiring permitted land uses to meet performance standards for groundwater protection (Williams, 2008) to states such as Florida, Arizona, and New Hampshire mandating regional councils or communities develop land use plans that address regional water supply planning and long-term water resources for their planned developments (Cohen, 2004; Williams, 2008; McKinney, 2003). Massachusetts' State Watershed Initiative and the Planning for Growth Program worked together to create an incentive-based approach at the state level to encourage comprehensive planning by communities. They award funding to communities who commit to designing innovative plans that integrate a comprehensive approach to water resource protection with an effective growth management strategy (Scattone et al., 2001).

> *One of the four core elements requires that communities identify land critical to sustaining a community's water supply, water quality and natural resources. This work helps municipal decision-makers understand the ecological carrying capacity of the community and the availability of water resources to support alternative build out scenarios.* (Massachusetts Executive Office of Energy and Environmental Affairs, n.d.)

A total of 220 Massachusetts communities participated in this program to date, and their finished plans will be roadmaps for the future growth of their community.

Outcomes: Comprehensive plans create a framework by which a community establishes the practices that drive development and management of land. Comprehensive plans are, in effect, a policy guide for a community to use in making decisions about growth and development. When communities plan to accommodate growth through in-fill, compact development, green building and landscaping standards, significant water savings accrue. The planning process is an opportunity for a jurisdiction – elected officials, planners, and the public – to address water demands alongside other important factors to the community and establish principles and broad strategies for managing their water needs via land use choices.

Relevant Survey Results: Colorado survey respondents reported more support for the potential of land use master plans as tools for effectively reducing water demand on a regional level than any other strategy, with 71% of respondents reporting the approach had moderate or high potential for success. The other approach, to include land use issues in water management plans, was not specifically asked about. However, a couple respondents suggested different strategies to include in water management plans, such as strategies for enforcing local water conservation ordinances and restrictions and water conservation and management plans. Though there was great support for the use of land use master plans, it is worth noting that when asked for examples of strategies that work in Colorado, only three survey respondents described a master plan process that addressed the integration of water and land use. One respondent described the Douglas County plan, another referred to an unnamed city or county plan that integrated the two issues, and the final one described a planning process emerging from a watershed council.

Densification and Growth Management

Description: Land management strategies seek to manage new growth and infill to protect natural resources and address both water quality and quantity concerns. Urban growth boundaries are a strategy used here in Colorado and in other states that does not necessarily address water quantity issues, but can be used for that purpose (McKinney, 2003). Growth boundaries direct growth toward areas with existing infrastructure, resulting in infill opportunities, and can create greenbelt boundaries that limit total growth and increase density of growth. Conservation of open space is a broader set of policies that can help to preserve not only land, but also water resources. In Colorado, the Conservation Tax Credit helps to preserve agricultural lands. California includes requirements that regional plans must address open space issues, including protection of water resources as part of the open spaces to be preserved. Cluster development policies compliment open space policies by concentrating building within a site to preserve the open space around the site, generally focused on improving water quality more than water quantity although depending on the size and landscaping of lots and green space vegetation, water consumption may also be significantly reduced. Cluster development policies are in place in many Colorado counties, first initiated by Larimer County, and generally exist through incentives such as exemptions from other requirements or parcel bonuses (Larimer County Planning Division, 1997; Douglas County Community Development Department, n.d.; Lipsher, 1997; Garfield County Building & Planning Department, 2000; Jefferson County Planning and Zoning, 2005).

Growth management strategies that are undertaken in a single jurisdiction are at risk of creating the opposite type of growth in neighboring communities. For example, Boulder, Colorado's urban growth boundary may have contributed to sprawl and growth in surrounding counties and cities (Jackson, 2005). For this reason, intergovernmental agreements are an important component of land use planning strategies to address water quantity issues. Coordinating planning efforts across jurisdictions can help with monitoring water demands (such as Colorado's Mesa County and Clifton Water District agreement), minimizing the negative impacts of development on surrounding areas (such as the Boulder, Colorado's City and County agreement), and limiting urban development to only those areas where the full range of urban public services can be provided (such as Colorado's Ouray County and Town of Ridgway agreement). Colorado already encourages all local governments to "make the most efficient and effective use of their powers and responsibilities by cooperating and contracting with" other local governmental entities through intergovernmental agreements (Colorado Department of Local Affairs Office of Smart Growth, 2006). Utah has gone a step further to assemble a partnership that develops quality growth strategies for the entire state that mix open spaces, transit oriented development, and mixed uses (State of Utah Division of Water Resources, 2001). These different cross-jurisdiction agreements are examples of local government making the choice to enter into a regional plan for a specific purpose, which differs from the next section on regional governmental structures that have the authority to guide local efforts.

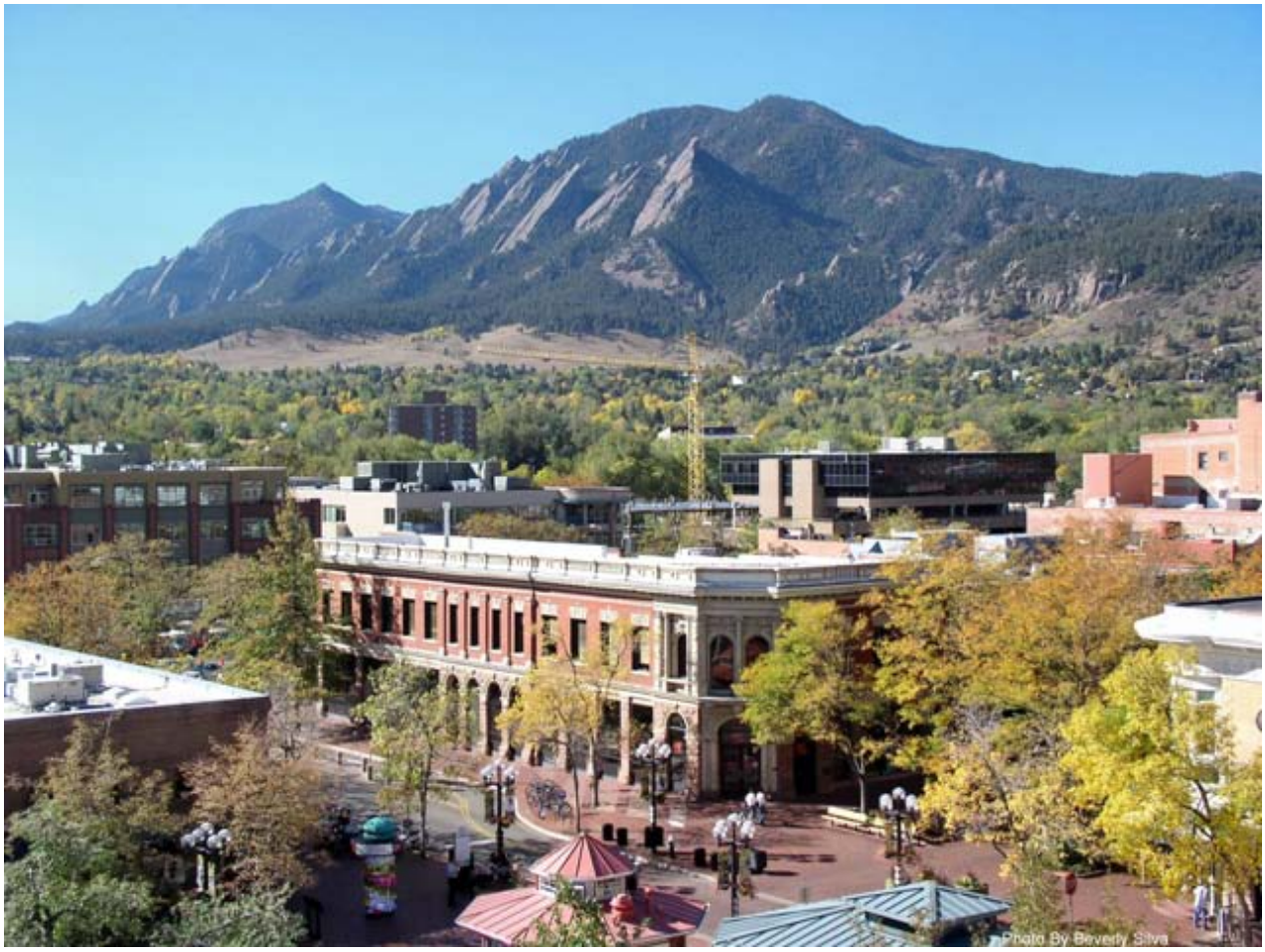
Outcomes: Water usage studies find that in urban areas the largest consumption of water is typically residential single family homes (Fullerton & Schauer, 2001) with 50% or more of the water used for outdoor landscaping. Densification that results in smaller lots sizes has the potential to improve water conservation on a per capita basis, although water usage is also influenced by additional factors including housing characteristics (primary versus secondary homes), household income, size and composition of household (e.g., adults versus families, especially teenagers), types of landscaping, consumer behavior toward conservation practices, and fluctuations in rainfall (Pint, 1999; Arbues, Garcia-Valinas & Martinez-Espineira, 2003; Domene & Sauri, 2006; Gram-Hanssen, 2007). While land management strategies such as growth boundaries or cross-jurisdictional agreements have not demonstrated success at addressing water quality or quantity issues, the degree to which the land use policies create more compact development can result in water savings (Patterson & Wentz, 2008). The lack of evidence is not because the policies are necessarily ineffective. Rather, evaluations of the policies' impacts have rarely been attempted. Evaluating these types of policies is complicated by the lack of clearly defined goals or targets, lack of evidence on what would have occurred in the absence of the policy, the length of time the policies take to be implemented and cause changes, and the many other policies and environmental factors that drive growth and development decisions (Bengston et al., 2004). Perhaps even more challenging, the very nature of these policies is cross-jurisdictional with many different overlapping jurisdictions and districts involved in the implementation, affected by the policy directly or indirectly, and changing their own related and semi-related policies over time. The complexity of this environment exceeds the realistic capacity of evaluation (Bengston et al., 2004). In the Colorado survey that is informing this report, stakeholders who identified growth management strategies reported that they were successful at decreasing water usage. As one respondent noted, although growth management is largely local, it has shown such success that, "If the State developed and enforced growth management boundaries, the development within the boundaries would increase

in density over time and therefore lowering [gallons per capita] numbers." However, as an area becomes denser, there will be increased water consumption per acre simply because there are more people per acre. The water consumption goal for densification -- and therefore the measure of success -- is a reduction in gallons per capita not a reduction in water used per acre.

Barriers to Adoption and Implementation: Although evidence is lacking in terms of outcomes from these policies, there is research indicating the implementation practices are a critical component of how the policies have an effect on their environment. Ineffective administration of growth boundary strategies can drive developers away, resulting in the feared "leapfrogging" to other communities (Bengston et al., 2004). Other barriers include the need to adopt and implement more than just a growth boundary policy or cluster development policy; research shows that a package of complementary policies will work best with such things as zoning that protects open space, purchase of development rights, right-to-farm policies, etc. accompanying the growth policies and keeping them from resulting in patchworks of protected and unprotected lands (Bengston et al., 2004). As many of these accompanying policies are implemented by different levels of government in different surrounding jurisdictions, the need for the regional land management plans also referenced in this section is clear. The multi-jurisdictional nature of growth management results in a need for coordination at the horizontal and vertical level from development through implementation and monitoring of a policy or set of policies (see Case Study 9 for the Denver Regional Council of Governments example).

Relevant Survey Results: Although only 11% of the examples from survey respondents were growth management strategies, six of the ten mentioned by respondents were reported to be successful, which is a much higher percentage than in other categories (60% of the strategies reported as successful compared to an average of 34%). The growth management strategies included limiting developments to environmentally appropriate areas, using conservation easements and open space requirements, placing regulations on land use to ensure both dense developments and open space, and establishing urban growth boundaries. The examples were a mix of voluntary efforts and mandatory requirements, and included the Rio Grande Basin work with the Headwaters Land Trust and use of low impact development in Highlands Ranch.

Case Study 7: Boulder Blue Line and Other Growth Control Measures



Source: Downtown Boulder, http://www.boulderdowntown.com/visit/outdoor-activities

In 1959, the City of Boulder instituted the "blue line," not to conserve water, but to help curb development on the mountain sides above the city to preserve open land and views. The blue line followed the 5,750 foot elevation line and restricted city water services to altitudes below this line. While this in itself did not halt development west of this line, it did hinder the construction of large residential developments that were planned at the time. Homes could still drill their own wells and seek non-city water supplies, but without a central water system, development of more dense subdivisions was difficult. (Snider, 2009; Bartlett, 2000).

The blue line was supplemented by a series of other initiatives that further limited development in Boulder. In 1967, city voters approved a dedicated sales tax for the acquisition, management, and maintenance of open space to purchase land before it was developed. In 1970, a Boulder Valley Comprehensive Plan was adopted as a joint city-county effort that defined the city's growth boundaries. And, in 1976, a residential growth management ordinance was passed, known as the Danish Plan, which limited population growth to no more than 2% per year (compared to the historic 4%), while placing no restrictions on commercial development. (Boulder Colorado Convention and Visitors Bureau, n.d.; Lidstone Jr., 2000).

The combination of these programs had many local and regional effects. While keeping the population in Boulder within defined limits, jobs continued to grow at historic rates without a correlative increase in housing in the city. This pushed residential growth to the region surrounding Boulder, affecting in particular the communities of Louisville, Lafayette, Broomfield, and Superior. The general effects of these limitations included:

- Home prices rising much faster than local incomes in Boulder;
- Inability for new and lower and middle-income Boulder workers to find available and affordable housing within the city;
- Increased residential growth rates in neighboring communities, without correlative commercial growth, resulting in an imbalanced tax base;
- Increased traffic and stress on roads from persons commuting into Boulder for jobs; and
- More recently, commercial businesses bypassing or leaving Boulder in favor of locating in neighboring communities. (Jackson, 2005)

The unintended effects that growth limitations had both within the city of Boulder and in the surrounding area illustrate the importance of regional planning in making local decisions that have out-of-area effects. This experience presents a few considerations in integrating regional and local planning goals:

Colorado Statutes and Regional Planning: Colorado State Statutes enable the formation of regional planning commissions "to make and adopt a regional plan for the physical development of territory within the boundaries of the region" and review and make recommendations on plans that affect the region (Colo. Rev. Stat. §§ 30-28-106(2)(a), 110). However, the Statutes do not require that regional planning commission member governments submit local plans with regional effects to the commission for review.

- The City of Boulder was a member of the Denver Regional Council of Governments (DRCOG) at the time the Danish Plan was adopted. DRCOG is a regional planning commission formed under authority of Colo. Rev. Stat. § 30-28-105. As a member of DRCOG, the City of Boulder assumed a duty to "refer to the regional planning commission for review any proposed new or changed land use plan, zoning amendments, ... or other planning functions which clearly affect another local government unit, or which affect the region as a whole" (Colo. Rev. Stat. § 30-28-110(2)(a)). However, by not referring the Danish Plan to DRCOG for its review, Colorado Statutes assume this was due to "a determination by [the] municipal planning commission that the matter is local in nature" (Colo. Rev. State. § 30-28-110(2)(e)). In other words, state statutes assume that the failure of a local government to submit a plan to review by the commission is a local determination that the plan has no regional effects, regardless of the actual determination by the local government, and requiring no determination from the commission as to the plan's potential for regional effects. (Lidstone Jr., 2000).

Citizen's Initiative: Both the blue line and the Danish Plan were mandated by citizen initiatives:

- The City Council denied initial proposals from the citizens to place the question of a blue line as a charter amendment on the ballot. Citizens then gathered enough signatures to place the question on the ballot themselves, which passed, and placed the blue line in the city's charter. (Bartlett, 2000)

- The City Council also rejected the original Danish Plan ordinance as proposed, in part because of the recognition that its adoption would be "premature, and possibly detrimental to the overall goals it is attempting to achieve," including harm to areas surrounding the city and increased cost of living. A slightly modified Plan was placed on the ballot by citizen initiative, which was approved on November 2, 1976. The voters had directed the city council to adopt an ordinance limiting growth to no more than 2,250 dwelling units over the next 5 years; less than half of the previous uncontrolled rate of growth in the city. An ordinance was adopted in 1977. (Lidstone Jr., 2000).

The ability for citizens to impose initiatives upon local governments is important when considering regional planning processes. Boulder's experiences show that citizen initiatives can force certain outcomes and goals for a locality within potentially rushed timeframes. This can be particularly difficult when also working with other regional governments to achieve local and regional goals. This stresses the importance of public education throughout the regional planning process, both with respect to effects on regional goals as well as desired local outcomes. This also speaks to the need for regional planning perspectives to not lose sight of local planning needs and goals.

Regional Structures

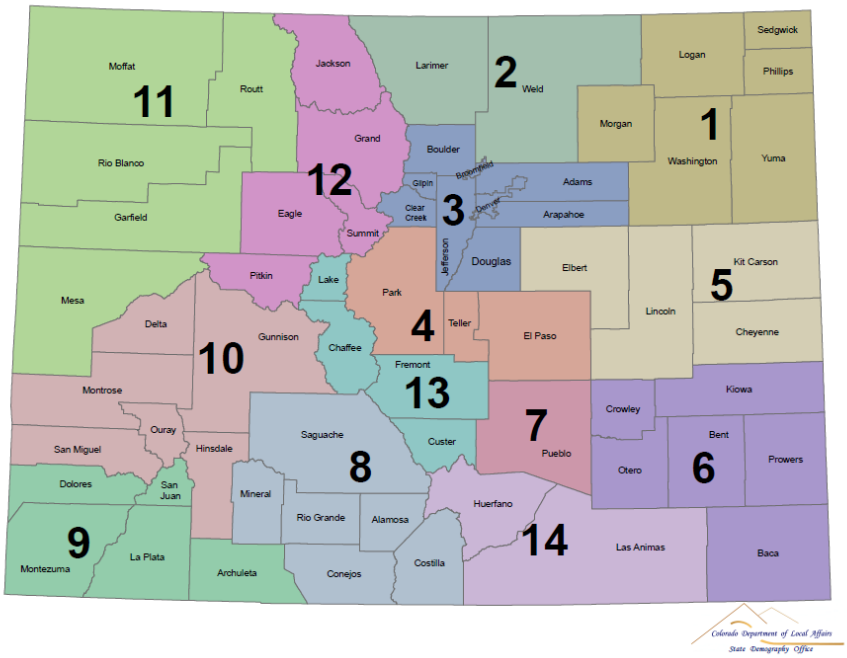
Description: Many states have established regional governance structures, some of which are specifically intended to address water and land use planning, while others have a broader charge that could include addressing water and land use planning. Colorado falls into the latter category. An argument for the use of regional planning structures to address the integration of water management and land use planning lies in the different levels of authority where the two systems are based (Van de Wetering, 2007). Colorado's water is administered at the state level. In contrast, land use planning in Colorado is largely a local issue, with a smaller set of state mandates (see Section 2. Legal Context), educational resources through offices like the *Office of Smart Growth and Sustainable Communities Initiative*, and largely local decision-making and implementation. Regional government structures bridge these two systems, engaging local leaders in decision-making that crosses jurisdictional boundaries.

For states like Florida and Georgia, the regional planning councils have significant authority, with a requirement to develop strategic regional policy plans that define how local governments can conduct their land use planning and connect land use planning to regional water supply (Cohen, 2004; Metropolitan North Georgia Water Planning District, 2006). Arizona's regional planning is specific to water, with four Active Management Areas required to balance groundwater withdrawal and natural and artificial recharge through mandatory water conservation requirements and incentives (McKinney, 2003). New Mexico's regional planning structure includes funding opportunities tied to evaluation of existing and future water demands in the region.

Colorado has fourteen Planning and Management Areas,[30] known as regional council of governments (COGs) of which at least three are undertaking some form of regional growth planning.[31] The COGs that choose to undertake water planning efforts do so voluntarily, with variation in their approaches from regional management of water supply to watershed level water quality planning and management. The Fountain Creek Watershed area is an example where Pikes Peak and Pueblo area COGs have partnered to address sedimentation and erosion issues (Pikes Peak Area Council of Governments, 2003). These two COGs teamed to fund a U.S. Army Corps of Engineers study of the watershed thereby making the regional drainage eligible for federal funds in the future.

Regional governance structures are a strategy used by the federal government as well. The Environmental Protection Agency has regions with responsibilities to manage water quality, tied to those areas that states identify as having substantial water

COLORADO PLANNING AND MANAGEMENT REGIONS



[30] The fourteen regions are:

Region 1 - Northeastern Colorado Association of Local Governments (Counties: Logan, Morgan, Phillips, Sedgwick, Washington & Yuma)
Region 2 - North Front Range Metropolitan Planning Organization (Counties: Larimer & Weld)
Region 3 - Denver Regional Council of Governments (Counties: Adams, Arapahoe, Boulder, Broomfield, Clear Creek, Denver, Douglas, Gilpin & Jefferson)
Region 4 - Pikes Peak Area Council of Governments (Counties: El Paso, Park & Teller)
Region 5 - East Central Council of Local Governments (Counties: Cheyenne, Elbert, Kit Carson & Lincoln)
Region 6 - Southeast Colorado Enterprise (Counties: Baca, Bent, Crowley, Kiowa, Otero & Prowers)
Region 7 - Pueblo Area Council of Governments (Pueblo County)
Region 8 - San Luis Valley Development Resources Group, Inc. (Counties: Alamosa, Conejos, Costilla, Mineral, Rio Grande & Saguache)
Region 9 - Economic Development District of SW Colorado, Inc. (Counties: Archuleta, Dolores, La Plata, Montezuma & San Juan)
Region 10 - League for Economic Assistance & Planning, Inc. (Counties: Delta, Gunnison, Hinsdale, Montrose, Ouray & San Miguel)
Region 11 - Associated Governments of Northwest Colorado (Counties: Garfield, Mesa, Moffat, Rio Blanco & Routt)
Region 12 - Northwest Colorado Council of Governments (Counties: Eagle, Grand, Jackson, Pitkin & Summit)
Region 13 - Upper Arkansas Area Council of Governments (Counties: Chafee, Custer, Fremont & Lake)
Region 14 - South Central Council of Governments (Counties: Huerfano & Las Animas)

[31] Regional growth planning is being done by Region 3 (DRCOG), Region 4 (PPACG), and Region 8 (SLVDRG).

quality control problems. Local and regional entities within regions are designated as responsible for establishing water quality policies and setting planning and management goals. These regional structures focus on quality issues, but may have potential as partners in addressing regional level quantity issues.

The Interbasin Compact Committee and the Basin Roundtable process is another approach to regional level water management. The roundtable process is intended to engage state, local, and private stakeholders in addressing statewide water conflict, water quantity issues, and setting local priorities (Van de Wetering, 2007). The process has state appropriated resources to conduct research and engage stakeholders. It does not have authority to implement any decisions made by the stakeholders, requiring the process to engage decision-makers and build consensus. This approach is relatively new in Colorado, so lacks evidence of large-scale policy change resulting from the collaborations. However, the different roundtables have undertaken joint projects and studies. Although the authorizing legislation does not specifically mention land use planning, the process has the potential. With city, county, and water provider representatives on each roundtable, the potential exists for Basin Roundtables to foster basin-wide integration of land use planning and water supply planning.

Case Study 8: Office of Smart Growth and Sustainable Communities Initiative

Colorado Department of Local Affairs – Division of Local Government

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

The *Office of Smart Growth and Sustainable Communities Initiative* promotes voluntary adoption of sustainable and smart growth practices within Colorado jurisdictions. Nearly $2 million has been awarded to projects involving over 100 local governments since its inception in 2000. Projects have addressed traffic congestion, loss of agriculture, loss of open space, fiscal impacts to local governments, wildfire hazards and lack of affordable housing.

The division also serves as a resource through which local jurisdictions can receive technical planning support and share best practices. Among the resources offered on-line include the following publications:

- Model Land Use Codes for (1) Colorado Counties and (2) Small Communities
- Model Green Building Program: New Residential Construction booklet and checklist
- Planning for Growth: Intergovernmental Agreements in Colorado
- Strategies for Updating Comprehensive Plans and Land Use Codes
- Water Efficient Landscape Design Model Ordinance;
- WaterWise Landscaping Best Practices Manual: A Companion to the Landscape Design Ordinance

Resources are available at http://dola.colorado.gov/osg

Case Study 9: Denver Regional Council of Governments & the Metro Vision

> ***Sustainable Development*** *manifests itself through compact development and the implementation of building practices that aim to preserve agricultural land and open space; conserve and reclaim water resources; prevent water quality degradation; protect wetlands; conserve energy; minimize traffic congestion and air pollution; reduce the impacts of greenhouse gases; and maintain economic viability* (DRCOG, 2007: 21).

> ***Livable communities*** *is a design concept that seeks to: promote compact development, human-scale, pedestrian-friendly communities; provide varied housing, shopping, recreation, transportation and employment choices; encourage integrated mixed-use development; preserve, restore, revitalize and refill urban centers; give people the option of walking, biking and using public transit, in addition to driving; provide well-defined public places; create a neighborhood identity; protect environmental resources; and conserve open space, farms and wildlife habitat* (DRCOG, 2007: 21).

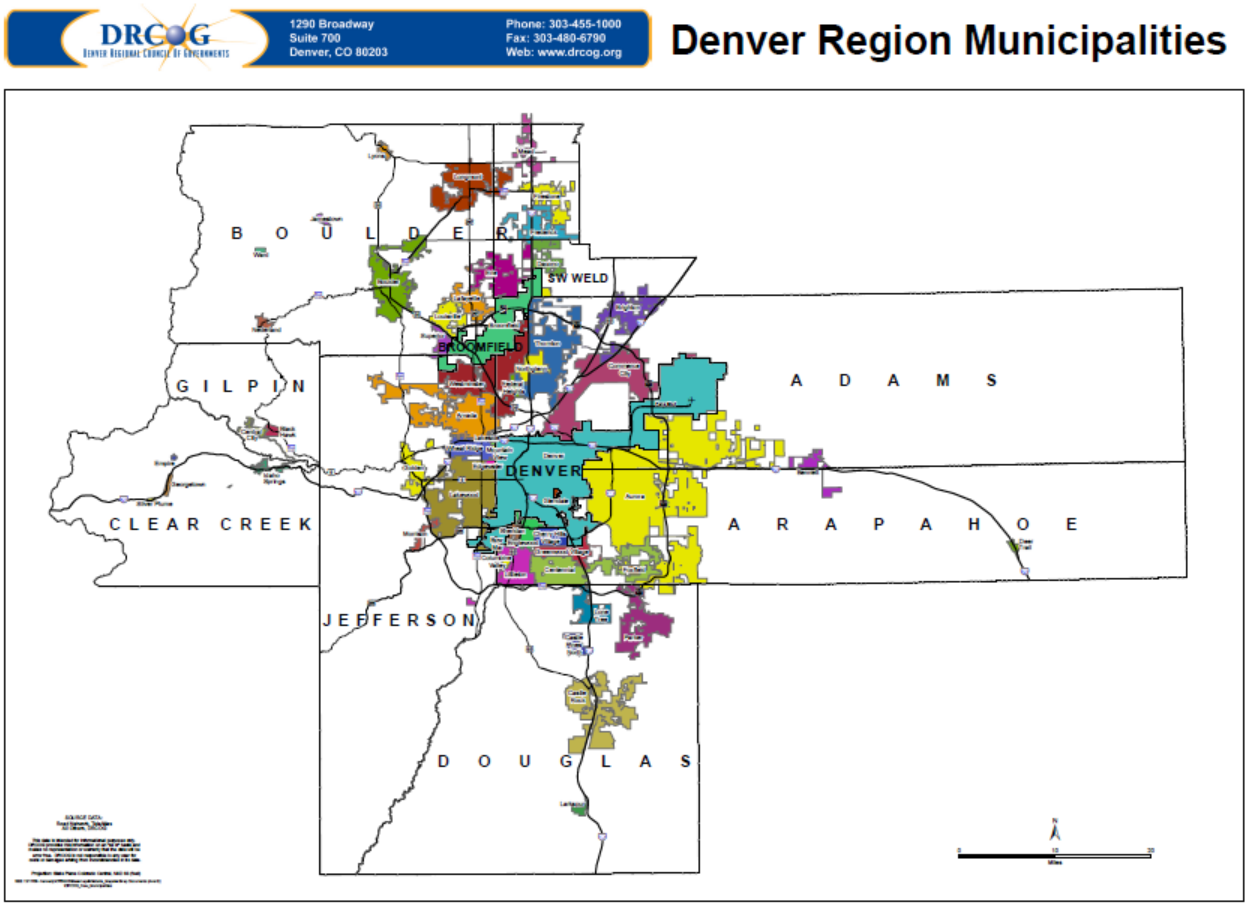
Denver Regional Council of Governments (DRCOG) representing 51 municipalities and counties, shown in Figure 4.4 below, has taken the lead on regional planning. In its most recent plan, Metro Vision 2035 embraces the concepts of ***sustainable development*** and ***livable communities***. Through a combination of sustainable land use strategies the metro area is expected to become 10% more dense, thereby decreasing lot sizes and residential landscaping.

In addition to the land use policies, for the first time DRCOG includes a water supply policy:

Metro Vision calls for urban development only in areas where long-term water service can be established or where adequate service is available from an existing water supply system. Conservation of water resources through innovative design, reuse, landscaping and education will be encouraged and considered in making service provision decisions. Water conservation measures will be incorporated in specific service plans. Overall, the regional increase in water consumption should be proportionally less than the population increase. (DRCOG, 2007: 14).

DRCOG's expectations are backed by the 2009 California Water Plan Update, which has calculated water savings from densification. "As a rule of thumb, landscaping irrigation accounts for almost half of residential water use. An increase in residential density from 4 units per acre to 5 reduces the landscaping area by 20%, which should cut water usage by roughly 10% compared to the lower density development" (California Department of Water Resources, 2009).

Figure 4.4. Municipalities of the Denver Regional Council of Governments.



Source: Denver Regional Council of Governments, Map Gallery, http://www.drcog.org/index.cfm?page=Maps

Relevant Survey Results: Although there are multiple Colorado examples listed above, survey respondents only identified two regional planning examples, one of which was reported as a success in terms of saving water. Both regional structures were described as land use planning projects with an interest in managing sprawl and the extension of municipal services. The Carbondale and Aspen partnership to plan for density within the communities and avoid sprawl between them was seen as a success in terms of decreasing water and energy demand.

Case Study 10: Denver Regional Council of Governments (DRCOG)

Denver Regional Council of Governments (DRCOG) representing 51 municipalities and counties has taken the lead on regional planning.

Metro Vision 2020, adopted in 1997, and now its update Metro Vision 2035, adopted in 2007, is a long-range plan to manage growth within the Denver region. The plan outlines long-term goals in three areas: growth and development, transportation, and the environment. It establishes an urban growth boundary and provides direction on how local governments can coordinate their efforts while respecting local plans. Key plan elements are:

- Limit the extent of urban development in 2035 to 921 square miles;
- Encourage development in higher density, mixed-use, transit- and pedestrian-oriented urban centers;
- Create senior-friendly communities through development patterns and community design features that meet the needs of elderly residents;
- Limit the amount of low density, large lot (semi-urban) development in 2035 to 3% of all households in the region, the same as it is today;
- Maintain Boulder, Brighton, Castle Rock and Longmont as distinct and self-sufficient freestanding communities, separate from the larger urban area;
- Recognize and support the role of rural town centers in providing services beyond the urban area. (DRCOG, 2007)

In 2000, the legally-binding Mile High Compact, an Intergovernmental Agreement between five counties and 25 municipalities, was signed. This voluntarily initiated agreement was the first of its kind in the United States. The signatories are bound to:

- Adopt a comprehensive land use plan that includes a common set of elements;
- Use growth management tools such as zoning regulations, urban growth boundaries, and development codes;
- Link their comprehensive plans to Metro Vision 2020, which outlines regional growth management; and
- Work collaboratively to guide growth and ensure planning consistency (DRCOG, 2005, p.79)

The Lincoln Institute of Land Policy credits, in part, the Metro Vision 2020 plan as one reason Colorado ranked high on indicators of smart growth despite not having a statewide smart growth policy. Other factors that facilitated Colorado's higher performance are attributed to relatively strong local regulations that allow local governments to pursue extensive growth management programs (Ingram & Hong, 2009).

Green Programs

Description: Green programs have been implemented at the state wide level, such as in California, as well as at the municipal and county level throughout the country. They vary in their audience (residential, commercial, and industrial) and strategies but have in common a goal of decreasing water usage through changing technology, external environments, and human behavior. Many conservation programs have chosen to focus on reducing outdoor water use. For example, ordinances can require such things as sidewalk and street designs minimize impervious surfaces, incorporation of swales and other designs to convey runoff, and incorporating tree cover to reduce runoff (AWARE Colorado, 2007). These types of site design requirements typically focus on water quality, not quantity; however, some municipalities use ordinances as part of their water demand management strategies during droughts.

Some jurisdictions have in place mandatory requirements related to water-efficient technology and other green practices on new or existing developments, sometimes at the state level, as in California, or at the municipal or county level (Scattone et al., 2001). For example, Colorado's SB05-100 prohibits restrictive covenants that limit xeriscaping. Boulder and Clark Counties in Nevada limit turf in new developments, depending on current drought status. Cities of Lafayette and Erie, Colorado, developed a model landscaping ordinance and manual, *Water-Efficient Landscape Design* and *WaterWise Landscaping Best Practices Manual,* to assist local communities along the Front Range in their efforts to encourage the use of drought-tolerant landscaping. Respondents to the Colorado survey highlighted the landscape requirements and programs in Phoenix and Tucson, Arizona as models. Other states have created incentive programs for local governments, encouraging them to adopt ordinances requiring landscaping in new developments to conserve water, protect the environment, and be drought tolerant (Florida Revised Statutes 373.185(2)).

Green programs often use the same practices for new development and renovation (see Table 1.1 and Figure 1.1). For the purposes of this report, the retrofitting of existing infrastructure falls solely under "conservation strategies." States and utilities run consumer campaigns offering rebates to residents and businesses who implement new technologies that decrease their water use, such as toilets, showerheads, residential and commercial washers, cooling tower conductivity controllers, circulation systems, smart irrigation controllers, drip systems, sprinkler heads, pool covers, and rain sensors. Other states have provided incentives for residential users to replace turf and improve irrigation, including rebates per square foot of new turf that range from $0.40 to $1.00 and in some cases and up to $350 in reimbursement for irrigation hardware (Addink, 2005; City of Santa Rosa Utilities Department, n.d.). In the Santa Rosa, California program, participants were required to agree to pre- and post-inspections of their irrigation changes (City of Santa Rosa Utilities Department, n.d.).

LEED standards, designed by the U.S. Green Building Council (USGBC), are another approach to green programs that provide third party verification that a building or community was designed using green building principles. The rating system awards points for achieving specified green measures, including water efficiency measures such as rainwater harvesting systems, graywater reuse systems, and use of high efficiency measures in landscape irrigation systems and indoor water use. Standards have been developed for various types of new and existing buildings, including homes, schools, retail constructions, and healthcare facilities (U.S. Green Building Council (USGBC), 2009). In 2007, the state of Colorado enacted a High Performance Certification Program that requires state-funded new construction and major renovations be built to the LEED Gold standard (State of Colorado, 2007). Water savings in green buildings can be as high as 40% with an average water volume reduction in commercial buildings of 23% (Kats, 2003). While building green costs more (approximately a 2% premium), the financial benefit in terms of reduced energy, water, and waste, lower operations and maintenance costs, and greater occupant productivity and health is over ten times the initial investment in the first 20 years (Kats, 2003). Energy savings alone pay for the increased costs of building green (Kats, 2003). Today, the market demand for LEED certified buildings – residential and commercial – is growing rapidly. Green is paying its way with increased rents and occupancy rates in LEED certified buildings compared to non-LEED buildings (Miller, Spivey & Florance, 2008).

One shortcoming of these standards is that they focus more on individual buildings and award relatively few points for site design and selection. To address this, the U.S. Green Building Council in partnership with the Congress for New Urbanism and the Natural Resources Defense Council has a new rating system for neighborhood development. This neighborhood focus takes into account local and regional considerations and encourages multi-use developments, denser neighborhoods, and other characteristics of smart growth (Congress for New Urbanism et al., 2009). In terms of water considerations, the LEED Neighborhood Development (LEED-ND) rating system provides up to 11 points for best practices such as proximity to existing water infrastructure, avoidance of floodplains, and

conservation of wetlands.[32] The LEED 2009 for Neighborhood Development Project Scorecard is reproduced in Appendix J.

Launched in 2006, the Environmental Protection Agency's WaterSense™ program promotes water conservation through water-efficient products, programs, and practices. Educational efforts teach consumers how to save water on a daily basis and why it makes sense (and cents) to do it (see WaterSense™ Education below). The WaterSense™ logo enables consumers to identify products that are at least 20% more water efficient than average similar products. In August 2008, WaterSense™ created *New Home Specifications* for plumbing fixtures, hot water systems, and irrigation systems. According to the EPA, the average WaterSense™ home will save 10,000 gallons of water per year. Aspen Homes of Colorado in Windsor, Colorado was one of the first builders in the country to commit to the program. A Colorado firm, EnergyLogic, provides training to become a certified WaterSense™ rater. Examples of Colorado communities that are working towards LEED-ND certification include the Washington Village Cohousing Project in Boulder (http://www.washington-village.com/) and the Geos development in Arvada (http://www.discovergeos.com/index.php), which is also aiming to be WaterSense™ certified.

Local green building standards and ordinances incorporate LEED-type building standards along with site design standards, including outdoor landscaping. The Town of Carbondale, Colorado adopted the *Efficient Building Program* in 2007, which includes xeriscaping and drip irrigation standards and requires that new homeowners receive an education packet about low water plants. Eagle County, Colorado implemented *ECO-Green Building* regulations that limit irrigated turf to 25% or less of lot area or 1000 square feet, whichever is smaller. It also sets out standards for xeriscape-rated plants and the installation of drip irrigation. Although Colorado does not regulate use of LEED standards, the voluntary program has been very successful in this state. As of 2007, Colorado was 5th in the nation in terms of total number of LEED buildings, and Denver was 7th in the nation among metropolitan areas (Miller, Spivey, & Florance, 2008). While the rankings are impressive, it is also important to remember that Colorado's LEED certified buildings constitute only 8% of its stock. However, LEED may underestimate the current state of residential and commercial property; many Colorado developments have voluntarily embraced the new urbanism designs that include high density, xeriscaping, and other elements that are related to decreased water usage.

[32] To be LEED certified, the building or neighborhood must meet a specified water reduction perquisite standard. In both LEED new construction and major renovation standards and LEED Neighborhood Design standards approximately 10% of the LEED points are aimed at additional water efficiencies.

Case Study 11: WaterSense™ Education

WaterSense™ Education

Fix That Leak!

Challenge: Leaky faucets that drip at the rate of one drip per second can waste more than 3,000 gallons of water each year.
Solution: If you're unsure whether you have a leak, read your water meter before and after a two-hour period when no water is being used. If the meter does not read exactly the same, you probably have a leak.

Challenge: A leaky toilet can waste about 200 gallons of water every day.
Solution: To tell if your toilet has a leak, place a drop of food coloring in the tank; if the color shows in the bowl without flushing, you have a leak.

Shower Power

Challenge: A full bath tub requires about 70 gallons of water, while taking a five-minute shower uses 10 to 25 gallons.
Solution: If you take a bath, stopper the drain immediately and adjust the temperature as you fill the tub.

Turn It Off!

Challenge: The average bathroom faucet flows at a rate of two gallons per minute.
Solution: Turning off the tap while brushing your teeth in the morning and at bedtime can save up to 8 gallons of water per day, which equals 240 gallons a month!

Water Wisely

Challenge: The typical single-family suburban household uses at least 30% of their water outdoors for irrigation. Some experts estimate that more than 50% of landscape water use goes to waste due to evaporation or runoff caused by overwatering.
Solution: Drip irrigation systems use between 20 to 50% less water than conventional in-ground sprinkler systems. They are also much more efficient than conventional sprinklers because no water is lost to wind, runoff, and evaporation. If your in-ground system uses 100,000 gallons annually, you could potentially save more than 200,000 gallons over the lifetime of drip irrigation should you choose to install it. That adds up to savings of at least $1,150!

Make It a Full Load

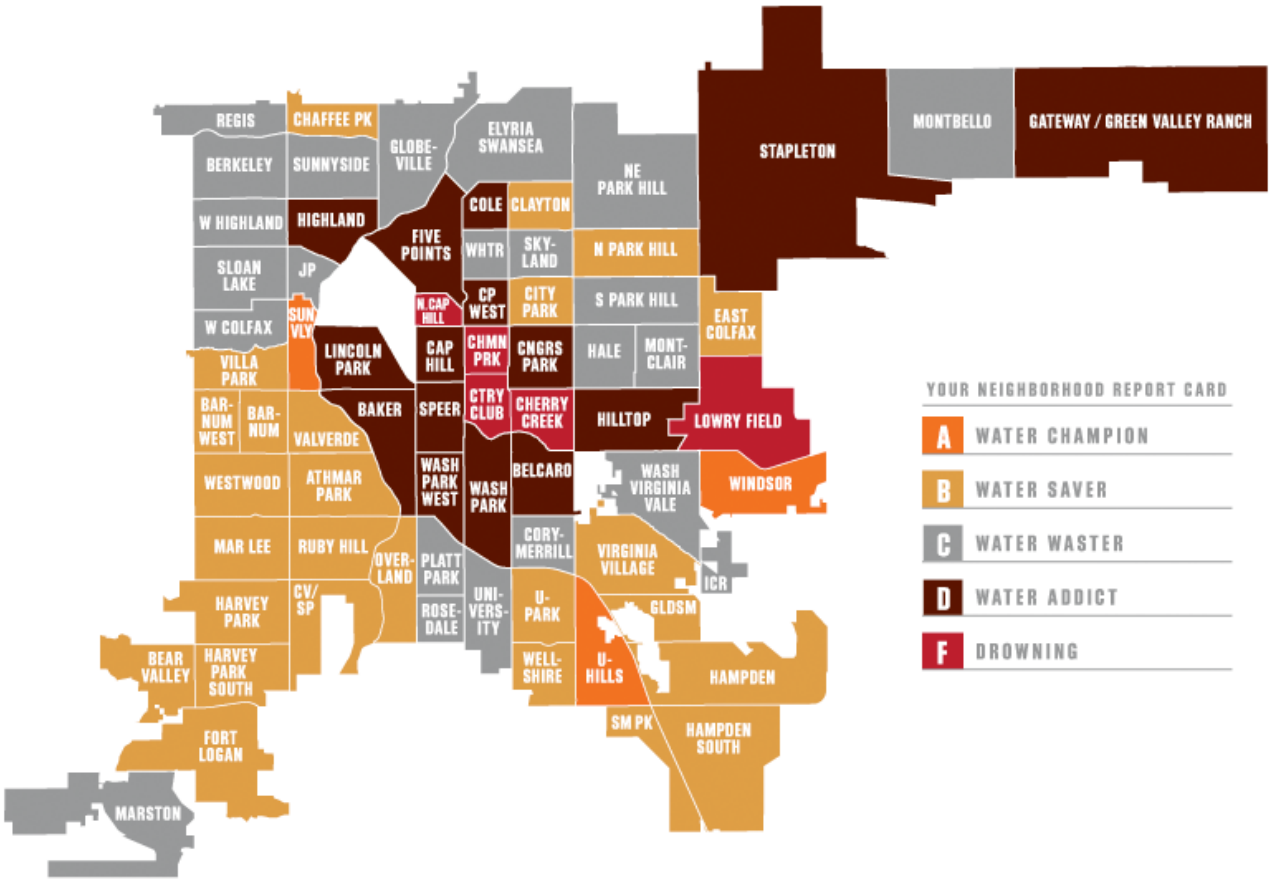
Challenge: The average washing machine uses about 41 gallons of water per load.
Solution: High-efficiency washing machines use less than 28 gallons of water per load. To achieve even greater savings, wash only full loads of laundry or use the appropriate load size selection on the washing machine.

Reproduced from WaterSense http://www.epa.gov/watersense/water_efficiency/what_you_can_do.html

Outcomes: Xeriscape programs have been found to decrease total water usage but are one of the more expensive changes to undertake per acre foot of water savings (Addink, 2005). Other conservation strategies in new development have less evaluation findings to support them, largely due a lack of research. Most outcomes research that looks at green programs has focused on rebate programs, which are less relevant to new development efforts but do tend to be successful at decreasing water usage. The findings that suggest rebate programs can decrease water usage point toward requiring or incentivizing any development, new or old, to use technology and landscape choices that require less water has the potential for successful decrease in water usage. Benefits from retrofit and new development programs that utilize low-flow technology vary in their success by the type of technology being used. The outcomes for replacing showerheads have been less promising (with some studies showing no change in water consumption), while the outcomes for low-flow toilets have ranged from no significant effect to a 20% reduction in water usage (Olmstead & Stavins, 2008). In a California study, adoption of drip systems and sprinkler heads, two types of water-efficient irrigation technology, reduced average total water usage in low density households by 31% and high density households by 10% (Renwick & Archibald, 1998). This suggests that when rebate resources are limited, policies should target those consumers with the characteristics most likely to result in significant decreases in water usage (Renwick & Archibald, 1998). A California study of many different strategies simultaneously undertaken to decrease water usage found retrofit subsidies to contribute to a 9% decrease in water demand (Renwick & Green, 2000). In El Paso, Texas a turf grass rebate program resulted in annual water savings of 18 gallons per sq. foot of turf removed, and a New Mexico study found that turf replacement saved on average 19 gallons per square foot. However, 17% of the New Mexico households actually used more water after planting drought-tolerant plants because people did not allow their landscape to go dormant in the summer, which required the application of more water than needed for the so-called “high water-use” vegetation (Addink, 2005).

Interestingly, the National Xeriscape Council points out that the human factors of water management and landscape design are more important than the vegetation planted. Efficient irrigation alone can immediately lower water usage by as much as 50% (Addink, 2005). A recent analysis of water usage by neighborhoods is a case in point. Two new Denver neighborhoods – Stapleton and Lowry – designed with new urbanism principles in mind appear to be “water addicts.” All Stapleton residences and commercial buildings are xeriscaped with drip irrigation; yet, per square foot of landscaped area, are using more water than some older neighborhoods covered in bluegrass (see Figure 4.5 below). Overall water usage may still be less in Stapleton and Lowry because of smaller yards, but any additional potential savings that could be achieved with xeriscape plants and sprinkler systems are not being met. Alternatively, the high water usage may reflect the large open spaces -- especially prevalent in Stapleton where 30% of the acreage is devoted to wetlands, parks, and green spaces – that are being irrigated by Denver Water’s recaptured recycling system (see Case Study 4).

Figure 4.5. Water use of lawns in Denver neighborhoods.



Source: Nathan, H. (2009, June 2). Denver Water reveals neighborhood 'waster' ratings. *CBS Television Stations, Inc.*

Combining seasonally-appropriate water-wise irrigation with smart landscape design of xeriscape vegetation can produce significant water savings but only if the appropriate amount of water is applied. A comprehensive approach to change human behavior is necessary. Concerted education efforts aimed at homeowners and businesses along with water audit programs and financial incentives to conserve water, e.g., increasing block rate structures, are necessary. Ideally, indoor and outdoor water meters would be installed so that residents could better monitor water usage. Specific educational programs and incentives aimed at landscape designers and sprinkler companies to create and maintain water efficient landscaping are also needed.

Barriers to Adoption and Implementation: Green programs with mandatory components can be difficult to enforce. Policies defining how water is used outdoors are more likely to be enforceable for the simple reason that they are visible. For example, requirements that new developments have low-flow showerheads may not achieve desired results when consumers move in and change the showerheads to the ones they desire (Olmstead & Stavins, 2009). Additionally, while technology changes can decrease the water consumption, behavior changes can offset those decreases. For example, residents with low-flow showerheads may take longer showers. Referred to as the "rebound effect," this problem has

been seen with improvements in shower-heads, toilets, and washers (Olmstead & Stavins, 2008). Individualized water budgets with inclining block rates can provide incentives to take advantage of the low flow fixtures.

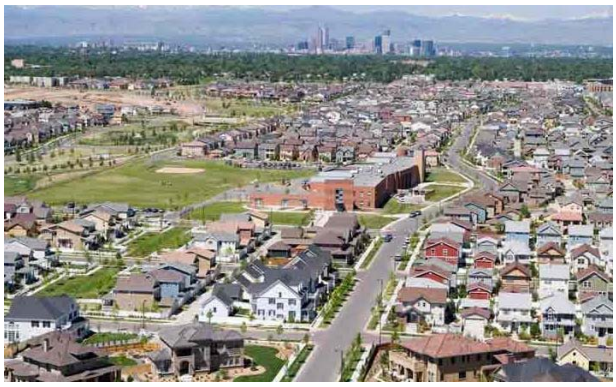
Additionally, stakeholders in the Rio Grande Basin in New Mexico and Texas indicated that barriers to implementing green programs also include the financial concerns, both to governments offering rebate programs or other incentives and to consumers who are mandated to implement drought-tolerant landscaping (Silvy, Kaiser, & Lesikar, 2005).

From the survey results from Colorado stakeholders conducted as part of this report, another barrier appears to be the lack of recognition of a water shortage. Five respondents described examples of local policies that knowingly increase the use of water, through requirements on landscaping that will "beautify" the city at the cost of water efficiency. Respondents noted that these cities currently have sufficient water rights to meet their growth expectations.

Relevant Survey Results: Twenty-nine (30%) of the ninety five strategies mentioned by survey respondents fell into the category of green programs, more than any other category. Seven were reported as successful at decreasing water usage, while seven were not. Among those that were not, many respondents noted that the lack of a mandate may be part of the reason. Fifteen of the survey respondents mentioning green programs were uncertain of their success. Respondents largely mentioned landscaping restrictions, varying from limiting the total square footage of turf to requiring xeriscaping for some or all of the landscape. Other green programs mentioned by respondents included restrictions on watering during high demand periods, zoning codes that define water usage levels, rebates for soil replacement, indoor efficiency requirements on new developments, and general requirements on developers to implement a wide range of green measures.

Case Study 12: Stapleton Redevelopment

Stapleton International Airport, decommissioned in 1995, has literally recycled all its 200,000 tons of asphalt runways into one of the largest urban infill projects in the nation. With 4700 acres, at build out it will have 8,000 single family homes, 4,000 rental homes, 10 million square feet of commercial space, and 3 million square feet of retail. Thirty percent of Stapleton's acreage is dedicated to open and green space, including the reclamation of wetlands that provide natural water filtration systems and wildlife habitat. All parks and open space are irrigated through Denver Water's recycled water program.



Stapleton is a registered LEED for Neighborhood Development pilot site (USGBC, 2009). Homebuilders participate in the ENERGY STAR program and all office buildings meet LEED Green Building Standards. Water management is a top priority and includes xeriscaped yards with drip irrigation and water reclamation. Forest City Stapleton, the master developer, has adopted water quality Best Management Practices to control erosion and lessen urban pollutants. Homes are situated on compact lots, some as small as 3,600 square feet, which requires less landscaping. Watered correctly, residents could expect to have a 40% reduction in water use.

Stapleton is already the winner of numerous sustainability awards including the EPA Environmental Achievement Award, The Urban Land Institute's 2006 Awards for Excellence, and the 2005 DRCOG Metro Vision Award.

Sources: Forest City Stapleton, Inc. (2004). Stapleton Sustainability Master Plan; and Forest City (2008). *Sustainability.* http://about.stapletondenver.com/about/sustainability

Education

Description: Education strategies have two audiences: the general public and the implementers of water and land use policies. Education is critical to build awareness and support for water wise living, water smart land use planning, and subsequently to successfully carryout the water demand management practices. Xeriscaping that is watered at the same rate as bluegrass – due to a lack of knowledge about caring for drought tolerant landscapes – provides zero water conservation. Automatic sprinkler and drip irrigation systems that are not set and maintained properly can waste significant amounts of water. Education is one conservation tool that can help green and or compact developments reach their water saving capacity.

Education to implementers focused on disseminating best management practices to municipal, industrial, and agricultural water users and emphasizing the role of regional and local stakeholders in adapting their implementation to address water supply and quality issues (Texas Water Development Board, 2005). Some researchers have argued that states need to play a greater role in guiding local practice, through assistance and/or requirements that align with federal requirements (Tarlock & Lucero, 2002), and education programs are one strategy to do this. Colorado's Division of Local Government *Office of Smart Growth and Sustainable Communities Initiative* is an example of state education resources for local officials, with website resources that include a model water-efficient landscape design ordinance and companion best practices manual, examples of local governments in Colorado using green building programs, checklists from various green building approaches, and even price comparisons for different green building programs inside and outside of Colorado. The model land use codes on the website include an example of language requiring developers to demonstrate a 300 year guaranteed water supply, similar to El Paso County's policy, and provides detail on how to determine adequacy. The Office explains their purpose as specifically educational, "Our intent is NOT to tell local governments how to plan, but to reduce your time spent researching so you can get right to tailoring the good and tested work of others to meet your community's circumstances" (Colorado Department of Local Affairs, 2009).

For the general public, education strategies have included such things as examples of xeriscaping in gardens throughout the city; TV, radio, print advertisements and other forms of social marketing; and partnerships with restaurants to only serve water when requested (Southern Nevada Water Authority, 2009). Some local jurisdictions mail all single-family homeowners calendars that have conservation tips, landscape and water restrictions, and examples of smart-landscapes (Southern Nevada Water Authority, 2009). Some public education campaigns have emerged at the statewide level, such as Pennsylvania's dissemination of guides that provide targeted information on outdoor water reduction strategies specific to the type of user receiving the guide, including golf courses, commercial buildings, public schools and colleges, and public water suppliers (Scattone et al., 2001). In Colorado, Denver's "Use Only What You Need" campaign is an example of a public education effort intended to decrease individual and household use of water. Children's water festivals are both fun and can help instill a water conservation ethic in the next generation (See Case Study 14 below and Appendix F for steps to organizing a Children's Water Festival)

While government agencies are sometimes the ones disseminating the education materials to the public and implementers, there are many examples of non-government entities, such as the University of Connecticut's resources for local officials, or the Colorado Foundation for Water Education's resources for the public and professionals (AWARE Colorado, 2007; Colorado Foundation for Water Education, n.d).

Case Study 13: Denver Water "Use Only What You Need"

Denver Water's conservation campaign is clever and successful. Features include eye-catching orange and white billboards as shown above. The campaign, developed by Sukle Advertising & Design, evolves every year and has included:

- An interactive web site where free wise-water-themed items are available for Denver Water customers to wear and share. A downloadable desktop weather alert widget, sprinkler programming suggestions, and monthly water conservation tips are available at http://www.denverwater.org/Conservation/TipsTools/
- Funny video featuring drunken flowers that are suffering from too much water to drink. The spot was distributed virally and run on YouTube and other web video sites. See http://www.sukle.com/DW_final02_web400.mov
- Decals for elevators in office buildings and public areas. Applied on the outside of elevator doors, the decals look like shower curtains with the message "Shower with Friends…Use Only What You Need"
- Free yard signs with the campaign slogan. Customers can get a sign by calling Denver Water or visiting http://www.useonlywhatyouneed.org/

Evaluations have found the campaign reduced water use by 20%, increased public trust by 10%, and cut in half the number of negative opinions held about Denver Water.

Source: Foust, J. (2007, July 24). Denver water campaign delivers clever new twists. *Yourhub.com.* http://denver.yourhub.com/Denver/Stories/Archive/About-Town/Story~338461.aspx; Water Education Task Force (2009, April 15). Meeting Agenda notes.

Outcomes: Studies of public education campaigns have shown some success. A California study of many different strategies simultaneously undertaken to decrease water usage found public education campaigns were responsible for 8% of the water demand reductions (Renwick & Green, 2000). Studies of xeriscape programs provide evidence in favor of public education campaigns, as the research indicates that water savings are resulting from emphasis on and education regarding proper irrigation, not just switching out plants (Addink, 2005). A meta-analysis across many types of public education campaigns concluded that there is evidence to suggest that campaigns can decrease water usage by as much as 25% in the short-term, particularly in response to crisis, but long-term behavior change in response to public education materials is still unknown (Syme, Nancarrow, & Seligman, 2000). It may also be important to provide information back to consumers about whether their behavior changes are resulting in aggregate improvements. A study of resident perceptions of water conservation policies found they wanted more education, specifically on the outcomes of the policies (Atwood, Kreutzwiser, & de Loe, 2007).

Case Study 14: Children's Water Festival

Annual Children's Water Festival in Grand Valley

The Festival was started 16 years ago by Ute Water Conservancy District to educate fifth graders to all facets of water: conservation, protection, pollution control, provision and treatment. Now Ute Water, the City of Grand Junction, and Clifton Water sponsor the annual Festival that draws 2,000 students to Mesa State College. The second largest water festival in the state, it is entirely run by volunteers from agencies, businesses, service clubs and private parties.

The two day event is packed full of hands-on classes. 2009 Festival included the following water conservation education:

Every Drop Counts: *How much water do we have on our Planet? How much of that water is usable? How much water does it take to make a hamburger? Learn how YOU can be water smart and help conserve Colorado's water!*

Balancing Act: *It's a race against waste as students scurry with cups of water to evaluate how they will manage water conservation for the future.*

Conservation in the Grand Valley: *A display board shows students the many difference ways the Grand Valley benefits from conservation efforts.*

Source: Ute Water Conservancy District, www.utewater.org/festival.html

Public education programs are an important component of a broader strategy for a variety of reasons. Even if the focus is on conservation efforts in new development, without changing attitudes, beliefs, and knowledge, the new residents of the development are likely to revert to previous landscaping and other water use practices. As noted by Colorado survey respondents, some of the green programs in Colorado that have required developers to use xeriscaping and limit turf are undermined in the long-run by the residents who remove these features or continue to water at the same level as their prior yard may have required. Education bolstered by incentives such as water budgets with inclining block rate structures can be a powerful reminder for customers to implement best practice conservation techniques.

Barriers to Adoption and Implementation: Public education campaigns do not face many of the barriers of other strategies and policy changes. They are not mandatory nor do they increase costs to residents. They do not require changes in decision-making venues or decision-makers, as the regional models and some approaches to comprehensive planning can do. In fact, in a survey of decision-makers in Texas and New Mexico on the Rio Grande Basin, encouraging drought-resistant landscapes and public education campaigns were the two more desirable and feasible strategies out of a list of fifteen (Silvy, Kaiser, & Lesikar, 2005).

While there are few or no political barriers to education, many small to mid-sized utilities have limited staff sizes, and sometimes no one is fully dedicated to conservation and other demand management practices. Budgets for these activities can be restricted, with many utilities relying on conservation messages included in brochures sent out with water bills. It is therefore unclear who would conduct the necessary education or marketing campaign. However, according to the survey results of the Water Education Task Force, there are many local groups who could provide this service if partnerships were developed.

Relevant Survey Results: Among the survey participants, educating the public and officials was seen as a necessary step to move toward the integration of land use and water planning. In response to a question on barriers to implementing water planning strategies in land use, some respondents reported that politicians need more education on the issues, while others argued for education of water providers, land use managers, or both. Finally, respondents asked for public education or described problems that could be partially alleviated through increased education, such as residents' preference for water intensive landscaping:

> *"Our urban dwellers tend to have a 'blue grass' lawn cultural heritage."*

Many of the barriers mentioned by survey respondents directly or indirectly related to the public's willingness to participate in water conservation, particularly in terms of their willingness to purchase new homes with conservation measures included. The impact on decision-makers of real or perceived expectations from the public can drive development, suggesting the value of marketing campaigns to change public opinion.

> *"Public fear (from lack of education) about development that looks different from expectations that were set for the appearance of communities decades ago is also a*

powerful barrier for decision-makers and planners looking to support an alternative model."

While respondents noted that a lack of education on these issues is holding Colorado back, only two survey respondents identified specific education campaigns to reduce water usage. One was a component of a watershed plan that educates the public about protecting flows and water quality. The other was a manual on enhancing groundwater recharge. Both were new efforts and therefore their success is unknown.

Overarching Barriers Identified by Survey Respondents

When asked about barriers to implementing land use strategies to reduce water demand, the vast majority of survey respondents described barriers, but did not suggest that the use of integrated planning was fundamentally problematic. The barriers fell into three primary categories: legal, economic, and political.

Legal Barriers: The legal barriers most often mentioned by survey respondents fell into two categories: the impact of the "use it or lose it" doctrine in current water law and the expectations and power of individual property rights. In total, 21 of the barriers mentioned by survey respondents fell into these two categories. However, other legal barriers were also mentioned repeatedly, including:

- The existence of many current land use policies that unintentionally have a negative impact on water conservation;
- The lack of authority or responsibility to address water demand among those with authority and responsibility to address land use issues; and
- Overlapping and neighboring political jurisdictions have separate and not complimentary policies.

"A key barrier exists in the jurisdictional distinctions between various governmental entities which do not benefit the entire community for the long term, as each entity has varying priorities and resources."

Economic Barriers: The most frequently cited economic barrier was the economic disincentive for local jurisdictions to manage and direct growth. Some survey respondents reported that jurisdictions have a perception that policies that risk making developments less aesthetically pleasing and policies that increase costs to developers will result in developers relocating proposed developments to other jurisdictions. Policies that explicitly limit growth are even more problematic.

"If a policy to reduce water demand will limit development, then it is difficult to get that policy approved, especially in this economic climate."

One survey respondent pointed out that cities and developers can also benefit from policies intended to decrease water usage, such as high density developments are a benefit to everyone.

"Local government officials see increased density as more tax dollars for the budget… let the developers have as much density as they want to make for money from the development."

Other economic disincentives include:

- The current belief by the public that water is, and should be, cheap;
- The cost of changing practices to political jurisdictions, developers, and residents;
- The lack of money for political jurisdictions to implement financial incentive programs to change behavior and technology; and
- The perception that due to economic power, developers and others with economic interest in land use policies are driving policies and have little incentive to drive them toward integration of water and land use planning.

"Support for encouraging planning decisions based on water availability will meet strong opposition from economic interests who profit from giving customers what they want rather then what a community can sustain."

Political Barriers: Political barriers were among the most frequently mentioned, with almost 25% of all barriers mentioned included reference to political barriers. However, most respondents did not go into any detail on the nature of the political barriers, rather provided something like this respondent's comment:

"There is little political and community will to systemically change the way we do things."

Where respondents did provide more detail, their political concerns were tied into the economic and legal issues explored above. In essence, these respondents were reporting that the economic and legal barriers cannot be overcome without political will, something that they perceive is currently lacking at both the state and local level.

Other Barriers: Survey respondents also mentioned the need for better information, both in terms of the technical quality of water assessment and other data provided to decision-makers, but also the need for more information overall. Respondents indicated that water experts, land use experts, politicians, and other decision-makers need education and information to understand why this is an important issue and how to address it.

Survey respondents also identified many barriers that can be best described as cultural or social barriers – the perceptions and expectations of the public. Nine respondents reported that the public has expectations about the aesthetics of their lawns that cannot be met with xeriscaped landscapes. The challenge of undertaking behavioral change was also noted repeatedly, change for the public and change for the decision-makers: "it is human nature to resist change and stay with the status quo."

Though there were many barriers mentioned, few respondents indicated any concern with the concept of including water planning in land use decision-making, and while the barriers identified above are significant, so too are the opportunities that respondents described (see Section 5).

Matrix of Water and Land Use Strategies

Following is a compilation of the land use and governance policies and programs discussed in the text above along with other examples that are relevant to creating integrated land use and water planning processes. The strategies are organized into eight categories and their intended outcomes:

1. Water Supply Assessment
    - Require developers to prove adequate water
    - Require city officials to determine sufficient supply
2. Water Supply Development
    - Expand storage and delivery capacity
    - Increase water supply
    - Precipitation capture
3. Rate Structures
    - Block rate pricing
    - Water restrictions
4. Comprehensive Planning
    - Water plans that include land use elements
    - Land use plans that include water management elements
5. Growth Management
    - Urban growth boundaries
    - Conservation of open space
    - Cluster development
6. Regional Structures
    - Intergovernmental Agreements (IGAs)
    - Metropolitan Regional Organizations
    - EPA regions
7. Green Programs
    - Water councils
    - Rebate/incentive programs
    - Energy/water efficiency standards
    - Site design requirements
8. Education
    - Public education
    - Education for policymaker and implementers

Local/regional, non-governmental, and state policies and programs are covered.

Table 4.2. Matrix of water and land use strategies.

Category	Type of Policy/ Strategy	Intended Outcomes	Local/Regional and Non-Governmental Action	State Action
Water Supply Assessment	Require developers to prove they have adequate water	Limit development to those where water supply is available	**El Paso County, Colorado** requires potential developers to prove a 300-year water supply (Mayo, 1990). **Jefferson County, Colorado** created the Mountain Groundwater Overlay District Provision that overrides underlying zoning districts and requires applicants for new building permits to submit proof of water supply adequacy through well yield tests and detailed water supply analysis. District boundaries are determined by elevation, which is linked to the underlying geographic structures and perceived water availability (Jefferson County Zoning Resolution, 2007). **Douglas County, Colorado** created the Water Supply Overlay District, that along with the Water Supply Zones Map, requires that new development and special districts prove that water supply is sufficient based upon geographic location and determines water demand standards based upon whether the proposal is for rural, urban, commercial, or other uses (Douglas County, 2009).	*Nine western states* have water supply laws requiring approval of new development be contingent on showing water availability (Klein & Kenney, 2009). *California, Senate Bill 2001-221*, requires developers of proposals for subdivisions of 500 units or more to prove they have water rights before they can receive final approval (McKinney, 2003).

Category	Type of Policy/ Strategy	Intended Outcomes	Local/Regional and Non-Governmental Action	State Action
Water Supply Assessment (continued)	Require city officials to determine whether there is sufficient water		An ordinance in *Frederick, Maryland* requires city officials to review every proposed development and decide whether the city can provide the necessary water. 45% of surplus water can be allocated for new residential developments, 30% for commercial, and 25% for other uses (McKinney, 2003).	**Colorado, House Bill 08-1141, r**equires a local government to determine whether an applicant for a development in excess of 50 units or single-family equivalents, or fewer as determined by the local government, has demonstrated that the proposed water supply is adequate to serve the proposed development. *California, Senate Bill 2002 – 610*, requires water supply agencies to prepare water supply assessments (WSA) that local governments must consider in deciding whether to approve proposed projects (Walston, 2009).
Water Supply Development	Expand storage and delivery capacity	Meet increasing demand (avoid shortages) due to new and growing communities Secondary objective is to avoid diverting water from agriculture	Numerous projects in Colorado, including: Southern Delivery System, Arkansas Valley Conduit, Prairie Waters Project, Halligan- Seaman Reservoir Enlargements, Moffat Collection System Project, Northern Integrated Supply Project, Windy Gap Firming, Chatfield Reservoir Storage Reallocation Project, Rueter Hess Reservoir, Stagecoach Reservoir Enlargement, and Elkhead Reservoir Enlargement Project.	Nevada, California, and Arizona pooled resources to begin constructing the 8,000 acre-foot *Drop 2 Reservoir* near the U.S.-Mexico border to store previously-unclaimed, but fully allocated Colorado River water that would otherwise inadvertently flow into Mexico (U.S. Department of the Interior Bureau of Reclamation, 2009). The *Central Arizona Project* (CAP**)**, one of the largest water supply projects in existence, is a state-operated effort that delivers more than 1 million acre-feet of water annually to three of Arizona's most populated counties (Central Arizona Project, 2009). In 2001, the **Colorado** legislature created a pilot **water banking program**. Two years later, each water district was given the power to request a water bank in its division. The purpose is to simplify transfers, reduce costs, increase information, and give farmers

Category	Type of Policy/ Strategy	Intended Outcomes	Local/Regional and Non-Governmental Action	State Action
				and ranchers the ability to lease their water rights without severing the rights from their land (Bell & Taylor, 2008, p.127)
	Increase water supply	…through water reuse	In Colorado, Aurora Water's **Prairie Waters Project** will transfer and treat recaptured wastewater from the South Platte via pipeline to increase Aurora's water supply by 20% (10,000 AF). To pay for the project, the city has amended customer bills and increased tap fees (Aurora Water, 2007). **Denver Water Recycling Program** is the largest non-potable water plant in Colorado. The 30 million gallons of effluent per day is treated and pumped back through the city's purple pipes for use by industries and public landscaping	*Oregon's Department of Environmental Quality (DEQ)* administers a statewide program to encourage and oversee reuse of graywater, recycled water (treated effluent) and industrial wastewater. The DEQ considers water reuse a key component of protecting water quality. A 2005 executive order from Oregon's governor directs the state to promote water reuse (Oregon Executive Order, 2005).
		…through acquisition of additional water rights	The **East Cherry Creek Valley Water and Sanitation District's Northern Project** involved the acquisition of 3,000 AF of South Platte River water rights that were formerly used for agricultural purposes. Numerous other members of the South Metro Water Supply Authority (SMWSA) purchased additional capacity in the pipeline, including Arapahoe County Water & Wastewater Authority, multiple water and sanitation districts, and the Town of Castle Rock (East Cherry Creek Valley Water and Sanitation District, 2008).	

Category	Type of Policy/ Strategy	Intended Outcomes	Local/Regional and Non-Governmental Action	State Action
		…through water augmentation	The **Upper Arkansas Water Conservancy District's** Water Augmentation Plan arranges for the purchase of agricultural water rights from users on Grape Creek and/or Texas Creek in order to satisfy 415 AF of augmentation obligations and increase the water supply available for development in the Upper Arkansas Valley (Upper Arkansas Water Conservancy District, 2009).	A **New Mexico** program purchases land and accompanying water rights, often diverting irrigation water from cropland to river augmentation needs in order to comply with interstate compacts.
Water Supply Development	Precipitation capture	Displace demand for treated drinking water that is used for irrigation and other outdoor uses	The *City of Tucson, Arizona* requires that all new commercial development after 2010 include rainwater capture plans to provide at least 50% of annual landscape water. Golf courses and some other commercial land uses are exempt from the 50% provision (City of Tucson, 2008). For retrofitters, *Tucson Water* publishes rainwater harvesting and gray water reuse resources, holds workshops, and helps connect homeowners with water harvesting designers and installers (Tucson Water, 2009).	**Colorado legislation: SB09-80** allows limited collection of rainwater and snowmelt, but only for residential users with a domestic well and no alternative water supply. **HB09-1129** creates up to ten precipitation pilot projects to study rainwater harvesting systems and determine capture potential within the framework of protecting existing water rights. The *Texas Water Development Board* (TWDB) publishes a manual on rainwater harvesting, including guidelines for collection, storage, and cost estimation (Texas Water Development Board, 2005). *Washington State* granted the *City of Seattle* a city-wide exemption from the permitting process required for rainwater capture, allowing residents to set up collection and storage systems (Seattle Department of Planning and Development, 2008).

Category	Type of Policy/ Strategy	Intended Outcomes	Local/Regional and Non-Governmental Action	State Action
Rate Structures	Block Rate Pricing	Reduce peak usage, reduce seasonal usage, reduce overall water demand	Inclining block rate pricing structures (also termed conservation pricing structures) are employed by a large number of western cities and water providers, in Colorado including **Denver, Parker, Boulder, Westminster** (Western Resource Advocates [WRA], 2004), and Albuquerque and Santa Fe, NM (WRA, 2006), Salt Lake City, UT (WRA, 2005), and the Irvine Ranch Water District in California (Irvine Ranch Water District, 2009). **Highlands Ranch, Colorado** sets the unit price for water through block volume thresholds that are customized specific to each water customer, based on estimates of indoor and outdoor requirements. The budget takes into account factors such as lot size and household population (Centennial Water and Sanitation District, 2005). *Las Vegas Valley Water District in Nevada* largely limits price increases to the upper threshold, with a 500% increase over 18 years for users exceeding 20,000 gallons a month (Southern Nevada Water Authority, 2009). As an alternative to block rate pricing, Albuquerque, New Mexico charges a flat $.09 per unit tax on municipal water.	The ***Colorado Water Conservation Act of 1991*** mandates water utilities with annual demands of 2,000 acre feet or more have an approved Water Conservation Plan. Among the measures that must be considered are "water rate structures and billing systems designed to encourage water use efficiency in a fiscally responsible manner." (*CRS* 37-60-126) *Georgia* mandates that public/private water systems in 24 of its coastal counties must adopt and implement a conservation orientated rate structure as a condition of new or modified withdrawal permits. The state provides a manual for developing the rate structures (Georgia Environmental Protection Division, 2007).

Category	Type of Policy/ Strategy	Intended Outcomes	Local/Regional and Non-Governmental Action	State Action
Rate Structures (continued)	Water restrictions		Some communities institute water restrictions even in non-drought years such as: **Denver Water** restricts outdoor watering between 10am – 6pm to reduce water loss due to evapo-transpiration in the heat of the day. *In Nevada, certain cities (Boulder City and Las Vegas) and counties (Clark)* permit limited turf in new developments depending on current drought status. The cities of *Henderson* and *North Las Vegas* severely restrict or prohibit turf on new properties.[33] *The Southern Nevada Water Authority* publishes mandatory watering restrictions. Restrictions are determined by watering group zone and include assigned irrigation days and times, sprinkler tips and compliance tips (Southern Nevada Water Authority, n.d.).	Very few states regulate watering or irrigation at a statewide level. Statewide watering restrictions are usually temporary, and usually part of a state's drought preparedness or emergency response efforts.
	Impact fees	Capture cost of supplying new water, incentivize development that promotes indoor and outdoor water conservation	**Westminster, Colorado** imposes a water tap fee that is structured individually and calculated for each site by use rather than size of tap alone. (City of Westminster, 2010). **Aurora, Colorado** uses differential irrigation tap fees that assess grass species $.71 per square foot and water-conserving landscaping $.36 per square foot. (City of Aurora, 2010).	State statute provides the legal authority to charge impact fees. Typically, these fees must be clearly related to the cost of providing the new service and cannot be used to finance existing system services.

[33] See Southern Nevada Water Authority, Turf Limits, http://www.snwa.com/html/drought_turflimits.html; and Clark County's *Water feature operation during drought, http://www.accessclarkcounty.com/depts/clark_county/drought/Documents/Water%20Feature%20ADR%20process%20Handout.pdf*

Category	Type of Policy/ Strategy	Intended Outcomes	Local/Regional and Non-Governmental Action	State Action
Comprehensive Planning	Water plans that include land use elements	Varies: outcomes may be intended to protect water *quantity* and/or water *quality*	*Newmarket, New Hampshire*, created an Aquifer Protection District and Wellhead Protection District ordinance requiring compliance with best management practices, open space and low-impact development, prohibiting high-risk land uses, increased minimum lot size, and reduced density (Williams, 2008).	*Arizona* requires all cities and counties to include land use elements in their water plans, primarily focused on finding new water supplies (Western Governors Association, 2008). *Oregon* requires suppliers who serve more than 1000 people to prepare long-term water supply plans, including such things as urban growth boundaries (Cohen, 2004).
	Land use plans that include water management elements	Varies: outcomes may be intended to protect water *quantity* and/or water *quality*	**Aurora, Colorado's** draft comprehensive plan includes a section on water conservation and demand management strategies (City of Aurora, 2009). **Douglas County, Colorado's** 2030 Comprehensive Master Plan and supporting zoning codes include land use and water demand elements, http://www.douglas.co.us/CMP2030/ *Hollis, New Hampshire* has a zoning ordinance based on the state's model ordinance that mandates that all permitted land uses must implement best management practices and meet specific performance standards for groundwater protection (Williams, 2008).	*Florida* requires its 11 regional planning councils to prepare land use plans that coordinate land use and regional water supply planning. Local governments are required to prepare land use plans in accordance with their regional plans (Cohen, 2004). *New Hampshire* published a model groundwater protection ordinance recommending communities address water resources in their land use master plans, and providing specific model language for ordinances (Williams, 2008).
Growth Management	Urban growth boundaries	Direct growth toward areas with existing infrastructure	**Boulder Blue Line** (Bartlett, 2000) and open space acquisitions through city sales tax have formed a permanent greenbelt boundary, containing and directing development toward existing service area. **Pueblo Urban Service Area Boundaries** is a cooperative planning effort among the City of Pueblo, Pueblo County, and Pueblo West Metro	*Oregon* has state statutes on urban growth boundaries. Boundaries are not determined by water availability. (McKinney, 2003).

Category	Type of Policy/ Strategy	Intended Outcomes	Local/Regional and Non-Governmental Action	State Action
			District. The parties agreed to adopt urban service areas and IGAs to manage and serve new growth within designated boundaries. **Metro Vision 2035** is a long-range plan to manage growth within the Denver region. The plan outlines long-term goals in three areas and establishes urban growth boundaries (DRCOG, 2005).	
	Conservation of Open Space	Protects natural spaces from being developed and prevents sprawl	As of 2007, **40 land trusts and 14 local government open space programs** collectively set aside over 2 million acres within Colorado (Colorado Coalition of Land Trusts, 2007).	The **Colorado Conservation Tax Credit** provides tax incentives to preserve agricultural lands. With funding from the lottery-funded **Great Outdoors Colorado Board** (GOCO), Colorado State University's Natural Resource Ecology Laboratory (NREL) has completed comprehensive mapping of Colorado's open spaces, including detailed information on conservation easements (Colorado State University, 2006).
	Cluster development	Concentrate buildings within a site to preserve open space (in hopes of improving water *quality*)	**Garfield, Douglas, Larimer, and Jefferson Counties in Colorado** have policies to encourage cluster developments through incentives such as exemption from other requirements or parcel bonuses (Larimer County Planning Division, 1997; GCBPD, 2000; Douglas County Community Development Department, n.d.; Jefferson County Planning and Zoning, 2005).	

Category	Type of Policy/ Strategy	Intended Outcomes	Local/Regional and Non-Governmental Action	State Action
Regional Structures	Inter-govern-mental Agreements	Coordinate planning efforts	57% of Colorado municipalities and 67% of counties have used IGAs. Examples include: • **Mesa County & Clifton Water District** IGA (May 2001) includes an agreement to develop a joint land use monitoring system to relate land uses to water demands that are created throughout the urban area. • **Boulder County** Countywide Coordinated Comprehensive Development Plan (Nov 2003) is an IGA among nine cities/towns in Boulder County and the County to plan for and regulate land uses to minimize the negative impacts of development on the surrounding areas and protect the environment. • **Ouray County and the Town of Ridgway** IGA (Aug 2002) to direct growth, not simply manage growth in the Urban Growth Management Area and to consider urban development only where the full range of urban public services can be provided in order to preserve open lands and natural areas. • **Fountain Creek Watershed District in Colorado** was established by an intergovernmental agreement signed by the counties of El Paso and Pueblo, the cities of Colorado Springs, Fountain, Manitou Springs, and Pueblo; the towns of Green Mountain Falls, Monument, and Palmer Lake; and the Lower Arkansas Water Conservancy District. The district is empowered to improve the health of the watershed.	**Colorado statutes** encourage all local governmental entities (including special districts and service authorities) to "make the most efficient and effective use of their powers and responsibilities by cooperating and contracting with" other local governmental entities through intergovernmental agreements (IGAs). IGAs provide flexibility for how local governments define and manage growth. Colorado's IGA Handbook is available at the Department of Local Affairs, *Office of Smart Growth and Sustainable Communities Initiative* http://www.dola.state.co.us/dlg/osg/docs/IGAhandbook.pdf The *State of Utah* has a longstanding affiliation with Envision Utah (EU), a public-private partnership dedicated to sustainable growth. Together the State and EU created a technical committee responsible for gathering citizen input and developing quality growth strategies that will maintain availability of water resources by means other than regulation. Strategies include preservation of open spaces, mixed-use and transit-oriented development (State of Utah Division of Water Resources, 2001).

Category	Type of Policy/ Strategy	Intended Outcomes	Local/Regional and Non-Governmental Action	State Action
			• Additional IGAs can be found at the Department of Local Affairs website, http://www.dola.state.co.us/dlg/osg/igahandbook.htm	
Regional Structures (continued)	Metropolitan Regional Organizations that create regional management areas with water and land use planning requirements	Balance the use of water with the restoration of water groundwater resources	A relatively small number of the **Councils of Governments (COGs) in Colorado** have programs and services to address water quality and quantity issues. The COGs that undertake water plans do so voluntarily, with variation in their approaches from regional management of water supply to watershed level water quality planning and management (Colorado Department of Local Affairs, 2008b). The Pikes Peak Area Council of Governments (PPACG) and the Pueblo Area of Council of Governments (PACOG) developed the Fountain Creek Watershed Plan in 2003.	*Arizona's Groundwater Management Act* that created four Active Management Areas (AMA) around the state's most populated areas. AMAs mandated to balance groundwater withdrawal and natural and artificial recharge, through water conservation requirements and incentives (McKinney, 2003). Georgia's legislative creation in 2001 of a Metropolitan North Georgia Water Planning District (MNGWPD) mandated development of a plan for water supply and conservation, with local government compliance to the plans enforced through the state Environmental Protection Division (MNGWPD, 2006).
	EPA Regions	Protect water quality under Section 208 of the Federal Clean Water Act. Protecting quality often results in conserving quantity	Local and regional entities are designated as Section 208 Water Quality Management Agencies. **Pueblo Area Council of Governments (PAGOG)**, for instance, publishes a Section 208 Water Quality Management Plan which establishes water quality policies and designates goals (Pueblo County and PACOG, 1994).	**States** are required by Section 208 to identify areas within their state that are subject to substantial water *quality* control problems.

Category	Type of Policy/ Strategy	Intended Outcomes	Local/Regional and Non-Governmental Action	State Action
	Water Councils		**Front Range Water Council** in Colorado is a coalition of trans-basin water diverters that have voluntarily formed to address water shortages of Colorado's urban Front Range. The providers include Denver Water, Northern Colorado Water Conservancy District, Colorado Springs Utilities, Aurora Water, Pueblo, and the Southeastern Water Conservancy District. **South Metro Water Supply Authority**, formed in 2004, is composed of 13 water providers that work collaboratively to foster long-term reliable water supplies for Douglas and Arapahoe Counties through water acquisitions and infrastructure development. http://www.southmetrowater.org/index.html **Pikes Peak Regional Water Authority** was established in 2007 through the adoption of an IGA with Academy Water and Sanitation District, Cherokee Metropolitan District, Donala Water and Sanitation District, Triview Metropolitan District, The Town of Monument, the Town of Palmer Lake and Woodmoor Water and Sanitation District. The purpose of the Authority is to secure adequate and reliable water supply through efficiency of use, conservation, and renewable water supplies. http://www.pprwa.com/	**Colorado Interbasin Compact Committee** is a legislatively mandated process, HB05-1177, designed to resolve issues associated with the development of water supplies within and across basins. It has no legal authority over water transactions but rather serves as a structure to help facilitate cooperation within basins and discussions across basins. There are nine water basin roundtables and one statewide committee.

Category	Type of Policy/ Strategy	Intended Outcomes	Local/Regional and Non-Governmental Action	State Action
Green Programs	Rebate/ incentive programs	Lower indoor and outdoor water consumption	Many cities/utilities in Colorado **– e.g., Aurora, Boulder, Colorado Springs, Denver, Fort Collins, Greeley, Thornton, Westminster**, offers rebates to residential and commercial water customers for low-flow toilets, high efficiency washers, irrigation system controllers, and other products (City of Greeley, n.d.). *The Southern Nevada Water Authority* offers rebates for pool covers, rain sensors, smart irrigation controllers, and other water efficient technologies (Southern Nevada Water Authority, 2008). *Santa Rosa, California,* has a toilet replacement program where the city pays all costs to replace toilets, faucets, and showerheads (City of Santa Rosa Utilities Department, n.d.).	Until the recent fiscal crisis, *California* funded a statewide program that included appliance rebates for residential and commercial washers, toilets, circulation systems, and cooling tower conductivity controllers (California Urban Water Council, 2008). The **Governor's Energy Office (GEO) in Colorado** has rebate programs for numerous household energy efficiency upgrades, including solar electric and solar hot water heaters, along with wind power projects (Colorado Governor's Energy Office, 2009). However, GEO does not have any water-specific rebate programs.

Category	Type of Policy/ Strategy	Intended Outcomes	Local/Regional and Non-Governmental Action	State Action
	Energy/water Efficiency Standards such as LEED, Energy Star, WaterSense™, etc.	Lower energy and water consumption	**Built Green Colorado** is one of the oldest and largest green home building programs in the nation. Introduced in 1995 by the Home Builders Association of Metro Denver for the purpose of encouraging home builders to use technologies, products, and practices that result in homes that are better built and better for the environment. Available on the website are check lists of Built Green Colorado standards for consumers and builders, and names of builders, suppliers and subcontractors who conform to the standards (Beckwith, 2009). www.builtgreen.org **Town of Carbondale, Colorado** Efficient Building Program, ordinance 12, series of 2007, includes Xeriscaping and drip irrigation standards and requires new homeowner education information about low water plants. See www.carbondalegov.org and go to Community Development, Planning & Zoning. **Eagle County, Colorado** ECO-Green Building regulations includes irrigated turf area limited to 25% or less of lot area or 1000 square feet, whichever is smaller, use of low-water-demand or xeriscape-rated plants, and installation of drip irrigation. Indoor water wise standards include low-flush or dual-flush toilets (1.4 GPF or less), low-flow showerheads, water efficient clothes washer	**Colorado HB07-1146** requires all jurisdictions that have a building code to adopt minimum energy code standard effective July 1, 2008. While the bill does not address water directly, lower end-use energy demand means less energy production, most of which are water intensive (e.g., coal-fired plants, nuclear plants, hydro-plants). *Arizona, California,* **Colorado,** *Nevada, and Washington* have issued directives requiring green building standards for state-funded construction and retrofitting of state-owned buildings. All new state building projects are required to achieve LEED certification or an equivalent standard (Western Governors' Association [WGA], 2007). *Arizona, California, Oregon and Washington* created statewide appliance and equipment energy standards beyond the federal standards. Many of these standards have been, or will soon be matched or surpassed by federal energy efficiency standards (WGA, 2007). *Nevada* has put in place a tax-abatement program for multi-family private dwellings that achieve LEED Silver certification or higher (WGA, 2007). **Colorado** was awarded nearly $20 million from the American Recovery and Reinvestment Act to implement energy efficiency programs throughout the state, including expansion of Renewable Energy Rebates and efficiency incentives for residential homes (WGA, 2007)

Category	Type of Policy/ Strategy	Intended Outcomes	Local/Regional and Non-Governmental Action	State Action
			and dishwasher. More model codes & ordinances can be found at DOLA, Division of Local Government, *Office of Smart Growth and Sustainable Communities Initiative* http://dola.colorado.gov/dlg/osg/modelcodes.htm	*Arizona Executive Order 2005-05* requires that new state buildings must derive 10% of their electricity from renewable sources (Arizona Executive Order 2005-05, 2005). *New Mexico's Energy Efficiency and Renewable Energy Bonding Act* pays for energy-efficient retrofitting of existing state facilities through a unique bond funding mechanism whereby utility bill savings are used to offset bond debt. New Mexico also requires that all public buildings over a certain size to be LEED Silver certified. (WGA, 2007) *Utah's Executive Order 2006-0004* set goals to increase energy efficiency 20% statewide by 2015 through simple energy-saving measures and conservation practices such as modified thermostat and appliance settings and replacement of incandescent lights. Colorado and Kansas issued similar directives (Utah Executive Order 2006-0004, 2006).

Category	Type of Policy/ Strategy	Intended Outcomes	Local/Regional and Non-Governmental Action	State Action
	Site design requirements	Preserve water *quality*/Conserve water *quantity*	In many local jurisdictions, ordinances require such things as sidewalk and street designs which minimize impervious surfaces; incorporation of swales and other designs to convey runoff; and incorporating tree cover to reduce runoff (AWARE Colorado, 2007). **Cities of Lafayette and Erie, Colorado** developed a model landscaping ordinance, *Water-Efficient Landscape Design,* and *WaterWise Landscaping Best Practices Manual* to assist local communities along the Front Range in their efforts to encourage the use of drought-tolerant landscaping. The *Office of Smart Growth and Sustainable Communities Initiative* in DOLA funded the manual through a CO Heritage Planning Grant. Ordinance and manual available at http://dola.colorado.gov/sustainability/modelcodes.htm **Metro Mayors Caucus & Colorado WaterWise Council** "Best Management Practices for Water Conservation and Stewardship" identifies eleven broad strategies for residential, commercial, and industrial users. For each set of strategies, multiple tools are discussed along with the benefits, potential barriers, and cost of implementation. The report includes additional resources and links for each of the eleven strategies. Find it at http://www.metromayors.org/Downloads/BMP%20Final%20for%20MMC%204-28.pdf	**Colorado passed Senate Bill 05-100** prohibiting restrictive covenants that limit Xeriscape from being enforced. (Does not prohibit covenants from including Xeriscape restrictions, just declares that they cannot be enforced.) **Colorado State University** Extension Horticulture office provides information on appropriate low water plants. http://www.ext.colostate.edu/pubs/garden/07228.html *Florida*'s requirements for its water management districts include developing incentive programs to encourage *local governments* to adopt ordinances requiring landscaping in new developments to conserve water, protect the environment, and be drought tolerant (Florida Revised Statutes 373.185(2)).

Category	Type of Policy/ Strategy	Intended Outcomes	Local/Regional and Non-Governmental Action	State Action
Education	Public Education		*Southern Nevada Water Authority* (SNWA) has demonstration gardens throughout the region; a water smart calendar sent to all single-family homeowners; TV, radio, and print advertisements; and agreement with restaurants to only serve water when requested (SNWA, 2009). **Northern Colorado Water Conservancy District** has conservation gardens that contain more than 700 plants and 60 turf grasses that thrive in Colorado's arid climate. http://www.ncwcd.org/ncwcd_about/gardens.asp) **Denver Water**'s education and outreach efforts include a conservation garden, teacher resource packets that contain information and activities related to water use and supply in the Denver area, Speakers Bureau that provides free presentations on a variety of water topics, and tours of a treatment plant. Denver's current public education campaign "Use Only What You Need" is visible throughout the city as art installations and yard signs. http://www.denverwater.org/ **Colorado Springs Utilities** has a Conservation and Environmental Center, which has xeriscaped gardens, displays and demonstrations on energy and water efficiency. Seasonal classes, such as "Winterize your Home and Landscape," are offered year-round. To see the Center, go to YouTube http://www.youtube.com/watch?v=ucy8tyKyvaI	*The Arizona Department of Water Resources* (ADWR), along with state agencies in New Mexico, Nevada, and several other western states have implemented the international *Project WET* (Water Education for Teachers). The project trains classroom educators and provides materials and support to expand K-12 students' knowledge of water resources (Project Wet, 2009). *Utah's Division of Water Resources* focuses on promoting water education in the state's public school system (Utah Division of Water Resources, n.d.). *California's State Water Resources Control Board* developed an educational outreach program to inform the public and gather input on water quality and pollution decisions. The program includes outreach to businesses, environmental groups, municipalities, schools, and indigenous tribes (California Environmental Protection Agency, 2008).

Category	Type of Policy/ Strategy	Intended Outcomes	Local/Regional and Non-Governmental Action	State Action
			AWARE Colorado (Addressing Water and Natural Resource Allocation) is a statewide program intended to educate local decision-makers about water and land use. **Colorado Foundation for Water Education** is a statewide non-profit, non-advocacy organization that provides water resource information and education to the public and water community. It offers professional development courses such as the Water Leaders Program; leads river basin tours to educate interested citizens, water professionals, educators, and policymakers about the intricacies of water basin and trans-basin management in Colorado; has numerous publications; posts newspaper articles on water issues relevant to Colorado; and hosts an events site on their website for organizations to announce water related events. http://www.cfwe.org/	**Colorado's Office of Water Conservation and Drought Planning** (OWCDP) promotes water conservation and drought mitigation planning throughout the state of Colorado. The OWCDP maintains a clearinghouse of information available to the public. Topics include tips for indoor & outdoor water conservation, water-wise landscaping, and general water education. It also puts on events such as children's water festivals, xeriscape workshops, demonstrations, seminars, and tours. http://cwcb.state.co.us/Conservation/PublicInfo/PublicInformationEducation.htm
	Education for Policymakers and Implementers		*Nonpoint Education for Municipal Officials* (NEMO), a program administered by the *University of Connecticut*, encourages regional, natural-resource-based planning practices and administers numerous local and statewide programs related to educating local officials about water and land use (AWARE Colorado, 2007).	The *Texas Water Development Board* (TWDB) publishes best management practices guides targeted at relevant groups (municipal, industrial, and agricultural water users) in hopes of increasing regional and local use of the practices (TWDB,2004).

Category	Type of Policy/ Strategy	Intended Outcomes	Local/Regional and Non-Governmental Action	State Action
			The Water Information Program is a public information program sponsored by the water districts, organizations, and agencies in the San Juan and Dolores watersheds of Southwestern Colorado. Its stated purpose is to provide information to the public and community on water topics and water-related issues. Most of information and activities target people in the water community and elected officials. WIP publishes a quarterly newsletter, hosts seminars for water providers, announces related events and generates a newsfeed. http://www.waterinfo.org/ **Colorado WaterWise Council**, a non-profit launched in 2000, develops and delivers broad water conservation programs and educational information to water providers, professionals, and other key stakeholders in Colorado. It supports programs such as Xeriscape Colorado, Metro Mayors Caucus Water Conservation Best Management Practices, Colorado State University's Water Conservation Trainings for Professionals, YARDX studies with the Bureau of Reclamation, and partners with many water conservation agencies including the Colorado Water Conservation Board. http://coloradowaterwise.org/	

Section 5. Colorado Opportunities

As the legal analysis demonstrates, much of the authority in Colorado surrounding land and water planning exists either at the local level or could occur at the regional level through existing planning bodies. However, the discussion of strategies includes many approaches that can be adopted and implemented at the state level or a combination of state, regional, and/or local levels. Throughout the Western States, there are many examples of policies that mandate, create incentives for, provide resources to, or otherwise drive integrated water and land planning. An important question for Colorado state government and local stakeholders to explore together is the extent to which state government can or should participate in policymaking and implementation to further integrate water and land use planning beyond the programs already being implemented.

The Colorado Survey explored this issue in depth, asking respondents for their levels of support for mechanisms that have potential for a regional level impact, as well as explicitly asking for their opinion on how the state should be involved in water and land use integration. The section to follow highlights these survey results, gives examples of policy changes suggested by respondents, and ties these to the strategies and barriers explored earlier. Before examining specific policy strategies, the survey also asked respondents to report which stakeholders are most interested and involved in addressing water demand through land use planning.

Stakeholders

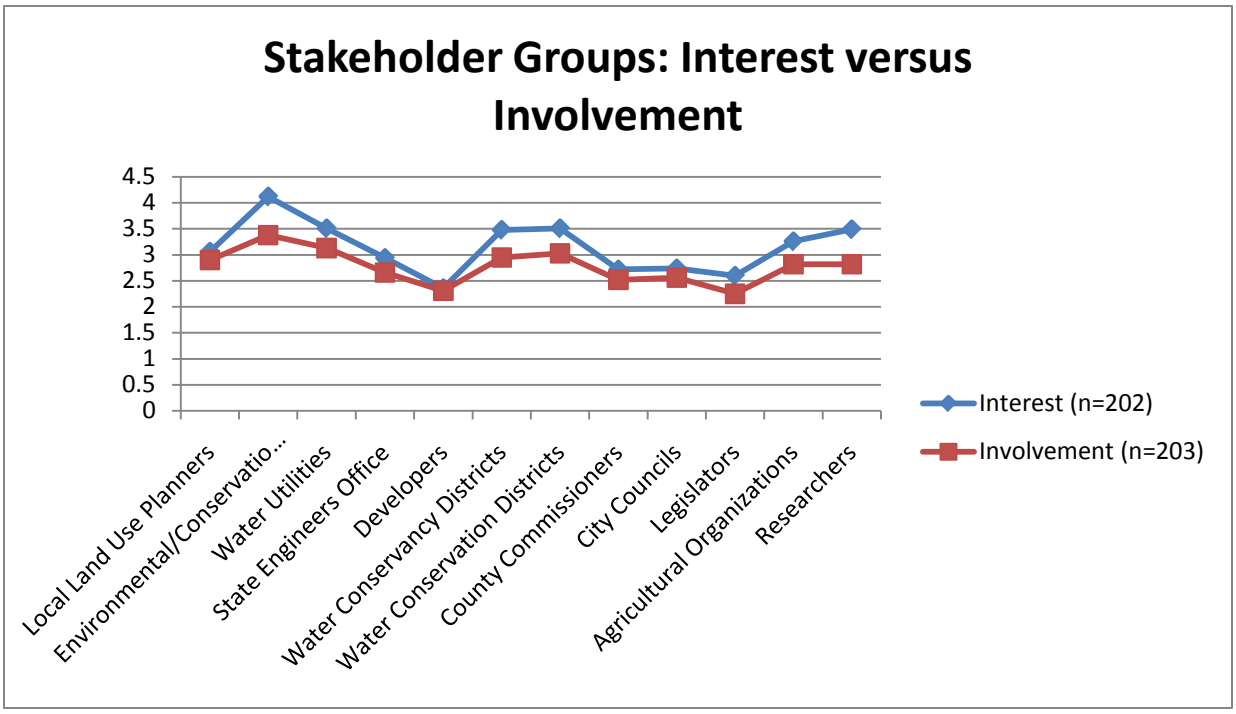
The survey provided respondents with a list of twelve types of stakeholders who may have an interest in using land use planning to reduce water demands. Respondents were asked to indicate the level of interest (from little or no interest to very high interest) and the level of involvement (from little or no involvement to very high involvement). This question is important because policy changes, whether through expansion of voluntary programs or adoption of state or local level mandatory practices, will require stakeholders to lead and support the efforts.

Overall, respondents reported that most stakeholders are moderately or considerably involved and interested, which suggests opportunities to pursue many different types of strategies that will require different expertise and leadership (Figure 5.1, next page). Respondents reported the greatest disconnect between levels of interest (high) and levels of involvement (moderate) for environmentalists, water conservancy districts, water conservation districts, and researchers. Notably, all four of these groups may be able to provide expertise in strategies for decreasing water demand, but lack authority to implement many of the strategies that engage land use planning. They are important partners whose information and experience could be further engaged.

Developers are seen as both the least interested (some interest) and least involved (some involvement), despite the fact that many of the strategies listed in Section 4 would directly or indirectly affect developers. The numerous examples of “green” communities, from Stapleton to efforts in Durango,

indicate that while the perception may be that developers are not interested or involved, there may be a subset of developers whose expertise and interest could be engaged.

Figure 5.1. *"Rate these stakeholder groups according to their current overall level of interest and involvement in utilizing land use planning to reduce water."*

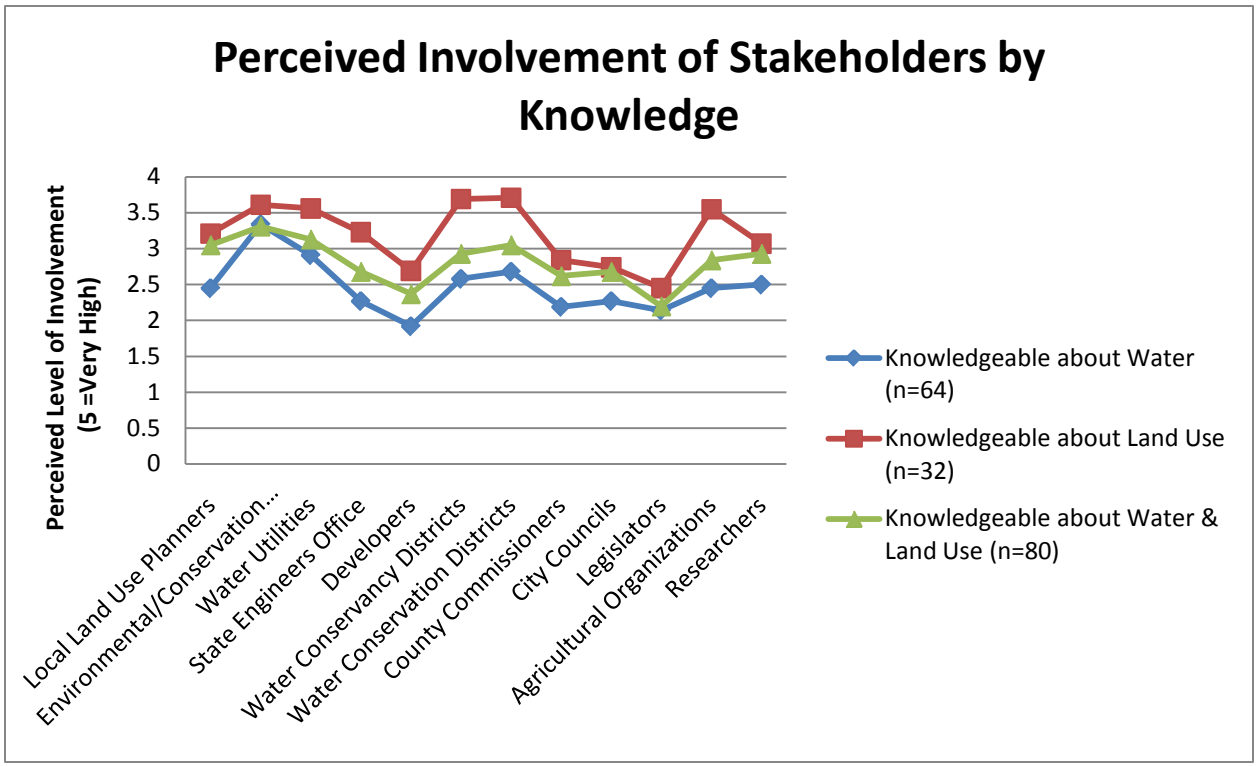


Survey respondents were asked to whether they felt they were more knowledgeable about water, land use, or both. When this information was combined with perceptions of stakeholder interest and involvement, a distinction was found between the stakeholders who reported more expertise in land use issues than stakeholders who reported more expertise in water. The land use experts had higher expectations of both the level of interest and the level of involvement of all stakeholders who may be an important part of integrating water management with land use planning (Figure 5.2, next page, involvement only).

The greatest difference in perceptions of interest and involvement between these two groups of self-reported experts was in their perceptions of water conservancy and conservation districts. Though water experts reported only moderate or less involvement of these water stakeholders, land use planners reported they had considerable involvement. This may suggest a disconnect between land use planners and water managers, though it may also be that the non-random sample of survey participants failed to include the water managers who are the most involved and connected to land-use planners.

All three types of experts agree, though at different levels, that land use planners, developers, and city councils are the least engaged in utilizing land use planning to reduce water demand. The findings for levels of interest showed the same disconnect.

Figure 5.2. *"Rate these stakeholder groups according to their current overall level of involvement in utilizing land use planning to reduce water" by self-reported area of expertise.*



Survey Findings: Potential Colorado Strategies

Throughout the survey, respondents had opportunities in open-ended questions to describe strategies they believe will be helpful in Colorado. To identify those strategies that survey respondents would prioritize, the survey also asked respondents to rate the potential for several mechanisms to reduce water demand on a *regional level* (Figure 5.3, next page).

Planning. Over 50% of respondents felt that land use master plans (71.4%), intergovernmental agreements (61.4%) and subdivision regulations (60.2%) have moderate or high potential to reduce water demand on a regional level. Respondents also added in their own planning suggestions as other strategies with high potential, including:

- Cooperative regional agreements among water providers;
- Water conservation and management plans; and
- Local and regional goal setting for water allocation and use.

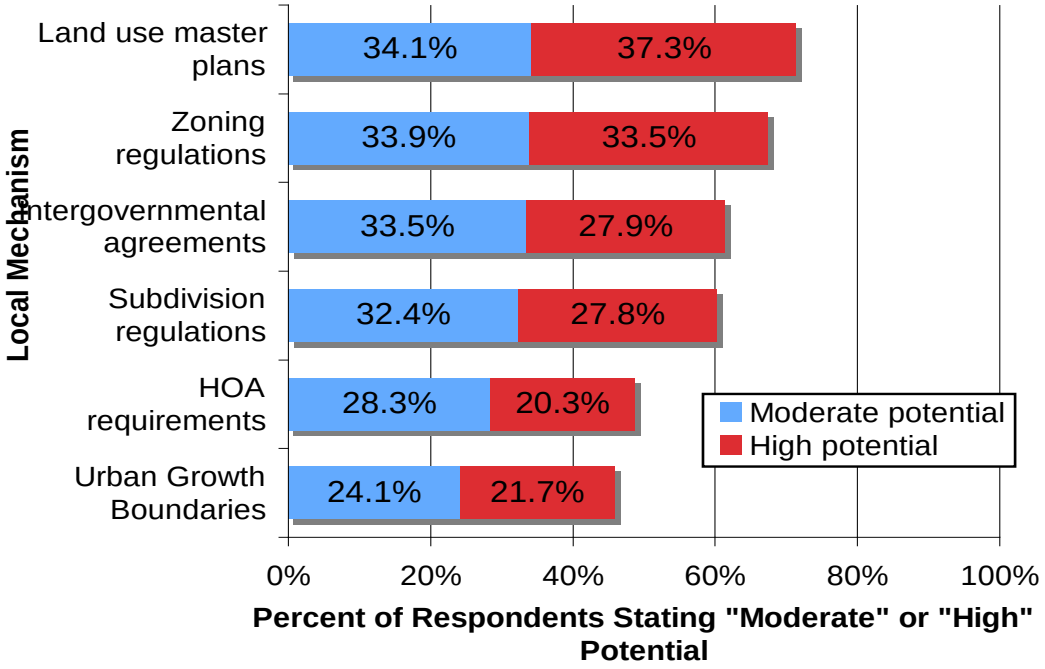
In open-ended questions, the survey respondents described multiple approaches to using land use plans, regional planning, and other planning structures to address water demand through land use. Most respondents who discussed planning processes recommended a more informal collaboration between water and land use that focuses on leveraging expertise:

> *"The land use authorities should take advantage of the technical knowledge and expertise that is available from the water supplier entities within the land use authority's jurisdiction."*

> *"Oversight authorities that do not provide water service or supply should proactively coordinate with entities that have overlapping jurisdiction to advance these goals."*

Other respondents proposed more formal mechanisms for planning, but provided limited detail, only mentioning the potential of land use plans to directly address water or address a wide range of issues that have an impact on water (such as transportation and growth).

Figure 5.3. *"Please rate the POTENTIAL of the following local mechanisms to effectively reduce water demand on a REGIONAL level"*



Zoning Regulations. Two thirds of survey respondents (67.4%) felt that zoning regulations have moderate or high potential to reduce water demand on a regional level. Additional respondents to this question proposed that enforcement of existing local water conservation ordinances and restrictions would have potential to reduce water demand at a regional level. In open ended responses later in the survey, respondents described zoning regulations that could establish "green" requirements for new developments, setting standards for buildings and landscapes. Although zoning regulations were regularly mentioned, many respondents who were interested in higher density developments and green

programs that could be established through zoning instead advocated for voluntary approaches. For example, one respondent suggested, *"Provide density incentives for more compact development plans"* and another proposed that "*Opportunities include higher density developments."*

HOA Requirements. Respondents were less likely to feel HOA requirements (48.6%) would help reduce water demand on a regional level, although it was still identified as useful by almost half of the survey respondents. In open-ended responses, HOAs were mentioned as part of the problem and a focus for potential solutions. In particular, six respondents proposed that HOAs should be prohibited from requiring high water-use landscaping or not allowing xeriscaping, "*Disallow HOA's to prohibit xeric type landscaping."* One respondent went further to also address the minimum grass requirements that some HOAs currently establish. Notably, these types of HOA restrictions are no longer enforceable in Colorado (see box to the right), yet, survey respondents who should be more knowledgeable about land use and water than the general public were unaware of Colorado's law passed in 2003 and amended in 2005.

> **Colorado Revised Statutes**, § 37-60-126(11)(a): *Any section of a restrictive covenant that prohibits or limits xeriscape, prohibits or limits the installation or use of drought-tolerant vegetative landscapes, or requires cultivated vegetation to consist exclusively or primarily of turf grass is hereby declared contrary to public policy and, on that basis, that section of the covenant shall be unenforceable.*

Urban Growth Boundaries. Slightly less than half of the survey respondents reported that urban growth boundaries (45.8%) would help reduce water demand on a regional level. In open-ended questions, a small group of respondents described various growth control mechanisms as opportunities for Colorado, including preserving open space, maintaining agricultural lands near the growing urban areas, and developing growth boundaries. Not all respondents who were interested in using open space as an opportunity for reducing water demand focused on mandatory or government driven approaches.

> *"Opportunities exist where privately owned open space currently in agricultural use can be turned over to a public/private owner interested in maintaining the open space or agricultural use. "*

Demand Management. About 18% of respondents to the question on the potential of specific strategies to reduce water demand on a regional level also mentioned additional programs that they felt had mostly high or moderate potential. Pricing, consumer education, landscaping, and regional cooperative agreements among water providers were the most frequent suggestions. Comments included demand management strategies, such as "Block rate metering structures and other payment systems to have users pay for the actual cost of water they use." Respondents encouraging the use of variable rates saw it as a mechanism for "incentivizing users to save water."

Green Programs and Public Education. When asked what the opportunities were in Colorado to implement land use strategies that would reduce water demand, a combination of mandatory and

voluntary green programs were described by survey respondents. They largely focused on landscape requirements, improved irrigation technology, and low flow technology for indoor water use.

> *"Well-designed landscape irrigation systems that are properly installed and maintained."*

Where green programs were suggested as mandatory, respondents were largely referring to new developments. When asked about barriers, survey respondents reported the lack of residents' willingness to maintain the xeriscaping and other practices that help new developments decrease water use. For this reason, it makes sense that many respondents encouraged more public education campaigns both to increase public knowledge of water limits as well as inspire culture change.

> *"Education to inform public about overall water issues, ownership, distribution, conservation, and real costs."*

Water Supply and Storage. Some survey respondents suggested water supply development and water storage options would have moderate to high potential to reduce water demand on a regional level, including:

- Water recycling and reuse;
- Managing the supply side through water detention and timely distribution;
- Store water in aquifers, not reservoirs.

Similarly, a small number of respondents focused on water supply and storage strategies when asked for opportunities to implement land use strategies to reduce water demand. The most commonly mentioned supply side recommendation was *"advancing the technical distribution and recapture of water"* and addressing legal barriers. Other respondents suggested secondary water systems in future developments, capture and use of graywater, and a variety of strategies for increasing water storage.

Legislative Changes. A small number of respondents identified specific legislative changes that are needed to enable local implementation of strategies for decreasing water demand. Some were very broad, others were very specific. The only opportunities repeatedly mentioned were expansion of rainwater capture and "rethinking the current water rights system and priority of use" often with a focus on the "use it or lose it rules that reward inefficiency." Other specific suggestions included:

- "*Eliminate the 35 acre exemption law in Colorado*," and
- "*Eliminate the well exemption granted to individual homeowners*."

Perhaps the most important finding from the survey results is that more than half of all respondents believe one or more strategies have potential to reduce water demand at the regional level, and many respondents were also able to identify their own suggestions of land management strategies that could reduce water demand. The strategies provided by respondents in the open-ended questions aligned with the many strategies identified in Colorado, nationally, and found to have successful outcomes in the research literature. The Colorado experts who responded to the survey supported attempting everything from public education to voluntary or mandatory green programs to growth management at the local and sometimes regional level.

Survey Findings: Potential State Role

Survey respondents were asked if the State of Colorado should be involved in efforts to reduce water demand through land use planning. Responses to this question showed some variation, with about 61% of respondents stating that the state should be involved in some capacity, 31% stating the state should not be involved, and about 8% that were unsure. These percentages remained fairly consistent among respondents within each of the four regions, indicating similar preferences for and against state involvement throughout the state.

Among the one-third of respondents who felt the state should not be involved, the majority expressed concern that land use planning is a local issue that should remain with the local decision-makers. Though some respondents indicated that state incentives and education were welcome, most felt that any interference from the state in local land planning decisions would only harm local planning efforts at water demand management.

Of the two-thirds of respondents that felt the state should have a role:

- About 31% indicated the state's role should be through non-regulatory, state assistance programs only, such as technical and funding assistance for local governments, facilitation of regional collaboration, educational programs, and statewide studies on water supply and demand to provide guidance and information to local decision-makers.

- Another 31% of these respondents indicated the state may also have a regulatory role, through, for example, water law and well permitting procedures, water rights transfers between agriculture and municipal uses, water demand reduction and conservation mandates related to new development, central water supply and treatment systems rather than individual wells and poorly managed septic systems, landscaping/xeriscaping leadership, state review of Master Plan water supply and demand components, shared tax revenue and infrastructure, and growth limits and boundaries.

- Finally, about 38% of responses were unclear as to whether the state's involvement should be incentive based only or also include regulatory components. Responses in this category largely recognized that water supply and demand crosses jurisdictional boundaries so should be looked at from the state and basin level, and that the state could help provide education, information, and leadership to build consistency in the application of important water conservation and demand management measures.

Potential areas of state involvement in water demand planning that were suggested by respondents are summarized in Table 5.1 below, categorized by type of program, including method of implementation, education, facilitation/leadership, and regulation. The comments provided in response to this question are provided in Appendix G

Table 5.1. State programs suggested by survey respondents.

Category	Method of Implementation	Education	Facilitation/ Leadership	Regulation
Water Supply Assessment			Water supply studies/information/ statistics used to local governments	
			Develop metrics to set goals and measure progress	
Water Supply Development	Water planning		State Division of Water Resources – master plan review of water element	Central water and wastewater system requirements
				Water law changes to encourage reuse and water conservation
Water Demand Management	Water planning	Reverse the perception that suppliers need to meet the growth plan (e.g. the growth plan should be tailored to supply)		Uniform water use standards for development
				Well permitting restrictions
				Restrict water transfers from agricultural to municipal uses
Comprehensive Planning	Public infrastructure improvements	City and County government outreach – water planning practices	State land use plan /watershed studies	Urban growth boundaries/sprawl limitations
			Assist communities to combine water and land planning (e.g. create State Planning Board)	Master plan water element requirements – state review
Land Management	Financial assistance tied to local land use plans that incorporate water reduction		State prioritization of areas critical for agriculture, wildlife, riparian health	
Local Zoning Ordinances			Recommended guidelines and codes that local communities could implement	

Category	Method of Implementation	Education	Facilitation/ Leadership	Regulation
Regional Structures			Facilitate regional collaboration	
Green Programs	Conservation rebates	Education on landscape options/plans to local government		Landscape restrictions/ requirements
	Retrofit residential, agricultural, and commercial water fixtures/ inefficient systems			Mandate design standards for new development
	Landscape renovation			Enforce water conservation
Education	Expand Colorado Water Conservation Board (CWCB) grants/programs	Individual user education: source of water, use statistics, etc.	Water supply, water quality and land use conversations	
		CWCB role: active education campaign at all times (not just dry times)		
		K thru 12 programs (educate kids as well as adults)		
		State of Colorado Department of Local Affairs workshops		

Opportunities to Educate, Facilitate, and Create Incentives

The emphasis on education is not only a match for a state where local control is often a priority; it also aligns with some of the most significant barriers facing local policymakers and implementers. Nationally, researchers are reporting that water policymakers and implementers in both land use and water management lack the information they need to determine the best strategies to decrease water usage and increase water quality. System-wide water audits are needed, including assessments to determine baseline water usage and reduce unaccounted water (Renwick & Archibald, 1998). Without education programs for the implementers of water and land use policies, it can be difficult to identify which of the many strategies and variations within each strategy fall into the category of a best management practice, defined by such criteria as the usefulness, proof of cost-effectiveness and

outcomes, and general acceptance by conservation experts (Texas Water Development Board, 2004). Indeed, this lack of information on comparative effectiveness was identified by survey respondents as a significant barrier to integrating land use and water planning.

The selection of the best set of water demand management policies is complicated by multiple issues. Research has found that different water demand policies act in concert, rather than merely adding to water savings independently; suggesting the package of policies should be thought through together. Additionally, the effectiveness of policies can vary greatly within a single jurisdiction, depending on the land use, income of customers, types of customers, whether drought is occurring, and the information provided to customers (Kenney et al., 2008; Renwick & Green, 2000). Effectiveness can also vary depending on the balance of mandatory and voluntary, as well as inclusion of block rate increases (Renwick & Green, 2000). Developing policies that balance the cost with the effectiveness requires knowledge about the interactions between policies and the different target audiences.

State activities in educating not only the general public, but also the decision-makers at all levels of government, could make a significant difference in increasing the awareness of the issue and potential solutions. As noted above, this is an area where survey respondents are more likely to support state involvement, with a variety of descriptions for what such education could include:

> *"Examples exist of excellent livable, sustainable, mixed use, new urbanism developments with higher densities with overall less per capita water use. These models can be used and perfected throughout Colorado. The state might be able to provide education or incentives for local governments to encourage this type of development."*

> *"Many opportunities through education. For instance, provide municipalities with examples of land use ordinances that have been adopted and are working for other municipalities."*

Going further, to set standards, monitor improvements, convene planning bodies, or otherwise coordinate across levels of government may also help reduce the confusion and overabundance of strategies and information facing local decision-makers.

Opportunities Presented by Current State Statutes

The statutory structure in Colorado has focused on a bottom-up approach to local and regional planning issues. Existing statutes, particularly related to land planning issues, seek to enable local and regional governments to implement a variety of tools to achieve their goals. When asked if the State of Colorado should be involved in efforts to reduce water demand through land use planning, respondents to the Colorado survey were largely supportive of this history. However, only 19% of the survey respondents indicated some preference for mandatory state legislation. Likewise, some respondents that did not want the state to be involved in local planning issues indicated some support for state education and incentive programs. In general, there was wide recognition that water supply and demand crosses jurisdictional boundaries so should be looked at from the state and basin level, and that the state could

help provide education, information, and leadership to build consistency in the application of important water planning and land-use planning measures.

Given this context, the following observations are made regarding potential state involvement in light of the interplay between existing state statutes and potential strategies for integrating water and land use planning:

Water Supply Development. Shared storage, water reuse options, and precipitation capture are available on a limited basis through existing statutes. As noted in the previous section on strategies, water supply development is unlikely to be a solution on its own.

- The ability for water supply authorities to voluntarily form cooperative agreements opens the door to shared storage options – some of which have already been formed in Colorado for this purpose.
- Water reuse is limited by water law in Colorado, in which only two categories of water can be reused. (1) Water that is imported from other basins can be reused to extinction. The City of Denver and Aurora both have limited reuse programs with imported water. (2) The consumptive use portion of agricultural water rights can be reused. (3) Homes could be adapted to reuse.
- Precipitation capture is also limited by Colorado water law, in which all precipitation belongs to water right holders. However, two recently passed statutes (HB09-080 and HB09-1129) permit limited residential precipitation capture and permit up to ten pilot projects that harvest rainwater from impervious surfaces, respectively. Information collected from these efforts can be used to inform the future potential for precipitation capture in Colorado. While precipitation capture can be beneficial to some dwellers, the strategy's contribution to addressing water demand in the state is likely to be small unless it is paired with demand management strategies at the individual (residential/commercial) level (Brooks, 2006).

Water Supply Assessment. Colorado statutes exist for both the county (Colo. Rev. Stat. § 30-28-133) and local level (§ 29-20-301 et. seq.), which require applicants for development to demonstrate that the proposed water supply is adequate to serve the proposed development. However, there are several limitations to these statutes:

- Subdivisions creating lots that are 35 acres or more in size are exempt from county subdivision ordinances;
- Subdivisions below 50 units (or single family equivalents) are exempt, unless otherwise specified by local governments;
- Enforcement and implementation of the statutes does not include a role for the state; and
- The determination as to whether the water supply is adequate is left to the local government. Potential tools to guide this determination could include cohesive benchmarks

provided at the state level or other statutory or informational assistance (e.g. adequate timeframe of supply (100-year, 300-year, etc.), amount of water generally needed per land use type, etc.).

Rate Structures. Water pricing through block rate structures have been implemented by many Colorado communities, with varied effects on water demand reduction. State statutes require all properties served by water service suppliers to have meters installed (with few exceptions), which is a basic requirement before implementing block rate structures and other pricing mechanisms. However, the state does not provide recommendations or information on effective pricing structures. Varied pricing structures could affect, or be affected by, competition between local governments for various land uses and growth targets. Pricing structures can also vary based on the land-use, for example single-family homes may have a block rate structure, while multi-unit buildings that lack individual water meters are exempt from the block rate structure. Land use planners can participate in helping block rate structures to be more successful by taking into account how different land uses will impact the ability of block rate structures to effectively influence water usage among residents in many types of buildings.

Comprehensive Planning. State statutes require counties and municipalities meeting certain growth standards to adopt a master plan (comprehensive plan) for the physical development of their jurisdictions. As explored in Section 4, comprehensive plans provide guidelines for how a community will implement land use policies. In Colorado, integration with water management in comprehensive plans is driven by local discretion:

- The "water supply element" is optional. If included, the county or municipality needs to coordinate with the local water supply entities. There is no requirement that the element be consistent with other city/county plans in the region;
- The "water supply element" is currently not reviewed by a state agency or authority (e.g., State Engineer) for input; and
- Master plans are considered advisory only and not binding upon the zoning discretion of any legislative body.

State statutes also require that all water providers with annual demands of 2,000 acre-feet or more develop a Water Conservation Plan. However, this is also limited with respect to water planning in that:

- Conservation plans have the potential to be comprehensive, such as the Aurora Water; however, the plans can also meet the statutory requirement through more singular strategies such as education programs aimed at residential customers asking them to make smart choices in water conservation;
- Water conservation plans are required only of water suppliers, not water users (such as municipalities or other local governments) – although any state or local governmental entity may develop, adopt, and implement a conservation plan voluntarily; and

- There is no requirement that water suppliers coordinate the development of conservation plans with local or regional government master plans.

Regional Structures. The state is very supportive of intergovernmental agreements and cooperation on planning and service issues. Regional master plans that are formed through intergovernmental agreements can be enforceable, unlike local master plans, which are advisory. Despite the voluntary flexibility to develop such regional cooperation, there is room for the state to provide more leadership and facilitation of the formation of regional collaboration for water planning. The IBCC is an example of a statutorily created committee to facilitate discussions among the eight basins and Denver Metropolitan area of the state regarding water supply and demand assessments. Regional Councils of Governments provide regional planning support for local governments, though most exist in a more limited capacity than their full legislative authority would indicate. State facilitation of an organization or committee or funding program to assist local governments and water suppliers in integrating land use planning with water supply assessments could be a next step in achieving water demand management goals.

Zoning Ordinances, Impact/Development Fees. Local governments have broad authority to adopt zoning regulations and impact and development fees. However, there are limits to the regional effectiveness of this authority:

- Zoning ordinances and impact fees often reflect local politics, preferences, and needs rather than addressing regional issues; although cohesive regional goals and intergovernmental agreements could help shape these ordinances. Sample water demand management ordinances provided by state agencies, such as DOLA, could also assist local communities in adopting water-wise regulations.

- Impact fees are an effective method by which to address infrastructure and other costs associated with new development. Impact fees do not address existing infrastructure upgrades that may be needed. This means that state funding and assistance programs to improve old water delivery systems, provide incentives for the renovation of old homes with conservation plumbing fixtures, and other water infrastructure upgrades will continue to be needed to help improve the efficiency of current water delivery and use.

Green Programs. Examples of green programs include landscaping restrictions or requirements, water efficient standards for new construction, and retrofit of older homes with more efficient plumbing.

- The state has taken some lead with landscaping requirements – specifically not prohibiting xeriscape options. The state has established guidelines for public project landscaping to promote water efficiency and conservation through Colo. Rev. Stat. § 37-96-101 et. seq. Covenants for homeowners associations that restrict or prohibit xeriscape options are also not enforceable per Colo. Rev. Stat. § 37-60-126. And model ordinances for landscaping, like those provided by DOLA (Water Efficient Landscape Design Model Ordinance; WaterWise Landscaping Best Practices Manual: A Companion to the Landscape Design Ordinance), can assist local governments in adopting local regulations promoting water

conserving landscapes. Additional considerations may include state mandates of maximum sod coverage on lots, which local governments could reduce if desired; and funding incentives to help existing development replace high water grass and plants, similar to programs adopted in some other states.

- LEED, LEED-Neighborhood Design, WaterSense™ and other building standards can provide guidelines for water efficiency standards for new development. The state could provide either a facilitation/informational role with respect to best practices regarding water-wise development that local governments could consult; incentives through funding assistance to help retrofit older homes to meet these standards; and/or requirements that new structures meet certain minimum efficiency standards, which local governments could strengthen.

Education. Education programs facilitated by the state were supported by a majority of survey respondents that felt the state should be involved in efforts to reduce water demand through land use planning, as well as some respondents that did not otherwise want the state involved in local planning issues. One significant tool to assist in educating policy makers, water suppliers, water users, and planners is a statewide consumptive and non-consumptive needs assessment. The Interbasin Compact Committee has already been working with roundtables from each of the eight water basins in Colorado and the Denver Metropolitan area to acquire the information and collaboration needed to develop a 40-year needs assessment for water use in the state. The advantages of developing a statewide needs assessment include:

- Influencing decisions at the local and regional level. Adoption of a statewide needs assessment shows broad support for the goals and strategies expressed therein. The process used to adopt a needs assessment requires input and support from a comprehensive array of state participants and multiple (and conflicting) interests. This broad support can assist local and regional decisions makers in adopting and enforcing strategies needed to help meet those needs, given that they are not working alone, but rather with the support of multiple state interests to achieve targeted water management goals.

- Providing a cohesive framework from which local and regional decisions can be made. By expressing uniform goals for communities and regions to reach, providing a toolbox of options to achieve the goals, and a threshold from which progress can be measured, communities can work toward common goals of water demand management. Although the goals may be achieved through different strategies within each community and region, the outcome of each effort will be targeted to achieving the same results

- Educating local and regional authorities on the status of water supply in the state and their region, expected demand from growth, and strategies to incorporate water demand management into land use planning decisions. Knowledge of the available supply and demand for water in various regions of the state and the impact of land use decisions on

future water needs will help local and regional governments make better decisions on matters that impact water use.

Additional educational considerations suggested by survey respondents included involvement from DOLA and the CWCB to provide information and research assistance to local and regional governments and decision-makers and maintain strong education campaigns even in non-drought years. Expanded educational programs from these state subdivisions would likely require additional funds or support from the state, which is more of a budgetary and political commitment issue than a statutory one.

Opportunities Identified at the Water & Land Use Planning Symposium

The *Water & Land Use Planning for a Sustainable Future: Scaling and Integrating* was held in Denver, Colorado, September 28-30, 2009. The symposium, co-sponsored by the Western States Water Council and the Colorado Water Conservation Board, brought together diverse participants from special districts, cities and counties, state and federal agencies, and nongovernmental organizations, including policy and decision-makers, planners, developers, and regulators. The event included facilitated table discussions for participants to share experiences and concerns, identify problems and potential solutions, discuss obstacles and opportunities, and develop recommendations to better integrate and scale water and land use planning for a sustainable future. The final day included a presentation and discussion about the information identified at the table discussions (See Appendix C for a compilation of issues discussed at each table). Eight broad categories emerged.

1. Data
2. Education
3. Coordination
4. Integration
5. Implementation
6. Regulation
7. Regionalization
8. Incentives/Market Solutions

In November 2009 the Advisory Committee met to discuss the symposium outcomes. The Committee identified opportunities that could be realized in the short-term and those that were long-term strategies. Below are the overarching recommendations followed by specific strategies.

Overarching Recommendations:

- **Need for Data:** Currently there is not much data regarding the ability of denser and more sustainable developments to reduce water demand in Colorado. This data is necessary so that developers and city and county planners can understand what the best management practices and methodologies are, and reliably how much water savings they could expect.
- **Role of the Market:** As the value of water continues to increase, the market may naturally lead to more water efficient developments. However it is not clear if current market conditions are sufficient. (Only 8% of Colorado buildings meet LEED standards, for instance, despite being 5th in

the nation for these types of buildings.) Therefore, incentives to catalyze the market in ways that will reduce future per capita water demand should be considered.

- **Infrastructure Replacement:** Dr. Lang's research at the Brookings Institute shows that approximately 75% of the Front Range's infrastructure is going to be replaced or remodeled by 2050. This provides an opportunity to determine how to make this infrastructure replacement more reliably water efficient.
- **Regional Collaborative Planning:** Several case studies and presentations indicate that localized solutions are not effective, since water demand is simply transferred from one jurisdiction to one or many others. Therefore, regional solutions are critical and should be further explored.
- **Integration:** Many other efforts are currently underway that could reduce regional water demand, but are not specifically aimed at achieving that purpose. There are many opportunities for developing partnerships with other water conservation efforts, sustainable/walkable neighborhood developments, energy conservation and CO_2 reduction programs, water quality programs, food security programs, transportation projects, market drivers, and many others.

Strategies / Actions:

The advisory committee analyzed the suggestions developed from conference table discussions (see Appendix C) and organized these into short term activities and long term strategies. The "quick wins" are indicated below in Table 5.2 and while they do not represent explicit recommendations, they do indicate how the above mentioned recommendations could be implemented. Longer term strategies are found in Table 5.3. Meeting notes from the advisory committee meeting are reproduced in Appendix D.

Table 5.2. Activities to pursue in the short-term.

Short-term Activities		Notes/ Examples
1. Data		
a.	Gather and organize existing information on current practices	This would naturally come together with developing best practices clearinghouse.
b.	Create a clearinghouse of best practices	• Metro Mayor's Water Conservation Best Practices. • Conservation Best Management Practices (BMP) manual currently being developed by the Colorado Water Wise Council
2. Education		
a.	Promote water education programs aimed at children so future generations use water wisely	• Douglas County "Water Ambassadors" • Project WET (Water Education for Teachers)
b.	Provide residential consumers with water conservation "tips"	Have water utilities share their best practice strategies with each other
c.	Provide xeriscaping education materials for residential and commercial properties	Education materials should be distributed to homeowners at time of sale (both new and existing units). Developers, realtors, and water providers can be

Short-term Activities		Notes/ Examples
		educational partners and conduits of information.
d.	Promote participation in EPA WaterSense™	
e.	Develop water education and outreach materials for elected officials and key decision-makers	Need to understand how land use affects water. • SP BRT needs assessment meeting in Dec. 2009 • Colorado Foundation for Water Education programs
f.	Work with water basin roundtables on land use issues	Some members are well-versed in land use issues. There is an opportunity to use the IBCC structure to integrate land use & water planning.
3. Coordination		
a.	Work with academic institutions.	Need the next generation to understand the interconnections between land use and water demand. Involve key institutes to coordinate efforts: Colorado Water Institute, Center for the American West, IGERT Sustainable Urban Infrastructure, University of Denver, University of Colorado and Colorado State University's main and satellite campuses.
b.	Work with NGOs	
c.	Establish regional standards formula for determining gallons/per capita for residential use.	A formula rather than a statewide standard is most appropriate to accommodate different regions in the state. • Have Colorado WaterWise Council take the lead (http://www.xeriscape.org/)
d.	Engage IBCC process in land use planning.	
4. Integration		
a.	Identify existing county and municipal planning regulations that could facilitate integrated planning.	
5. Implementation		
a.	Provide technical assistance and resources to help municipalities and counties integrate water planning into their comprehensive planning process.	Many entities are updating their plans. Now is an opportunity to include water as a key component in land use planning.
b.	Educate HOA's and developers on SB05-100, which prohibits restrictive covenants that limit xeriscaping.	This prohibition is not known and/or not enforced. Many survey respondents and attendees at the symposium cited examples of violations.
6. Regulation		
a.	Support local regulatory efforts that address water conservation and demand management.	
7. Regionalization		
a.	Engage Council of Governments in water/land use discussions.	• NWCCOG is addressing water quality & quantity.

Short-term Activities		Notes/ Examples
		• CWCB is looking at DRCOG's urban growth boundaries to determine water savings. • This might be a role for CFWE.
b.	Identify regional planning efforts underway (e.g., transportation) and include water issues.	May need more investigation before pursuing.
c.	Use Intergovernmental Agreements (IGAs) to create legally-binding agreements among regional entities.	The Mile High Compact is a good example.
8. Incentives/Market Solutions		
a.	Develop incentive programs for local governments to adopt water-wise landscaping ordinances.	
b.	Use impact fees to promote water-wise developments and in-fill.	Structured impact (tap) fees to penalize water inefficient, sprawl developments and/or to reward sustainable/dense developments.

Table 5.3. Long-term strategies to consider.

Long-term Strategies		Notes/ Examples
1. Data		
a.	Collect new data on water demand of land use types	We are projecting water demands right now and how much those plans are based on current water use patterns. We don't have statewide data on how different community types use different amounts of water.
b.	Collect existing data/conduct research on water use to understand how infrastructure and land use patterns arise	• Examine neighborhood level water use data of new urbanism communities such as Stapleton and Belmar • Keep abreast of Sterling Ranch development • Develop partnerships to facilitate data sharing
c.	Review local land use plans to understand how Colorado communities are planning for growth	• Metro Vision is projecting 10% more density. What is the impact on water demand? • Are communities crafting plans to grow more efficiently and compact?
d.	Develop measurable standards of success	
e.	Provide state technical assistance to help communities collect good data	
2. Education		
a.	Promote continuing education events & courses on the integration of water/land use for planners.	Partners could include: CWCB, CU-Denver Urban & Regional Planning Dept, IGERT Sustainable Urban Infrastructure, Colorado Chapter of the American Planning Association, etc.
b.	Work with the Homebuilders Association to	They are an important constituency of elected

Long-term Strategies		Notes/ Examples
	promote water wise construction	officials. If the Association champions green building this will help elected officials to promote it.
c.	Work with Club 20, Progressive 15, and Action 22	Rural paradigm is different than the urban perspective on growth.
d.	Engage Council of Governments in water/land use planning	
e.	Develop education and outreach materials on integrated planning for the water basin roundtables	• This can be a component of the IBCC's Public Education, Outreach and Participation (PEPO)
3. Coordination		
a.	Coordinate growth through revenue sharing.	For example, sharing a portion of sales tax revenues. Russ George proposed legislation that would have facilitated it.
4. Integration		
a.	Add additional components to regional plans that include water, transportation, land use, energy, and food security.	Helpful to identify efforts already underway. DOLA is a good partner. Could also be incorporated into comprehensive planning efforts
b.	Identify initiatives that work together (e.g., energy, transportation, water demand, agriculture, etc.) and build partnerships at the regional scale.	This is foundational work for long-term integrated regional planning.
c.	Develop shared infrastructure.	
d.	Develop state water plan.	
5. Implementation		
a.	Evaluate rate structures to determine effective levels to reduce demand.	
b.	Municipalities and counties update zoning codes to incorporate LEED Neighborhood Design Standards	
6. Regulation		
a.	Assess effectiveness of HB08-1141.	If needed, craft legislation to strengthen it.
b.	Require xeriscape standards for new and redeveloped residential, business and industrial development.	DOLA has model landscaping ordinance and manual to assist local communities along the Front Range.
c.	Follow up on precipitation capture pilot studies (HB09-1129).	Craft appropriate legislation as needed.
d.	Develop incentive-based smart growth regulations to entice local governments to plan better.	
e.	Conduct a comprehensive scan of existing regulations, tools, processes, etc., before the creation of new regulations.	
f.	Require: Urban growth boundaries, water	All need to be studied first.

Long-term Strategies		Notes/ Examples
	providers prove supply, use of low water technologies, water component in Comprehensive Plans	
g.	Allow residential gray water systems.	
h.	Disallow minimum turf requirements by HOA's, developers, restrictive covenants.	
7. Regionalization		
a.	Integrate water into various efforts through federal stimulus and livability money. EPA, DOT, GEO block grants are all regional.	Many need more investigation before pursuing. Need to know who at the state level receives federal funds. If you want funds to be regional, the money needs to go through a clearinghouse that establishes criteria. Regions need to be defined: Watersheds may work well for Colorado.
b.	Develop model regulations to encourage county and municipal regulations to align with each other.	
c.	Work with Colorado's five metropolitan planning organizations to have them submit a Water Supply Improvement Program to DNR. It would be similar to that required for transportation and submitted to CDOT.	
8. Incentives/Market Solutions		
a.	Provide funding for local planning efforts such as master water supply plans, especially if regional and includes other comprehensive planning efforts.	
b.	Remove competition between local governments by giving incentives through coordinated funding based on willingness to engage in best practices.	Provide not just planning dollars but infrastructure funds.

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List of Appendices

Appendix A: Water & Land Use Planning Symposium Agenda

Western States Water Council 2009 Symposium

Water & Land Use Planning for a Sustainable Future: Scaling and Integrating

Red Lion Hotel, 4040 Quebec Street, Denver, CO

September 28th – 30th, 2009

AGENDA

Monday, September 28, 2009	
11:00 am	Registration
12:30 – 1:15 pm	Welcome and Remarks Jennifer Gimbel, Director, Colorado Water Conservation Board Tony Willardson, Executive Director, Western States Water Council Bert Garcia, Director, Ecosystems Protection Program, Region 8, Environmental Protection Agency
1:15 – 1:45 pm	Keynote Address John Tubbs, Deputy Assistant Secretary for Water and Science, Department of Interior
1:45 – 2:30 pm	What's Driving Land Use in the Dry Sunbelt? Dr. Robert Lang, Director of Brookings Mountain West and Professor of Sociology, University of Nevada – Las Vegas
2:30 – 3:45	Planning for Water Demand in the West Jennifer Gimbel, Executive Director, Colorado Water Conservation Board (moderator) • Kay Brothers, Deputy General Manager, Southern Nevada Water Authority • Carolyn Brittin, Deputy Executive Administrator, Texas Water Development Board • *Water Demand Planning in New Mexico.* John Longworth, Bureau Chief, Water Use and Conservation Bureau, New Mexico State Engineer's Office
3:45 – 4:00 pm	Break
4:00 – 5:00 pm	Land Use Planning and Water Demand (Colorado Report) Jacob Bornstein, Program Manager, Intrastate Water Management and

	Development Section Lyn Kathlene, Ph.D., Senior Research Associate, Center for Systems Integration
5:00 pm	Adjourn/Instructions
6:00 pm	Social Hour & Fajita Bar
Tuesday, September, 29, 2009	
8:00 am	Continental Breakfast
8:30 – 9:00 am	**Opening Remarks** Governor Bill Ritter, State of Colorado
9:00 – 9:15 am	Introduction to Day's Activities Jacob Bornstein, Program Manager, Intrastate Water Management and Development Section Lyn Kathlene, Ph.D., Senior Research Associate, Center for Systems Integration
9:15 – 10:45 am	**State Efforts** Alex Davis, Assistant Deputy Director for Water, Colorado Department of Natural Resources (moderator) • *Coordination of Land Use Planning and Water Supply Planning: The California Experience.* Roderick Walston, Best Best & Krieger, LLP • *Arizona Ground Water Management/Assured Water Supply Subdivision Requirements.* Sandy Fabritz-Whitney, Assistant Director, Water Management, Arizona Department of Water Resources • *Water and Land Use Planning in Washington State.* Brian Walsh, Department of Ecology, State of Washington
10:45 – 11:00 am	**Break**
11:00 am – 12:30 pm	**Local and County Efforts** Julio Iturreria, Long Range Program Manager, Arapahoe County, Colorado • *City of Boulder's Land Use Policies: Local and Regional Impact.* Peter Pollock, Ronald Smith Fellow, Lincoln Institute of Land Policy

	• *Land Use and Water Connection in Oregon: Past Practices and Innovations.* Lorna Stickel, Portland Water Bureau • *Water in Douglas County, Colorado: Past, Present & Future.* Mark Shively, Executive Director, Douglas County Water Resource Authority
12:30 pm	Lunch
12:45 – 1:45	**Luncheon Panel: Two Sides Talking** Peter Nichols, Attorney, Trout, Raley, Montano, Witwer & Freeman, (moderator) • Chips Barry, Denver Water and Mayor Hickenlooper, City of Denver • Mark Pifher, Aurora Water and Mayor Ed Tauer, City of Aurora • Eric Kuhn, Colorado River Water Conservation District & Greg Trainor, Utilities Manager, City of Grand Junction
1:45 – 2:00	Break
2:00 – 3:30pm	Private and NGO Efforts Dave Merritt, Senior Water Resources Program Leader, HDR Engineering, Inc. (moderator) • How to Plan for Water-wise Growth. Clark Anderson, Director, Western Colorado Legacy Program at the Sonoran Institute. • LEED Standards for Neighborhood Development. Conor Merrigan, Principal, U.S. Green Building Council, Colorado Chapter • Case Studies in Water-Smart Development. Drew Beckwith, Water Policy Analyst, Western Resource Advocates • A Developer's Perspective. Doug Scott, Shea Properties
3:30 – 3:45 pm	Break
3:45 – 5:15 pm	Cooperating Across Scales: Local, County, Region and State Barbara Biggs, Governmental Affairs Officer, Metro Wastewater Reclamation District in Denver (moderator) • Local Land Use Planners' Role in Assuring Sustainable Water Supply, Graham Billingsley, Principal, Billingsley Consultants; and Commissioner on the American Institute of Certified Planners • Sustainable Community Development in Colorado. Andy Hill, Colorado Department of Local Affairs

	• HB08-1141: Development Permits, Representative Kathleen Curry • Special Districts, Tom Grimshaw, of Counsel, Grimshaw & Harring
5:15 – 5:30 pm	Wrap Up/Adjourn (dinner on your own)
Wednesday, September 30, 2009	
7:45 am	Continental Breakfast
8:15 – 9:45 am	Federal Roles, Regulations and Planning Functions Tony Willardson, Western States Water Council, (moderator) • *Water Needs in the 404 Permitting Arena and Shared Vision Planning*. Chandler Peter, Denver Regulatory Office, Omaha District, Army Corps of Engineers • *EPA's Regulatory Roles and Responsibilities Related to Water and Land Use Decision Making.* Bert Garcia, Director, Ecosystems Protection Program, Region 8, Environmental Protection Agency • *Working Together at the Landscape Scale.* Randy Karstaedt, Director, Physical Resources, U.S. Forest Service. • *Water Uses on Public Lands: Planning to Permitting.* Maryanne Kurtinaitis, Renewable Energy Program Manager, Bureau of Land Management • *FWS Regulations Affecting Development.* Meg Estep, Mountain-Prairie Region, Chief, Water Resources Division, U.S. Fish and Wildlife Service
9:45 – 10:00 am	Summary of Table Discussions
10:00 – 10:45 am	Issues and Opportunities (facilitated discussion)
10:45 – 11:00 am	Break
11:00 – 11:45 am	**Prioritizing Next Steps** (facilitated discussion)
11:45 am – 12:45 pm	Partnerships with other Colorado Efforts Susan Kirkpatrick, Executive Director, Colorado Department of Local Affairs (moderator) • *Denver Regional Council of Governments (DRCOG)*, Jennifer Schaufele, Executive Director • *Colorado State Legislature*. Colorado State Representative Claire Levy (District 13)

	• *Colorado Department of Local Affairs* (DOLA), Susan Kirkpatrick, Executive Director
12:45 pm	Adjourn

Appendix B: Water & Land Use Planning Symposium Panel Presentation Notes

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Water & Land Use Planning for a Sustainable Future: Scaling and Integrating
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September 28th – 30th, 2009

Planning for Water Demand in the West

Panelists:

Jennifer Gimbel, Executive Director, Colorado Water Conservation Board (moderator)

- **Kay Brothers**, Deputy General Manager, Southern Nevada Water Authority
- **Carolyn Brittin**, Deputy Executive Administrator, Texas Water Development Board
- *Water Demand Planning in New Mexico.* **John Longworth**, Bureau Chief, Water Use and Conservation Bureau, New Mexico State Engineer's Office

Kay Brothers, *Southern Nevada Water Authority (SNWA)*

History of Las Vegas: rapid growth

Competition for Colorado River water

- Water agencies were operating independently – no coordination of resources, demands, etc.
- Each agency was negotiating its own best deal for future supplies with the Colorado River Commission – "every-man-for-himself."

No coordinated conservation plan

- There was no incentive to save water - agencies were allocated water based on the prior year's use – the more they used, the more they got.
- If an agency used less than its allocated amount, its water share was reduced accordingly.

Differing municipalities in Clark County, NV: use determined share

- Henderson, Las Vegas, Summerlin, North Las Vegas, unincorporated Clark County

Tremendous demand: need to supplement Colorado River water

SNWA formed in 1991:

- Regional agency for water purveyors and wastewater purveyors treated water returned back to Colorado River

Yearly development of resource plan: population changes taken into account annually, determine that there are water resources available

Colorado River resources

- Nevada receives return-flow credits for all water that is used indoors;
- Water is treated and then returned to Lake Mead, stretching the state's Colorado River allocation.

2009 plan:

- The SNWA Resource Plan has evolved over time, but has always included a portfolio of resource options.
- Options are assessed and prioritized based on need, accessibility, availability and cost.
- Conservation plays large role in meeting demand
    - Pursue more aggressive promotion of water conservation and regulation of water use through methods such as the reduction of turf
        - Rebated $150 million dollars for more than 136 million square feet of turf converted, saving Southern Nevada more than 7.5 billion gallons of water annually
    - Decrease total water demand from 272 GPCD to 250 GPCD by 2010 and to 245 GPCD by 2035
        - Reduced water demand to less than 250 GPCD in 2008
    - Assess conservation achievement annually, investigate the potential for further GPCD reductions and revise conservation goals accordingly
        - Set new conservation goal of 199 GPCD by 2035

In-state plan important to replace temporary supplies

- Former plan to use unused AZ water until 2025
- 1996: AZ implements water banking
- 1999: surplus guidelines

Need to diversify resources: 1989 NV groundwater resources plan

Recommendations from Citizens' Committee:

- Conservation
- Resource Development

Resource Development Strategies:

- Pursue development of all the resource options considered in the IWPAC planning scenarios
    - AZ Water Bank
    - Coyote Spring Valley Groundwater Rights
    - Pre-Compact Water Rights (Virgin and Muddy Rivers)
    - Three Lakes Valley Groundwater Rights
    - Virgin River Water Rights
    - Augmentation Credits
    - Additional Conservation
    - Clark, Lincoln and White Pine Counties Groundwater Applications
- Provide additional safeguards for communities and the environment in areas where in-state groundwater resources are developed

  - Entered into monitoring, mitigation and protection plans for federal basins
- Work with the Colorado River Basin States and the Bureau of Reclamation to implement augmentation credits for in-state, non-Colorado River resources
  - Revised return-flow credit methodology to include in-state groundwater
- Pursue delivery of pre-compact Muddy and Virgin River water rights through Lake Mead and the existing Southern Nevada Water System ("lake conveyance")
  - Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead Record of Decision allows for up to 50,000 AFY
- Utilize the Southern Nevada Water Bank and California Water Bank as "bridge resources" to help meet any supply deficits
  - Banked more than 300,000 AF in Southern Nevada and 70,000 AF in California, in addition to 1.25 million AF banked in Arizona
- Utilize surplus and interim surplus Colorado River water, if and when they are available
  - Lake Mead above elevation 1145 - Nevada's allocation increases to 400,000 AFY
- Continue to pursue ocean desalination as a long-term resource
  - 7 states pursuing augmentation and Nevada will get first 75,000 AF

Colorado River Basis treaty: impetus for development of in-state resources in-state water returned to Lake Mead: increased allocation?

300,000 acre-ft banked in NV, CA

Utilize available surplus

Pursue desalination (w/other states)

Fewer gallons per capita in 2005 than 1990

Carolyn Brittin, *Texas Water Development Board*

Reservoir development focus of new water sources

Drought an overriding concern for Texas water planners

- Brazos Reservoir surpassed previous drought record
- $4.5 billion economic development in state: cost

New process: consensus-driven, bottom-up

- Design areas and give technical support for regional water planning agencies,
- Resolving over allocation disputes/mediation: compiled into state water plan annually, aquifer desalinization

Voluntary transfers, voluntary conservation, transfers to meet demand, leg recommendations

Individual plans: 2564

Conservation/efficiency considered a management strategy

Some supplies not connected, not legally available, costs involved in making available

Costs/impact, water quality evaluated in regional plans

Conservation has doubled: 23% of water needs in 2007 met through conservation

- Wastewater effluent treated through wetlands, aquifers
- Environmental concerns about impact on withdrawal of wastewater discharge

Diverse terrain/diverse water resources, availability

Water demand to increase: double current population by 2060

Need 8.9 million acre-feet

Over planned? 1.3million acre-feet of agricultural need not met currently

How much does the environment need? How to meet that need in over-appropriated basin?

Consistency with regional water plans necessary for approval of local plans

Land-use planning not used in Texas

1.1 million new acre-feet from new reservoirs planned

Legislature designates unique sites for reservoirs

2007: state water plan recommends 19 new reservoirs

Impetus for action: F+W designated refuge at potential site, Texas files suit

- Federal officials override state water planning process to detrimental effect, w/ no recourse for state

Restriction of state imminent domain powers: could be detrimental to reservoir plans

19 sites designated, but must be acted on: 2015 sunset on designation

John Longworth, *Water Demand Planning in New Mexico.*

Water use planning requirements driven by climate

Empty reservoirs, Pecos River drought in 2003

Municipal and Industrial source water: 90% groundwater, junior water rights

Demographic Climate

- Projected Trends M&I Uses Next 30 years
  - 856,000 new residents in State
  - 84% in the Rio Grande Basin
  - 72% in the Middle Rio Grande
- Rio Grande Basin water use
  - No new appropriations

- 100,000 AF/y of new demand (@ 160 GPCD)
- Approximately 10% of Rio Grande's average surface water supply

Legal Climate

- Western Water Law
  - Doctrine of prior appropriation
  - Interstate compacts
  - Native American
  - Endangered Species Act

Indian nations rights: complicating factor in water use planning

State water plan: broad-based policy document

- Municipal Act
  - Generally served by a water utility
    - There are exceptions
  - Utilities require a State Engineer permit
  - Water Development Plans
    - Provide the basis for holding water rights unused
    - This is the intersection for utilities to demonstrate non-speculative appropriation/use
- Subdivision act: req. state engineer positive/negative opinion
- Involves water quality, not simply quantity
- Dual-authority zone: counties generally defer to cities

Legislation requires meeting of stakeholder groups to discuss statutes required in Water Development Plans

- 40 year requirement: drought exception

Constitutionality of domestic wells

Water availability

- Demonstrate water rights
- Hydrological component

Audience Questions

Q. What is the effect of density on water planning?

Kay Brothers: Peak demand is changing

John Longworth: Subdivisions- SE looks at overall site plan, likely impact. Municipalities: moving in direction of looking more at zoning/density effects on water use/trends

Q. What are Texas' conservation efforts?

Carolyn Brittin: Implementation of conservation measures, leveling demand in DFW area after reservoirs down to 1-years supply in 2004. Projecting water demand based on: existing use, advantages of annual water usage surveys, continuing to refine numbers, looking at most current information

Appendix B: Water & Land Use Planning Symposium Panel Presentation Notes (continued)

Western States Water Council 2009 Symposium

Water & Land Use Planning for a Sustainable Future: Scaling and Integrating
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September 28th – 30th, 2009

State Efforts

Panelists:

Alex Davis, Assistant Deputy Director for Water, Colorado Department of Natural Resources (moderator)

- *Coordination of Land Use Planning and Water Supply Planning: The California Experience.* **Roderick Walston**, Best Best & Krieger, LLP
- *Arizona Ground Water Management/Assured Water Supply Subdivision Requirements.* **Sandy Fabritz-Whitney**, Assistant Director, Water Management, Arizona Department of Water Resources
- *Water and Land Use Planning in Washington State.* **Brian Walsh**, Department of Ecology, State of Washington

Roderick Walston, *Coordination of Land Use Planning and Water Supply Planning: The California Experience*

Traditionally, water discussions have focused on water quantity and quality. As the West has grown, especially California and Colorado, there has been more focus on how you coordinate water supply with population growth and land use. You can't integrate land and water use unless you know how land is used and can't plan land use unless you know where water is going to come from.

California passed California Environmental Planning Act (CEPA) in 1970s, which required developers to issue environmental impact report before beginning a project. Cities must consider environmental impact before project is approved. CEPA was modeled under national act. Under national act, federal agencies must issue environmental impact report before starting a project. Local government can choose whether or not environmental impact is acceptable.

Court decisions found that if project affects water supplies, then local governments must consider that with environmental impact. The local agency is required to consider the effects but not necessarily disapprove the plans if water is affected. Some impact assessments have been struck down by courts because there was not sufficient coordination of water supply issues.

Other California statutes:

Urban Water Management Plans- every 5 years agencies must inventory their water supplies, compare water usage and supplies for next 20 years.

Water Supply Assessment Statute- When local government considers a project, water supply agency must prepare assessment and state whether there is enough water for the next 20 years.

These kind of laws maybe the future of the West.

What about the California example? Is it a good example, or is there a better way to coordinate the water supply? What is the role of courts in addressing water supply? In California, they tend to defer to local governments. Could/should courts take more of a role? Should the legislature require disapproval of projects with environmental impacts, or should they just require that the impacts be considered?

Sandy Fabritz-Whitney, *Arizona Ground Water Management/Assured Water Supply Subdivision Requirements*

Arizona is ranked 38th among states in population; 20th in 2000 and projected to be 10th by 2030.

Population density is most significant in the driest part of the state.

Of the states that get water from the Colorado River, Arizona is the last.

Agriculture is the largest water user in Arizona, using 70% of water. The Phoenix area used to be majority agricultural and only within the past 20 years has it changed.

The first program that really looked at both water and land use was 1973 Water Adequacy program; mostly consumer information program. It required that land owners be notified if there was not adequate water supply.

1980 Groundwater Management Act

- More regulations
- Assured Water Supply Program

1995 Assured & Adequate Water Supply Rules

- Demonstration of 100 Year Water Supply for New Subdivisions; cannot sell a lot unless you can demonstrate a legal right to a 100 year supply.
- Significant change from 1973 Water Adequacy Act which just required disclosure.

1998 & 2000 Growing Smarter

- included water element in planning

2004 State Drought and Water Conservation Plan

- First drought plan
- Community Water Plans that include drought, conservations and water supply plans

Brian Walsh, *Water and Land Use Planning in Washington State*

Legislative History- water code dating back to 1917 but focusing on more recent Acts

Washington has approximately 6.5 million population, third largest of western states after California and Texas, just above Arizona. Separated into east and west by Cascade Mountains. East side is much drier. Growth projection is 2 million years in the next 20 years. Also endangered species are found all over the state.

Growth Management Act 1990

- Required state and local governments to coordinate growth; growing together, not just pushing all the growth to one area of the state.
- Also meant to protect environment and quality of living
- Looking for both physically and legally available water for growth

Watershed Planning Act 1998

- Purpose was to integrate water supply, water quality and habitat planning, including developing option for current and future supply needs.
- Groups could apply to state for funds to address water issues; groups could be voluntary.
- Plan have been written and approved for 36 watersheds

Municipal Water Law

- Growing Communities Doctrine- Provides more certainty and flexibility for water rights held by water systems
- More closely ties water system planning and engineering approvals by Dept of Health to water rights administered by the state Department of Ecology.
- Improves the ability to plan for future growth.
- Offers greater flexibility to solve public health problems with water right changes and transfers
- Advances water use efficiency
- Assure greater reliability of safe drinking water for communities

Columbia River Basin Water Management Program

- Lake Roosevelt Storage Releases
- Legislation directs the WA Department of Ecology to aggressively pursue development of water supplies to benefit both in stream and out-of-stream uses through storage, conservation and voluntary regional water management agreements.

Adjudications Reform

- Legislature enacted Ecology proposed adjudication modernization legislation
- Legislation drew from *Water Disputes Task Force Report of 2003*
- Updates adjudication process to make it faster and less complicated
- Addresses both judicial & non-judicial aspects of law

- Encourages courts to direct parties toward alternative dispute resolution, mediation and settlement
- Encourages innovative practices and technologies (electronic filing, teleconferencing, allowing pre-filing of testimony, etc.)
- Allows service of summons by certified mail vs. personal service
- Water users served by irrigation districts or public utility districts would not parties to case

Water Banking

- Authorized by legislature last year, moving water around
- Uses state Trust Water Program for banking
- Clarifies Ecology authority to do water banking statewide
- Expanded to include groundwater
- Consumptive quantity of a water right removed from trust is equal to the consumptive quantity prior to going into trust
- Ecology may recover costs for water service contracts with federal agencies from individuals receiving water

Water and Land Use Planning Challenges

- No statewide plan
- Uncertainty about water rights
- Watershed planning patchwork
- Municipal water law conflict
- Relinquishment – "Use it or lose it"
- Permit exempt wells
- Need to integrate planning
- Relationship of statutes
- Climate change

Water and Land Use Planning Opportunities

- Water conservation, banking, acquisition, reclamation
- Columbia River Program
- Puget Sound Program
- Storm water management
- Rainwater harvest
- Aquifer storage recovery
- Low impact development
- Climate change

Audience Questions

Q: What is most effective?

Roderick Walston: In California, the direct involvement by the legislature. The two Acts discussed in the presentation. Drought has imposed demands, so local governments have begun coordinating ground and surface water supplies- conjunctive use programs have been done at the regional level. What is not working is that the legislature has not required the use of

conjunctive use programs. California also is the only one in the West that does not regulate ground water: local governments are not required to manage ground water, but they have the option to adopt a groundwater management plan. There needs to be a state program or requirement for local governments to do it. State also does not mandate water transfers; again, it is up to the local water management agency. On top of that, everything is dependent on the Endangered Species Act. It is difficult to plan when you don't know what the courts will impose. California lost one third of their water supplies because of federal requirement to reserve more water in the San Joaquin basin. There have also been several court decisions that disapproved development plans because environmental impact report was not satisfactory.

CEPA was not originally a water supply mechanism, only a land use. Courts interpreted it that it addresses water, and it is logical, but it was not designed to include water planning, so it does not address some of the nuances of water planning.

Q: Can you speak to a particular obstacle that your state has overcome in getting the various entities and stakeholders to work together?

Sandy Fabritz-Whitney: In Arizona it is very difficult. It is a struggle to keep the integrity of the Groundwater Management Act in place. People are always asking for exemptions. It has been 30 years, and there has been a lot of backlash, and some weakening of the code. There has also been the "Don't let Phoenix take my water" sentiment. There is a law against transporting water across basin boundaries. There is more chance for success at the regional level.

Brian Walsh: In Washington we are also struggling, no clear answer. Surface water has been appropriated since 1985, so there can be curtailments. The town of Roslyn had their water shut off, but you could go outside the boundaries and dig a well still.

Roderick Walston: In California there is a North/South dispute. North has the water and South has the population. There is also an Initiative process regarding the budget that other states don't have. The question about allocating water supply is bound up in CA political climate. There is a statewide mechanism to manage appropriation of water supply but not the coordination of planning.

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- *Land Use and Water Connection in Oregon: Past Practices and Innovations.* **Lorna Stickel**, Portland Water Bureau
- *Water in Douglas County, Colorado: Past, Present & Future.* **Mark Shively**, Executive Director, Douglas County Water Resource Authority

Peter Pollock, *City of Boulder's Land Use Policies: Local and Regional Impact*

As the former planning director of the City of Boulder, Colorado, I will discuss the impact of Boulder's land use policies

Boulder, unlike many Colorado communities, has plenty of water, due to foresighted early planning- water availability not an issue

Is it enough for local governments to individually do a better job? *(Slide 2)*

- We can certainly do better at the local level; however, lots of good local plans will not add up to a sustainable regional development pattern
- Water availability should be used as a tool for creating more sustainable land use patterns

Drawing on Bill Klein's five strategic points of intervention, I will frame Boulder's development. The five strategic points are *(Slide 3)*

1. Visioning and Goal Setting
2. Plan Making
3. Management tools: laws and incentives
4. Development review
5. Public Investments

Applying the strategic points of intervention:

1. **Visioning and Goal Setting:** *(Slide 4)*

- Needs to be a community exercise
- Environment, Economy, Equity issues must be considered in creating a sustainable plan
- Addresses active growth management

Boulder's vision is *(Slide 5)*

- A compact city surrounded by open space
- Community Sustainability
- Growth management: How much growth, what kind, how fast, and with what impact?

In Boulder, plans were jointly adopted with Boulder County

Job of the planning process is to accommodate the integration of possibly conflicting goals *(Slide 6)*

- Sustainability
- Intergovernmental cooperation
- Growth management
- Community design
- Facilities and services
- Environment
- Economy
- Transportation
- Housing
- Human services

Policy framework created around water: Protect/Improve water quality *(Slide 7)*

- Protection of water quality
- Water resource planning
- Water acquisition
- Drinking water
- Storm water
- Minimum flow program
- Groundwater
- Pollution control
- Wastewater

2. Plan Making *(Slide 8)*

Opportunities in Comprehensive Planning: asking the long-term questions *(Slide 9)*

- Build-out analysis:
  - Zoning and planning for the future
- Alternative scenarios for future development
  - Alternative scenarios of differing scenarios on water quality/quantity
- Land use suitability analysis
  - Sustainability panels: discussion of wetlands, etc

- Defining service areas
- Land use map anticipating uses

3. Management tools: Laws and Incentives *(Slide 10)*

Functional Master Plans: feeds into discussions about how functions of local government are going to be dealt with. These are linked with land-use projections and in terms of water include: *(Slide 11)*

- Source water master plan
- Treated water facilities master plan
- Wastewater treatment plant master plan
- Wastewater collection system master plan
- Comprehensive flood and storm water utility master plan….all linked to the land use and growth projections

4. Development Review *(Slide 12)*

Development Review = points of control. These are strategic points for the community and include defining standards: *(Slide 13)*

- Service area changes
- Annexation/initial zoning
- Subdivision
- Discretionary reviews
- Building permits
- Utility connection permits
- Right-of-way permits

5. Public investments *(Slide 14)*

Capital Improvement Program - CIP *(Slide 15)*

- Six year projection of capital fund uses and sources. First year = capital budget
- Are we keeping up with growth?
- Are we directing improvements to the right locations?
- Are we taking advantage of efficiencies?

Is it enough for each local jurisdiction to do a great job of integrating land use and water planning? *(Slide 16)*

- How much state control would be required to get localities to plan together?
- Political climate feasible? *(Slide 17)*

Broad scale of regional development *(Slide 18)*

- Local governments will continue to compete. It is the default position.

Boulder looks for tools to control growth somewhat outside city *(Slide 19)*

- Spokes of the Wheel
- Robinson case
- Service Area concept

- Boulder Valley Comp Plan – County Intergovernmental Agreement (IGA)
  - Multiple municipalities: Super IGA
- Fort Collins and others are following Boulder's lead *(Slide 20)*

Denver Regional Council of Governments (DRCOG) *(Slide 21)*

- Is an effort to bring together local governments to discuss land use decisions
- Controlling federal investments to promote uniform standards

Brookings Institute: Mountain Megas *(Slide 22)*

- Brookings identified five high growth areas in the intermountain West
  - Colorado's Front Range
  - Northern New Mexico
  - Arizona's "Sun Corridor"
  - Nevada's greater Las Vegas area
  - Utah's Wasatch Front

Lincoln Land Institute: Emerging Mega regions *(Slide 23)*

Both Institutes point to the need for *(Slide 24)*

> *Policies that support more compact, mixed-use development and reinforce its ability to reduce VMT, energy use, and CO2 emissions should be encouraged.*
> *-National Academy of Sciences, 2009*

  - Infrastructure investments at a broader, regional scale
  - Transportation planning as an opportunity to influence land use
    - Efforts can be used as an example for how to do water/land use planning on a regional basis *(Slide 25)*

Need more coordination, education, incentives (funding) *(Slide 26)*

- Governments "shooting low" in coordination of individual development with water resources
- We can do better. We have tools that can be used and sufficient knowledge of the interaction between land use and water.

Lorna Stickel, *Land Use and Water Connection in Oregon: Past Practices and Innovations*, City of Portland

Land Use and Water Supply Connection 1 *(Slide 3)*

- Vital, influence on growth, public health
  - Water supply is vital to urban settlement and migration, and urban water systems have been founded on public health concerns and adequate quantities to meet needs.
- Institutional divisions in land use/ water planning
  - Institutional complexity with water supply presents challenges. (Cities, special districts, PUD's, counties, state water right and other permitting)
- Turf issues between state and local issues

- Land use is often planned and decided independently of water supply planning and infrastructure implementation – turf issues.

Land Use and Water Supply Connection 2 *(Slide 4)*

- Water is only one of other vital infrastructure services needed to provide for growth.
- Lack of data about water resources is an impediment to including it in land use planning in many cases.
- Is there really a carrying capacity for development based on water?
- Rural and small water systems present unique issues, turf issues between state water right permitting and land use permitting.

Oregon Planning Requirements *(Slide 5)*

- Statewide mandated land use planning program since 1972
  - 19 Statewide Goals, water mentioned in many of them, but detail really only provided in protection of wetlands and preparing public facilities plans.
  - Not a lot of coordination in many cases between water supply and local land use plans, particularly when political boundaries are taken into account that bisect watersheds/groundwater basins.
  - The land use planning and permitting agencies are cities and districts; there are 277 of these in Oregon. Each one will direct their permitting processes a little bit differently.

Required comprehensive plans

  - Water as a growth control mechanism has problems – Oregon does not allow permanent moratoriums. Local Government is encouraged to find ways to manage growth, but not limit it.

- Lack of coordination w/ water planning
- Each planning agency addresses permitting differently
- At the time of issuance of building permit, must address water supply
- Public facilities plans required for >2500 for public facilities
- Annexation rules on absorbing water districts: difficulties in providing services
- Statewide water protections programs
- Challenges of statewide water management
- Political overlap
- water providers not willing to work w/ planners for
- Live actions plans
- Green building code (in process of revision)
- Major issue: decentralized water and wastewater systems relevant on individuals to maintain/ protect
- Transportation, Energy costs, Water: latter needs to fit into larger planning efforts

Mark Shively, *Water in Douglas County, Colorado: Past, Present & Future*

- Issues not limited to Douglas County
    - Reliant on Denver-based groundwater
    - Dependent on aquifers
    - 24+ water providers and individual wells
    - conflicts with Reclamation's 2025 plan
- Poundstone Amendment limits Denver growth to existing county (de facto)
- Denver water's role as regional water provider threatened by the veto for the Two Forks project
- South Metro Water Supply study identifying water supply, aquifer storage and reclamation
- Douglas County government
    - Land use planning
    - Audit of indoor/outdoor water use
    - Conservation plans for outlaying areas
- Douglas County Water Resources Authority
    - Public policy
    - 40% open space in perpetuity: conservation easements, national forests, etc
- South Metro Water Supply Board
- Making the best of regional water resources:
- Education programs (water ambassadors- high school, elementary school outreach)
- IGA w/ Denver Water, Aurora, S Metro, Reclamation
    - Grant from CO water conservation board to study IGA efforts
- Monthly dialogues with different stakeholders: Board of County Commissioners, South Metro Water Services authority, County, Douglas County Water Resource Authority
- Overview of why conservation matters: training and education efforts about importance, reasons for water conservation
- Special Districts: good for regional planning?
- State pilot study: rainwater used for water supply (infringement on water rights?)
- Larger perspective on watershed planning: expand definition of our watershed (CA example?)

Appendix B: Water & Land Use Planning Symposium Panel Presentation Notes (continued)

Western States Water Council 2009 Symposium

Water & Land Use Planning for a Sustainable Future: Scaling and Integrating
Red Lion Hotel, 4040 Quebec Street, Denver, CO

September 28th – 30th, 2009

Luncheon Panel: Two Sides Talking

Panelists:

Peter Nichols, Attorney, Trout, Raley, Montano, Witwer & Freeman, (moderator)

- **Chips Barry**, Denver Water and **Mayor John Hickenlooper**, City of Denver
- **Mark Pifher**, Aurora Water and **Mayor Ed Tauer**, City of Aurora
- **Eric Kuhn**, Colorado River Water Conservation District & **Greg Trainor**, Utilities Manager, City of Grand Junction

Mayor John Hickenlooper¸ *City of Denver*

When Douglas County or Aurora gets into trouble with a lack of water, it will affect the value of everyone on the Front Range. The tenor of the discussion has to be one of regional cooperation. We are so far down the road in how to save water in Denver. Chips said 2.5 years ago to me that we would drop per capita consumption by 2015 what had been a 50 year goal. And Denver now is on track to exceed the 2015 goal.

How do we talk about land use planning and have water experts at the table during our planning processes?

Denser development uses less water and less energy. Need to fully utilize our existing infrastructure.

Denver Water has removed 27 acres of blue grass in park system. Found resources to be more efficient in bonds – 27 million dollars to improve water efficiency. DNC was hallmark of water conservation. Today we use 28% less water being than in 2001.

The great battle is public sentiment. With public sentiment, nothing can fail. Without it nothing can succeed. Denver Water has won several national advertising awards.

Peter Nichols asks: What more can you do to foster a regional approach?

A: Ultimately, we are going to rise or fall together. Through many methods – technology, conservation efforts. Col-labor-ate (center of the word collaborate is "to work").

Chips Barry, *Denver Water*

Two sides talking – what are the sides?

- The haves versus the have not's
- The east v west
- Developers vs. environmentalists?

Still doesn't know but believes that two sides talking is the way we must precede. Need shared objectives: sustainable community, healthy environment, etc. If it is to put more money in private development, that is not a shared objective.

Density increase will decrease water per capita consumption. You densify urban development, decrease lower per capita but higher gallons per day per acre.

Denver is in a formal mediation with Colorado River District, Summit County, Eagle County, and Mesa County to settle a 50 year dispute.

- Denver wants certainty on Green Mountain reservoir, Wolford pump back, enlargement of Gross reservoir
- West Slope wants certainty on how much Denver will take from the West Slope
- The past 50 years have been endless litigation which has not served anyone well.
- West Slope is beginning to understand that having parts of the Front Range doesn't help any part of the state.
- The mediation is making progress.

In Metro area have Intergovernmental Agreements (IGAs) with Douglas County and Aurora to talk about how to share resources with each other.

- e.g., Denver has excess amount of reusable effluent. It can be used by Aurora in their pipeline and used by them or Douglas County.

Seeking to enlarge Gross Reservoir by 1800 acre feet of yield.

- Gone to Boulder County to see if they are interested in some of it and help pay for it. Yes, Boulder is.
- $8 million.
    - Denver will pay $4 million
    - Cities of Boulder and Lafayette will pay $4 million
        - For that they have storage rights in Gross Reservoir

Peter Nichols asks: What more can you do to foster regional approach?

A: We are going to work with Aurora and Douglas County and others up to the point that we will be responsible for their build out. We can take part of our water and share it but not so much that we take it away from the needs of our customers. Tells about running toilet advertising campaign and says "we're willing to share that costume!"

Peter Nichols asks: Greater state involvement?

A: We have no tradition or history here. Most of the knowledge about water treatment and supply is not vested in state government. Some history with agriculture but not with cities. It would work in Colorado if we ever built one of the mega projects (e.g., Big Straw) then you'd need state involvement in financing.

Greg Trainor, *Utilities Manager, City of Grand Junction*

Delph Carpenter quote on establishing ground rules and rights between parties. Greg advocates for a new compact: Using hb1177 process, establishing an agreed upon set of principles and how water should be shared and moved forward. 1177 process is important b/c you need a broad base of citizen support to deal with statewide solutions. One statewide solution is the CO river basin proposal and those will need to come back to the basin RTs. Need peer review of state water availability studies.

Need to examine the function of the CFWE and use them. Need to mold public thinking. Need story tellers that can boil down the technical data and make it understandable to the citizens so that they support it.

Need visionaries – Manhattan-style project. Need to be proactive, visionary.

Peter Nichols asks: On the west slope we often hear "not one more drop." What sort of regional cooperation is the West Slope willing to do?

A: As Water supply diminish, our view of the watershed changes. We do understand that the prosperity of the Front Range is the West Slope's as well. One of our principles is agriculture and non-consumptive uses are important and we see Round Tables embracing it. It is how the drops are developed and delivered – not one more drop.

Peter Nichols asks: Greater state involvement? Yes, if we believe in the state water supply analysis, then the gaps need to be addressed and the state will have to be involved.

Eric Kuhn, *Colorado River Water Conservation District*

Colorado water community needs a cultural change – but more than that, so do the other compact states. We all need to go through a culture change. We're at a place where the tools of the past will not work for the uncertainty of the future.

Two myths:

1. The water we think we have will always be there in the future.
2. The growth we experienced will always be there in the future.

Both are possible but there are all types of possibilities where one or both are not true.

Points out that growth may not really happen as we project. Gives example of Denmark. Cut out immigration, and we are not growing as much as we think.

Can run scenarios – many are likely to occur. Need to look at water like Las Vegas looks at slot machine payoffs. Need to have a surplus left over after all probable scenarios are taken into account. Commends Chips Barry.

It's how the drops impact the lives and livelihood of the Western Slope. The Western Slope cannot be a water farm for the East Slope.

Mayor Ed Tauer, *City of Aurora*

Ten years ago if we tried to have this conversation, no one was listening. But today is completely different. Ten years ago, Aurora required bluegrass to prevent people from putting rocks in their yards. Not today. A lot has changed in ten years. 2002 we had a 300 year drought and that spurred change. Primary driver in how Aurora thought about how they would grow. Xeriscape is promoted. Water efficient appliances. More than how we are talking together, we have changed the culture in this state. Denver says "Use only what you need." We say "Use as much as you can afford with our new water rights" (joke!!)

Conservation has become a culture change. But crisis fade in time. With a wet year, we can lose the culture change. Economic viability is connected to West Slope – a culture change.

Best gift we received in water and land planning was the drought of 2002. Now it's about partnerships. It's not the low flow showers or xeriscape – it's the new partnerships that can make lasting change in Colorado.

Peter Nichols asks: Does the support for regionalism extend to a compact or an agreement on how the water would be used?

A: The question is almost like how do we shackle you? But it should be how to we succeed together? How do we ensure there is plenty for us so we can help you and you help us? We only have seven Representatives and two Senators in DC. We only make progress by doing it together. How do we make sure everyone is better off by working together than if we do it on our own?

Peter Nichols asks: State involvement?

A: Our water resource people in the state of Colorado are great. But we don't have a tradition of Uber governments. I like the ability to talk face to face with partners in the Valley. Last thing I want to do is go to the legislature and lobby for our needs while the others are lobbying against it.

Mark Pifher, *Aurora Water*

City of Aurora has a comprehensive plan with a section on water and water resources development. Addresses water more general terms such as promoting regional partnerships. It doesn't get to the details on land use and water consumption/delivery. But we are engaged in water conservation activities. Close connection to how land is developed. It's not just the local impact on local lands in your community. It's also the cost of developing the water resource – agricultural impact, flows in basin of origin if it is a transbasin diversion.

Conservation includes: irrigation audits, xeriscape, vegetation requirements, educational center, aggressive tiered rate structure, study on reclamation and expansion, non-potable water for parks.

Prairie Waters Project: 34 miles pipeline that brings reusable flow back to the city. 90% of Aurora's water is eligible for reuse. This has been under utilized. Develop it minimizes need for transbasin diversion and agricultural transfers. This water can be used to extinction. Looked at a lot of different treatment technologies, including their own. The water that is available is of poor quality. The brine disposal issue is a major land use issue.

Leasing/fallowing. Aurora is a trend setter in interruptible supply arrangements. Very successful project from Arkansas Valley – brought water to Aurora and left $10 million in cash and infrastructure to the Valley. Truly "saved the farm" for many.

Platte River roundtable business plan on interruptible supply.

Water infrastructure supply enhancement partnership: WISE Partnership. Saves them in times of drought or Colorado River compact call allows them to use existing supplies.

Infrastructure is too expensive to do on your own. We have to partner.

What will cause people to change urban growth? The market place. Believes that given the cost of water due to scarcity and infrastructure to transport and treatment to make it potable – the cost to the consumer and developer's tap fees, that it will become self-regulating as the fees rise to reflect the actual costs.

Peter Nichols asks: Does the support for regionalism extend to a compact or an agreement on how the water would be used?

A: The compact concept is acceptable but the devil is in the details. How much water is allocated and how is it enforced (many water rights holders are not signatories to compact). The concept to agree on transfers is good. Agreements as to how to move it is here now. But it's how – IGAs, MOU? Prefers IGAs.

Peter Nichols asks: State involvement?

A: How you achieve it is a local issue. But financing role for the state for a large multi-purpose project is appropriate.

Audience Questions

Q. What is DRCOG's Metro Vision and Mile High Compact – is that working?

Mayor Ed Tauer: It is working but not doing what you want it to because it wasn't thought about as water. Rather, it was about contiguous growth (limit leap frog development). It was not designed to put water into land use plans. Believes it can be lobbied better at the local level.

Q. Where are the IBCC Round Tables going at this point?

Greg Trainor: Believes in the process. It is educating a generation. A compact can be an agreement on principles.

Chips Barry: The Round Table process has served a purpose and may continue to serve a purpose. But no Round Table or the IBCC has any authority – they can opine and educate and that is important but it is limited. The dialogue is valuable but just as the Round Table has no authority; none of these people have the ability to bind anyone else in this state so the intrastate compact can't work like the interstate compacts. The formalized compact idea cannot work.

Appendix B: Water & Land Use Planning Symposium Panel Presentation Notes (continued)

Western States Water Council 2009 Symposium

Water & Land Use Planning for a Sustainable Future: Scaling and Integrating
Red Lion Hotel, 4040 Quebec Street, Denver, CO

September 28th – 30th, 2009

Private and NGO Efforts

Panelists:

Dave Merritt, Senior Water Resources Program Leader, HDR Engineering (Moderator)

- *How to Plan for Water-wise Growth*. **Clark Anderson**, Director, Western Colorado Legacy Program at the Sonoran Institute.
- *LEED Standards for Neighborhood Development.* **Conor Merrigan**, Chair, LEED ND Interest Group, U.S. Green Building Council, Colorado Chapter.
- *Case Studies in Water-Smart Development.* **Drew Beckwith**, Water Policy Analyst, Western Resource Advocates.
- *A Developer's Perspective.* **Doug Scott**, Shea Properties.

Dave Merritt (moderator)

The session this afternoon is about NGOs, specifically on what sort of involvement can we get from NGOs terms of integration of land and water use.

Clark Anderson, How *to Plan for Water-wise Growth*

How do we get to the planning and design solutions to build water friendly communities? The discussion here today really recognizes the importance of the designed and built environments, and I am pleased to see the level of sophistication in the discussion today. My role today is to talk about the big picture.

Why connect water and land use? We are growing! Colorado will add about 2.5 million people from now to 2035. The Front Range alone will add about 2 million people, growing from 4,263,593 to 6,215,054 between 2010 and 2035.

We don't know for certain that we will grow this much, but we do know that we ***will*** grow. There is no no-growth scenario, and if you hear one it is really just a no action scenario!

All land, developed or not, is a watershed.

In a healthy watershed, you have healthy soils, vegetation, wetlands, etc. When you add human growth, you cap over the natural surface cover and reduce the natural capacity of the

ground to collect water. Water pools up on our streets and sidewalks and collects pollution and then washes into our streams and reservoirs.

As we plan for growth, we must respect and appreciate that there is always an impact to growth. The question is how to limit those impacts.

Most of our recent growth in Colorado is low density growth, or growth at the edge, but what we need is high density growth. Auto-oriented design, or sprawl, is what we must work to avoid. Low density patterns have higher water demands. Low density planning also has negative impacts on infrastructure needs, like longer transmission lines.

As far as water quality goes, the EPA recently did a study and found that high density scenarios had the best impact on water quality; much better than low density scenarios.

Improving development patterns and protecting the natural infrastructure: these are related! Some areas are not as suitable for growth—flood prone areas, riparian zones, ecologically sensitive areas,

A combo of strategies is needed:

- Water smart community design. Compact form, infill, redevelopment—these types of development are all about location! The power of infill and redevelopment is incredible—it's an opportunity to develop your community as well as conserve water and reduce pollution.
- Community form: compact form, mixed uses, walk-able design, transit-oriented development—these are all critical to good growth design for water use.
- Our building and zoning codes right now call for a low density growth design; they need to be retooled to encourage the type of development we want.
- Regional coordination: we can't achieve any of the goals we are talking about today without much better coordination between cities and counties, housing, transportation, etc.

Conor Merrigan, *LEED Standards for Neighborhood Development*

I am here on behalf of the US Green Building Council, and will focus on some of the nuances of how water works in the LEED system. The LEED-Neighborhood Development (ND) rating looks at things on a neighborhood scale. LEED-ND is a collaboration of the US Green Building Council, the NRDC, and the Congress for the New Urbanism.

The rating system has been through the pilot phase, and it will probably be passed by about mid November. Coming soon to a consultant's office near you! There will also be an associated professional designation for it in a year or so.

LEED-ND and Water: Smart Location and Linkage (SLL):

SLLp2: Proximity to water and wastewater infrastructure
SLLp4: Wetland and Water Body Conservation
SLLp6: Flood-plain Avoidance

SLLp6: Steep Slope avoidance
SLLp7: Site design for habitat or wetland conservation
SLLp8: restoration of habitat or wetland
SLLp9: Conservation management of habitat or wetland

LEED-ND and Water: Green Infrastructure and Buildings

GIBc3: Minimum water efficiency
GIBc3: Water efficiency landscaping—50% reduction

Examples:

Washington Village Cohousing—Boulder (http://washington-village.com/). They are looking at a silver or gold LEED designation. Depending on how much of the property can capture stormwater, you can gain points on your LEED rating.

The Geos Development in Arvada (http://discovergeos.com/) is doing a lot of things right. Infiltration spreaders, percolation parks. They did a nice job of blending civic water uses with storm-water retention.

Drew Beckwith, *Case Studies in Water Smart Development*

Western Resource Advocates is releasing a new report this week called *New House, New Paradigm: How to Plan, Build and Live Water Smart* (http://www.westernresourceadvocates.org/water/newparadigm/NewParadigmReport.pdf). It looks at the integration of smart planning, green building, ongoing programs, and existing developments provide case studies.

There are water-smart developments in

- Stapleton, http://discover.stapletondenver.com/
- Daybreak in Utah, http://www.daybreakutah.com/#
- Sterling Ranch in Colorado, http://sterlingranchcolorado.com/

Civano, Arizona: This is a city oriented effort. IMPACT System, energy/water reports, specified plant list, alternative supplies (reclaimed water, cisterns , etc). Civano is extremely aggressive in solar energy and extremely stingy in water use. They required people to track annual water needs. Civano is using 30-40% less water overall than Tucson. It is the peaks of water use that drives utility infrastructure needs, so keeping those peaks down is important. For more information see http://www.terrain.org/unsprawl/5/ and http://www.civanoneighbors.com/

Southern Nevada Water Authority (SNWA) Water Smart Homes: partner with Southern Nevada Home Builders Association (SNHBA), community scale, indoor and outdoor requirements. Required to build whole neighborhoods of water smart homes. The water smart homes had significant reductions in the summertime peak load. For more information see http://www.snwa.com/html/cons_wshome.html

Oshara Village, New Mexico (http://osharavillage.com/). This project was held to very strict water requirements, so they did a water budget approach. They have small lots, and there are strict restrictions like no potable taps on the outside of homes. On site wastewater treatment. Not surprisingly, their water use is pretty low, around half of what's used in the Santa Fe area.

Take home messages:

- Land use planning = new water supply.
- Holistic integration required.
- Water/land use planning is feasible and desirable.

The report is available at http://www.westernresourceadvocates.org

Doug Scott, *A Developer's Perspective*

Fish need water every day!

I work on the property side inside the Coty and County of Denver. Infill is very expensive! You need community meetings, rezoning, planting, etc.

There is a great deal of parity in the cost of living in the fast growing Front Range counties.

A $35 million office building gets a 29% assessment, and then that is taxed by the mill levy.

Metro area schools: there are 250,000 kids in schools. As long of school systems want to expand their boundaries, people will put houses in there. It is a huge incentive to be in a school district in the Denver metro area.

Median Family income: the Front Range is about 50,000 per year (2007).

All costs that developers incur are passed thought to the homeowner. $25K of improvements costs more than the water before the improvements costs, so there is very little incentive to make improvements.

Space is cheap; people are expensive! Corporations don't spend a lot of money on water. However the home water bills of the people who work for corporation is very expensive, so it is a factor.

In Denver: 21% of our houses were built between 2001 and 2008.

What developers want in new rules is consistency across multiple markets, lead time, incremental steps, and realistic regulations. We don't mind regulations as long as they are consistent!

Audience Questions:

Q. Have there been reevaluation of LEED projects?

A lot of projects modeled to be at code are not even meeting energy star. This is an ongoing question in LEED development. The existing building operations and maintenance rating system

is where some of these problems can be addressed. For ND, it's the performance metrics we'll be looking at. The single biggest way to measure is in reduction of vehicle miles traveled.

Q. How do you see volunteer efforts at being successful at water and land use planning?

It is a big challenge. As individuals we can only do so much. At the broader level of encouraging conservation at the utility or local government scale, if the incentives are put in place correctly, we can do that. Mobilizing communities is a good idea. Pubic engagement is really critical. We can't do what we're trying to do without making it matter to people. Engaging the public and getting them excited about these things is a big challenge—it's kind of wonky.

Q. How do we accomplish regulatory consistency?

Local governments with different regulations create an incentive for developers to shop their plans around. That is a real problem because it causes a race to the bottom. Our zoning codes make it hard to do the good thing. It makes it tougher to build sustainable projects. Going from one community to the next there will be different elements in the codes. It is very frustrating for developers. There are reasons why codes vary, but in many places communities are trying to encourage the right kind of development.

Q. Infill verse new development: is it really more expensive to do infill than new development?

Give developers a standard across the state or the Front Range for water need! It is expensive to figure out what each community needs.

Q. Water quality issues associated with graywater use?

None of the developments discussed today had graywater quality issues. All states tend to make it too hard to do graywater, which means that almost all graywater systems are under the legal radar. However, having illegal graywater systems is a big opportunity for water quality issues, so we might want to think about making it easier to do graywater, so we can regulate it better.

Appendix B: Water & Land Use Planning Symposium Panel Presentation Notes (continued)

Western States Water Council 2009 Symposium

Water & Land Use Planning for a Sustainable Future: Scaling and Integrating
Red Lion Hotel, 4040 Quebec Street, Denver, CO

September 28th – 30th, 2009

Cooperating Across Scales: Local, County, Region and State

Panelists:

Barbara Biggs, Governmental Affairs Officer, Metro Wastewater Reclamation District in Denver (moderator)

- *Local Land Use Planners' Role in Assuring Sustainable Water Supply*, **Graham Billingsley**, Principal, Billingsley Consultants; and Commissioner on the American Institute of Certified Planners.
- *Sustainable Community Development in Colorado: Linking Land Use and Water Planning*. **Andy Hill**, Colorado Department of Local Affairs.
- *HB08-1141: Development Permits*, **Representative Kathleen Curry**, Colorado General Assembly.
- *Special Districts,* **Tom Grimshaw**, of Counsel, Grimshaw & Harring.

Graham Billingsley, *Local Land Use Planners' Role in Assuring Sustainable Water Supply*

Communication is key: how to communicate and who to talk to in the planning process

Sustainability has been a historical theme of planning but can come across as "preachy" to some people

- Urban design in Greensboro: how to make sustainable as well?
  - Staff meeting: no issue, all the water you need (construction of reservoirs, not resolving root issues)
  - Need to talk about what sustainability means

Because they work with various stakeholders across a variety of issues, planners

- Can act as facilitators for communication and to bring ideas together into cohesive visions.
- Are in a position to understand problems holistically -- all aspects

However, planners are generally ignorant of the water issues in their communities, aside from comprehensive plans, and unaware of watersheds as they relate to agriculture, forests, ranchlands, changes in watershed land use and effects on water supply

Comprehensive plan can work to bring disparate elements together:

Areas for:

- conservation
- development
- preservation

The reality is that cities need growth to become sustainable

With water supply, consider the pollution threat: point, non-point, habitat protection

Planners work for communities and generally don't think of the regional perspective

Consideration of problems upstream

Water planners are in a better position to understand regional effects, but communication does not always go through to everyone who needs to understand issues. This is a critical communication gap for fast-growing areas such as the West

Best management practices for a region must be pursued but how do you start a dialogue?

Enforcement through a watershed approach to water planning has made many officials more aware of impacts of development and land use on water supply

Implementation strategies include:

- Riparian buffers
- Storm water management
- Nitrate regulation
- Zoning flood plain land-use controls

We need to encourage:

- compact development
- new parks to mitigate:
  - social spaces
  - impervious mitigation
- more efficient use of water
- smart development and smart growth needs to be part of practice, not just lexicon
- capital improvements: assure that they won't threaten existing supplies, design sensitivity in transportation, development

Open space movement started in 1860s: concern for light and open space for citizens

- Also important as a water resource
- Not enough money for open space projects
- Current recreation emphasis in conservation projects

Communication: no actor can work on water issues alone, no matter how competent

We need to find the best way professionals can engage citizens in serious discussions

- advantage in planning issues: popular press is picking up language of sustainability, understanding of broader issues, potential for education
- Look at political agendas: figure out how far you can go, how much change you can

make
- (Easier after communication and coming together with a single voice)

Andy Hill, *Sustainable Community Development in Colorado: Linking Land Use and Water Planning*

Planning commissions: providing window in to local governments and their needs/perspectives

Strong tradition of local control in Colorado will influence solutions reflecting local culture

No state land use plan, no comprehensive state database of land use

Communities evolve and find their own ways to plan: public sentiment important in creating plans

Danger in thinking of single solution for the whole state: won't fit everywhere, can't impose.

Absence of state mandates: communities innovate with enabling and pressure to come up with solutions: DOLA attempts to nurture innovation w/ information, technical and financial assistance

How does DOLA invest?

- Mission to strengthen Colorado communities and their needs/wants
- Has funded water efficient landscape design code (said to be Front-Range specific but West Slope communities creating list of plants appropriate for them)
- On website are county and municipal codes

Planning: potential to build support, dependent on community support and input

- Many communities do urban growth/service area agreements (IGAs)
- Regulation: taking to next step: cluster zoning, annexation policies need to be better considered Green building programs
- Many local plans do not add up to regional solutions

Important to promote regional solutions that will last and have greater impact

IGA examples:

- Clifton Water District and Lincoln County IGA
- Pueblo Metro Districts: appropriate development and how to provide services

Changes in development patterns, how we live, need for education:

- Initiatives
- Changing behaviors
- Making it meaningful for general public
- Make green development more affordable

Individual effort

Sustainable Community Development

Focus on what communities say they need

Broadening focus to include sustainability

Formalizing partnerships

Solutions teams

Leverage funding, funding cycles: how to better for community needs

Partnerships and coordination in sustainability context

Way to consider making grant criteria fund projects that are more sustainable: so it works for counties across the entire state

Partnership with Governor's energy office

- Energy grants program: required to form regional partnerships
- hard to develop projects, and contracting projects
- helped to fund/ create partnerships at the regional level

Energy efficient, transportation, public health

New state construction must meet sustainability standards

- DOLA can assist in implementing high-performance specifications

Sharing best practices, having all the resource that communities need to get through sustainability process: can be overwhelming for communities

Submit good models to DOLA office: www.dola.colorado.gov/sustainability

- thinking more carefully about investment decisions
- facilitate regulatory solutions
- inform communities about projects across the state

Kathleen Curry, *HB08-1141: Development Permits*

Adequate water supply for development

Local government shall not approve application for development unless application demonstrates water supply is adequate

Improving communication between localities and water suppliers

Local control: strong influence in state

Colorado Municipal League: very powerful actor in state government represents local governments

Different jurisdictional district requirements here to stay: opposition to uniform standards for water management

Bill: basic communication between water suppliers and development/approvers

Some municipalities have to duplicate communication under bill: inefficient process

More workable process: special districts

- weak link in process but major player
- must contend with special district being part of the system
- don't always have a direct link to the county government

Whole water supply in hand? Build-out timetable

Statutes for counties: had to send to state engineer in Denver

- Required to reply to county w/ assessment of water supply adequacy

Bringing municipalities and special districts into fold

Hard to document effects of bill

Pagosa Springs/Archuleta County:

- town council offering vested rights to increase revenue w/o consulting water suppliers
- water district obligated to supply denser development into the future
- unsure that water supply can meet needs
- lack of communication between supplier and city council (bill requires)

Big picture (opinions):

Tax policy major driver in water policy implementation

- Municipalities reliant on sales tax and property tax revenue: have to keep getting more with increasing public services: have to approve additional development for additional revenue
- How do municipalities meet those needs/service requirements?
    - TABOR (1992): elimination of real estate transfer tax
    - Helpful to supplement sales tax revenue
    - Not enough tools avail to deal with needs of constituents

Private property rights; major factor in municipal development and water development

35-acre exemptions: not amendable, considered as a right by property owners

Vested rights: hands are tied because zoning rights set that people are relying on (inflexible) creation of incentives when changing

Water supply: Balancing agricultural producers needs (municipalities competing with developers for right to use water)

Big factor: manner in which appropriation system works: strict in Colorado ownership of rights challenge

There is a role for the state because the state is involved in helping communities deal with adequacy of water supply (need resources):

- helping small towns without engineers, professionals on staff

Many counties dependent on government help to determine suitability of water supply

- State should be part of the conversation

Future: incentive-driven process respecting local control will be more effective than top-down approaches

How to take to next level:

- How can state government help local officials?
- State should not stand in the way, but provide financial, technical assistance

Tom Grimshaw, *Special Districts*

As of September 21, 2009, there were 1872 special districts in Colorado

- 200 water or water/ sanitary districts
- 18 metro districts: can provide more than one service

Water significant function for many special districts in Colorado

Relationship of special districts to land use:

- No district can be formed without consent of city or county
  - Must submit service plan: plan for infrastructure necessary to provide water, physically possible to provide water

Gunnison example: independent engineer to assess, lawyer for ordinance for adopting service plan

- Knew the right questions, now what they were doing, fully informed

No special district in Colorado has any land use power whatsoever:

- No reference in statute that enables them to have that right;
- Special districts per se should not constitute impediments to city/county comprehensive plans

Why are there so many in Colorado?

- Economics: special districts efficient in achieving objects and relatively inexpensive compared to alternatives in funding infrastructure
- No tax exemptions for ordinary funding mechanisms, but in special districts, tax incentives for investing in infrastructure (ad valorem tax)- costs subsidized by government
- Cities/counties restricted from other funding mechanisms because of TABOR
- Under this environment, special districts have thrived

Appendix C: Water & Land Use Planning Symposium Table Discussion Notes

Western States Water Council 2009 Symposium
Water & Land Use Planning for a Sustainable Future: Scaling and Integrating
Red Lion Hotel, 4040 Quebec Street, Denver, CO
September 28th – 30th, 2009

State Efforts Panel Participants

Alex Davis, Assistant Deputy Director for Water, Colorado Department of Natural Resources (moderator)

- *Coordination of Land Use Planning and Water Supply Planning: The California Experience.* **Roderick Walston**, Best Best & Krieger, LLP, Best Best & Krieger, LLP
- *Arizona Ground Water Management/Assured Water Supply Subdivision Requirements.* **Sandy Fabritz-Whitney**, Assistant Director, Water Management, Arizona Department of Water Resources
- *Water and Land Use Planning in Washington State.* **Brian Walsh**, Department of Ecology, State of Washington

Discussion Questions:

1. If you could be "Governor for a Day" of your state, *what role would you want the state to play*? Facilitator? Enabler? Educator? Regulator? Etc. Be specific.
2. Considering the culture, budget, institutional structure and what's already happening in your state, *what role(s) are realistic*?
3. For your state, *what are the barriers* that hinder integrated water and land use planning?
4. *What are the next steps?*

Table Facilitator: Tom Iseman

Table Attendee Affiliations:

- Wyoming SEO
- Park County Water Preservation Coalition
- Wyoming State Engineer's Office
- Pikes Peak Regional Water Authority
- New Mexico State Engineer's Office
- Local Gov Muni Waste Water
- DOI Bureau of Land Management

1. What role would you want the state to play?

- WY: Facilitate/enable: Need state to play a more active role for smart growth, empowerment, don't dictate from on high.
    - Prior appropriation is regulation – so water adequacy shouldn't play in
    - As new people move to the West they need to be educated in laws and practices

    - Each community own approach
- NM: State should be regulatory, local authorities only look at themselves
    - We need to consider impacts, otherwise everyone wants it all – it's competition
    - Locals don't have "statewide vision"
- Respect local autonomy. State could provide a vision though.

2. *What role(s) are realistic?*
    - Resources and budgets are limitations, you can't enforce all water quality laws for example
    - Cultural change in office, need it at grassroots level too, and with citizens and local planners, they haven't embraced
    - Agricultural community needs to be on board

3. *What are the barriers?*
    - No true exchange, transfers
    - Focus on after development
    - We have an asymmetrical vision –
        - focus on water decision-making
        - Waste and land use are forgotten
    - Politics:
        - Planning is a waste of time, politicians don't see value,
        - too much frontier mentality, libertarianism,
        - tax dollars and development lobby as a political focus

4. *What are the next steps?*
    - More to Wyoming
    - Buy guns (pearl handled)
    - Convene stakeholders, but consensus to develop political will.
    - Not just land and water – environment and agriculture too

Table Facilitator: Andy Hill

Table Attendee Affiliations:

- Professional Water Association
- Water Consultant
- Professional Engineer
- Colorado State Government
- Chatfield Watershed Authority

1. *What role would you want the state to play?*
    - Educator – data gathering and disseminating, single most important role
    - Enabler – facilitate and regulate multiple roles (2 people agreed)
    - Have to start educating first
    - Would mountains have developed as densely if people knew water issues?
    - Concern about losing agricultural land
    - Education and enabling most important
    - Need data to make informed decisions

2. *What role(s) are realistic?*
    - Facilitator – when would we stop growth? Don't know if you can. Part of the human condition. Water sustainable system for each house. Didn't work because of access to remote houses.
    - 2002 Drought – public significantly reduced consumption. Lots of inefficiency in current systems. What about line leakage? Leakage in pipes?
    - Economics – will become too expensive to live here due to shortages or inefficiencies. Look at Boulder for example for trying to control growth – not good!

3. *What are the barriers?*
    - Egos
    - Prior appropriation
    - Competition
    - Reactionary, not proactive
    - Metro round tables – if they can follow through, need action.
    - Have a surplus of storage, but shortage of integration. Role for development community to be responsible
    - Elected officials need political cover to make hard choices

4. *What are the next steps?*
    - (blank)

Table Facilitator: Adam Greenwade

Table Attendee Affiliations:

- City of Boulder Planning Department
- University of Colorado - Denver
- Clear Creek County Planning Department
- Water Engineer
- Bureau of Land Management
- Private facilitator
- SGM

1. *What role would you want the state to play?*
    - Role in all – can't be dictatorial, but in many cases need regulatory or legislative changes. But need to be aware of what needs to be done
    - Interesting that many states say you need to prove that you have water, but states only come close to that threshold. The strength of the developer lobby is one explanation. The challenge is proving physical water
    - State of Colorado plays a role in providing info to counties and cities. Local control is a given for land use plans, but the question is how the local governments use that info
    - HB1041 gives counties authority to make plans on issues of state interest
    - County commissioners in Colorado are concerned that the State Engineer's office will say there is enough water, but they are concerned that the data isn't clear enough.
    - State needs more facilitation, needs to do a better job of getting out there and talking with local governments about what they are doing

2. *What role(s) are realistic?*
    - States need a lot more funding and resources to provide adequate data to be the info provider.

- Would they be more of the clearing house (from universities and others)
- States could convene those throughout the state of Colorado who have to enforce the current regulations like the Curry bill. What help do they need from the state? What do they know about the bill? How could data be shared? Real need to get together
- Does the design/institutional structure of the state in terms of what we must do – Colorado as an enabler? But much coordination is needed
- Local government perspective – set up in the west for most local governments is for competition between governments. How do we change that? State needs to give incentives through coordinated funding based on willingness to engage in best practices and coordination. Not just planning money, but big infrastructure dollars

3. *What are the barriers?*
    - What could the state do to change the sales tax allocation? State law changes (e.g. Wyoming changed its law to allow the state to reallocate)
    - Coordinated funding
    - Lack of dialogue
    - We don't have a Colorado land use commission anymore – full impact of 1041 can't be realized.

4. *What are the next steps?*
    - Help local governments understanding and communicate with one another and with the state
    - Dialogue – basin roundtables with local governments. We think that the IBCC should ask the roundtables to take on this issue at the regional level (not coordination through more state government)
    - Figure out how WY handles its sales tax and consider tying allocations to local planning

Table Facilitators: Peter Nichols and Dennis Gelvin

Table Attendee Affiliations:

- Park County Water Preservation Coalition
- Planning Program Manager for Arapahoe County
- Eagle River Water and Sanitation District
- Watershed Program Coordinator for Jefferson County Water Conservation
- Upper Gunnison River Water Conservancy District

1. *What role would you want the state to play?*
    - All agreed that regulator was the least desirable
    - Enabler was seen as most desirable and the states help should include:
        - Providing education for all local entities, as well as support in planning efforts so that all have the same resources to deal with the issues that arise
    - Important decisions on water use should be made at local level within the legal framework governing water rights

2. *What role(s) are realistic?*
    - Western slope is willing to work with front rage on water supply issues, but there is a strong concern that the west slope will end up with too little

- Roundtables effective in helping watersheds and regions gain understanding of other regions issues, very helpful should remain independent
- Currently state has some programs that help in the development of water storage, but in other issues the state is not open to creative solutions, to optimizing beneficial uses, protect the environment, reduce energy uses related to water supply, and enhance stream flows
- Is it possible for the state to change its culture and institutional structure to meet strategic goals? We hope so!
- Participants expressed a distrust of the state regarding water issues, and views the state as wanting to take the West Slope's water to the Front Range. Note however that each participant stated they were willing to work with the front range to meet the needs of the state

3. *What are the barriers?*
   - Inherent disconnect between land use planning which is managed at local level and water use planning which is managed by water providers and overseen by courts and state administrative offices
   - Why do regulators that try to tie land uses and water supply have short time frames for proof of adequate water supply? e.g. 40 years or 100 years. Seems like a long period of time, but what happens when it expires. There is no time frame on land use, so why on water?

4. *What are the next steps?*
   - Groups suggested legislation that would tie land use and water supply plans
   - More discussions with stakeholders

Table Facilitator: Dave Merritt

Table Attendee Affiliations:

- Upper Gunnison River Water Conservancy District
- Water Consultant
- Municipal water provider
- US Geological Survey
- Colorado Department of Natural Resources

1. *What role would you want the state to play?*
   - Facilitator:
     - Currently the state can't reach out and do things.
     - Participation on AG committee, IBCC, etc.,
     - Colorado is on the right track
     - Statewide solution doesn't always fit every community: need local planning and participation
   - Regulator
     - water planning with public interest in mind
     - not always prior appropriation
     - Physical water – not paper water
     - exempt wells causing huge issues e.g., shutting down local producers
     - transportation planning – local basis needed
     - Funding for SEO/DWR – local planning hinges on regulation
     - top down control does not work

2. *What role(s) are realistic?*
   - Larger planning effort
   - need more focus than roundtables provide
   - facilitate open community discussions
     - more facilitated discussions, more local communities involved
   - more data needed – state assist in data collection
   - BMP's for planning and regulation
     - support for technical role
   - develop and demonstrate – 100 year plan

3. *What are the barriers?*
   - policy and legislation
   - special districts – no commitment to availability of water
   - regional planning needed
   - responsible communities and districts
   - need long term commitment
   - need incentives to get people to look at issues, statutes, and legislation
   - economics

4. *What are the next steps?*
   - Policy and legislation

Table Facilitators: Wendy Sullivan and Lyn Kathlene

Table Attendee Affiliations:

- Colorado Water Conservation Board
- Western Resource Advocates
- Denver Water
- Portland Water Bureau
- Bureau of Reclamation

1. *What role would you want the state to play?*
   - CWCB repository of information: to local governments – can assist in planning, tools, financing
   - Policies promoting growth and water supply – at what point to do? How integrated? State is not responsible for hard decisions
   - Be more directed on water supply priorities of use
   - State Water Plan is needed: we want to have our cake and it, too. Need to call those on it.
   - Can state have plan to restrict growth based on water availability?
   - Information and coordination
   - SWSI: Where are people trying to claim the same water in their supply plans? Projected 20% deficit without taking into consideration multiple counting of same projects/supplies.
   - Water court system – third party interests to be heard
   - State should:
     - have an obligation to be a repository of data
     - facilitate water planning
     - flexible on prior appropriation system
     - growth control based on water is hard but must be addressed

2. *What role(s) are realistic?*
    - Separation of institutions: water districts, water utility districts, and land planning. Decisions made separate from each other
        - water provider: develop more water
        - land planners: developments need water
        - both point fingers at each other for not considering each other
    - Revenue sharing needed – better coordinated growth: economic v water fight
    - Water suppliers want more customers: have a duty to serve
    - Counties need support to say "no" if water is not available
    - No forum to integrate water and land use planning
        - need to change structure of how both groups work – what would that look like?
    - Political suicide not to support growth and not to support improvements to environment – yet, these are at odds with each other
    - Price of water is too cheap; varies by community
    - State roundtables are an example of "marrying" diverse interests but just on the water side. Imagine how long the process would be if land use were also included.

3. *What are the barriers?*
    - (blank)

4. *What are the next steps?*
    - (blank)

Table Facilitator: Beorn Courtney

Table Attendee Affiliations:

- Colorado Water Conservation Board
- City of Greeley
- Attorney
- Montana Department of Natural Resources
- Upper Gunnison River Water Conservancy District
- Western Governors
- State of Washington

1. *What role would you want the state to play?*
    - (none listed)

2. *What role(s) are realistic?*
    - More strings to funding could be a good start but bigger entities do not seek funding
    - Even water rights acquisition could be tied to certain standards
    - Default when crisis hits is to look to the state
    - Could provide more funding to local entities for desired planning
    - Would be helpful to have regular meeting of head water officials
        - but not too big
        - large entities must come to agreement
        - Governor's involvement would help

3. *What are the barriers?*

- Homebuilders and Realtors lobbies
    - Montana is targeting them with water education
- Divisive history and attitudes

4. *What are the next steps?*
    - Better Funding at the state level
    - Engagement with current planning/management structures
        - e.g., IBCC roundtable process in Colorado
    - Kathleen Curry bill requiring disclosure of adequate water supply

Table Facilitator: Eric Hecox

Table Attendee Affiliations:

- Aurora Water
- State Senate
- Southwestern Water District
- Conservation District
- Rangeview Metro District
- US EPA-Region 8
- Colorado River Water

1. *What role would you want the state to play?*
    - Difficult to follow California – overlay of public trust doctrine.
    - State can be more of a facilitator – leave decision-making at local level
    - State advocacy for broader issues, e.g., funding, political support
    - State education role, e.g., water law education at local level
    - Consistent requirements, e.g.,
        - for adequacy of water supply – like Arizona
        - Procedural floor – required at local planning level

2. *What role(s) are realistic?*
    - What is current "procedural floor" in Colorado? What procedures do we have, what hinders further collaboration of land and water planning?
    - 1041 show steps that should be taken but didn't dictate details
        - Engineering perspective needs to be expanded with longer
    - Difficult to get through water supply planning process now
        - Current situation encourages things like avoiding Federal nexus – get "most likely project to make it through the process" instead of "best" project.
    - Strengthen CO statutes for coordination of permitting process
    - Current statute – CWCB statute – state oversight is looking at federal, state, local permitting regulations but doesn't seem to be used. Really an opportunity to better coordinate across permitting regulations.

3. *What are the barriers?*
    - (blank)

4. *What are the next steps?*
    - (blank)

Table Facilitator: Gary Barber

Table Attendee Affiliations:

- Western Slope county commissioner
- Home Builders – statewide trade association
- U.S. Forest Service
- EPA
- Rocky Mountain Farmers Union
- Non- profit

1. *What role would you want the state to play?*
   - Regulator:
     - merge regulation of quantity and quality
     - more than a state plan – need regulation aka CEQA with courts involved
     - need for some authority to make "things" happen
       - create dialogue
     - tax incentives for water conservation
   - Educator
     - Governor should be educating folks about what tools are currently in the toolbox, and what statute & regulations already exist is important
   - Integrator
     - Merging regulation with education to assist in development of future water supplies – management of AG dry-up, food security, transportation, and energy needs. From better understanding comes better regulation
   - Facilitator/Enabler
     - promote more meaningful water conservation
     - support more focused discussion at roundtables to identify real gaps.
     - develop decision support tool for water allocation & growth management
     - Governor to push legislators on round tables to create better legislation

2. *What role(s) are realistic?*
   - Educator – Facilitator – Enabler
     - Required start to better engage and inform; create better understanding of what is already available; what tools exist; evaluate and characterize "gaps" and consequences of actions (e.g., Ag-dry up), etc.
     - From this effort (which can be shared by the state and its many partners – public & private), better legislation can be developed to regulate and "manage" (or is it direct) smarter growth

3. *What are the barriers?*
   - (blank)

4. *What are the next steps?*
   - (blank)

Table Facilitator: Priya Gnanasekaran

Table Attendee Affiliations:

- City of Grand Junction, municipal water supplier
- Colorado Water Conservation Board
- EPA
- Eagle River Water and Sanitation
- Colorado Geological Survey

1. *What role would you want the state to play?*
   - Oversee
   - Gather
   - Coordinate
   - Clearinghouse
   - No environmental statewide policy in Colorado.
     - CA, AZ, WA – was there a crisis that caused statewide involvement or was it good planning so it was successful or just expensive?
     - Has policy/statutes reduced litigation? Provides answer earlier to determine success/failure of project
     - Does planning that have teeth avoid litigation?
   - How can Colorado learn from their mistakes? What would they do differently now based upon history?

2. *What role(s) are realistic?*
   - People currently are comfortable with the status quo
   - Colorado has significant government lands with no control
     - There is no federal or state process
       - USFS, BLM
       - US Government policy continually changing
     - There is no local process
     - What is "acceptable" environmental damage?
     - How adequate is today's science as it relates to 100 year planning
       - Where does drought/climate change fit in? The Wildcard.

3. *What are the barriers?*
   - (blank)

4. *What are the next steps?*
   - Comprehensive study(ies) before reservoirs are built.
   - Who decides risk: local, state, federal
   - Capture earlier and quicker run-off to store water then decide how it will be used.

Table Facilitator: Clark Anderson

Table Attendee Affiliations:

- Northern Water
- Colorado Attorney General's Office
- Colorado Springs Utilities
- Park CO Water Pres Coalition
- Clear Creek County
- Sonoran Institute

1. *What role would you want the state to play?*

- Try to be truly comprehensive, including land, water and others such as transport, energy, security, etc.
    - facilitate education on role or meaning of comprehensive
- Extend to include regional perspective, e.g., Brian Walsh's remarks on water budget at a regional level or watershed level. HB1177 may be an appropriate model using a "carrot and stick" approach.
- Perhaps a 20 year horizon analytically, but longer term vision.
- Cooperate intergovernmentally
- Facilitator and Funding mechanisms. Top down approach. CA model included funding within broad constraints.
- Top down state role as a regulator okay so long as it doesn't stifle discussion and collaboration between water management and development agencies.
- Is water law being truly created by the people or by special interests and lobbyists?
- What is the role of population centers (municipalities) in defining amount of water used state-wide?

2. *What role(s) are realistic?*
    - Consistent data (as facilitator)
    - If each agency is planning for high growth scenario, state can play role of consolidating, regionalizing and "truthing." For example, will the final total be the sum of all the parts or will it be some other number if integrated?
    - Perspective from other states (CA, UT, OR), the roundtable process is a positive step in the right direction

3. *What are the barriers?*
    - Fear of having others know the value of your asset
    - There remains significant administrative and technical hurdles or issues that need to be refined or resolved
    - Getting some agreement on risk management when a wide range of risk tolerance and risk profiles is currently being managed separately.
    - Local develop, decisions will roll up to regional impacts.
    - While some watershed management organization have developed around the state that have some role in land use planning, the ownership, responsibility, and duty to serve (water supply) remains financially and politically with municipalities and water districts.

4. *What are the next steps?*
    - (blank)

Table Facilitator: Nathan Thompson

Table Attendee Affiliations:

- EPA
- CDM Consultant
- Northwest Colorado Council of Governments
- Lake City town manager's office
- Northern Water
- Bureau of Reclamation

1. *What role would you want the state to play?*
   - Regulatory & Educator
     - set up broad based policy boundaries for local government
     - Incentive based to get local governments to achieve smart growth principles
   - Facilitator & Educator
     - provide leadership and education for local governments/providers
     - work with state agencies to educate local government leaders (who are usually newbies that lack understanding of these issues)
   - Coordinator
     - look at statewide land use by reviewing local land use plans. Help with some planning at local levels.

2. *What role(s) are realistic?*
   - More federal involvement in conveying regulatory issues governing local government water planning projects

3. *What are the barriers?*
   - Institutional
   - Small town politics – local political culture governing and not wanting change
   - Need more political will – drought years a reminder that water supply planning 20-30 years out, local planning is shorter planning horizon

4. *What are the next steps?*
   - (blank)

Table Facilitator: Gerry McDaniel

Table Attendee Affiliations:

- Aurora Water
- Upper Gunnison River Water Conservancy District
- JCD
- BHFS
- Action 22
- Metro Roundtable
- City of Aurora
- Water Awareness and Responsibility Programs

1. *What role would you want the state to play?*
   - Governors' capabilities are limited but the governor has to be able to perform all of the above roles.
   - more detailed watershed management – the state needs to take a strong role in developing watershed data
   - limit city growth
     - establish gallons/capita in house use
   - stop issuing permits for over appropriated basins
   - does water dictate growth or does growth dictate water use??
   - cities and counties must work more the same way
   - the state must be a driving force

    - first make it something you consider and then eventually make water the driving force behind development, planning and implementation
- work with other states to develop national water protection planning
- DOLA increase efforts to educate and encourage regional planning in rural Colorado

3. *What are the barriers?*
    - (blank)

4. *What are the next steps?*
    - (blank)

Table Facilitator: Tim Murrell

Table Attendee Affiliations:

- Federal government
- State legislators
- Private sector
- Municipal water supply

1. *What role would you want the state to play?*
    - Federal perspective
        - If state doesn't do it, Feds will. Since state doesn't have data and coordination, Fed regulatory ends up picking up "herding" the locals or states. A statewide framework would help bring everyone together
    - Observer
        - Some state demonstrate "leadership"
            - North Dakota best organized, cooperating, communicating state
            - Nevada – no state organization or leadership.
            - It's better if state takes leadership role
        - There's a need for state standardized data collection. Cities don't have staff to collect or analyze data. State needs to provide resources to the effort.
        - Implementation
            - Follow through with that leadership

2. *What role(s) are realistic?*
    - Water is a valve we all share. Why wait for building codes to make water conservation happen?
    - States may not need to dictate but it would help for them to organize…at least for the sake of coordination
    - Water does not follow political boundaries. How about shifting mentality to look at larger watersheds. Establish large watersheds as the coordination.

3. *What are the barriers?*
    - Hydro/political boundaries
    - People responsible for water/land use at local level
        - economics drives process…water is secondary
            - economic factors/water thinking need to "mesh" better
        - a regulatory link in current times and in future
        - barriers are the lack of state involvement, leadership, coordinating

- politics is the barrier, short election cycles
  - we keep having to "re-educate" commissioners or decision-makers

4. What are the next steps?

- If state does coordinate or organize, Feds need to interact but with the understanding that regulatory is reactionary
- States need to force Feds and locals to come together

Table Facilitator: Quinn Lung

Table Attendee Affiliations:

- Colorado Water Conservation Board
- Colorado River Water Conservation District
- Tri-County WCD
- Pueblo Water Board

1. What role would you want the state to play?

- Facilitator
  - many basin programs going already
- Educator
  - use bully pulpit
- Regulation is a scary word for people
- Is facilitation working fast enough?
  - Because of the nature of water rights, must not go too quickly
  - How ready is the public?
    - Water reuse education
- Why does the public need any education? Don't they only care that it comes out of the faucet?
- Leaders should lead, but if we put an issue on the ballot, we need to educate voters as to its consequences
- WET program in 3rd grade discusses water cycle. National program can be adopted.
- What about land use integration?
- Governor asked that question and said no easy answer. Very entrenched in culture.
- Current system has failed – look at number of developments with no water.
- New law that state must look at water impact.
- People came to the West because they wanted freedom.

2. What role(s) are realistic?

- What qualifications do you need to be a county commissioner? None. But they are the ones making the decisions.
- One participant – got into water when ran for city council and found out there was a problem.
  - Need to educate our elected leaders
- Town staffs haven't seen implementation before because they have only seen their own town. Need money to get expertise in so we don't repeat mistakes that other towns have already made.
- Right now we are having more pleasant conversations because we are not in a crisis situation. In 2002, we were in crisis. Las Vegas and Tucson are facing that or did recently. Locally, look at Aurora. It was down to 24 days in 2002.

- Shocked that no one state is much farther along.

3. *What are the barriers?*
   - (blank)

4. *What are the next steps?*
   - Get more land use planning people to the table; most people at this symposium are water people.
   - California model of looking ahead not just in crisis times.
   - Need more people talking about what they have done, especially people who have faced what I'm facing so I don't have to reinvent the wheel.

Appendix C: Water & Land Use Planning Symposium: Table Discussion Notes (continued)

Western States Water Council 2009 Symposium
Water & Land Use Planning for a Sustainable Future: Scaling and Integrating
Red Lion Hotel, 4040 Quebec Street, Denver, CO
September 28th – 30th, 2009

Local and County Efforts Panel Participants

Julio Iturreria, Long Range Program Manager, Arapahoe County, Colorado (moderator)

- *City of Boulder's Land Use Policies: Local and Regional Impact.* **Peter Pollock**, Ronald Smith Fellow, Lincoln Institute of Land Policy.
- *Land Use and Water Connection in Oregon: Past Practices and Innovations.* **Lorna Stickel**, Portland Water Bureau.
- *Water in Douglas County, Colorado: Past, Present & Future.* **Mark Shively**, Executive Director, Douglas County Water Resource Authority.

Discussion Questions:

1. If you could be "Mayor or City Manager for a Day" of your community, *what actions or steps to integrate water and land use planning would you want your community to do?*
2. Considering the culture, budget, institutional structure and what's already happening in your community, *what steps/actions are realistic?*
3. For your community, *what are the barriers* that hinder integrated water and land use planning at the regional level?
4. *What are the next steps?*

Table Facilitator: Tom Iseman

Table Attendee Affiliations:

- Wyoming SEO
- Park County Water Preservation Coalition
- Wyoming State Engineer's Office
- Pikes Peak Regional Water Authority
- New Mexico State Engineer's Office
- Local Gov Muni Waste Water
- DOI Bureau of Land Management

1. What actions or steps to integrate water and land use planning would you want your community to do?

- Develop a water element in comprehensive/strategic master plans for county
- Counties/local governments working with state government and regional groups
- Start with watershed. Not your local or political boundaries
- Think about destination between water rich and water provider plans

- Get the right data to understand your role, situation, and options
- Park County: 1% sale tax to preserve water in community

2. *What steps/actions are realistic?*
   - Data available in raw form but need to analyze it and assess. That takes resources.
   - Can still include water as element in comprehensive plans
   - Regional planning may be difficult because of competition/conflicts over water; and different cultures between communities (east west, urban rural)
   - Funding for data can be a problem
   - Uncertainty over future – e.g. climate change or ESA or even growth trends
   - Difficult to invest in planning vs. police, education, etc.

3. *What are the barriers?*
   - Distrust between rural/urban, over GPCD, can be misleading
   - Skepticism in planning for politicians
   - Funding
   - Data
   - Politics, petty
   - Regional

4. *What are the next steps?*
   - Integrate water into existing plans
   - Create catastrophe or train wreck and provide impetus for planning – drought? Climate change?
   - State could play a constructive role in promising new mindset and initiatives for regional planning
   - State can play a role with data and information

Table Facilitator: Andy Hill

Table Attendee Affiliations:

- Professional Water Association
- Water Consultant
- Professional Engineer
- Colorado State Government
- Chatfield Watershed Authority

1. *What actions or steps to integrate water and land use planning would you want your community to do?*
   - Would make sure there was adequate water supply
   - Water supply is not finite – can have carrying capacity
   - Would want to get together with other stakeholders in watershed to maximize water supply development
   - Would we change zoning to reflect realistic water supply?
   - Need to maintain quality of life – have to protect water sources that enhance quality of life

2. *What steps/actions are realistic?*
   - Disconnect between county and city standards – more important to work regionally, particularly with water
   - Need to reflect true costs
   - Need to emphasize water conservation and reuse – save $, people will support that kind of project
   - Evaluate rate structure to reduce peak demand

3. *What are the barriers?*
   - Political cover
   - Turf protection
   - Egos
   - Have-have not mentality
   - Need to figure out what is in it for the stakeholders

4. *What are the next steps?*
   - Delay switch for washing machines and dishwashers
   - Manage peak use times

Table Facilitator: Adam Greenwade

Table Attendee Affiliations:

- City of Boulder Planning Department
- University of Colorado - Denver
- Clear Creek County Planning Department
- Water Engineer
- Bureau of Land Management
- Private facilitator
- SGM

1. *What actions or steps to integrate water and land use planning would you want your community to do?*
   - Integration of local water supply infrastructure
   - Bring together leaders from local, county, state level to confront problems
   - Enact 1041 regulations
   - Bring water with land use people together to integrate their ideas

2. *What steps/actions are realistic?*
   - Infrastructure doesn't align with planning goals
   - At least get water and land use people at the same table on a regular basis
   - Reduce competition between local communities and incentives to level the playing field

3. *What are the barriers?*
   - American way of life gets in the way of demand efficiency improvements
   - Co doesn't permit rainwater harvesting
   - Regional/county competition (e.g. Eagle/El Paso)
   - Entrenched distrust

- Developers can pit cities/counties against each other – build where they can get approval, leverage annexation threats
- Uncertainty regarding water supply creates barriers

4. What are the next steps?

- Irrigation improvements, efficiency with agriculture
- Combine piece meal planning efforts
- Institutional/financial incentives
- Look at OR – they have to fight localities but at least its working there

Table Facilitators: Peter Nichols and Dennis Gelvin

Table Attendee Affiliations:

- Park County Water Preservation Coalition
- Planning Program Manager for Arapahoe County
- Eagle River Water and Sanitation District
- Watershed Program Coordinator for Jefferson County Water Conservation
- Upper Gunnison River Water Conservancy District

1. What actions or steps to integrate water and land use planning would you want your community to do?

- Create links between land use and water supply agencies, make them partner and work together on growth
- If you don't have proof of water in your subdivision regulations now, put it in there immediately and require it to be perpetual
- Education of land use authorities that water should not be used as a growth control tool (to limit growth). Like the idea of using after to promote sustainable growth
- Water providers have a duty to serve, ties their hands in being more proactive in imposing a master plan on water supply and development

2. What steps/actions are realistic?

- Water suppliers should be out front on the issue of growth and sustainability, not hiding behind the duty to serve
- Culture and structure could be changed, it's not something that should be viewed as a given
- Educate the public, the general public does not understand the issues, would be helpful to politician and agencies when they need to make hard decisions

3. What are the barriers?

- Existing zoning was set up without thought for water availability and supply issues
- Land use agencies are looking for sources of revenue and are looking to up zoning to higher densities which puts pressure on water supplies. Serving denser population is more effective for both municipalities and water providers.
- Land use planning is done by politicians with short term view. Water planning is done by professionals with long term view.

4. What are the next steps?

- (blank)

Table Facilitator: Dave Merritt

Table Attendee Affiliations:

- Upper Gunnison River Water Conservancy District
- Water Consultant
- Municipal water provider
- US Geological Survey
- Colorado Department of Natural Resources

1. What actions or steps to integrate water and land use planning would you want your community to do?

- Close the disconnect gap between growth and planning
- City and county get on board with water planning
- Rate structure incentives

2. What steps/actions are realistic?

- Regional plans
- Most productive irrigated farmland should stay in production

3. What are the barriers?

- Autonomy
- Tax structure
- Supply, cost, location and development

4. What are the next steps?

- Storage and regional supply

Table Facilitators: Wendy Sullivan and Lyn Kathlene

Table Attendee Affiliations:

- Colorado Water Conservation Board
- Western Resource Advocates
- Denver Water
- Portland Water Bureau
- Bureau of Reclamation

1. What actions or steps to integrate water and land use planning would you want your community to do?

- Create zoning based on water supply and distribution/infrastructure
- Denver Water is doing scenario planning – should implement this model in all localities and include in scenario planning all utilities & land uses.
    - transportation, wastewater, storm water, laws, schools, parks, etc.
    - look at forces of change then come up with small land use scenarios
- Land use patterns and relationships for infrastructure services need to be looked at collectively.
- Require urban growth boundaries. Even when you expand boundaries, find adding chunks on the edges is less expensive than flag polling.

    - more mixed use, higher density
    - more demand in Oregon for smaller footprints demonstrates it is desirable
- Test new ideas in every way possible
- Have a requirement from water utility that proves water supply is available. But water utility is not necessarily required to know supply, rather than know the infrastructure.
- Covenants/HOA's that require bluegrass coverage needs to be removed

2. What steps/actions are realistic?

- Need to decide how we want our green space to be: lawns? parks? agriculture? forests? etc.
- The southwest lives without grass so our attachment is regional and cultural. This can be changed.
    - need to transition to xeriscaping
- Can't expect every acre foot saved is available
- Groundwater recharge relationship to sprinkling lawns and park grass

3. What are the barriers?

- Lack of communication between water and land use planners. Transportation and land use is now happening and it should include water.
- Land use planners can't plan across regions nor can water providers. Now we want them to talk to each other!
- Lack incentives, grants, etc.

4. What are the next steps?

- Do scenario planning
- Pursue more conversations, forums

Table Facilitator: Beorn Courtney

Table Attendee Affiliations:

- Colorado Water Conservation Board
- City of Greeley
- Attorney
- Montana Department of Natural Resources
- Upper Gunnison River Water Conservancy District
- Western Governors
- State of Washington

1. What actions or steps to integrate water and land use planning would you want your community to do?

- Regional based approach, move up a notch, maybe to watershed scale to open up possibilities for partnerships. Build bridges with other jurisdictions for a regional cooperative scale.
- Lateral coordination between water department and planning department, and educating the city council on water uses.
- Chicken and egg issues – utility and land use planning
- Rural community, private property rights – no planning from the city level.

2. What steps/actions are realistic?

- Creating equity within the rate structures within a region – supports regional planning effort.

- Getting different departments within an agency to communicate
- Integrate county with the city planning (Boulder example)
- Enlightened self-interest

3. What are the barriers?

- Political
- Financial
- Cultural
- Demographic
- Competition
- Conflicting water uses

4. What are the next steps?

- Cooperative agreements between jurisdictions
- Consolidating infrastructure and resources (perhaps into a single water entity?)

Table Facilitator: Eric Hecox

Table Attendee Affiliations:

- Aurora Water
- State Senate
- Southwestern Water District
- Rangeview Metro District
- US EPA-Region 8
- Colorado River Water

1. What actions or steps to integrate water and land use planning would you want your community to do?

- Ought to be a mechanism that water utility can say "we can supply this many people so don't grow beyond that in this jurisdiction."
    - Some cities (e.g., Longmont) have done it.
- Two issues:
    - Special district law
    - Developer driven – groundwater law (based largely on "fluff")
- Big hole – land use + water
    - Denver basin: try city, try special district finally drill some wells
    - Deal with problem through financing of development versus zoning, etc.
        - e.g., banks currently refusing to refinance homes in Roxborough due to insufficient water supply.
    - Attack problem through requirement to certify water supply to allow financing

2. What steps/actions are realistic?

- Housing permits and tap fees financing water growth – situation has changed with recession
- Arizona – growth cannot recover completely with recession – need in-migration

3. What are the barriers?

- Water utilities have no land use authorities
    - Would have to reorganize local government. Should we – if so how?
- Discussion now on how can demand be reduced

    - Denver has little or no interaction with city council over conservation, etc.
    - West Slope pretty much the same – smaller communities
- Excess current supply versus current demand (like Denver). Other restrictions, e.g., salinity became much more controlling.
    - e.g., Rifle or Windy Gap – established absolute water rights very early (1950's) – therefore, does not integrate land use and water supply.

4. What are the next steps?

- (blank)

Table Facilitator: Gary Barber

Table Attendee Affiliations:

- Western Slope county commissioner
- Home Builders – statewide trade association
- U.S. Forest Service
- EPA
- Rocky Mountain Farmers Union
- Non-profit

1. What actions or steps to integrate water and land use planning would you want your community to do?

- Lack of data
    - What is energy budget of house? Develop a water budget. This is how much and provides a baseline for comparison – better growth and targeted growth. Define quality growth and move toward it.
    - Look at different scales – what to do alone. Who do we need to work with?
    - Water-Energy-Transportation: determine cost of growth and what the cost is
    - Examine secondary consequences of independent action with neighbors
- Consider growth versus improving quality of life. Be pro-active rather than reactive
- Require integrated water and land use planning
- Benevolent dictator – take a watershed approach. Old 208 plan. Define nexus of interest – regional planning that includes transportation and energy.

2. What steps/actions are realistic?

- Contain costs – don't externalize
- Funding is a challenge
- Going it alone is NOT realistic
- Planning must be collaborative

3. What are the barriers?

- (blank)

4. What are the next steps?

- (blank)

Table Facilitator: Priya Gnanasekaran

Table Attendee Affiliations:

- City of Grand Junction, municipal water supplier
- Colorado Water Conservation Board
- EPA
- Eagle River Water and Sanitation
- Colorado Geological Survey

1. What actions or steps to integrate water and land use planning would you want your community to do?

- Bring wet water and legal water to table prior to approving development
- Is where water available a factor?
- Coordinate planning departments with water providers
- Integrate irrigators with municipal water

2. What steps/actions are realistic?

- Planner must recognize water as a key issue
- Need to envision the regional plan so all parties accept before fighting stops
- Need to make a bigger pie

3. What are the barriers?

- Economic and environmental

4. What are the next steps?

- (blank)

Table Facilitator: Clark Anderson

Table Attendee Affiliations:

- Northern Water
- Colorado Attorney General's Office
- Colorado Springs Utilities
- Park CO Water Pres Coalition
- Clear Creek County
- Sonoran Institute

1. What actions or steps to integrate water and land use planning would you want your community to do?

- Get everyone rowing in the same direction, i.e., there are multiple jurisdictions even within smaller counties/watersheds. DRCOG may be an appropriate example.
- Integrate and consolidate city, county, and utility enterprises, but there are significant political, administrative, legal and financial/taxation barriers and constraints in doing so.
- The various master planning processes should be cross-referenced
- Public communications, assertively pursued, should supplant the negative press or scandal that sells newspapers and creates headlines for the evening news.

2. What steps/actions are realistic?

- Time: processes take time. Maintaining continuity and momentum over long planning periods.

3. What are the barriers?

- (blank)

4. What are the next steps?

- (blank)

Table Facilitator: Nathan Thompson

Table Attendee Affiliations:

- EPA
- CDM Consultant
- Northwest Colorado Council of Governments
- Lake City town manager's office
- Northern Water
- Bureau of Reclamation

1. What actions or steps to integrate water and land use planning would you want your community to do?

- Land use/water planning has been integral in Hinsdale County for a long time. New developments must bring water. There is not a time frame associated with time – it is part of town master plan for town water/sewer system. Outside of legal limit looked by county commissioners.
- For all of Northern Colorado can't annex without showing there is water supply
- Northern Water uses land use plans as basis for their demand projection, e.g., so much water use/acre for different types of land use.
- Annexation of large areas may cause problems for counties
- What about rural growth

2. What steps/actions are realistic?

- Some local governments are responsible for providing water
- Some count on growth to pay for what is happening today

3. What are the barriers?

- The comprehensive plans don't have any authority/regulations/teeth to them.
- Plans can result in local ordinance

4. What are the next steps?

- Long range planning
  - focus on permanency of water supply
- More communication between municipalities and county government
- Regional COGs – help to regionalize the conversation – COG by COG some COGs are more focused on economic development
- County Commissioners – philosophy can change by changes in seat
- needs to be beyond politics and needs political will

Table Facilitator: Gerry McDaniel

Table Attendee Affiliations:

- Aurora Water
- Upper Gunnison River Water Conservancy District
- JCD
- BHFS
- Action 22
- Metro Roundtable
- City of Aurora
- Water Awareness and Responsibility Programs

1. What actions or steps to integrate water and land use planning would you want your community to do?

- Education – developers and politicians and citizens
  - water and land use development connection
- Conservation measures
  - HOA banning green lawns via covenants be removed
  - rate incentives
  - fines
- revising comprehensive plans
- require native plants in landscaping
- give all water resource divisions a raise
- More proactive regional planning
- Increase transportation funding

2. What steps/actions are realistic?

- Inter-governmental agreements
- If you want to annex to a city, you must bring your water rights with you
- Require additional fees for providing water outside of a jurisdiction
- Require amendments to code: low flow in homes and businesses
- Require counties to ratify comprehensive city plans
  - 3 mile radius – state statute
  - encourage to facilitate reconciliation of 3 mile radius
- Identify areas where IGA make sense for future development
  - county able to facilitate
  - make IGA binding for county and eventually regional

3. What are the barriers?

- Tax base – jurisdictions battle for development (need cost sharing)
- Ineffective 208 planning jurisdictions
- Insufficient state funding to vitalize costs
- Getting multiple counties to communicate
- Political unwillingness
- Federal land reluctance to adhere to regulations
- History of feuds – cultural
- Turf battles/political boundaries

4. What are the next steps?

- Engaging community leaders
- Identify 80% of the items we can agree on. Find common ground.
- Do not ignore environmental and recreational diversity and need
- Find projects that don't need funding
- Adopt both and not either/or attitude to negotiation
- Get state to stir the pot – DOLA in rural areas – provoke local entities to work on current statutes
- Have a state emergency plan for allocation in the case of river compact call

Table Facilitator: Tim Murrell

Table Attendee Affiliations:

- Federal government
- State legislators
- Private sector
- Municipal water supply

1. What actions or steps to integrate water and land use planning would you want your community to do?

- What policies consider at local level?
  - Conservation – local level = communication, facilitation.
    - Billing occurs at local level. pay more = use less but hinders cash flow for utility
  - Incentives to move to new technology – regulation needed (landscape, phase out of old technology)
- Culture & economics play role in ability
  - Yes – Boulder vs. rural areas. Uneven resources to implement
  - Some type of regional entity?
  - Accountability – mostly to the tap
- Special districts. How city and county bring them along when developing regulations/guidelines.
- How to breakdown silos?
  - Collaborative effort bringing groups together
  - build trust amongst water providers

2. What steps/actions are realistic?

- (blank)

3. What are the barriers?

- Political and hydro boundaries
- Economics
- Cultural

4. What are the next steps?

- (blank)

Table Facilitator: Quinn Lung

Table Attendee Affiliations:

- Colorado Water Conservation Board
- Colorado River Water Conservation District
- Tri-County WCD
- Pueblo Water Board

1. What actions or steps to integrate water and land use planning would you want your community to do?

- Require sustainable water supply for all areas.
- Developers in Castle Pines/Sterling Ranch are saying that they can build on 2.5 acres. Is that truly sustainable?
- What is sustainable? 20 years? 30 years? How long will buildings last?
- Design in OR is amazing from an efficiency standpoint.
- Being aware of possibilities, defining options
- Facilitator
    - to move 1177 process forward
- Educator
    - The Steamboat Springs meeting was very good
    - Maybe education required in third grade or fourth grade
    - But general public does need some educating

2. What steps/actions are realistic?

- A lot of education is still needed; maybe starting at grade school
- What if we are at the drop-dead point already?
- The feeling I get from water professionals is frustration
- Officials need to look past careers; sometimes elected officials can't do what is needed because they are elected; public education needed to get the public behind the official.
- People won't understand the problems unless there is a crisis. The public won't face the problem 25 years in advance. Difficult to budget for long term projects. Some places require voter approval for rate increases; some boards are elected, some appointed.
- Within the way fees are set up (cap improvement fees, mill levies) a large reduction in usage doesn't always equal large reduction in bill.
- Water is an undervalued commodity. A diamond is just a shiny rock that someone started a marketing campaign for.
- All agree that we need another drought to bring people's attention to water issues.

3. What are the barriers?

- (blank)

4. What are the next steps?

- (blank)

Appendix C: Water & Land Use Planning Symposium: Table Discussion Notes (continued)

Western States Water Council 2009 Symposium
Water & Land Use Planning for a Sustainable Future: Scaling and Integrating
Red Lion Hotel, 4040 Quebec Street, Denver, CO
September 28th – 30th, 2009

Private and NGO Efforts Panel Participants

Dave Merritt, Senior Water Resources Program Leader, HDR Engineering (Moderator)

- *How to Plan for Water-wise Growth.* **Clark Anderson**, Director, *Western Colorado Legacy Program at the Sonoran Institute*.
- *LEED Standards for Neighborhood Development*. **Conor Merrigan**, Principal, U.S. Green Building Council, Colorado Chapter.
- *Case Studies in Water-Smart Development*. **Drew Beckwith**, Water Policy Analyst, Western Resource Advocates.
- *A Developer's Perspective*. **Doug Scott**, Shea Properties.

Discussion Questions:

1. We talked about possible state, and local and county roles. Now I want us to *consider how private and NGO efforts can fill in the gaps of what the state and communities are unable to do.* What would these be?

2. Given the market demand and capacity to produce water wise development, *what is realistic?*

3. *What are the barriers* that would hinder the private sector and NGOs from participating in state and local efforts to integrating water and land use planning?

Table Facilitator: Tom Iseman

Table Attendee Affiliations:

- Wyoming SEO
- Park County Water Preservation Coalition
- Wyoming State Engineer's Office
- Pikes Peak Regional Water Authority
- New Mexico State Engineer's Office
- Local Gov Muni Waste Water
- DOI Bureau of Land Management

1. How can private and NGO efforts fill in the gaps of what the state and communities are unable to do?

- Sources of information
- Advocates to push policymakers
- Not just prioritizing, but organizing
- But need to consider motives of NGOs and understand where they are coming from

- Private sector is best potential for innovation
- If state providers consistency, private sector can perform

2. *What is realistic?*
   - If you have stable regulation and clear visible goals, private sector can achieve
   - Could need citizen to pay true costs of water
   - Water will cost more – next water source will cost more. Development will have to bear the cost. True implication.
   - But we keep delaying the true cost in billing practices
   - One problem with infill is infrastructure to provide for infill diversity

3. *What are the barriers?*
   - Arbitrary, uncertain regulations
   - Skepticism on motives of NGOs
   - NGO may not own land or water rights and may give them an inferior position in the conversation

Table Facilitator: Andy Hill

Table Attendee Affiliations:

- Professional Water Association
- Water Consultant
- Professional Engineer
- Colorado State Government
- Chatfield Watershed Authority

1. *How can private and NGO efforts fill in the gaps of what the state and communities are unable to do?*
   - Provide political cover because they are neutral
   - Lead by innovation – innovative design criteria
   - Take more risks
   - Set good example
   - Don't wait for rules and regulations

2. *What is realistic?*
   - Shift in demand – boomers don't all want huge backyards
   - Neo-urbanism, new developments
   - Can still have huge backyard
   - Can be expensive – everything driven by cost, just another tool in the tool box, but it isn't the only tool
   - How to make infill developments more cost effective
   - Expensive piece is the rezoning
   - Need consistent rules

3. *What are the barriers?*
   - Rules and regulations
   - Length of renew time

- No consistency
- Personnel turnover
- Profit margin
- Streamline the process
- Uncertainty
- NIMBY

Table Facilitator: Adam Greenwade

Table Attendee Affiliations:

- City of Boulder Planning Department
- University of Colorado - Denver
- Clear Creek County Planning Department
- Water Engineer
- Bureau of Land Management
- Private facilitator
- SGM

1. *How can private and NGO efforts fill in the gaps of what the state and communities are unable to do?*
   - Providing industry with accepted standards for others to work with, e.g. LEED, Green Building Council

2. *What is realistic?*
   - Landscaping options
   - Educate policymakers on technology
   - Growing market for water wise homes
   - How to incentivize developers to provide options
   - Key: water rates reflective of the actual cost of water
   - Link water-wise development to other tangible benefits – more time don't have to maintain lawn
   - Regulation – require low flow appliances, some lawn features

3. *What are the barriers?*
   - Lack of market incentives
   - Do people recognize water wise housing options as a worthwhile tradeoff for more $?
   - Public is generally uneducated
   - Less water used = less money to water providers – so how can we pay for infrastructure
   - Developers and other NGOs need to be made aware of changes in time

Table Facilitators: Peter Nichols and Dennis Gelvin

Table Attendee Affiliations:

- Park County Water Preservation Coalition
- Planning Program Manager for Arapahoe County
- Eagle River Water and Sanitation District
- Watershed Program Coordinator for Jefferson County Water Conservation
- Upper Gunnison River Water Conservancy District

1. *How can private and NGO efforts fill in the gaps of what the state and communities are unable to do?*
    - NGOs provide accountability, tacking, education, creativity
    - Developers will only do what government requires or what the market drives
        - Positive: developers will work to implement the requirement sin a way that is marketable, which is a good test of regulations.
        - Potential: bring developers into planning of regulations

2. *What is realistic?*
    - Developers will determine what is realistic ultimately, the market will determine it.

3. *What are the barriers?*
    - Lack of knowledge of water issues
    - Profit motive
    - Pass through doesn't work because of developer doesn't see a property for what it costs, but what the market will bear

Table Facilitator: Dave Merritt

Table Attendee Affiliations:

- Upper Gunnison River Water Conservancy District
- Water Consultant
- Municipal water provider
- US Geological Survey
- Colorado Department of Natural Resources

1. *How can private and NGO efforts fill in the gaps of what the state and communities are unable to do?*
    - Can't stop growth, needs to be planned for
    - Technical development of economic green growth
    - no mandates
    - conform to marketplace
    - building high density clustered housing
    - provide development water

2. *What is realistic?*
    - to start smart planning now
    - developments already established should not pay the price

3. *What are the barriers?*
    - Communication
    - Money
    - Federal laws (EPA, ESA, CWA, etc)
    - State regulations
    - consistency of structure "non-homogeneous"
    - too many laws and regulations that drive up cost to consumer
    - opportunity loss

Table Facilitators: Wendy Sullivan and Lyn Kathlene

Table Attendee Affiliations:

- Colorado Water Conservation Board
- Western Resource Advocates
- Denver Water
- Portland Water Bureau
- Bureau of Reclamation

1. *How can private and NGO efforts fill in the gaps of what the state and communities are unable to do?*
   - Market-based efficiencies – take advantage of populace that wants more efficient homes
   - Doug's points are good:
     - Building community is not going to be swayed by cost of water itself but rather a combination of factors that includes water
   - Case studies offer a lot of information and opportunity to envision alternatives
   - Market forces will guide demand. "MacMansions" are down. Private sector can push development to green planners and developers can make it appealing by marketing it as a higher quality of life.
   - More upfront cost to live in a smart growth development but over time less water. But mobile society makes it harder to attract people based on lower water bills and therefore greater long term savings. People do not stay in homes long enough to re-coup costs.

2. *What is realistic?*
   - Market demand in Denver is here now. Even in other places there is a tendency to not irrigate as much. Even Highlands Ranch is zoning for higher density.
   - Comes down to money. We will always have people who want to be progressive and then those who are forced through cost.
   - Water restrictions can work even in non-drought years.
   - Concern that the upper class can afford the lawns while others cannot
   - Need zoning to encourage desired development and landscaping
   - Private development community is leading in some ways. This can bring along the rest.
     - In Seattle, Graywater was lead by the AIA.
     - New Urbanism developments are more and more desirable.

3. *What are the barriers?*
   - Culture of "my property, I can do what I want"
   - Building codes. Landscape requirements for turf.
   - Water restrictions in Gunnison won't happen; they have enough water for themselves.
   - Low cost of water that is controlled. Based on cost of service and infrastructure maintenance. Not allowed to have a "profit."
   - Old developments with large lots

Table Facilitator: Beorn Courtney

Table Attendee Affiliations:

- Colorado Water Conservation Board
- City of Greeley
- Attorney

- Montana Department of Natural Resources
- Upper Gunnison River Water Conservancy District
- Western Governors
- State of Washington

1. *How can private and NGO efforts fill in the gaps of what the state and communities are unable to do?*
   - NGO's have more flexibility in presenting information, more enthusiasm/passion in conveying information
   - Can be creative and push the envelope to happen faster
   - Consultants see lots of different ways to handle similar projects and NGO's may be able to do the same
     - maybe states should pay for this on a watershed scale
   - Risk with NGO's if they tend to have a single issue and tunnel vision, so need to balance with other perspectives.

2. *What is realistic?*
   - If can show no appreciable difference in value of home with a water-wise home, there will be increased demand for the homes.
   - Group questioned the developer's panelist analysis of the price of water
   - It is realistic if the public understands the cost/importance of water.

3. *What are the barriers?*
   - Afraid of regulations
   - Private sector likely to mostly care about bottom line in terms of money so if it could be shown it works financially, likely to do so.
   - NGO's tend to be single focused and therefore risks no room for compromise. Can be a perception that NGO's being extremists, there is risk that others will hesitate to engage with them.

Table Facilitator: Eric Hecox

Table Attendee Affiliations:

- Aurora Water
- State Senate
- Southwestern Water District
- Conservation District
- Rangeview Metro District
- US EPA-Region 8
- Colorado River Water

1. *How can private and NGO efforts fill in the gaps of what the state and communities are unable to do?*
   - NGO's swaying public perception
   - Private market willing to respond to public demands , e.g., smart growth

2. *What is realistic?*
   - There is a demand and developers are responding
   - Recognizing increased costs to, e.g., infrastructure improvement with infill

3. *What are the barriers?*

- Private property rights
    - e.g., users want to sell – private owners develop as they would like
- Majority of some areas are already developed
- NGO perspective – little regulatory role, etc.

Table Facilitator: Gary Barber

Table Attendee Affiliations:

- Western Slope county commissioner
- Home Builders – statewide trade association
- U.S. Forest Service
- EPA
- Rocky Mountain Farmers Union
- Non- profit

1. *How can private and NGO efforts fill in the gaps of what the state and communities are unable to do?*
    - More nimble and ability to procure results more quickly
    - Work both within and outside system
        - legislatively
        - fund raising
    - Great examples
    - Large role for private consultant to do the work and have the expertise
    - Source of innovation and market feedback
    - Education, research and analysis – life cycle costs
    - Private – to create new norms
    - Encourage consistency in regulation
        - to create an even playing field
    - NGO's establish measureable standards for success like LEED's – creators of level playing field and drivers of public sentiment

2. *What is realistic?*
    - Water is not as valuable so it's harder for non-profits to sustain themselves
    - Development more driven by schools and taxes (Doug Scott's presentation)
    - Are we in a paradigm shift around water? No, probably not.
    - Education is very important!
        - Where does your water come from?
        - Second homes
        - What's it like to live in the arid West?
    - What impacts arise from change?

3. *What are the barriers?*
    - Education via non-profits – find funding
    - Greater incentives needed
    - Increasing costs drive prospective buyers out of the market

Table Facilitator: Priya Gnanasekaran

Table Attendee Affiliations:

- City of Grand Junction, municipal water supplier
- Colorado Water Conservation Board
- EPA

- Eagle River Water and Sanitation
- Colorado Geological Survey

1. *How can private and NGO efforts fill in the gaps of what the state and communities are unable to do?*
   - They have the
     - Ability to understand both environment and development side
     - Not bogged down by economic constraints and budgets
     - Time to take data and generate information
   - "Think Tanks"
   - Educate developers on things such as LEED
   - Develop partnerships with developers and government agencies and make them think beyond their traditional role
   - Collaborate with water providers – make them think beyond water supply
     - like developing new codes that can add more values to homes like Boulder/S. Nevada

2. *What is realistic?*
   - They have been innovate in energy sector
     - Boulder: solar panels;
     - Grand Junction, etc.
   - Can come out with innovate solutions in integrating water and land use
   - Market conditions will lead to innovative and realistic solutions

3. *What are the barriers?*
   - Favorable conditions:
     - wealthy communities
     - having a crisis brings many people together
   - Barriers:
     - Lack of holistic thinking
     - Lack of collaborating with other organizations

Table Facilitator: Clark Anderson

Table Attendee Affiliations:

- Northern Water
- Colorado Attorney General's Office
- Colorado Springs Utilities
- Park CO Water Pres Coalition
- Clear Creek County
- Sonoran Institute

1. *How can private and NGO efforts fill in the gaps of what the state and communities are unable to do?*
    - May bring a broader (national or international) perspective
    - Private sector may provide a higher level of innovation
    - NGOs may have more time since they are not tasked with an operational role
    - Private developers bring a bottom-line perspective

2. *What is realistic?*
    - Is there enough rainfall to really impact municipal or agency supply planning?
    - State and local regulations regarding graywater use at the residential or subdivision/development level
    - Is there a consumer demand for water-wise development?

3. *What are the barriers?*
    - The political stance or mindset of some NGO's may be out of sync with the local or regional perspective
    - Tension between water as a public good or resource and water as an economic factor or variable.

Table Facilitator: Nathan Thompson

Table Attendee Affiliations:

- EPA
- CDM Consultant
- Northwest Colorado Council of Governments
- Lake City town manager's office
- Northern Water
- Bureau of Reclamation

1. *How can private and NGO efforts fill in the gaps of what the state and communities are unable to do?*
    - Balance from NGOs – education – more trust?
    - Importance of incentives
    - Learn from developers

2. *What is realistic?*
    - Culture shift
    - Education
    - Making affordable smart growth
    - Market focus – look at target market, what can be supported

3. *What are the barriers?*
    - Time – planning process
    - Positions – institutional roles – stark divide between private and government sectors
    - Attitudes toward government

Table Facilitator: Gerry McDaniel

Table Attendee Affiliations:

- Aurora Water
- Upper Gunnison River Water Conservancy District
- JCD
- BHFS
- Action 22
- Metro Roundtable
- City of Aurora
- Water Awareness and Responsibility Programs

1. *How can private and NGO efforts fill in the gaps of what the state and communities are unable to do?*
   - The general public needs to be educated and take some of the issues on. Not just policy makers but the general public by policy makers.
   - It is the NGO to set the agenda for education – it is policy's job to implement the agenda.
     - Keeping the playing field level
   - Public education
   - Make sure elected officials are responding to public desires

2. *What is realistic?*
   - Stop subsidizing water development – but super hard to do!
     - Wean public subsidies away from water development and more towards mandating!
   - Utilizing our technology – we need to get the issues into the hearts and minds of the public!
   - If people understood that water is 30% of budget – again education is needed.
   - Regulatory consistency?
   - Participation?
   - Public notification – free – symposiums for communities!

3. *What are the barriers?*
   - Inconsistency
   - Ignorance
   - Corruption
   - Greed
   - Stubbornness
   - "Us against them"
   - Anti-government sentiment
   - Economic valve vs. environment

Table Facilitator: Tim Murrell

Table Attendee Affiliations:

- Federal government
- State legislators
- Private sector
- Municipal water supply

1. *How can private and NGO efforts fill in the gaps of what the state and communities are unable to do?*
    - They can go places local government can't go. They're viewpoint is ignored often. Local government should not fear regulating them.
    - Federal perspective: they mind regulation when it hinders them. Feds should probably do more outreach, help them understand our regulatory process so they understand restrictions and avoid delays.
    - Reduction in tap fee if family uses less water?
    - Establish incentives (local governments) at local planning levels so developers will go that direction.

2. *What is realistic?*
    - Through tap fees … this motivates developers.
        - lower tap fees if they create a water-wise development
    - data is needed to prove savings
    - water bank (AG doesn't use fallow, lease water to M&I)
        - assurance of longevity
        - mechanisms to work out, but businesses would get financial rewards
        - Cap and trade concept
    - Use tax code for developers or individual, restructure based on water use, create incentives, mill levy adjustment for water savings
    - water itself is too cheap

3. *What are the barriers?*
    - Regulatory processes sometimes restrict people (NGOs) from coming to the table
    - Time, energy, money and effort to invite NGO's and educate.
    - Regulatory doesn't allow for innovation

Appendix D: Advisory Committee Meeting Notes, November 2009

WALUP Advisory Committee Meeting Notes

November 10, 2009

Advisory Committee Members in Attendance:

Gary Barber	El Paso County Water Authority
Jacob Bornstein	Colorado Water Conservation Board
Tom Browning	Colorado Water Conservation Board
Jennifer Gimbel	Colorado Water Conservation Board
Andy Hill	Department of Local Affairs
Steve Harris	Club 20
Eric Hecox	Colorado Water Conservation Board
Julio Iturreria	Arapahoe County Planning Department
Tracy MacDonald	Colorado Department of Transportation
Gerry McDaniel	Action 22
Dave Merritt	HDR Engineering
Peter Nichols	Trout, Raley, Montano, Witwer & Freeman, PC
Mark Pifher	City of Aurora, Water Resources

Staffed by:

Rebecca Kahn	Center for System Integration
Lyn Kathlene	Center for System Integration

Solutions mentioned at the conference / Identify next steps for Colorado

(Short Term Quick Wins; Short term, viable for current political and economic climate; Long term)

OVERARCHING RECOMMENDATIONS:

- **Need for Data:** Currently there is not much data regarding the ability of denser and more sustainable developments to reduce water demand in Colorado. This data is necessary so that developers and city and county planners can understand what the best management practices and methodologies are, and reliably how much water savings they could expect.
- **Role of the Market:** As the value of water continues to increase, the market may naturally lead to more water efficient developments. However it is not clear if current market conditions are sufficient (Only 8% of Colorado buildings meet LEED standards, for instance, despite being 5th in the nation for these types of buildings.) Therefore, incentives should be considered to

determine how to determine how to catalyze the market in ways that will reduce future per capita water demand.

- **Infrastructure Replacement:** Dr. Lang's research at the Brookings Institute shows that approximately 75% of the Front Range's infrastructure is going to be replaced or remodeled by 2050. This provides an opportunity to determine how to make this infrastructure replacement more reliably efficient.
- **Regional Collaborative Planning:** Several case studies and presentations indicate that localized solutions are not effective, since water demand is simply transferred from one municipality to one or many others. Therefore, regional solutions, as mentioned by many of the table discussions are critical.
- **Integration:** Many other efforts are currently underway that could reduce regional demand levels, but are not specifically aimed at achieving that purpose. There are many opportunities for developing partnerships with other water conservation efforts, sustainable/walkable neighborhood developments, energy conservation and CO_2 reduction programs, water quality programs, food security programs, transportation projects, market drivers, and many others.

STRATEGIES / ACTIONS: The advisory committee analyzed the suggestions developed from conference table discussions and research on how to achieve each of the overarching recommendations. They organized these into quick wins, short term viable wins, and long term strategies. The "quick wins" are indicated below, and while they do not represent explicit recommendations, they do indicate how the above mentioned recommendations could be implemented.

INFORMATION / DATA

- One key result of the survey was that comprehensive plans may be a very effective way of working to reduce water demands through land use practices. However, research indicates that the effect of comprehensive plans are not well known as there is little data to speak to this question. If we don't know if comprehensive plans lead to good outcomes, it is not clear that they are our best strategy. The comprehensive plan in Colorado is a guideline, not a law; and is at the discretion of which jurisdiction happens to be looking at it. Judges, for instance, look at whether their decision is good as far as the comprehensive plan.
- Form based code. Land use decision doesn't comport with the comprehensive plan. Any time there is a zoning request that went against the comprehensive plan; approval automatically changes the comprehensive plan.
- What type of data would we like to have, and how can we get it?
  - **Collect data on water demand of land use types**: We are projecting water demands right now (Eric), and how much those plans are base on current water use patterns. We don't have statewide data on how different community make-ups use different amounts of water.
  - **Understand how infrastructure and land use patterns arise:**
    - The Sterling Ranch—if that development gets approved it will be a significant change in thought.
    - Stapleton, Lowry, Belmar – collect data for already-built communities. Denver Water may have the data.

        - There is some reluctance to share data. Need to build partnerships
    - **Review local land use plans to understand how Colorado communities are planning for growth:**
        - For example: Metro Vision is projecting 10% more density.
        - Look at all municipal and county plans to see if they are looking to make their future plans more efficient and dense.
    - In addition to the need to build housing infrastructure for the new people that will double Colorado's population by 2050, 50% of existing homes are going to be replaced or renovated–infrastructure. More people will mean more water, but how you project that is important. The question is what the renovation is going to do for water use
    - We don't have to invent the wheel in every community—**we need the clearinghouse of best practices.**
    - **Clearinghouse** and **Data on land use types** are important—those might be the two next steps.
    - If you were going to deliver best practices, a large education component would need to be a part of that.

- **REGIONALIZATION**
    - These may be all long term goals except **Engaging COGs in water/land use discussions** and **Develop models regulations for counties and municipalities to better facilitate regional planning**. Some of them, like **Federal stimulus and livability funding** or **Identify current regional planning efforts to pursue inclusion of water planning**, may need more investigation.
    - **Coordinate growth through revenue sharing.** Sharing a portion of sales tax revenues, for example. Russ George proposed legislation at one point that would have facilitated that.
    - **Land use planning efforts by COGS** —in the new transportation authority, there will be stronger links with land use planning. DRCOG doesn't currently engage in water. Northwest COG is addressing water. CWCB is determining if DRCOG urban growth boundaries can be used to determine how much water may be saved by the increased density represented by the growth boundaries. We need *to engage the COGS and educate them about water use and land use*. It is a question of who needs the education and how to deliver it to them. Cones of influence—what is a well, how do septic systems affect wells, not many people know enough about this.
    - **Federal stimulus money** might be able to address water as well as land use, transportation etc. DOT, HUD, and EPA will be administering some of the stimulus money, as grants. Once it comes down from the federal government to the state level, who at the state level gets it? Sometimes Federal Transit Authority funds go through the state. Some of the ARRA funds, and community block grants can go directly to a community entity without passing through the state. It varies; there is no single set method. There needs to be some established clearinghouse for the funds—right now it is somewhat chaotic. If you want funds to be more regional the funds would need to go through some clearinghouse that creates the criteria. Do you regionalize your use or your supply? Watersheds may work pretty well for Colorado.

- **Engaging the IBCC water basin roundtables in basin-wide integration of land use planning and water supply planning** might be a good way to go in terms of a quick win, because the legislature packed them full of land use people. The opportunity with the IBCC is to talk about what good looks like. We are starting to get a very good idea what bad looks like.
- **Use IGAs to create legally binding agreements among regional entities**. This is a great mechanism when it works! Over 50% of DRCOG people are part of the regional Mile High Compact.
- On the one hand, states could put in place regulations to incentivize regionalization or to dis-incentivize regionalization. Not having partners on the front end dis-incentivizes regionalization.
- Nobody wants to be the boss. How you actually get regionalization done is tricky. Everyone wants new residential to pay for itself, but it is not going to unless you balance retail development with residential. We are going there, but there's a hard way and an easy way. The state may have a role here around natural resources and their allocation. Just having the courage to talk about water and land use in the same sentence.

o **INTEGRATION**

- **Develop Regional Plans that include water, transportation, land use, energy, food security**, etc. We should reword this to be more specific. Add additional components to regional plans? Develop regional plans that include water components. Should we list out more components, like transportation, water, land use, energy, and food security? It would be helpful to identify those types of efforts already going on. We worked with DOLA on efforts they are doing. We could help facilitate a water component being included in an effort already underway. Who develops these regional plans? That goes back to the COGS. Dr. Lang gave a PPT to Colorado College, and basically what he said is that education, water supply, transportation, etc had better connect to each other. Also, you need to define the regions. Colorado Springs is asking what their region is right now, and they are talking about defining their region as just Colorado Springs, not even including Pueblo. What do land use planners use as the region? A region might need to be defined as greater than a COG. Certainly we haven't started thinking in mega regions. It would be really interesting to see the state comes up with a regional plan on its own—not mandatory, but something to create a lot of discussion. Is anything done on the watershed level, or is that too big? Even watershed are a very variable definition in terms of size. Our regions are defined more by interest, and since interests change the regions are somewhat fluid.

o **INFORMATION / EDUCATION**

- **The Colorado Foundation for Water Education** should be included. Focus has been to get elected and others to understand water. Land use has not been included but this could be of interest to the Board.
- **Elected Officials**. It is not the planners that need the education about water planning/land use as much as it is the elected officials. Are elected official more keyed in to land use or water use? They are keyed into land use. We need to focus education on elected officials.
    - One thing the South Platte water basin roundtable is doing is taking the information from their needs assessments and holding workshops for elected officials so the elected officials can see what the basin's future water supply

needs are. Land use decisions are what elected officials do. There are a lot of things when it comes to training that we fall short on. There are some links already between the water basin roundtables and organizations like Club 20, and elected officials. Maybe the water basin roundtables would be interested in presentations on the information we have developed here.

- There are a lot of people who simply don't understand both water issues and land issues.
- Maybe it is not communicating on the land and water use link so much as relating land use decisions to water use decisions. Take water needs and show how they will relate to decisions elected officials are making.
- **Developers and homebuilders**. The home builders have a lot of influence—they are influencing the county. Maybe we should go there. They will be focused very much on the next subdivision sale, and perhaps reluctant to focus on planning until after that. Perhaps the developers could be a conduit as well.
- We need a set message:
  - Growth control, density, etc. Some of those messages will go over fine, others will not.
  - Economic vitality is another message that is becoming very important.
  - Conservation can result in savings, and some, municipalities understand that.
  - One possible hook is "rates". Water bills. Land use patterns. How can you think about water and land use in a way that minimizes the need to raise rates?
  - Tap fees may be driving growth elsewhere—this may be a concern to some elected officials.
- Urban and rural issues are very different. To get people to think beyond 30 years from now is very challenging—it is a paradigm shift.
- Do water utilities have someone thinking about long term planning? There are long range planners in the larger communities, but not in the smaller communities. The smaller communities sometimes don't have any planners at all, much less long term planners.

o **REGULATION**

- Study these recommendations further!
  - State-crafted incentive-based smart growth regulations to entice local governments to plan better.
  - Urban growth boundaries
  - Water providers prove supply
  - Regulate use of new low water technologies
  - Require any "proof of water" to be perpetual
  - Require water component in Comprehensive Land Use Plans
  - Develop consistent regulations so developers have an equal playing field from place to place
  - Allow graywater systems
  - Strengthen Colorado Statutes for coordination of permitting

- Disallow minimum turf requirements in HOA's and restrictive covenants.
- Require xeriscape standards for new and redeveloped residential, business and industrial development
- Assess effectiveness of HB08-1141. If needed, craft legislation to strengthen it
- Follow up on precipitation capture pilot studies (HB09-1129) and craft appropriate legislation as needed
- Support local regulatory efforts

o **COORDINATION**

- **Work with academic institutions**. Part of the infrastructure is the trained workforce. The recent economic analysis done for Colorado Springs was done by University of Colorado – Colorado Springs. Is there an opportunity to get different academic entities together to talk about these issues? Yes—they are on their own paths and probably need to talk to each other more.
  - We have reached out to the Center for the American West and the University of Denver (DU). Believe that DU convened a group to talk about water in the Front Range. IGERT has a full blown graduate program and a certificate program—continuing education for different groups. They also have a seminar series-we might be able to work with them on one or more of these programs.
  - Maybe the Water Institute out of CSU can help.
- **Utilize existing planning and agency structures**.
- **Conduct a cross reference of master plans**—this one may not be a good allocation of resources.
- **Coordinate planning departments with water providers**: How? What does this mean? Title 32—no direct connection. I-70 regional corridor plan—they are talking to the water providers all along the corridor, but that is a nuance, not the norm. There is a need for these groups to know each other better—perhaps this should be part of the education piece.
- **Better coordination across permitting requirements** —do we mean federal, state, county, or what? You get punished by the federal agencies for talking regionally.
- **Establish regional standards for gallons per capita for residential use**. We could perhaps be very beneficial here in figuring out what this formula should be. Develop a standard formula. Applying it to everyone across the state may not be realistic, but getting the formula established is a good idea. As a quick win, perhaps we could say the way to calculate water use is to use the indoor winter use. Communities like Aspen that serve many more people than they have residents are very different from communities like Denver.

General Discussion:

♦ The marketplace is a driver. That's going to be a source of friction, too—the bottom line is that those who pay, play. Are there any particular incentives for the market? Government incentives in the form of payments or grants, perhaps. Obviously the government could have a role in forcing other entities like smaller water providers in with the major players. It is in statute to encourage waste water consolidation. There are too many small communities that can't afford treatment facilities, so you will have some regionalization as a matter of course.

- We need incentives for people to talk about these critical issues.
- The federal agencies keep asking what the barriers are.
- We don't have funds currently to do another water/land use conference, but it may be worth seeking funding for doing them on a yearly basis. Maybe focusing on marketing the next one or land use planners would be a good idea.
- With limited resources, is another conference the best next step? Or is one of these other ideas a better use of funds? There is no more important subject out there in Colorado than water use right now. With IBCC saying that meeting demand will require changes in land use, this is the very best moment to deal with this.
- The symposium was a really important first step. What the next step should be is a very important question.
- The governor is very interested in furthering this conversation. The concern that we didn't get enough planners is an easy one to take care of.
- The planners can only do so much—it is the elected official you really need to convince. Or you need to find out which elected are interested in water issues.
- The planner's philosophy has been that they plan land use and it is up to the water people to figure out where the water is to come from. Cities have their own water provider, as a separate department. Planning people are not included in water issues. The bigger you get, the more sectionalized that becomes.
- Get to the elected officials through Colorado Counties Inc, (CCI) —get them to put it on the agenda.
- Colorado Municipal League (CML) has a water and waste water committee.
- Don't forget Club 20, Action 22, and others. Need to work these ideas into program that regional organizations can bring to the table. It is easier to use existing meetings/groups.
- Identify existing groups and their meetings. Have some presentation materials for information sharing, to get the discussions going, to heighted people's understanding, all without relying on another symposium. We can do these things now. The more groups you can think of, the better. We need something to take to other groups to get them thinking and drawn into the concept of regional cooperation and planning.
  - First weekend in April—Action 22. Corporate sponsors to help pay.
- One thing we did in transportation was the Blue Ribbon Panel. Outreach to rural on transportation issues. Land use came up at almost every meeting. They came out with a list of recommendations; 25 meetings in a month. Department of Transportation (DOT) is beginning to talk about land use. Pilot with a rural community to look at scenario planning.
- Strong outreach is needed, through the Colorado Foundation for Water Education or someone else. White papers.

Appendix E: Statutory and Home Rule Counties in Colorado

Statutory Towns, Cities, and Home Rule Municipalities in Colorado as of August 2, 2009 (271 municipalities)

http://www.dola.state.co.us/dlg/local_governments/municipalities.html

City/Town Name	Type	Counties
Aguilar, Town of	Statutory Towns	Las Animas
Akron, Town of	Statutory Towns	Washington
Alamosa, City of	Home Rule Municipalities	Alamosa
Alma, Town of	Statutory Towns	Park
Antonito, Town of	Statutory Towns	Conejos
Arriba, Town of	Statutory Towns	Lincoln
Arvada, City of	Home Rule Municipalities	Adams, Jefferson
Aspen, City of	Home Rule Municipalities	Pitkin
Ault, Town of	Statutory Towns	Weld
Aurora, City of	Home Rule Municipalities	Adams, Arapahoe, Douglas
Avon, Town of	Home Rule Municipalities	Eagle
Basalt, Town of	Statutory Towns	Eagle, Pitkin
Bayfield, Town of	Statutory Towns	La Plata
Bennett, Town of	Statutory Towns	Adams, Arapahoe
Berthoud, Town of	Statutory Towns	Larimer, Weld
Bethune, Town of	Statutory Towns	Kit Carson
Black Hawk, City of	Home Rule Municipalities	Gilpin
Blanca, Town of	Statutory Towns	Costilla
Blue River, Town of	Statutory Towns	Summit
Bonanza City, Town of	Statutory Towns	Saguache
Boone, Town of	Statutory Towns	Pueblo
Boulder, City of	Home Rule Municipalities	Boulder
Bow Mar, Town of	Statutory Towns	Arapahoe, Jefferson
Branson, Town of	Statutory Towns	Las Animas
Breckenridge, Town of	Home Rule Municipalities	Summit
Brighton, City of	Home Rule Municipalities	Adams, Weld
Brookside, Town of	Statutory Towns	Fremont
Broomfield, City and County of	City & County Of Broomfield, consolidated	Broomfield
Brush, City of	Statutory Cities	Morgan
Buena Vista, Town of	Statutory Towns	Chaffee
Burlington, City of	Home Rule Municipalities	Kit Carson
Calhan, Town of	Statutory Towns	El Paso
Campo, Town of	Statutory Towns	Baca
Canon City, City of	Home Rule Municipalities	Fremont

City/Town Name	Type	Counties
Carbondale, Town of	Home Rule Municipalities	Garfield
Castle Pines North, City of	Statutory Cities	Douglas
Castle Rock, Town of	Home Rule Municipalities	Douglas
Cedaredge, Town of	Home Rule Municipalities	Delta
Centennial, City of	Home Rule Municipalities	Arapahoe
Center, Town of	Statutory Towns	Rio Grande, Saguache
Central City	Home Rule Municipalities	Clear Creek, Gilpin
Cheraw, Town of	Statutory Towns	Otero
Cherry Hills Village, City of	Home Rule Municipalities	Arapahoe
Cheyenne Wells, Town of	Statutory Towns	Cheyenne
Coal Creek, Town of	Statutory Towns	Fremont
Cokedale, Town of	Statutory Towns	Las Animas
Collbran, Town of	Statutory Towns	Mesa
Colorado Springs, City of	Home Rule Municipalities	El Paso
Columbine Valley, Town of	Statutory Towns	Arapahoe
Commerce City, City of	Home Rule Municipalities	Adams
Cortez, City of	Home Rule Municipalities	Montezuma
Craig, City of	Home Rule Municipalities	Moffat
Crawford, Town of	Statutory Towns	Delta
Creede, City of	Statutory Towns	Mineral
Crested Butte, Town of	Home Rule Municipalities	Gunnison
Crestone, Town of	Statutory Towns	Saguache
Cripple Creek, City of	Statutory Cities	Teller
Crook, Town of	Statutory Towns	Logan
Crowley, Town of	Statutory Towns	Crowley
Dacono, City of	Home Rule Municipalities	Weld
De Beque, Town of	Statutory Towns	Mesa
Deer Trail, Town of	Statutory Towns	Arapahoe
Del Norte, Town of	Statutory Towns	Rio Grande
Delta, City of	Home Rule Municipalities	Delta
Denver, City And County of	City & County Of Denver	Denver
Dillon, Town of	Home Rule Municipalities	Summit
Dinosaur, Town of	Statutory Towns	Moffat
Dolores, Town of	Statutory Towns	Montezuma
Dove Creek, Town of	Statutory Towns	Dolores
Durango, City of	Home Rule Municipalities	La Plata
Eads, Town of	Statutory Towns	Kiowa
Eagle, Town of	Statutory Towns	Eagle
Eaton, Town of	Statutory Towns	Weld
Eckley, Town of	Statutory Towns	Yuma
Edgewater, City of	Home Rule Municipalities	Jefferson

City/Town Name	Type	Counties
Elizabeth, Town of	Statutory Towns	Elbert
Empire, Town of	Statutory Towns	Clear Creek
Englewood, City of	Home Rule Municipalities	Arapahoe
Erie, Town of	Statutory Towns	Boulder, Weld
Estes Park, Town of	Statutory Towns	Larimer
Evans, City of	Home Rule Municipalities	Weld
Fairplay, Town of	Statutory Towns	Park
Federal Heights, City of	Statutory Cities	Adams
Firestone, Town of	Statutory Towns	Weld
Flagler, Town of	Statutory Towns	Kit Carson
Fleming, Town of	Statutory Towns	Logan
Florence, City of	Statutory Cities	Fremont
Fort Collins, City of	Home Rule Municipalities	Larimer
Fort Lupton, City of	Statutory Cities	Weld
Fort Morgan, City of	Home Rule Municipalities	Morgan
Fountain, City of	Home Rule Municipalities	El Paso
Fowler, Town of	Statutory Towns	Otero
Foxfield, Town of	Statutory Towns	Arapahoe
Fraser, Town of	Statutory Towns	Grand
Frederick, Town of	Statutory Towns	Weld
Frisco, Town of	Home Rule Municipalities	Summit
Fruita, City of	Home Rule Municipalities	Mesa
Garden City, Town of	Statutory Towns	Weld
Genoa, Town of	Statutory Towns	Lincoln
Georgetown, Town of	Territorial Charter Municipalities	Clear Creek
Gilcrest, Town of	Statutory Towns	Weld
Glendale, City of	Home Rule Municipalities	Arapahoe
Glenwood Springs, City of	Home Rule Municipalities	Garfield
Golden, City of	Home Rule Municipalities	Jefferson
Granada, Town of	Statutory Towns	Prowers
Granby, Town of	Statutory Towns	Grand
Grand Junction, City of	Home Rule Municipalities	Mesa
Grand Lake, Town of	Statutory Towns	Grand
Greeley, City of	Home Rule Municipalities	Weld
Green Mountain Falls, Town of	Statutory Towns	El Paso, Teller
Greenwood Village, City of	Home Rule Municipalities	Arapahoe
Grover, Town of	Statutory Towns	Weld
Gunnison, City of	Home Rule Municipalities	Gunnison
Gypsum, Town of	Home Rule Municipalities	Eagle
Hartman, Town of	Statutory Towns	Prowers
Haswell, Town of	Statutory Towns	Kiowa

City/Town Name	Type	Counties
Haxtun, Town of	Statutory Towns	Phillips
Hayden, Town of	Statutory Towns	Routt
Hillrose, Town of	Statutory Towns	Morgan
Holly, Town of	Statutory Towns	Prowers
Holyoke, City of	Home Rule Municipalities	Phillips
Hooper, Town of	Statutory Towns	Alamosa
Hot Sulphur Springs, Town of	Statutory Towns	Grand
Hotchkiss, Town of	Statutory Towns	Delta
Hudson, Town of	Statutory Towns	Weld
Hugo, Town of	Statutory Towns	Lincoln
Idaho Springs, City of	Statutory Cities	Clear Creek
Ignacio, Town of	Statutory Towns	La Plata
Iliff, Town of	Statutory Towns	Logan
Jamestown, Town of	Statutory Towns	Boulder
Johnstown, Town of	Statutory Towns	Larimer, Weld
Julesburg, Town of	Statutory Towns	Sedgwick
Keenesburg, Town of	Statutory Towns	Weld
Kersey, Town of	Statutory Towns	Weld
Kim, Town of	Statutory Towns	Las Animas
Kiowa, Town of	Home Rule Municipalities	Elbert
Kit Carson, Town of	Statutory Towns	Cheyenne
Kremmling, Town of	Statutory Towns	Grand
La Jara, Town of	Statutory Towns	Conejos
La Junta, City of	Home Rule Municipalities	Otero
La Salle, Town of	Statutory Towns	Weld
La Veta, Town of	Statutory Towns	Huerfano
Lafayette, City of	Home Rule Municipalities	Boulder
Lake City, Town of	Statutory Towns	Hinsdale
Lakeside, Town of	Statutory Towns	Jefferson
Lakewood, City of	Home Rule Municipalities	Jefferson
Lamar, City of	Home Rule Municipalities	Prowers
Larkspur, Town of	Home Rule Municipalities	Douglas
Las Animas, City of	Statutory Cities	Bent
Leadville, City of	Statutory Cities	Lake
Limon, Town of	Statutory Towns	Lincoln
Littleton, City of	Home Rule Municipalities	Arapahoe, Douglas, Jefferson
Lochbuie, Town of	Statutory Towns	Adams, Weld
Log Lane Village, Town of	Statutory Towns	Morgan
Lone Tree, City of	Home Rule Municipalities	Douglas
Longmont, City of	Home Rule Municipalities	Boulder, Weld
Louisville, City of	Home Rule Municipalities	Boulder

City/Town Name	Type	Counties
Loveland, City of	Home Rule Municipalities	Larimer
Lyons, Town of	Statutory Towns	Boulder
Manassa, Town of	Statutory Towns	Conejos
Mancos, Town of	Statutory Towns	Montezuma
Manitou Springs, City of	Home Rule Municipalities	El Paso
Manzanola, Town of	Statutory Towns	Otero
Marble, Town of	Statutory Towns	Gunnison
Mead, Town of	Statutory Towns	Weld
Meeker, Town of	Statutory Towns	Rio Blanco
Merino, Town of	Statutory Towns	Logan
Milliken, Town of	Statutory Towns	Weld
Minturn, Town of	Home Rule Municipalities	Eagle
Moffat, Town of	Statutory Towns	Saguache
Monte Vista, City of	Home Rule Municipalities	Rio Grande
Montezuma, Town of	Statutory Towns	Summit
Montrose, City of	Home Rule Municipalities	Montrose
Monument, Town of	Statutory Towns	El Paso
Morrison, Town of	Home Rule Municipalities	Jefferson
Mountain View, Town of	Home Rule Municipalities	Jefferson
Mountain Village, Town of	Home Rule Municipalities	San Miguel
Mt. Crested Butte, Town of	Home Rule Municipalities	Gunnison
Naturita, Town of	Statutory Towns	Montrose
Nederland, Town of	Statutory Towns	Boulder
New Castle, Town of	Home Rule Municipalities	Garfield
Northglenn, City of	Home Rule Municipalities	Adams, Weld
Norwood, Town of	Statutory Towns	San Miguel
Nucla, Town of	Statutory Towns	Montrose
Nunn, Town of	Statutory Towns	Weld
Oak Creek, Town of	Statutory Towns	Routt
Olathe, Town of	Statutory Towns	Montrose
Olney Springs, Town of	Statutory Towns	Crowley
Ophir, Town of	Home Rule Municipalities	San Miguel
Orchard City, Town of	Statutory Towns	Delta
Ordway, Town of	Statutory Towns	Crowley
Otis, Town of	Statutory Towns	Washington
Ouray, City of	Home Rule Municipalities	Ouray
Ovid, Town of	Statutory Towns	Sedgwick
Pagosa Springs, Town of	Home Rule Municipalities	Archuleta
Palisade, Town of	Statutory Towns	Mesa
Palmer Lake, Town of	Statutory Towns	El Paso
Paoli, Town of	Statutory Towns	Phillips

City/Town Name	Type	Counties
Paonia, Town of	Statutory Towns	Delta
Parachute, Town of	Home Rule Municipalities	Garfield
Parker, Town of	Home Rule Municipalities	Douglas
Peetz, Town of	Statutory Towns	Logan
Pierce, Town of	Statutory Towns	Weld
Pitkin, Town of	Statutory Towns	Gunnison
Platteville, Town of	Statutory Towns	Weld
Poncha Springs, Town of	Statutory Towns	Chaffee
Pritchett, Town of	Statutory Towns	Baca
Pueblo, City of	Home Rule Municipalities	Pueblo
Ramah, Town of	Statutory Towns	El Paso
Rangely, Town of	Statutory Towns	Rio Blanco
Raymer, Town of	Statutory Towns	Weld
Red Cliff, Town of	Statutory Towns	Eagle
Rico, Town of	Home Rule Municipalities	Dolores
Ridgway, Town of	Home Rule Municipalities	Ouray
Rifle, City of	Home Rule Municipalities	Garfield
Rockvale, Town of	Statutory Towns	Fremont
Rocky Ford, City of	Statutory Cities	Otero
Romeo, Town of	Statutory Towns	Conejos
Rye, Town of	Statutory Towns	Pueblo
Saguache, Town of	Statutory Towns	Saguache
Salida, City of	Statutory Cities	Chaffee
San Luis, Town of	Statutory Towns	Costilla
Sanford, Town of	Statutory Towns	Conejos
Sawpit, Town of	Statutory Towns	San Miguel
Sedgwick, Town of	Statutory Towns	Sedgwick
Seibert, Town of	Statutory Towns	Kit Carson
Severance, Town of	Statutory Towns	Weld
Sheridan Lake, Town of	Statutory Towns	Kiowa
Sheridan, City of	Home Rule Municipalities	Arapahoe
Silt, Town of	Statutory Towns	Garfield
Silver Cliff, Town of	Statutory Towns	Custer
Silver Plume, Town of	Statutory Towns	Clear Creek
Silverthorne, Town of	Home Rule Municipalities	Summit
Silverton, Town of	Statutory Towns	San Juan
Simla, Town of	Statutory Towns	Elbert
Snowmass Village, Town of	Home Rule Municipalities	Pitkin
South Fork, Town of	Statutory Towns	Rio Grande
Springfield, Town of	Statutory Towns	Baca
Starkville, Town of	Statutory Towns	Las Animas

City/Town Name	Type	Counties
Steamboat Springs, City of	Home Rule Municipalities	Routt
Sterling, City of	Home Rule Municipalities	Logan
Stratton, Town of	Statutory Towns	Kit Carson
Sugar City, Town of	Statutory Towns	Crowley
Superior, Town of	Statutory Towns	Boulder, Jefferson
Swink, Town of	Statutory Towns	Otero
Telluride, Town of	Home Rule Municipalities	San Miguel
Thornton, City of	Home Rule Municipalities	Adams, Weld
Timnath, Town of	Statutory Towns	Larimer
Trinidad, City of	Home Rule Municipalities	Las Animas
Two Buttes, Town of	Statutory Towns	Baca
Vail, Town of	Home Rule Municipalities	Eagle
Victor, City of	Statutory Cities	Teller
Vilas, Town of	Statutory Towns	Baca
Vona, Town of	Statutory Towns	Kit Carson
Walden, Town of	Statutory Towns	Jackson
Walsenburg, City of	Statutory Cities	Huerfano
Walsh, Town of	Statutory Towns	Baca
Ward, Town of	Home Rule Municipalities	Boulder
Wellington, Town of	Statutory Towns	Larimer
Westcliffe, Town of	Statutory Towns	Custer
Westminster, City of	Home Rule Municipalities	Adams, Jefferson
Wheat Ridge, City of	Home Rule Municipalities	Jefferson
Wiggins, Town of	Statutory Towns	Morgan
Wiley, Town of	Statutory Towns	Prowers
Williamsburg, Town of	Statutory Towns	Fremont
Windsor, Town of	Home Rule Municipalities	Larimer, Weld
Winter Park, Town of	Home Rule Municipalities	Grand
Woodland Park, City of	Home Rule Municipalities	Teller
Wray, City of	Home Rule Municipalities	Yuma
Yampa, Town of	Statutory Towns	Routt
Yuma, City of	Home Rule Municipalities	Yuma

Appendix F: Children's Water Festivals: Success Breeds Success in Colorado

Brian R. Werner[34]

Introduction

The Nebraska Groundwater Federation spearheaded the first children's water festival in 1989. Colorado held its first festival two years later, in March 1991, hosted by the Central Colorado Water Conservancy District under the direction of Executive Director Tom Cech.

The goal of children's water festivals is to educate youth about the importance of water with as much interaction and hands-on learning as possible. With the increasing emphasis on water issues today, especially in the political realm, it is imperative that we continue to improve the methods we use to educate our children about this topic. Colorado children's water festivals are designed to offer a wide variety of educational, interesting, informative and fun activities on water-related topics. Hands-on, action-oriented and interactive presentations are the norm.

Classroom presentations, whether they are in a "classroom" setting or not, are scheduled for just 20 minutes. This forces presenters to be concise and to focus on two or three major points. Additional activities that have proven success include an exhibition hall, a Water Wizards Trivia Bowl, a poster and/or essay contest, and a teacher's resource room. Contests are also a method for getting community and business support for the festival through the donation of prizes. Passes to the community pool or to a water slide or park make excellent prizes.

Exhibition halls are used to display large exhibits, to display winner poster contest entries, and to allow hands-on interaction for the students.

The **Water Wizards Trivia Bowl** is the loudest part of the festival and easily one of the most popular. Competing against other schools, and ideally with local and state dignitaries or professional athletes serving as hosts, this competition can get very noisy as students cheer on their classmates. The questions are distributed well in advance and include categories such as history, geography,

[34] Head, Information Services Branch and Public Information Officer, Northern Colorado Water Conservancy District. http://www.ncwcd.org/

water supply, conservation, treatment, and water rights. However these questions are chosen, every effort should be made to relate them to the specific community and region involved.

Art poster and essay writing contests have sparked great interest and helped keep a focus on the festival, especially among art and writing instructors. These contests are a good way to emphasize a festival theme. We have used "Why Water is Important to Me" and "How I use Water" as themes. The best entries from each school are submitted for final judging and the top posters or essays are displayed at the water festival.

A **Teacher's Resource Room** is an area that not only allows teachers a brief "escape" from their class, but also a place where participating organizations can provide handouts and water-related information for teachers to pick up for later use.

How to Organize a Festival

There are many different ways to organize a children's water festival. In most ways, the process is similar to organizing any successful conference or event. Following are 13 steps to creating a successful water festival:

1. **Meet with festival sponsors and school district.** Support and commitment, both monetary and time, are crucial to undertaking the process that leads to a festival. Once it is decided to move forward, the real planning effort begins.
2. **Who, where and when.**
    a. **Who to target?** What age group or grade level? This needs to be decided with your local school district(s).
    b. **Where to hold the festival?** Is there a facility in your area large enough to accommodate such an event? How many students will be invited to participate? Are there outside areas that could be used to add more space?
    c. **When to hold the festival?** If at a local university or community college, it probably needs to be held during their spring break or after the school year is done.
3. **What and how.** After the location and date are set the big questions of what to offer and how to organize the festival take precedence. These two questions will dominate all future discussions about the festival.
4. **Speakers/exhibitors list.** A good brainstorming session does wonders for coming up with names of possible speakers, participating organizations and exhibition participants. An invitation letter needs to be sent to these people ASAP asking for an indication of interest.
5. **Meet with school district – again!** At this point, their endorsement and sponsorship should have already been secured. Discuss method for notification of teachers, transportation

arrangements for getting students to the festival, and logistics of the poster/essay and water trivia contests. The method for distributing further festival information to individual teachers is a must at this point. Will it be the coordinating committee's responsibility or the school district's?

6. Meet with facility staff. This will allow you to become familiar with the building(s) to be used for festival activities. Determine the number of rooms available for various activities. Are there outdoor areas, gyms, or theaters that could be used? Which areas appear to be best suited for the trivia competition and exhibit hall? Is water available in the rooms or nearby? Are there any restrictions on usage? Can you meet with volunteers prior to the festival for an on-site walk through? Discuss where poster/essay contest winners can be displayed.
7. **Festival details.** This takes in everything that does not fit into another category. This can include the development of a logo to be used on all correspondence, a large sign announcing the festival, or t-shirts given away to volunteers. T-shirts are an easy way to identify volunteers. Sponsors for the event, either for awards or contributions, need to be identified and contacted. Judges need to be selected for the contests. Finding someone to serve as the official photographer for the event is a good idea. Trivia contest hosts need to be recruited. Ribbons should be ordered for contest participants. These steps may involve writing dozens of letters and follow up phone calls.
8. **Confirm speakers/exhibitors.** It is NEVER too early to get commitments from individuals to participate. The more advance warning provided, the easier it is to secure commitments. Ask presenters if they will need special media equipment or if they need a special set up in the room. Discuss an evaluation method to receive feedback on the festival from all participants – students, teachers, presenter, exhibitors and volunteers.
9. **Festival organization meetings.** Regularly scheduled festival organizing meetings, at least monthly, keep the program moving forward. Is also provides timely opportunities to make schedule changes if needed.
10. **Volunteer help.** A successful festival needs strong volunteer support. This group can include employees from the sponsoring agencies, teacher aides, community volunteers, and school-related organizations. A walk through of the site in advance of the festival services as a good orientation for volunteers.
11. **Media notification.** Establish procedures for notifying local media about the festival. This might include advance releases about the festival, festival speakers, or a special program that would be of interest to the media. Don't ignore any media – newspapers, radio and television stations. If notified properly, local and regional media will find the festival a great story opportunity.
12. **Confirm logistics!** This may be the most important step of all – especially for those undertaking their first festival. Details such as bus coordination, school reservation responses, and time schedules forced a number of last minute changes to past festival schedules. Follow up with all parties involved to make absolutely sure nothing has slipped through the cracks. Reconfirm with presenters, exhibitors, trivia hosts, and anyone else who will be helping with the festival.
13. **Be flexible.** Despite the best laid plans, be prepared to make last minute changes. We had one speaker cancel the day before the festival. In another instance, two scheduled classes failed to show up. During our first festival with one community, the school district notified us one week

prior to the festival that it conflicted with the city junior high track meet and all busses would be unavailable for transporting students after 2pm. Panic could have set in! However, we were able to revise the schedules to allow for an earlier end to the festival.

14. **The day of the festival.** Festival coordinators should arrive early. A festival headquarters office, preferably in a central location, needs to be established. All festival questions can then be directed to this location. A snack food area for presenters, exhibitors, and volunteers is a nice touch. This can also service as the lunch area. As festival sponsors, we have provided lunches and drinks for all those helping out. Enjoy the chaos! Remember that this is an educational and fun event for all. At the conclusion of the day, have enough volunteers available to help tear down and remove festival equipment and displays.
15. **Post festival.** Set a time to review the festival with the coordinators. Participant evaluations should be analyzed, feedback discussed, and changes for future festivals considered. It is never too early to begin planning for the next festival!

Appendix G: Survey Responses on State Role

State Role according to Survey Respondents, n=154

Survey question: "Should the State of Colorado be involved in efforts to reduce water demand through land use planning?"

Response Category	N	Percent
Yes, there is a role for the state	84	54.5%
Yes, there is a limited role for the state	25	16.2%
No, there is not a role for the state	45	29.2%

Yes, there is a role for the state (n=84):

1. Yes, it should. Collaboration and communication must occur for this to happen, and since that it difficult, this will be a difficult task.
2. As a starting point, the state could require local master plans to address the impact of density, growth, and land use on water consumption. The problem would be enforcement.
3. Yes: may have more horsepower??
4. Must be. Laws need to change.
5. Absolutely yes. Although there should be a system of metrics developed to set goals and measure progress.
6. Yes. The state should provide assistance to cities and counties in land use planning.
7. That would be great. If we had a statewide, collaborative discussion, it may pique the interest of decision-makers and result in some public education. If nothing else, it sets a statewide expectation that decision-makers should be more carefully considering water in their decision making.
8. Yes - very large and important issue that needs statewide support on many levels; difficult to be effective without broad-based support or through isolated local and regional efforts - must be statewide for most significant and supported impact
9. The State Engineers Office could play a primary role in an effort to reduce water demand through the issuance of well permits (increasing the amount of water needed to get a well permit), which would have a secondary effect on land use planning. This effect would create less (or larger lot) rural estate lots.
10. Yes. This is a fine line however. We gained assistance from the State Engineers memo to Counties stating that subdivision water supply plans would be reviewed by the SEO within a 21 day period (Attachment A to that memo dated March 4, 2005).
11. It would also be of assistance for the State to prepare a guide to local governments providing details on the creation of water supply and adequacy regulations for land use development.
12. Yes, one reason is because water quantity has a big impact on water quality. If there is less water in our streams because it is going to supply subdivisions, then contaminants are more concentrated and there is a higher likelihood for a stream segment to exceed water quality standards. Also, in many cases, a water rights holder takes water out of the stream in one area, and then returns it to the stream further down in the basin. It is allowed because it is returned to

the same basin for downstream water rights holder. Or water can be removed from the ground and then returned to the system through the stream. This water is then not available to recharge existing wells in the area.

13. Yes, they should be leading the efforts through example and regulation.
14. YES. If it is the responsibility of the state to regulate water resources, there needs to be a connection with land use planning at the same level. Land use drives water use. For example, state-imposed urban growth boundaries could have a significant effect on urban sprawl, which can have a positive effect on water conservation.
15. Yes, a minimum requirement/planning could be set by the state and improved upon in counties/cities that are capable.
16. The State should offer incentives and other means to encourage local planning efforts to reduce water demand.
17. Absolutely. The state is the only entity that can look at Colorado as a whole to determine where the resources are, and therefore, where the people should be.
18. THE STATE SHOULD REQUIRE ALL CITIES AND COUNTIES TO FORCE WATER CONSERVATION
19. I think the State of Colorado Office of the State engineer has blinders on to this issue. They are too busy regulating and administering the existing rules. I think they could be leaders but finding where to fit is the question. CWCB SHOULD be the leaders in this. I think conservation is an education process and significant efforts and resources should be spent educating everyone starting from pre-school on up. Water use and misuse should be in the curriculum of every school in this state. A constant marketing and education campaign should be used so the idea of water conservation and the value of every drop stay in the mind of all Coloradans at all times, not just the dry times. This is a statewide issue, and the leadership should come from the highest levels of the State.
20. Yes, to some degree. If it were totally left to the local level, it may be difficult for anything to be accomplished. For example, if one county decided to adopt an open space policy to regulate growth and water use, it may be at a disadvantage tax-wise to an adjacent county that allows any type of development or water use.
21. Yes, Colorado can assist local water providers with incentives to improve water conservation and water use efficiency
22. Yes - local groups are not recognizing the need and value fast enough and water is generally an undervalued resource outside of the water resources expert world. Unless the State steps in and help educate, at a minimum, the development of land and its potential revenue will continue to overshadow water demand effects.
23. YES,YES,YES- AG must adjust to new crop schedules using less water for more dollars, not just the way grandpa did it, We must plan our villages around math models of max use of water, reuse of water, recapture of water without enriching all the water lawyers--Ho, Ho
24. The Division of Water Resources definitely needs to be involved due to the fact the Division issues the well permits and reviews the water districts. Innovative thinking and possibly regulations need to start at the top.
25. The state should create a state planning board, or strong regional entities to enforce water conservation and to limit sprawl.
26. Yes. One mission of CWCB is to make strong suggestions on M & I use. Eventually legislation will have to come down limiting urban sprawl with all of the water use involved, but probably not in my lifetime.

27. Yes, because many of the issues are more than just local.
28. Yes, urban growth is going to have to be controlled.
29. YES! Someone has to lead. State should find out from agencies what their specific barriers are and then provide leadership to come up with creative ways to dissolve those barriers.
30. Yes. They won't do it. Limit taps and wells. Restrict development, but you will never do it. Developers and business run the government interests.
31. Yes, it is imperative if we are going to be able to provide water in the future for the basics
32. Yes-use it or lose it regulations prevents or inhibits innovation on water use.
33. ABSOLUTELY--the long-term security of the state's economy depends on this issue.
34. Yes. It must be uniform and fair throughout the state. This is a statewide problem, especially since the Front Range must import a great portion of its water supply from the West Slope.
35. They should as a leader for the state and they have a better chance of having a broad audience of diverse interests.
36. Yes, I would think by regulating enough open spaces per land development that the demand would not be as high as in areas where the homes are packed into a neighborhood.
37. Yes, but stop drying up the agricultural land to support the city people. We'll be buying all our produce from other countries. There are people out there that would like to destroy our country and that would be one way.
38. Yes
39. Yes, helping counties and municipalities to implement conservation minded ordinances and education. Agricultural changes from flood irrigation and conservation minded education is essential.
40. Yes. It will be unpopular to say the least but this will be necessary. Every day I run up against the results of poor land use-water planning that has happened over the years. One reason is simply population growth vs. water supply/demand. The coming years must see lower water demands through denser and more water smart developments. This must include estimated water budgets for whole developments and/or subdivisions before one shovelful of dirt is moved. Where will the water come from for the new development? If you know how much will be needed then a reasonable plan can be made as to where the water will be supplied from. At this point in time water is not the limiting factor. There is no limiting factor except for the recession. Municipalities cannot continue with the mentality that the water utility will have to support the growth plan. The growth should stay within the boundaries of how much water is available. Until a larger encompassing entity, such as the State, steps in and governs the situation each municipality will be developing as fast as they can to get a piece of the pie while it exists.
41. Yes-- the State should NOT allow residential & industrial development that is unsustainable in terms of water supply -- and reduction is just one component of this equation-- the State should also be looking at how to optimize the availability of water through better land health across the state--It is also critical that the State work with land use planning and land conservation efforts to prioritize areas (and associated water supplies) that are critical to agriculture, wildlife, wetlands and riparian health so that these are protected with an adequate water supply to sustain their multiple values. Otherwise the potential (and current!) impacts to both our agricultural economy and to wildlife species (80% of which depend upon riparian & wetland areas) that we both enjoy and which are required by law to be protected.

42. The state could provide outreach programs to local governments and other educational efforts to show examples of good land use planning that achieve reduced water demand.
43. Yes, but future developers can be guided into xeriscaping and there developments can produce significantly less water waste. While present day home owners go un-helped and don't know how to convert their life styles and water consumption due to their communities built in the past without regard for water waste. And this concept is still being sold.
44. Yes, I think a more common sense approach needs to be taken in terms of development. There are ways we can design buildings, houses, farm systems that are environmentally sustainable.
45. Yes. To the extent the legislature and/or individual State departments can work with regional councils, counties and local governments to further education and understanding of water supply, (over) allocation and legal implications statewide, they should do more. To the extent the State can examine (assess), bolster or enhance existing smart growth policies and initiatives - establishing stronger partnerships; facilitating the establishment of more regional planning organizations (especially in western slope and rural resort regions) - they should. The State should also explore development of State wide land use and growth management plans tied to resource management goals (water as the key limiting factor to continued sustainable growth).
46. It might be helpful if the state promoted sensible changes to water laws that allowed some reuse or conservation efforts to proceed without having to go through water court. State-wide encouragement of low impact development principles would also be helpful, though it is difficult to see what form this could take without being perceived as infringing on local home rule authority.
47. Water is a statewide issue; land use planning should be too. SB-35 and HB-1041 were the last time the state mandated local opportunities and requirements.
48. Yes. (1) Through education, not regulation. (2) The State could provide assurance to West Slope water users that water saved via efficient land use will be used to maintain historic river flows and not to further the proliferation of non native blue grass lawns on the Front Range. (3) The State could do a better job of educating Front Range water users where their water comes from and the tradeoffs of supplying additional water supplies, such as loss of agriculture and water in West Slope Rivers.
49. Yes. Although land use planning is in county or city hands, water leadership has mostly been ceded to the state. Both water supply and water quality sides of state water need to get involved with local land use issues to ensure that state and federal policies are upheld. The National nonpoint education for municipal officials is an example of land use education that affects both water quality and demand. AWARE Colorado has not succeeded in fulfilling that mission, in part because many more presenters are needed for the effort.
50. Colorado is involved HB 08-1141.
51. Yes--since county and local governments are doing such a lousy job! Also, when are we going to address the big elephant in the room--exponential population growth?!!
52. Yes--since county and local governments are doing such a lousy job! Also, when are we going to address the big elephant in the room--exponential population growth?!!
53. Yes. Achieving this presents challenges but absent an overall plan, local interests will drive the process. A state level emphasis on water basin may be an easy avenue to look to the state level.
54. Possibly if through incentives and educational activities

55. Yes, to be able to maintain sustainable growth and communities, water law being what it is, it will take partnerships throughout the state to achieve reduced water demands through good land use planning.
56. Yes, laws must be established to provide requirements for land use strategies that reduce demand.
57. Yes and no. It's a short term fix. If they're willing to invest in the long-term then yes, if not they're wasting their time.
58. Yes, they can control the "big picture" through legislation.
59. Yes! Simplify the message. Give municipalities exactly what they need to succeed in changing their land use planning locally. Provide them with stats they can share with individuals. Make it real and understandable. The State of Colorado has to take control - there are too many conflicting interests. Encourage individuals and not just organizations to get involved and how to get involved.
60. YES - absolutely. The governor and the legislature should pass growth limitations and the structure to advance the technology.
61. Seems like most on-the-ground decisions apply more at the county and local levels, but Colorado has a stake too. In my opinion, water quality is a public trust issue and ultimately we must treat it as such!
62. This question seems to be asking the question, should the State of Colorado be involved in regional planning? Regional growth boundaries, shared tax revenue, shared infrastructure, etc. could all help reduce water demand by building greener communities, including ones with lower water demand.
63. Yes, at a macro level, watersheds, etc.
64. Yes! They should start by having developers replace old inefficient water closets in existing dwellings and commercial structures for every new dwelling and commercial structure constructed. This worked in California years ago.
65. Urban sprawl is a constant drain for the demand of water and there needs to be evidence that there is adequate water to handle further development.
66. Upon submission of Land Use Master Plans, the State Division of Water Resources should have the final approval based on plans for water augmentation/use.
67. Yes, if it involves subdivisions or planned communities as these new subs use water where before it was undeveloped and didn't use water. We're semi-arid and as such, shouldn't be allowed grasses or plants that use a lot of water, for example.
68. The State needs to find ways to require more efficient use of water by agriculture and by real estate development. Low evaporation methods of irrigation, low plant water use species, etc. This needs to be accomplished by both carrot and stick methods.
69. Some municipalities require new development to provide its own water supplies. Statewide rationalizing of conditions for new development for all planning jurisdictions would reduce development opportunity inequities that exist now.
70. Yes. Maybe have the Department of Local Affairs conduct some regional workshops then tie financial assistance to counties and local government to having plans that incorporate water demand reduction into land use planning.
71. Conjunctive use of groundwater and surface water is impossible without General Assembly input and participation. Limited knowledge level of term-limited state representatives means that

Executive Branch staff must provide leadership on this issue. Central water systems, rather than individual wells on 2.5 acre lots, should be required at the subdivision level. Central wastewater treatment and reuse instead of poorly managed septic systems causing groundwater contamination. Groundwater subject to the plenary authority of the General Assembly.

72. Yes
73. Yes, the State should play a role. Perhaps the State could give local governmental entities 'monetary rebates' to encourage water conservation.
74. Yes, new construction on small parcels of property uses a lot more water. Also the amount of new construction should be relative to the amount of resale properties available. At the time of the crash, there were 35,000 resale homes on the market and new construction was continuing with a large amount of new homes available. Water purchased from agricultural entities should be stopped and kept in balance in order to keep growth under control. Developers and their attorneys are changing water right definitions for their own self interest. Agriculture does not have the money to fight these entities.
75. Yes, force water conservation on new development along with adding additional supplies for the future impact of a specific land use change.
76. If the State can create interest and action by the local decision-makers, it would be very valuable.
77. The state geologist should have seismic and geological surveys that more accurately identify wetlands, underground water resources and, for aquifers, recharge mechanisms. This data should be used on a state or region-wide basis to identify critical land use areas.
78. Yes, because the issue crosses jurisdictional lines.
79. Yes, through County land use controls and CWCB grants/programs.
80. Yes. The state should revise approach to issuing exempt well permits in over-appropriated basins.
81. The state administers the water law and should be involved in water demand in land use planning. With water being a finite resource, the state should be involved before the fight breaks out.
82. Yes. Since the people of the state constitutionally own the water resources, and since most of the land needs water resources to give it value, the relationship between water demand and land use is the state's concern.
83. Absolutely. Reducing demand--by a variety of means--must be lead by the State making it clear that they believe demand reduction is an essential approach to meeting needs, and that it makes economic, social, and environmental sense. The State should be supporting and encouraging, through financing and rulemaking, efforts to investigate and implement all potentially viable approaches to demand reduction. One concrete example: the assumption of non-injury of residential wells on 35 acre lots should be re-examined.
84. Yes, they are tied very closely together. Smart growth will not occur without the involvement of land use planning.

Yes, the state has a limited role to play (n=25):

1. Other than through enabling legislation and state-wide sharing of information, land use decisions should remain at the local level. The State should be involved, however, in the nature of water laws.
2. The state can encourage but these are local decisions. The state should not mandate local planning. The state should facilitate and help local planners.

3. Yes and no: When you live/work in a very conservative and property rights oriented community/county, it would be nice to have Big Brother step in to make the changes. However, forced change on that level never gets the buy in that you want to make cultural changes.
4. The State could establish recommended guidelines and codes that could be implemented by local communities. But, local water and development issues vary by community. So, regulatory measures would probably be more successful if develop by individual cities and counties. For example - the residents of Pueblo may be okay with providing water for companies that provide jobs, but not as willing to have water extended for new residential development currently outside the City's boundaries.
5. This is a zealously held local prerogative. Rather than initiate long and weary battles with the locals, the state should continue its advisory and educational roles
6. Land use planning is inherently a local governmental function, and the State should have only a role of providing water use, availability and quality information.
7. Land use planning is the responsibility of local and county governments. the state should facilitate information and communication only
8. Land use planning seems oriented more appropriately at the local or regional level than at the state level. If the state is involved, serious consideration needs to be given to regional differences in sources of supply so that reasonable results can be reached which naturally fit those regions.
9. No. The top down approach does not foster buy-in by those ultimately commanding water use, the end user. The only appropriate role for the State is to encourage the change through appeals and incentives, but ultimately the change has to be bottom up for it to be legitimate.
10. Not sure what agency this would be, so it's hard to say. Perhaps the conservation easement concept could be expanded or incentives could be provided to counties and municipalities that increase non-developable open space.
11. The local municipalities are better suited for this. The state should remain a high level resource.
12. Only if the state would realize that water needs to stay in the region it naturally flows through. Spending billions of dollars to move water to large metropolitan areas needs to be stopped and let the areas that have the water expand.
13. Most planning should be local with perhaps cooperative regional oversight.
14. Leave it to local government. State can provide some expertise.
15. The State should be involved only to the extent of educating the public as to potential consequences of NOT conserving -- and educated public will, more often than not, make the right decisions (i.e. concerning conservation), without the bureaucracy, and enforcement costs that accompany master planning... It may not be as quick, but in the end it will be more effective.
16. Not sure the state is suited for this, but an entity whose scope is regional (like DRCOG) but one that has some teeth and targeted at water scarcity.
17. Not from a command position. The state may have a role to play in fostering the development of new ideas for reduction of water demand by local oversight authorities, and could appropriately provide support and incentives to do so.
18. No to state mandates. Yes to education
19. The State can play a leadership role and act as a facilitator, but regulations will need to be local.
20. In some cases, it might not be a bad idea, but overall it's really a local-specific issue and should be handled as such.
21. Studies and leadership but not onerous taxation and penalties

22. Only be providing technical, financial resources to assist local governments, publishing comparable use rates.
23. Any involvement by the State into local land use decisions should be minimal at best.
24. Only as a clearinghouse of information it should be handled through water departments and the AWWA.
25. No. The state can't keep up with the water planning much less adding land use planning to its "to do" list. Land use planning is up to the county commissioners. Leave it that way; however, I think the counties could be given more guidance on water planning. FOR EXAMPLE: Water sufficiency is almost the last step prior to approving a subdivision. By that time the developer has so much money and time into the project as does county planning that if they find they don't have enough water, somehow it gets approved anyway. Several times I have seen subdivisions that said they were going have a central water system and at the last minute it was changed to individual wells on smaller 2.5 acres lots. I think just by requiring water sufficiency to be determined as one the first steps in land use planning and not the last everyone would know upfront how much water exists, where it is coming from and how it is to distributed. (AND THEN MAKE DEVELOPERS STICK TO IT).

No, the state should not be involved (n=45):

1. No. Local control can get it done in a more responsive manner.
2. No. The state involves itself too much now in matters of local concern. They do not have the knowledge of local nuances in land use planning to be able to effect any positive change from Denver.
3. No, every situation has specific needs which should be regulated locally or by the market. The Western Slope does not have a pressing need to reduce water use in many cases. Statewide regulations would be overly restrictive and result in loss of quality of life for individuals.
4. No local control needs to stay local
5. No, it is more efficient from the local level.
6. No, No and no. No state involvement is needed or requested. Counties know the needs better that the State. We know our water demand and opportunities.
7. No! Land use is a local issue; State is not in the business of land use planning.
8. No. Communities' resources and interests vary. A one size fits all solution will not help.
9. No. The state has become too politically unstable and easily captured by vested interests on both the left and right. State should be kept a double arms distance from any land use planning. Attempting to involve the state will result in a citizen constitutional amendment in the next election.
10. No. I believe the burden should be base on a community level rather than additional regulation from the state. Since each community is different.
11. No. Land use planning is best handled by those that best know the community. I am an appointee to a city planning commission. I am amazed at how well local staff deals with and balances the issues. I have been less impressed when the experts from Denver weigh in on issues.
12. ABSOLUTELY NOT! They have already managed to slit our throats with the oil and gas industry. Keep them MILES away from the water issue. The current administration has absolutely no desire to make sure the Western Slope is financially stable, and their hands in our water are the LAST thing we need.

13. State control is a thing many people dread. In Boulder the Commissioners are out of control believing they "own" the land, making it extremely difficult for people to buy and maintain property or even get remodel and building permits. The whole environmental thing is out of whack. Green build is excessively expensive and relatively untried/unverified. Xeriscape, water conservation is good but how do you irrigate in a state where irrigation is everything. Water...is Gold
14. I am very skeptical and am actually against the State being involved in water demand through land use planning. The DWR assistance to Counties to evaluate water adequacy is not helpful because the SEO is not a water planning agency, it is an administration agency. I do not see any State agency with the knowledge and expertise to have positive involvement, only more regulations that is more likely to exacerbate the problem than help (e.g. DWR's current involvement). STAY OUT!
15. No. Local or regional decisions should be made at the local or regional level. The State of Colorado should not be "big brother" with controlling authority as to how land use planning should be done. It should be the obligation of local land use authorities to responsibly address water use questions when making land use decisions and they are the most qualified, more knowledgeable, and most responsive to local needs and local limitations.
16. No. Definitely not!
17. No, we do not need state land use regulation. Give local government the tools and trust the elected officials closest to their constituents to do the right thing. Most legislators want to legislate a one-size fits all, but that can in fact result in negative impacts to regulation enforcement.
18. No. Each water district is different the way that water is used, climate, storage, agricultural uses, improvements are all different in each area. Therefore it would be impossible for the state to make regulations and rules that would benefit all areas. Each area needs to be dealt with by the local officials.
19. Land use planning should remain a local endeavor. The State's role should stay as is, namely the allocation of water rights. All areas of a State are different demographically, i.e., agriculture, urban, mining, oil and gas, tourism, etc. Each is best known by local officials. They need to carry the burden of land use planning.
20. NO
21. NO
22. No - leave it up to the regions and municipalities.
23. Should be handled at local level. Becomes self-regulating; if water is available long-term, then land planning should reflect this. Conservation strategies are reflected in zoning.
24. No please- we have enough to favor the Front Range over the mountains why keep it uneven in policy . .. when TABOR is repealed or changed, then it's a different story.
25. NO. This is best left to local level water providers and government who can talk to people as home town representatives rather than the heavy hand of the state.
26. No. The need for water reduction should be left to the water purveyor - and the purveyor has a tremendous responsibility in that arena and should be required proof of availability of water resources sufficient to supply its commitment to demand.
27. Based on the decimation of agricultural land brought about by Senate Bill 35, NO.
28. The State has a specific job related to the administration of the legal rights to how the water is utilized. Placing them in the land use planning business would bring an unnecessary structure to deal with that is all ready in an advisory position when considering water use and the changing of its use.

29. Local Governments should be the most involved where the water is mostly located.
30. It should be left to counties and cities as they understand the local watering restrictions needed for the area.
31. This should be a local effort not State or Federal
32. START WITH THE WATER WE ARE LOSING DOWN STREAM!!!
33. No
34. NO!!! The state needs to be involved and concentrate on storage. What are we doing state wide right now since the reservoirs are full? I'll answer that question for you, "Nothing". We have allowed the cost of water to go up but we haven't used those funds to store the water we are allowing to leave our state because we don't have the storage facilities.
35. The State of Colorado should not be involved, leave wise planning issues up to each County.
36. Land use decisions should be left to local elected officials. Centralized planning has never worked very well.
37. NO - this is something that each area should put in place - what may work for northern Colorado may not be in the best interest of southern Colorado.
38. Land use planning belongs at the local level.
39. No. Land use rights should remain under the jurisdiction of local government.
1. 40. No. State of Colorado has problems addressing the existing problem without taking on this added task. Private sectors along with cities and water groups are starting to work in cooperative effort and state involvement would likely hamper this effort.
40. There is no obvious role for the state, given the current set up of state agencies and policies.
41. No. Land use planning should be totally on the local level.
42. The State needs to be careful in becoming too involved in local control issues. Particularly since the State does not have any funding to participate in implementation.
43. We do not need the state dictating land use regulations that will attempt to reduce water demand. Local governments need broad authority to control land use and implement reductions in water demand. The State legislators do not have the experience and knowledge to draft reasonable land use planning regulations. Attempts last year would have resulted in reduced land use control because terms were inadequately defined in the legislation. A special use permit in one county is not necessarily the same as a special use permit in another county.
44. No - isn't this a local decision? The State is already pushing water conservation far enough, adding too many regulations, and increasing the cost of living here.

Appendix H: Email Invitation to Survey Participants

First email organizations sent out to their members:

In preparation for the Western States Water Council's September 28th – 30th Symposium in Denver on "Scaling and Integrating Water and Land Use Planning," the Colorado Water Conservation Board is conducting a survey. The primary purpose is to determine what current land use planning practices within the state of Colorado are reducing future per capita water demands. Because many of you are familiar with this topic, we would like to learn about your experiences and opinions. The survey will take approximately 15 minutes to complete. No identifying information will be attached to your responses.

The Center for Systems Integration is the consultant for the project. If you have any questions, please feel free to email Lyn Kathlene at lyn@csi-policy.org

Please follow this link to the on-line survey:
http://www.surveymonkey.com/s.aspx?sm=AGUezSEWnWz3V9AzkR_2bY8Q_3d_3d

Reminder email sent out two weeks later:

This is just a reminder that if you have not yet participated in the Colorado Water Conservation Board survey, you still have time! If you have taken it, thank you very much. The primary purpose of the survey is to determine what current land use planning practices within the state of Colorado are reducing future per capita water demands. Because many of you are familiar with this topic, we would like to learn about your experiences and opinions. The survey will take approximately 15 minutes to complete. No identifying information will be attached to your responses. **The deadline to complete the survey is Friday, July 17th, 2009.**

Follow this link to the on-line survey:
http://www.surveymonkey.com/s.aspx?sm=AGUezSEWnWz3V9AzkR_2bY8Q_3d_3d

If you have any questions, please feel free to email Lyn Kathlene at lyn@csi-policy.org

Appendix I: Water Management and Land Use Survey

1. Welcome/Confidentiality statement

Please help us by completing this survey about land use planning and water demand. As a person who is knowledgeable in one or both of these areas, your input is important for a better understanding of past, current and potential practices.

The survey is anonymous. However, if you choose to provide contact information to receive the results of the research or an invitation to the fall conference on Land Use Planning and Water Demand, be assured that your survey responses will remain confidential.

If you experience technical difficulties or have questions about the survey, please contact Lyn Kathlene or Adam Greenwade at 303-455-1740.

Thank you for taking the time to participate in this project.

2. Demographics

INSTRUCTIONS: On this page, please select the choices that best describe your affiliation(s).

1. Select all answers that apply.

- [ ] Consulting firm
- [ ] Engineering firm
- [ ] Environmental organization
- [ ] Land development company
- [ ] Land use planning department
- [ ] Legal firm
- [ ] Non-profit
- [ ] Real estate firm
- [ ] Research institute/University
- [ ] Special district
- [ ] Water provider
- [ ] Other affiliations, including immediate past affiliations (please specify)

2. How would you describe yourself?

- ◯ Most knowledgeable about water planning.
- ◯ Most knowledgeable about land use planning.
- ◯ Knowledgeable about both water and land use planning.

3. If you work for the government, please indicate your role(s)

	City	County	State
Elected Official	☐	☐	☐
Appointed Official	☐	☐	☐
Non-elected or appointed employee	☐	☐	☐

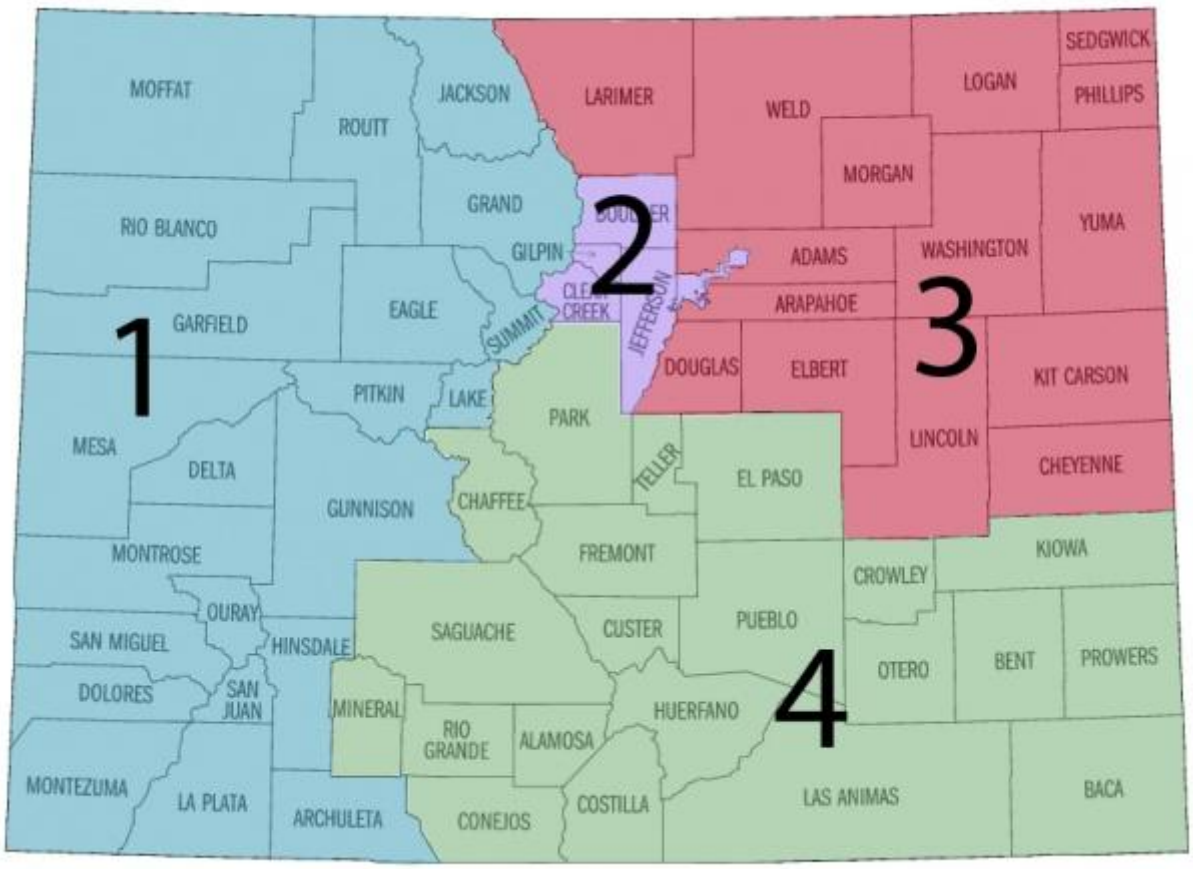
4. If you are a city or county government official or employee, is your city or county home rule?
If you do not work for a city or county, please select "Not Applicable."

- ◯ Yes
- ◯ No
- ◯ Unsure
- ◯ Not Applicable

5. Identify your region(s) from either the map or list of counties below. Please check the region(s) you represent.

- ☐ Region 1
  (Archuleta, Delta, Dolores, Eagle, Garfield, Grand, Gunnison, Hinsdale, Jackson, Lake, La Plata, Mesa, Moffat, Montezuma, Montrose, Ouray, Pitkin, Rio Blanco, Routt, San Juan, San Miguel, Summit)
- ☐ Region 2
  (Boulder, Broomfield, Clear Creek, Denver, Gilpin, Jefferson)
- ☐ Region 3
  (Adams, Arapahoe, Cheyenne, Douglas, Elbert, Kit Carson, Larimer, Lincoln, Logan, Morgan, Phillips, Sedgwick, Washington, Weld, Yuma)
- ☐ Region 4
  (Alamosa, Baca, Bent, Chaffee, Conejos, Costilla, Crowley, Custer, El Paso, Fremont, Huerfano, Kiowa, Las Animas, Mineral, Otero, Park, Prowers, Pueblo, Rio Grande, Saguache, Teller)
- ☐ Statewide
- ☐ Outside Colorado

(Specify if you wish)



3. Statutes, Policies and Stakeholders

1. Please rate the POTENTIAL of the following local mechanisms to effectively reduce water demand on a REGIONAL level.

	Low potential	Some potential	Moderate potential	High potential
Land use master plans	◯	◯	◯	◯
Zoning regulations	◯	◯	◯	◯
HOA requirements	◯	◯	◯	◯
Subdivision regulations	◯	◯	◯	◯
Urban Growth Boundaries	◯	◯	◯	◯
Intergovernmental agreements	◯	◯	◯	◯
Other	◯	◯	◯	◯

(please specify)

For questions 2 and 3:

An important distinction exists between *INTEREST* and *INVOLVEMENT*. Some groups are involved in integrating land use planning to reduce water demand, while other groups are interested but uninvolved. Please consider this distinction while answering questions 2 and 3.

2. INTEREST: Rate these stakeholder groups according to their current overall level of *interest* in utilizing land use planning to reduce water demand.

	Little or no interest	Some interest	Moderate interest	Considerable interest	Very high interest
Local land use planners	◯	◯	◯	◯	◯
Environmental/conservation groups	◯	◯	◯	◯	◯
Water utilities	◯	◯	◯	◯	◯
State Engineers Office	◯	◯	◯	◯	◯
Developers	◯	◯	◯	◯	◯
Water conservancy districts	◯	◯	◯	◯	◯
Water conservation districts	◯	◯	◯	◯	◯
County commissioners	◯	◯	◯	◯	◯
City councils	◯	◯	◯	◯	◯
Legislators	◯	◯	◯	◯	◯
Agricultural organizations	◯	◯	◯	◯	◯
Researchers	◯	◯	◯	◯	◯
Other	◯	◯	◯	◯	◯

(please specify)

3. INVOLVEMENT: Rate these stakeholder groups according to their current overall level of *involvement* in utilizing land use planning to reduce water demand.

	Little or no involvement	Some involvement	Moderate involvement	Considerable involvement	Very high involvement
Local land use planners	◯	◯	◯	◯	◯
Environmental/conservation groups	◯	◯	◯	◯	◯
Water utilities	◯	◯	◯	◯	◯
State Engineers Office	◯	◯	◯	◯	◯
Developers	◯	◯	◯	◯	◯
Water conservancy districts	◯	◯	◯	◯	◯
Water conservation districts	◯	◯	◯	◯	◯
County commissioners	◯	◯	◯	◯	◯
City councils	◯	◯	◯	◯	◯
Legislators	◯	◯	◯	◯	◯
Agricultural organizations	◯	◯	◯	◯	◯
Researchers	◯	◯	◯	◯	◯
Other	◯	◯	◯	◯	◯

(please specify)

4. What are the opportunities and barriers (e.g., social, technical, environmental, economic, political) to implementing land use strategies to reduce water demand? Please be specific.

5. Should the State of Colorado be involved in efforts to reduce water demand through land use planning? (Please explain your reasoning, provide examples or ideas if applicable)

6. If you know of other states in the West that are reducing water demand through land use planning, what has worked for them? Would similar strategies work in Colorado, and why or why not?

4. Logic split

INSTRUCTIONS: Please respond to a few questions about water and land use planning.

1. Are you aware of:

A. land use planning efforts that directly or indirectly affect water demand, or

B. water planning efforts that directly or indirectly affect land use?

Please consider current and past efforts.
Examples may include specific zoning changes, conservation plans, statutes, and other measures.

- ◯ Yes
- ◯ No

5. Water/Land use split

EFFORT 1

1. What was the original primary focus of the effort?

- ◯ Water
- ◯ Land Use

6. WE 1

INSTRUCTIONS: Please answer a few questions about the water planning effort and outcome. You will have the opportunity to describe up to three water/land use efforts and outcomes. Please describe one effort at a time.

EFFORT 1

1. What was the water planning effort?
(Please include details such as the statute or water conservation measure; we may want to find out more about it)

2. What were the goal(s) of the effort?

3. Did the effort include water planning measures explicitly intended to affect land use?

◯ Yes ◯ No

If Yes, what were the measures?

4. What were the outcome(s) of the effort with regard to land use?

5. If the effort fell short of the goal(s), what happened?

6. Are you aware of additional water/land use planning efforts? Answering "Yes" will provide you with an opportunity to describe the additional efforts and outcomes.

◯ Yes

◯ No

7. LE 1

INSTRUCTIONS: Please answer a few questions about the land use planning effort and outcome. You will have the opportunity to describe up to three water/land use efforts and outcomes. Please describe one effort at a time.

EFFORT 1

1. What was the land use planning effort?
(Please include details such as the statute or zoning code; we may want to find out more about it)

2. What were the goal(s) of the effort?

3. Did the effort include land use planning measures explicitly intended to affect water demand?

- ◯ Yes
- ◯ No

If Yes, what were the measures?

4. What were the outcome(s) of the effort with regard to water demand?

5. If the effort fell short of the goal(s), what happened?

6. Is this a land use planning effort that could have an effect on water demand at a regional level? Why or why not?

7. Are you aware of additional water/land use planning efforts? Answering "Yes" will provide you with an opportunity to describe the additional efforts and outcomes.

- ◯ Yes
- ◯ No

8. Water/Land use split 2

EFFORT 2

1. What was the original primary focus of the second effort?

- ◯ Water
- ◯ Land Use

9. WE 2

INSTRUCTIONS: Please answer a few questions about the water planning effort and outcome. You will have the opportunity to describe one more water/land use effort and outcome after this. Please describe one effort at a time.

EFFORT 2

1. What was the water planning effort?
(Please include details such as the statute or water conservation measure; we may want to find out more about it)

2. What were the goal(s) of the effort?

3. Did the effort include water planning measures explicitly intended to affect land use?

◯ Yes ◯ No

If Yes, what were the measures?

4. What were the outcome(s) of the effort with regard to land use?

5. If the effort fell short of the goal(s), what happened?

6. Are you aware of additional water/land use planning efforts? Answering "Yes" will provide you with one more opportunity to describe an additional effort and outcome.

◯ Yes

◯ No

10. LE 2

INSTRUCTIONS: Please answer a few questions about the land use planning effort and outcome. You will have the opportunity to describe one more water/land use effort and outcome after this. Please describe one effort at a time.

EFFORT 2

1. What was the land use planning effort?
(Please include details such as the statute or zoning code; we may want to find out more about it)

2. What were the goal(s) of the effort?

3. Did the effort include land use planning measures explicitly intended to affect water demand?

◯ Yes ◯ No

If Yes, what were the measures?

4. What were the outcome(s) of the effort with regard to water demand?

5. If the effort fell short of the goal(s), what happened?

6. Is this a land use planning effort that could have an effect on water demand at a regional level? Why or why not?

7. Are you aware of additional water/land use planning efforts? Answering "Yes" will provide you with an opportunity to describe the additional efforts and outcomes.

◯ Yes

◯ No

11. Water/Land use split 3

EFFORT 3

1. What was the original primary focus of the third effort?

- ◯ Water
- ◯ Land Use

12. WE 3

INSTRUCTIONS: Please answer a few questions about the water planning effort and outcome.

EFFORT 3

1. What was the water planning effort?
(Please include details such as the statute or water conservation measure; we may want to find out more about it)

2. What were the goal(s) of the effort?

3. Did the effort include water planning measures explicitly intended to affect land use?

- ◯ Yes
- ◯ No

If Yes, what were the measures?

4. What were the outcome(s) of the effort with regard to land use?

5. If the effort fell short of the goal(s), what happened?

13. LE 3

INSTRUCTIONS: Please answer a few questions about the land use planning effort and outcome.

EFFORT 3

1. What was the land use planning effort?
(Please include details such as the statute or zoning code; we may want to find out more about it)

2. What were the goal(s) of the effort?

3. Did the effort include land use planning measures explicitly intended to affect water demand?

◯ Yes ◯ No

If Yes, what were the measures?

4. What were the outcomes of the effort with regard to water demand?

5. If the effort fell short of the goal(s), what happened?

6. Is this a land use planning effort that could have an effect on water demand at a regional level? Why or why not?

14. Last Questions

Last Questions! Thank you for your participation.

There is an upcoming symposium which may be of interest to you. The Western States Water Council is hosting a symposium in Denver on "Integrating and Scaling Water & Land Use Planning." The conference will be held on September 28-30, 2009, at the Red Lion Hotel in Denver. The conference will focus on ways in which states in the West can better integrate water and land use planning through related laws, policies, and relationships with local governments.

1. Are you interested in receiving (select all that apply):

- [ ] The results of this survey
- [ ] An invitation to the conference

Email address:

2. Can we contact you for clarification of responses if necessary?

- ◯ Yes (Please add phone number below)
- ◯ No

Phone number:

Appendix J: LEED 2009 for Neighborhood Development Project Scorecard

LEED 2009 for Neighborhood Development Project Scorecard

Project Name:

Smart Location and Linkage — 27 Points Possible

Yes	?	No			
Y			Prereq 1	**Smart Location**	Required
Y			Prereq 2	**Imperiled Species and Ecological Communities**	Required
Y			Prereq 3	**Wetland and Water Body Conservation**	Required
Y			Prereq 4	**Agricultural Land Conservation**	Required
Y			Prereq 5	**Floodplain Avoidance**	Required
			Credit 1	**Preferred Locations**	10
			Credit 2	**Brownfield Redevelopment**	2
			Credit 3	**Locations with Reduced Automobile Dependence**	7
			Credit 4	**Bicycle Network and Storage**	1
			Credit 5	**Housing and Jobs Proximity**	3
			Credit 6	**Steep Slope Protection**	1
			Credit 7	**Site Design for Habitat or Wetland and Water Body Conservation**	1
			Credit 8	**Restoration of Habitat or Wetlands and Water Bodies**	1
			Credit 9	**Long-Term Conservation Management of Habitat or Wetlands and Water Bodies**	1

Neighborhood Pattern and Design — 44 Points Possible

Yes	?	No			
Y			Prereq 1	**Walkable Streets**	Required
Y			Prereq 2	**Compact Development**	Required
Y			Prereq 3	**Connected and Open Community**	Required
			Credit 1	**Walkable Streets**	12
			Credit 2	**Compact Development**	6
			Credit 3	**Mixed-Use Neighborhood Centers**	4
			Credit 4	**Mixed-Income Diverse Communities**	7
			Credit 5	**Reduced Parking Footprint**	1
			Credit 6	**Street Network**	2
			Credit 7	**Transit Facilities**	1
			Credit 8	**Transportation Demand Management**	2
			Credit 9	**Access to Civic and Public Spaces**	1
			Credit 10	**Access to Recreation Facilities**	1
			Credit 11	**Visitability and Universal Design**	1
			Credit 12	**Community Outreach and Involvement**	2
			Credit 13	**Local Food Production**	1
			Credit 14	**Tree-Lined and Shaded Streets**	2
			Credit 15	**Neighborhood Schools**	1

Yes	?	No			
			Green Infrastructure and Buildings		**29** Points Possible
Y			Prereq 1	**Certified Green Building**	Required
Y			Prereq 2	**Minimum Building Energy Efficiency**	Required
Y			Prereq 3	**Minimum Building Water Efficiency**	Required
Y			Prereq 4	**Construction Activity Pollution Prevention**	Required
			Credit 1	**Certified Green Buildings**	5
			Credit 2	**Building Energy Efficiency**	2
			Credit 3	**Building Water Efficiency**	1
			Credit 4	**Water-Efficient Landscaping**	1
			Credit 5	**Existing Building Use**	1
			Credit 6	**Historic Resource Preservation and Adaptive Reuse**	1
			Credit 7	**Minimized Site Disturbance in Design and Construction**	1
			Credit 8	**Stormwater Management**	4
			Credit 9	**Heat Island Reduction**	1
			Credit 10	**Solar Orientation**	1
			Credit 11	**On-Site Renewable Energy Sources**	3
			Credit 12	**District Heating and Cooling**	2
			Credit 13	**Infrastructure Energy Efficiency**	1
			Credit 14	**Wastewater Management**	2
			Credit 15	**Recycled Content in Infrastructure**	1
			Credit 16	**Solid Waste Management Infrastructure**	1
			Credit 17	**Light Pollution Reduction**	1

Yes	?	No			
			Innovation and Design Process		6 Points
			Credit 1.1	**Innovation and Exemplary Performance**: Provide Specific Title	1
			Credit 1.2	**Innovation and Exemplary Performance**: Provide Specific Title	1
			Credit 1.3	**Innovation and Exemplary Performance**: Provide Specific Title	1
			Credit 1.4	**Innovation and Exemplary Performance**: Provide Specific Title	1
			Credit 1.5	**Innovation and Exemplary Performance**: Provide Specific Title	1
			Credit 2	**LEED® Accredited Professional**	1

Yes	?	No			
			Regional Priority Credit		4 Points
			Credit 1.1	**Regional Priority Credit**: Region Defined	1
			Credit 1.2	**Regional Priority Credit**: Region Defined	1
			Credit 1.3	**Regional Priority Credit:** Region Defined	1
			Credit 1.4	**Regional Priority Credit**: Region Defined	1

			Project Totals (Certification estimates)	110 Points

Certified: 40-49 points, **Silver:** 50-59 points, **Gold:** 60-79 points, **Platinum:** 80+ points