MODULE 1

BREAKING DOWN SILOS: INTEGRATING WATER EFFICIENCY INTO LAND USE PLANNING

A Guide for Colorado Communities

A. Water Supply & Population Growth Issues in Colorado

The U.S. population is growing at an unprecedented level, with the Census Bureau predicting the largest increase targeted for the Western United States: nearly 46% between 2000 and 2030.[1] In Colorado, demographers project a growth from 5.5 million people in 2015 to 8.7 million by 2050.[2] At the same time, Colorado is facing increasingly limited water supplies. Further complicating this situation is the historic disconnect between land use development decisions and water supply decisions.[3] At a time when there will be a significant number of land use decisions made to accommodate future growth, it will also be necessary to incorporate decisions that conserve water. It is widely recognized that there is a missing link between these two processes, for many reasons, and that this missing link can negatively impact the ability of Colorado communities to accommodate growth while maintaining adequate water supply.[4]

1. Increasing Growth

From 1980 to 2015, Colorado had the sixth fastest-growing population in the country, experiencing growth of nearly 2.6 million people, or 88.8%. During that same period, the rest of the country experienced a 41.9% growth.[5] Prospects for the future are similar: the Census Bureau projects that by the year 2050, the population of the United States will have swelled to nearly 400 million, an increase of 77 million people since 2015. These additional residents will create a tremendous demand for additional housing and nonresidential development. By 2040, it is projected that the U.S. will add 93 million new homes and 137

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[1] Michelle Bryan Mudd, A Next, Big Step for the West: Using Model Legislation to Create a Water-Climate Element in Local Comprehensive Plans, 3:1 WASH. J. ENVTL. L. & POL'Y 1, 3 (2013).

[2] Email communication with Colorado State Demography Office (August 18, 2016). *See also,* Allen Best, *From the Ground Up: Colorado's Rapid Growth Offers a Golden Opportunity to Merge Water and Land Use*, Headwaters, Summer 2015, at 17.

[3] A. Dan Tarlock & Lora A. Lucero, AICP, *Connecting Land, Water, and Growth*, 34 URB. LAW. 971, 972 (2002) [hereinafter *Connecting Land, Water, and Growth*].

[4] Michelle Bryan Mudd, A Next, Big Step for the West: Using Model Legislation to Create a Water-Climate Element in Local Comprehensive Plans, 3:1 WASH. J. ENVTL. L. & POL'Y 1, 3 (2013); A. Dan Tarlock & Sarah B. Van De Wetering, Western Growth and Sustainable Water Use: If There are No "Natural Limits," Should We Worry About Water Supplies?, 27 PUB. LAND & RESOURCES L. REV. 33, 39 (2006); A. Don Tarlock & Lora A. Lucero, AICP, Connecting Land, Water, and Growth, 34 URB. LAW. 971, 972 (2002).

[5] *Population and Housing Unit Estimates*, United States Census Bureau, www.census.gov/popest (last visited Aug. 28, 2016).

billion square feet of nonresidential construction to accommodate growth and replace obsolete buildings.[6] A large percentage of this residential and nonresidential construction will take place in Colorado. According to a report from the Brookings Institution, from 1990 to 2000, Colorado had two of the top ten fastest growing metropolitan areas in the country (Colorado Springs and Denver-Aurora).[7] Colorado Springs was also the eighth fastest-growing metropolitan area in the country from 1960 to 2004.

Although the U.S. Census Bureau has not completed state population projections in recent years, previous reports put the Interior West in the "fastest growing" category, containing half of the top ten fastest-growing states between 1995 and 2025, with a projected percent change in population (births minus deaths plus net migration) of over 40%. Colorado ranks in the 14th spot with a projected growth of about 39%, with more than half of states having a projected population increase of under 25% for that time period.[8]

2. Decreasing Water

While population continues to grow, available surface and groundwater reserves are straining.[9] Water availability has become a serious concern for many communities in Colorado and across the Western United States. Surface water supplies near population centers are fully-, if not over-, appropriated and many communities are dependent upon non-renewable groundwater. Water of acceptable quality is increasingly hard to find because local sources are allocated to prior uses, depleted by over-pumping, or diminished by drought stress.[10] Climate change is also contributing to water supply issues and experts warn that the regions that are now experiencing the most growth in the country are likely to suffer the most from a warming climate.[11] Not only is climate change predicted to lead to more frequent and destructive precipitation-related disasters—including floods, mudslides, and droughts—but it is also predicted to decrease snowpack, increase winter

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[6] *See* Arthur C. Nelson, University of Utah, American Mega Trends (Oct. 28, 2009), http://www.arch.utah.edu/cgi-bin/wordpress-metroresearch/wp-content/uploads/2012/publications/presentations/Nelson_-_American_Mega_Trends_10-28-09.pdf.

[7] William H. Frey, *Metro America in the New Century: Metropolitan and Central City Shifts Since 2000*, THE BROOKINGS INSTITUTE, 16 (2005), http://www.frey-demographer.org/reports/R-2005-5_MetroAmNewCentury.pdf.

[8] PAUL CAMPBELL, CENSUS BUREAU, CURRENT POPULATION REPORTS, POPULATION PROJECTS (May 1997), https://www.census.gov/prod/2/pop/p25/p25-1131.pdf. The U.S. Census Bureau does not have a current set of state population projections and currently has no plans to produce them. The Bureau recommends that caution be exercised when using these historical state projections because populations trends may have changed substantially since their release. *State Population Projections*, United States Census Bureau, www.census.gov/population/projections/data/state (last visited Aug. 29, 2016).

[9] A. Dan Tarlock & Sarah B. Van De Wetering, Western Growth and Sustainable Water Use: If There are No "Natural Limits," Should We Worry About Water Supplies?, 27 PUB. LAND & RESOURCES L. REV. 33, 39 (2006).

[10] Mark T. Anderson & Lloyd H. Woosley, Jr., U.S Geological Survey Circular 1261, Water Availability for the Western United States – Key Scientific Challenges 1 (2005), http://pubs.usgs.gov/circ/2005/circ1261/pdf/C1261.pdf.

[11] Sarah Bates, *Bridging the Governance Gap: Emerging Strategies to Integrate Water and Land Use Planning*, 52 NAT. RESOURCES J. 61, 66 (2012), http://lawschool.unm.edu/nrj/volumes/52/1/bates.pdf.

rain, and further reduce flows in rivers and streams at low-flow periods due to increased evaporation.[12]

A major problem in the Interior West is the current drought conditions, which are having a significant impact on the flow of the 1,450-mile Colorado River,[13] which provides drinking water to nearly 40 million Americans[14] and produces 15% of the nation's food.[15] According to the U.S. Department of the Interior, "since 2000, the Colorado River Basin has been experiencing a historic, extended drought that has impacted regional water supply and other resources, such as hydropower, recreation, and ecologic services. During this time, the Basin has experienced its lowest 16-year period of inflow in over 100 years of record keeping, and reservoir storage in the Colorado River system has declined from nearly full to about half of capacity"[16] and experts predict that the basin will keep getting drier.[17]

While Colorado faces significant population growth, a resulting increase in development, and drought, it is no surprise that many communities struggle already to provide sufficient water to meet residential demands. Exacerbating this water availability struggle is that Western communities have historically had some of the highest rates of per capita water use in the nation.[18] Colorado's semi-arid climate along with the existing land use patterns and residential landscaping preferences for high water demand vegetation contribute to these high water use rates. While per capita water use has been decreasing for many years on the national level, Colorado is still facing a demand-supply gap of somewhere in the range of 600,000 to 1 million acre feet by 2050.[19] According to a 2006 EPA report, the

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[12] BOBBIE KLEIN & DOUGLAS S. KENNEY, NATURAL RES. LAW CTR., UNIV. OF COLO. LAW SCH., LAND USE PLANNING, WATER RESOURCES & CLIMATE CHANGE ADAPTION CONNECTION: CHALLENGES AND OPPORTUNITIES 3 (2009), http://scholar.law.colorado.edu/cgi/viewcontent.cgi?article=1130&context=books_reports_studies; UNESCO, WATER FOR PEOPLE WATER FOR LIFE: THE U.N. WORLD WATER DEVELOPMENT REPORT 17 (2003), http://unesdoc.unesco.org/images/0012/001295/129556e.pdf.

[13] Michael Wines, *Colorado River Drought Forces a Painful Reckoning for States*, N.Y. TIMES (Jan. 4, 2014), http://www.nytimes.com/2014/01/06/us/colorado-river-drought-forces-a-painful-reckoning-for-states.html.

[14] RECLAMATION: MANAGING WATER IN THE WEST, COLORADO RIVER BASIN WATER SUPPLY AND DEMAND STUDY, EXECUTIVE SUMMARY (2012), https://www.usbr.gov/lc/region/programs/crbstudy/finalreport/Executive%20Summary/Executive_Summary_FINAL_Dec2012.pdf.

[15] Michael Wines, *Colorado River Drought Forces a Painful Reckoning for States*, N.Y. TIMES (Jan. 4, 2014), http://www.nytimes.com/2014/01/06/us/colorado-river-drought-forces-a-painful-reckoning-for-states.html.

[16] RECLAMATION: MANAGING WATER IN THE WEST, COLORADO RIVER BASIN WATER SUPPLY AND DEMAND STUDY, EXECUTIVE SUMMARY (2012), https://www.usbr.gov/lc/region/programs/crbstudy/finalreport/Executive%20Summary/Executive_Summary_FINAL_Dec2012.pdf.

[17] Michael Wines, *Colorado River Drought Forces a Painful Reckoning for States*, N.Y. TIMES (Jan. 4, 2014), http://www.nytimes.com/2014/01/06/us/colorado-river-drought-forces-a-painful-reckoning-for-states.html.

[18] Environmental Protection Agency, Growing Toward More Efficient Water Use: Linking Development, Infrastructure, and Drinking Water Policies 2 (2006), https://www.epa.gov/sites/production/files/2014-01/documents/growing_water_use_efficiency.pdf.

[19] Colorado's Water Supply Future, Final Report, Colorado Water Conservation Board, Statewide Water Supply Initiative (2011), http://cwcb.state.co.us/water-management/water-supply-planning/Documents/SWSI2010/SWSI2010.pdf.

combination of high growth rates and high water use is rapidly depleting the State's aquifers, with aquifers in the Denver region, for example, falling 30 feet per year.[20]

In the Colorado River Basin as a whole, population growth and the impacts of climate change are projected to result in a long-term imbalance between supply and demand of about 3.2 million acre feet per year by 2060.[21] As water supply projections decrease, water demand projections increase, and future water supply uncertainty grows, a significant imbalance is inevitable without additional future water management actions.

[20] Environmental Protection Agency, Growing Toward More Efficient Water Use: Linking Development, Infrastructure, and Drinking Water Policies 2 (2006), https://www.epa.gov/sites/production/files/2014-01/documents/growing_water_use_efficiency.pdf.

[21] RECLAMATION: MANAGING WATER IN THE WEST, COLORADO RIVER BASIN WATER SUPPLY AND DEMAND STUDY, EXECUTIVE SUMMARY (2012), https://www.usbr.gov/lc/region/programs/crbstudy/finalreport/Executive%20Summary/Executive_Summary_FINAL_Dec2012.pdf.

B. Working Together

1. A Call to Action

In some Colorado communities, comprehensive plans and land use regulations do not specifically address water supply and conservation. In others, they may include only general references to assured water supply requirements (i.e., show-me-the-water laws). Meanwhile, the way that Colorado's local governments choose to plan and regulate development can have a significant effect on per capita water use and water supply reliability, not to mention the obvious effect on a community's ability to absorb growth.

Careful planning for population growth is increasingly important in areas that face water supply challenges. Finding ways to decrease water demand and increase alternative water supplies (such as greywater, green infrastructure, onsite water recycling, and the like) is a task that happens most effectively in the land development process, not once a building is already in place. This presents an opportunity for communities in Colorado to embrace growth while planning for water conservation through integrating land use and water planning and promoting water-efficient land development patterns. Land use plans and development codes will not be able to influence precipitation but they certainly can influence water consumption and conservation.

Large lots, low densities, and dispersed developments increase water use per household. Compact, mixed-use development generally requires less water per household than single-family housing, and the infrastructure requirements of both types of development are quite different. This point is made in the *Metro Vision 2035 Plan* by the Denver Regional Council of Governments (DRCOG): "Compact, infill, and redevelopment…help reduce water demand and related infrastructure costs."[22] As cited by the 2015 *Colorado Water and Growth Dialog* report,[23] Planners in Utah have determined that the per capita daily water demand of development at a density of two units per acre is reduced by *half* at a density of five units per acre.[24] It has also been shown that increasing residential density by 20% can yield a 10% per capita water savings.[25] A study of household water use in Sacramento, CA, showed

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[22] DENVER REGIONAL COUNCIL OF GOVERNMENTS, METRO VISION 2035 PLAN (2011), https://drcog.org/documents/MetroVision2035FinalPlanIntro-Ch%202.pdf.

[23] CLARION ASSOCIATES, COLORADO WATER AND GROWTH DIALOG 7 (The Keystone Center 2015), http://www.clarionassociates.com/wp-content/uploads/2016/08/Keystone-Colorado-Water-and-Growth-Dialogue.pdf.

[24] Environmental Protection Agency, Growing Toward More Efficient Water Use: Linking Development, Infrastructure, and Drinking Water Policies 3 (2006), https://www.epa.gov/smartgrowth/growing-toward-more-efficient-water-use.

[25] CENTER FOR SYSTEMS INTEGRATION, COLORADO REVIEW: WATER MANAGEMENT AND LAND USE PLANNING INTEGRATION 68 (2010), http://cwcbweblink.state.co.us/WebLink/ElectronicFile.aspx?docid=139880&searchid=c5b7f207-ff18-4096-9a70-035a47b9cb1b&&dbid=0. *See also*, CWCB DRAFT TECHNICAL MEMORANDUM: CALCULATING PER CAPITA WATER DEMAND SAVINGS FROM DENSITY INCREASES TO RESIDENTIAL HOUSING FOR PORTFOLIO AND TRADE-OFF TOOL 1 (2010), http://cwcb.state.co.us/public-information/publications/Documents/ReportsStudies/DRAFTDensityTechnicalMemo.pdf.

20-30% less water use in a new compact single-family development than in typical (large lot) suburban developments.[26] Townhouse and multifamily housing development and mixed-use development reduce per capita water demand even more. This can be seen in the Northern California Water Association's *Land Use/Water Supply Analysis Guidebook*.[27] A table demonstrating the typical ranges of water demand based on residential density in Central Valley, California, showed that the total water demand for low-density, single-family residential development is 0.70-1.10 (af/du/yr), while medium-density, townhouse development falls to 0.35-0.65 (af/du/yr), and high-density apartment residential is only 0.25-0.45 (af/du/yr).[28] Landscaping demands are the main differentiator between single-family and multi-family housing. Variables like lot size, development density, landscape composition, and irrigation efficiency all play roles in consumption. The literature supports the idea that single-family homes will generally use more than multi-family homes due primarily to landscape water use differences.[29] A 2006 EPA report states definitively: "No matter where they are, areas with low density, large lots, and large lawns require more water than areas with high density, small lots, and small lawns."[30] This same report also explains the effect that the level of density has on water loss: "highly dispersed communities will need longer systems and incur greater loss overall than would more compact communities, regardless of where the main pumping system is located."[31] Because of these significant effects, the link between land use patterns and water conservation needs to be clearly understood. Very few planning strategies can do more to reduce water consumption than focusing on this interconnection.

It is crucial that those professionals whose work touches the land and shapes the way our communities will develop, address this undeniable imperative: They must craft intelligent solutions for Colorado communities to thrive in spite of mounting water scarcity.[32] With all of the challenges that water scarcity brings, especially when faced with pressure to quickly accommodate growth, this inspired group of land and water planners must recognize the importance of their own collaboration, communication, and shared understandings to answer this call.

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[26] Environmental Protection Agency, Growing Toward More Efficient Water Use: Linking Development, Infrastructure, and Drinking Water Policies 3 (2006), https://www.epa.gov/smartgrowth/growing-toward-more-efficient-water-use.

[27] SACRAMENTO VALLEY, LAND USE/ WATER SUPPLY ANALYSIS GUIDEBOOK, NORTHERN CALIFORNIA WATER ASSOCIATION (2007), http://www.norcalwater.org/res/docs/NCWA-guidebook-final.pdf.

[28] SACRAMENTO VALLEY, LAND USE/ WATER SUPPLY ANALYSIS GUIDEBOOK, NORTHERN CALIFORNIA WATER ASSOCIATION 6, Table 2-1 (2007), http://www.norcalwater.org/res/docs/NCWA-guidebook-final.pdf.

[29] Bobbie Klein and Douglas S. Kenney, THE LAND USE PLANNING, WATER RESOURCE, AND CLIMATE CHANGE ADAPTATION CONNECTION: CHALLENGES AND OPPORTUNITIES 3 (2009), http://scholar.law.colorado.edu/cgi/viewcontent.cgi?article=1130&context=books_reports_studies.

[30] Environmental Protection Agency, Growing Toward More Efficient Water Use: Linking Development, Infrastructure, and Drinking Water Policies 3 (2006), https://www.epa.gov/smartgrowth/growing-toward-more-efficient-water-use.

[31] Environmental Protection Agency, Growing Toward More Efficient Water Use: Linking Development, Infrastructure, and Drinking Water Policies 5 (2006), https://www.epa.gov/smartgrowth/growing-toward-more-efficient-water-use.

[32] Water in the West, STANFORD WOODS INSTITUTE FOR THE ENVIRONMENT, https://woods.stanford.edu/research/centers-programs/water-west (last visited July 22, 2016).

2. The Need for Cross-Education

Many water planners have only a vague idea of who their land use planners are, what they do, and the tools at their disposal; and vice-versa. This is exacerbated in situations where water is provided by a special district or private entity (while land use is controlled by the local government). To manage land use, the legal system often requires diverse and disconnected agencies to work with one another. Planning for the water supply of new development in Colorado is done by local or regional water suppliers, who are subject to statewide water planning and regulatory requirements. The land use planning that drives future water demand, however, is done predominantly at the local level by counties, cities, and towns. For proper planning to occur, these legally distinct agencies and actors must be connected effectively.

This disconnect is not new or unique to water efficiency and land use. Other examples of this type of disconnection are many. They include, among others:

- Transportation planning, where state and federal agencies invest in transportation and transit infrastructure while local land use planners determine what is built on the land that will need to be serviced by roads, highways, transit, or some combination. (Add to this that, under federal law, local actors in urban areas participate in regional Metropolitan Planning Organizations).[33]
- Open space acquisition funding and planning at the state level, with local governments zoning for the development of open spaces.
- Federal and state standards for habitat and wetlands protection with localities planning and zoning for development that may adversely impact these natural resources.

These and many more examples make it clear that existing legal frameworks and procedures seldom guarantee the type of coordination that is necessary for the local land use planning and regulatory system to work effectively to plan, regulate, and service development properly. Just as other stakeholders have overcome challenges in their fields, water planners and land use planners need to develop creative and common sense means of working together.

EXAMPLE OF THE WATER-LAND USE PLANNING DISCONNECT

Lakewood, Colorado [34]

In an effort to permit "mother-in-law" apartments and quickly accommodate additional

[33] Metropolitan Planning Organizations (MPOs) are responsible for creating short and long-term transportation spending budgets. In some regions, the MPOs stimulate some connectivity between local land use planning and regional transportation planning, but this is the exception.

[34] LAKEWOOD, CO, MUNICIPAL CODE §17.4.3.1(A) PURPOSE AND APPLICABILITY (2015), http://www.lakewood.org/City_Clerk/Codes_and_Laws/Municipal_Code/Title_17_-_Zoning/Article_4_-_Uses_and_Supplemental_Standards/17_4_3_-_Supplemental_Standards/2147506011/.

density while maintaining community character, the City of Lakewood amended its zoning code to allow for accessory dwelling units.[35] The City's ordinance permits a primary single-family dwelling unit on a lot of at least 9,000 square feet to have one accessory unit so long as either the primary or accessory unit is occupied by the property owner and so long as the accessory unit is located to the side or rear of the primary unit, with no more than one bedroom, a maximum of 700 square feet of gross floor area, a maximum height of 30 feet (if detached), and an exterior that is similar in appearance to the primary unit and maintains the residential character of the property. If located on a second floor or above a garage, the accessory unit may have a separate external stairway that is not on the street-facing façade.

As homeowners began to avail themselves of this new accessory dwelling unit provision, they would contact the water provider to expand their existing tap only to discover that the non-City water provider intended to charge a tap fee as if the accessory unit were a new home, regardless of whether the structure and infrastructure were already existing, effectively making the project cost prohibitive for most homeowners.[36] As a result, since Lakewood's code amendment, the City has received and approved significantly fewer accessory units than anticipated and has not been able to accommodate growth in the way it planned.

Successful efforts to bridge these gaps typically begin with **education**. Water planners need to learn what land use planners do and vice versa. These practitioners operate in completely different contexts and have not been exposed to their respective practices. As a result, the benefits of cooperation are not evident and little effort to work together is made. Initial education efforts should include a review for water supply planners of basic land use regulation tools (zoning, subdivision, building permits, etc.) as well as state-specific land use laws; and, for land use planners, a review of water resource planning for supply, wastewater, stormwater, integrated systems, water quality, water rates setting, system development charges and especially water conservation. Once this education occurs, the next step is to create some type of **procedure for regular contact**. Next, these discussions should result in **coordinated planning** based on a deeper understanding of the interdependence of both systems and how they can be leveraged for greater effect. Finally, after senior decision-makers have learned the benefits of coordinated efforts, these informal procedures can be **institutionalized**. (On this point, it is important to consider the need to engage decision-makers early in this process—discussed further under *Getting Started*, below—in order to gain their support and understanding of the effort.)

EXAMPLES OF LOCAL DEPARTMENTS WORKING TOGETHER

[35] Lakewood Representatives, Land Use Leadership Alliance Training Program (LULA), Denver, CO (April 30, 2015); email interview with Henry Hollender, HVS Engineering (April 11, 2016).
[36] Lakewood Representatives, Land Use Leadership Alliance Training Program (LULA), Denver, CO (April 30, 2015).

Aurora, Colorado[37]

Collaboration is integrated into Aurora's organizational structure, especially when it comes to water. Whenever code changes are proposed, the City's departments work together to ensure that water conservation is part of the conversation. This collaboration began in earnest in 2009 when the City updated its Comprehensive Plan.[38] As the comprehensive planning process began, the City's Water Department and Planning and Development Services Department came together and have maintained a high level of communication ever since. The Comprehensive Plan itself contains language calling for the water conservation division to use a multi-faceted approach including programs for peer agency collaboration and outreach.[39] Much of the reason the collaboration continues is due to the City's Integrated Water Master Plan, which operates in a way that necessitates a conversation when water and land use decisions are made. The process and requirements that have been put in place require the water department's planning and engineering group (along with their conservation group) to work closely with not only the planning department but also with other departments to determine how the City will grow. This process provides the water department with the information it needs to adequately plan for the City's future water supply needs.

In addition, the City's water department uses technology to share use information with the planning department. Similarly, the planning department shares data to enable the water department to plan for infrastructure needs. Through modeling software the departments work together to examine how water use changes under various land use development scenarios. The City also created an Office of Development Assistance—a division within the City Manager's office—to facilitate the development process with staff members that cross all boundaries. Collaboration is now also a priority in the City's hiring process—making sure new hires are people who thrive in a face-to-face, cooperative approach.

Throughout the initiatives discussed here, other departments have also been heavily involved in the dialogue surrounding land use planning and water demand, including Public Works, the Office of Development Assistance, Parks, Recreation, and Open Space, and others. As a result of the City's focus on interdepartmental collaboration, staff has a significantly fuller picture of what is going on and what actions could raise red flags for other departments. It has also helped employees recognize they are on one team, as opposed to eight separate departments. Services are more efficient, customers are more informed, and the City has seen higher quality development.

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[37] Telephone interview with Lyle Whitney, Water Conservation Supervisor, City of Aurora, and Karen Hancock, Long-Range Planner & Environmental Program Supervisor, City of Aurora (Aug. 5, 2016).

[38] CITY OF AURORA 2009 COMPREHENSIVE PLAN (2010), https://www.auroragov.org/UserFiles/Servers/Server_1881137/Image/Departments/Development/Final%20Comp%20Plan.pdf.

[39] CITY OF AURORA 2009 COMPREHENSIVE PLAN, G: DEVELOPING AND PROTECTING WATER AND OTHER NATURAL RESOURCES 5 (2010), https://www.auroragov.org/UserFiles/Servers/Server_1881137/Image/Departments/Development/Final%20Comp%20Plan.pdf.

Santa Fe, New Mexico[40]

The City of Santa Fe, New Mexico, adopted a Sustainable Santa Fe Plan in 2008. The Plan lays out Proposed Actions, organized under ten main topics, one of which is Water Conservation. The Water Conservation chapter contains a Proposed Action to develop a Water Conservation Strategic Plan, which should, among other things:

- "Better integrate (for planning purposes) the various functions currently managed by separate entities within City government, including Water Conservation, Long Range Water Supply, Planning and Land Use, Billing Division, etc."
- "Address the harder questions regarding water conservation, particularly the interconnections between conservation, land use, and growth—all within the context of climate change."

Golden, Colorado

In 2008, Golden, Colorado, established the Community Sustainability Advisory Board (CSAB) to assist the City in achieving its sustainability goals.[41] In 2015, the City updated its Sustainability Strategic Plan, which is composed of seven measures, including green buildings and water. According to the Plan, the CSAB works directly with other boards and commissions within the City to facilitate and track progress within the set sustainability goals.[42]

Among the City's goals are to revise its land use code every three years to reflect the best practices in sustainability; reduce the City's per capita water use by 15% in 15 years; and increase the efficiency of the water delivery system (water infrastructure from reservoir to plant and to end-user). Among others, the Plan's strategies to implement some of these goals include:

- Having the CSAB work with the City Council, Public Works, Communications Department, and the general public to develop an advanced metering program;
- Having the City partner with the local Center for Resource Conservation to promote outdoor water conservation; and
- Having the CSAB work with the Planning Commission to research innovations and ideas to minimize outdoor water use in new and redevelopment projects (in order to eventually adopt regulations to reduce such water use).

San Jose, California[43]

Adopted in 2011, Envision San Jose 2040 General Plan is the City's comprehensive plan. The Plan incorporates various land use and water conservation methods to reach the City's goals. The Plan's Land Use and Transportation chapter calls for many water-conserving

[40] SUSTAINABLE SANTA FE PLAN (2008), http://www.santafenm.gov/media/files/Public_Utilities_Environmental_Services/SustainableSFweb.pdf.
[41] *Boards and Commissions*, CITY OF GOLDEN, http://www.cityofgolden.net/government/boards-commissions/ (last visited Jul., 19, 2016).
[42] CITY OF GOLDEN, CO 2015 CITY OF GOLDEN SUSTAINABILITY STRATEGIC PLAN 4, 7 (2015), http://www.cityofgolden.net/media/SustainabilityStrategicPlan.pdf.
[43] ENVISION SAN JOSE 2040 GENERAL PLAN (2011), https://www.sanjoseca.gov/DocumentCenter/Home/View/474.

land uses and for requiring new developments to incorporate measures to minimize water consumption. As part of its goal to "establish a land use pattern that fosters a more fiscally and environmentally sustainable safe, and livable city", the Plan includes the following implementation action, among many others:

- Collaborate with appropriate external agencies with land use authority or regulations in the City. Consider applicable Airport Land Use Commission, Water District, Local Area Formation Commission, and other policies from outside agencies when reviewing new or expanded uses.

3. The Value in Regional Planning & Communication

The jurisdiction of local governments in Colorado runs only to their boundaries, making land use planning highly parochial in nature.[44] The disadvantages of this are obvious when considering that water exists and freely flows across political boundaries. For example, groundwater resources typically underlie multiple jurisdictions and surface water systems are virtually always intergovernmental resources where upstream users greatly affect the quality and quantity of water available for downstream users. Compounding this disconnect is the reality that "all politics is local" and communities tend to guard their legal independence and power. As a result, most states, including Colorado, do not require intergovernmental planning—either in general or with respect to water.[45] Where states or the federal government do create regional planning agencies, they are often voluntary organizations and have little effective control over local decision-making.

At the same time, the legal system in Colorado permits and encourages intergovernmental cooperation and regional planning.[46] Local governments are more likely to take advantage of this enabling law where a lack of joint planning would result in serious problems and where they can decide outcomes through a process of intergovernmental or regional interaction. A distinct advantage of this type of coordinated regional planning is that it tends to capture and reconcile the interests of the relevant communities within water districts and agencies, which often have jurisdiction over all or part of more than one local government. Local governments could therefore increase the efficiency of planning and regulating for water conservation by coordinating efforts with adjacent local governments that have shared issues and resources and using intergovernmental cooperative measures to institute a framework for improved water conservation and land use integration.

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[44] COLO. REV. STAT., §§ 29-20-101, 102 (2015) (State enabling statute delegating land use planning and regulation to local governments in Colorado).

[45] The State of Colorado does not "require" intergovernmental or regional planning but does require that each local government create a Master Plan for the physical development of the municipality and that Plan must "make careful and comprehensive surveys and studies of present conditions and future growth of the municipality, with due regard to its relation to neighboring territory." COLO. REV. STAT., § 31-23-207 (2015).

[46] Colorado, COLO. REV. STAT., § 30-28-105 (2015) (giving counties the authority to cooperate in the creation of a regional planning commission), COLO. REV. STAT., § 31-23-227 (2015) (allowing municipalities to enter into intergovernmental agreements with their own counties "for the purposes of joint participation in land use planning…").

Communities in Colorado can create and adopt a Memorandum of Understanding or Intergovernmental Agreement (IGA)[47] that stipulates the process of joint planning. They can also share related costs on an equitable basis (for example, one or more staff members could be engaged to enforce post-occupancy requirements related to water). Funding of planning across local government lines not only makes water and land use planning more effective, but it can reduce costs through economies of scale. Local governments in Colorado may also utilize IGAs to plan for jurisdictional expansion into areas outside of the local government boundaries, including placing binding requirements on those areas. Those areas (often called Growth Management Areas or GMAs) are often subject to special planning considerations either through IGAs or other planning tools to ensure growth happening there is compatible with the rest of the community, including meeting sustainability and water conservation goals.

Communities interested in a less formal approach can consider organizing regional discussions. This is likely within the purview of the regional planning agency, if one exists, which may have greater technical information and resources than the individual jurisdictions that decide to cooperate. Because many communities have only a vague idea of what neighboring communities are doing on land use and water, there is significant value in simply sharing lessons.

EXAMPLES OF LOCALLY-INITIATED REGIONAL PARTNERSHIPS

San Jose, California[48]

Adopted in 2011, the City's comprehensive plan, Envision San Jose 2040 General Plan, incorporates various land use and water conservation methods to reach the City's goals. The Plan's Environmental Leadership chapter emphasizes the importance of developing effective local, regional, and statewide partnerships and governance structures that enable sustainable water management. Specifically, the Plan sets forth a goal for responsible management of the City's water supply and, as part of this goal, includes the following implementation action:

- Create partnerships and governance structures that allow for a comprehensive approach to water supply management that improves the reliability of local and imported water supplies, explores new sources of water, and thereby protects and enhances the Sacramento-San Joaquin River Delta ecosystem.

Boulder, Colorado

The Boulder Valley 2010 comprehensive plan lists sustainability as the first core value and uses it as a unifying framework to meet environmental, economic, and social goals.[49]

[47] Colorado, COLO. REV. STAT., §§ 29-1-203, 29-20-105—107 (2015) (allowing governments to cooperate or contract with each other on various matters, including "the sharing of costs, the imposition of taxes, or the incurring of debt").

[48] ENVISION SAN JOSE 2040 GENERAL PLAN (2011), https://www.sanjoseca.gov/DocumentCenter/Home/View/474.

Section 1.1 emphasizes that effective regional or statewide cooperation and solutions are necessary to attain these goals, and calls for an active pursuit of cooperative planning opportunities, intergovernmental agreements, broader information exchanges and communication, collaborative initiatives, and closer cooperation with entities in the region and state.[50] In addition, Section 3.24 of the comprehensive plan states that to ensure water quality, there will be special emphasis on regional efforts such as watershed planning and that priority will be placed on pollution prevention over treatment.[51]

4. When Water Providers Take the Lead

When coordinating an effort to better integrate land use and water planning, it is more typical for a local government entity with land use regulatory powers to lead the charge. Water providers, however, sometimes do take the lead, and local governments should be sure to explore whether their local water provider has done so, as certain initiatives may not have been brought to the local governments' attention.

EXAMPLES OF WATER PROVIDER-LED LAND USE ACTION

East Bay Municipal Utilities District[52]

The East Bay Municipal Utilities District (EBMUD), which serves customers in and around Oakland, California, faced water supply availability challenges for a number of years. In response, it developed Service Rules to govern those connecting to its system. Under these rules, starting in 2008, EBMUD conditions turning on the water service to a new home (or for expanded service) on whether the home meets certain standards, such as high-efficiency indoor fixtures and water-conserving landscapes. Applicants for standard service must get approval from EBMUD's Water Conservation Division. Customers applying for water meters to serve two or fewer residential units must complete a Water Efficiency Requirements Checklist and certify that the subject property meets the specified water-efficiency requirements.[53] Those applying for water meters to serve three or more residential units or for non-residential projects must supply plumbing and landscaping plans for review.

South Metro Water Supply Authority (Denver, Colorado)

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[49] CITY OF BOULDER, BOULDER VALLEY COMPREHENSIVE PLAN 9 (2010), https://bouldercolorado.gov/bvcp/2010-boulder-valley-comprehensive-plan.

[50] CITY OF BOULDER, BOULDER VALLEY COMPREHENSIVE PLAN 11 (2010), https://bouldercolorado.gov/bvcp/2010-boulder-valley-comprehensive-plan.

[51] CITY OF BOULDER, BOULDER VALLEY COMPREHENSIVE PLAN 38 (2010), https://bouldercolorado.gov/bvcp/2010-boulder-valley-comprehensive-plan.

[52] *Regulations*, EAST BAY MUNICIPAL UTILITY DISTRICT, http://www.ebmud.com/customers/regulations/ (last visited Jul. 25, 2016).

[53] *Water Efficiency Requirements Checklist*, EAST BAY MUNICIPAL UTILITY DISTRICT, http://www.ebmud.com/files/6914/3197/0193/C-06320Water20Service20Regulations2002-13_fillable.pdf.

In 2004, the Douglas County Water Resource Authority brought together other smaller water entities in south Denver and formed the South Metro Water Supply Authority (SMWSA), to act as a regional body to address the water needs of the communities it serves.[54] Today, there are 13 member water providers working together to implement planning projects and programs, such as the Water Infrastructure and Supply Efficiency partnership (WISE). WISE is a partnership between SMWSA and the Aurora and Denver Water Authorities, to connect and use existing infrastructure to reduce reliance on nonrenewable groundwater resources for the region, while maximizing the use of existing water assets.[55]

Southern Nevada Water Authority[56]

Shortly after a severe drought in the early 2000s, the Southern Nevada Water Authority (SNWA) decided that the absence of effective landscape standards in local land use regulations (and the predominant use of turf grass in front yards) was a missed opportunity to reduce potable water use. Though it lacks direct land use authority, SNWA subsequently developed a model landscape code limiting the use of water-intensive vegetation and other provisions. Through partnerships and work with local land use planners and decision-makers within its service area, SNWA won support for its landscape standards, with every local community adopting the code as part of its land use regulatory framework.

Local land use policy can benefit from water planners who take the lead in this effort to coordinate. Where water planners develop water conservation practices, these techniques can be incorporated into land use planning and regulation in a number ways. These include adding them to the comprehensive land use plan, putting them directly into zoning laws, incorporating them in subdivision or site plan regulations, using them to draft development agreements with Planned Unit Development sponsors, and adding them to building or plumbing codes.

Although population growth has had and will continue to have a substantial impact on an increasingly strained water supply, the situation could be far worse if water providers had not already begun efforts to reduce water use, such as those described in this Section. One study of communities in the Colorado River Basin documents that for nearly 30 water agencies, while the population increased by over 40% between 1990 and 2008, actual total

[54] *About*, SOUTH METRO WATER RESOURCE AUTHORITY, http://southmetrowater.org/about/ (last visited Jul. 19, 2016).
[55] *Wise Partnership*, SOUTH METRO WATER RESOURCE AUTHORITY, http://southmetrowater.org/wise-partnership/ (last visited Jul. 19, 2016).
[56] Telephone interview with Drew Beckwith, Water Policy Manager, Western Resource Advocates (Jul. 21, 2016). *See also, Turf Limits,* SOUTHERN NEVADA WATER AUTHORITY, https://www.snwa.com/consv/restrictions_turf.html (last visited Jul. 25, 2016) (SNWA's webpage with specific information on each community's turf limits as well as information on the Authority's Water Smart Landscape rebate program).

water use declined over that same time period.[57] For example, while Greeley, Colorado's population increased by 48,238 people in that time, they saw a 42% reduction in per capita water use; Denver Water's service area saw a population increase of 263,000 with a 28% reduction in per capita water use; Boulder's population increased by 16,898 with a 20% reduction in per capita use; and Fort Collins-Loveland grew by 32,800 while experiencing a 33% reduction in per capita water use.[58] The water agencies whose actions have contributed to substantial declines in per capita deliveries demonstrate the importance of increased water efficiency and conservation, and should provide other agencies and local governments with encouragement to promote conservation and efficiency more aggressively in their own jurisdictions.

[57] The study—which included 68 water agencies with population and water delivery data for both 1990 and 2008, and 32 additional providers with limited data—indicated that, while the population that was served increased by over 40%, 29 water agencies in the study withdrew and delivered less water in 2008 than they had in 1990. For *all* communities in the study, taken together, total municipal water deliveries from the Colorado River basin increased by over 600,000 acre-feet, but this increase is mainly attributed to population growth, though commercial development and climatic variability also contributed. The 600,000 acre-feet rate of increased delivery, however, is actually much slower than population growth. "If water deliveries had increased at the same rate as population growth, they would have grown by almost two-million acre-feet—assuming that much additional water was even available for delivery." MICHAEL J. COHEN, PACIFIC INSTITUTE, MUNICIPAL DELIVERIES OF COLORADO RIVER BASIN WATER (June 2011), http://pacinst.org/wp-content/uploads/2013/02/crb_water_8_21_2011.pdf.

[58] MICHAEL J. COHEN, PACIFIC INSTITUTE, MUNICIPAL DELIVERIES OF COLORADO RIVER BASIN WATER 39-40 (June 2011), http://pacinst.org/wp-content/uploads/2013/02/crb_water_8_21_2011.pdf.

C. The Colorado Land Use System

The purpose of this section is to familiarize the reader with the basic components of the land use regulatory system in the State of Colorado. Knowledge of this framework, the source of its power, and the agencies that operate within it is essential for those who are interested in achieving water conservation in the built environment.

1. Delegation of Legislative Authority

The Constitution of the State of Colorado gives the state legislature the police power, that is, the power to adopt laws that protect and promote the health, safety, welfare, and morals of the people of the state. Using this authority, the state legislature has delegated authority to local governments to adopt land use or "master" plans, zoning, and other land use regulations.[59] Using this authority, local governments including counties and municipalities, regulate land development to benefit the people of the state.

Managing the built environment to conserve water serves the public interest. Within their jurisdictions, municipalities adopt standards governing the use and dimensions of buildings, the subdivision and development of the land, and the details of development, particularly of large projects.[60]

Colorado law sets out rules and procedures that counties and municipalities must follow in land use planning and regulation to ensure that their actions are legal and immunized from attack by property owners, neighbors, or other stakeholders.[61] For instance, Colorado law requires most municipalities to develop and adopt master plans.[62] Local governments are free to put various elements into those master plans, including water conservation. State law provides for the formation of local agencies to administer the land use system, such as planning and zoning commissions, which the law encourages to be combined to achieve more comprehensive and coherent regulations and practices.[63]

The State Legislature of Colorado allows most cities and counties to become a "home rule" community, by voluntarily opting to become one.[64] (The process of becoming a home rule local government is beyond the scope of this module.) Once this is done, a home rule municipality has the power to create its own charter, ordinances, and laws that involve land use planning and regulation.[65] Some matters may be beyond the reach of local land use law because they have been expressly pre-empted by state or federal law. Where home rule communities establish their own procedures and standards to regulate land use, they

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[59] COLO. REV. STAT., § 29-20-101, *et seq.* (2015) (Local Government Land Use Control Enabling Act of 1974).
[60] COLO. REV. STAT., §§ 31-23-206, -214, -301 (2015).
[61] COLO. REV. STAT., §§ 29-20-101 – 306 (2015).
[62] COLO. REV. STAT., § 31-23-206.
[63] COLO. REV. STAT. §§ 29-20-105, 30-28-105 (2015).
[64] Colo. Const. art. XX, § 6; COLO. REV. STAT., § 30-35-103 (2015).
[65] Colo. Const. art. XX, § 6.

must follow those self-prescribed procedures or else risk a legal challenge. "Statutory communities," those that may not or do not choose to be home rule communities, must follow the rules and regulations for land use planning and regulation adopted by the state legislature (as they do not have the power to create their own ordinances and laws that involve land use planning and regulation).

2. Components of the Land Use Legal System

a. Comprehensive or Master Plan

A comprehensive or master plan is a document that must be formally adopted by the local planning commission that contains goals, objectives, and strategies for the future development and conservation of the community.[66] Though many communities in Colorado choose to adopt a comprehensive or master plan, only certain jurisdictions are required by the State to do so.[67] The comprehensive or master plan is advisory in nature[68] and acts as a blueprint for all other land use regulations in the jurisdiction. In some cases, a local government may make its master plan binding by incorporating the plan into the community's zoning or other land use laws.

b. Zoning

One of the most significant powers delegated to local governments in Colorado is the power to adopt zoning codes or ordinances. Through the use of these codes, localities partition their jurisdiction into zones that allow specified land uses or types of development to occur within each zone.[69] These zones may be amended or changed as a local government sees fit as long as applicable procedures and judicial standards are followed.

c. Subdivision Regulation

Subdivision is the process by which land is divided into parcels so they may be developed appropriately for the uses allowed by zoning. Subdivision standards govern the size and location of roads and utilities, sidewalks, the slopes of driveways, filling and grading during development, and similar aspects of development not regulated by zoning. Subdivision

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[66] COLO. REV. STAT., §§ 30-28-106, 31-23-206 (2015) (authorizing both counties and municipalities to "make and adopt a master plan for the physical development" of their territories).

[67] See COLO. REV. STAT., §§ 30-28-106(4)(a), 31-23-206(4)(a). Counties within Colorado must have a comprehensive or master plan if they either have 100,000 or more people, or a population of 10,000 or more with a 10% growth in population within a specified timeframe. Municipalities merely require a population of 2,000 or more and existence within a county.

[68] In Colorado, a comprehensive plan can be regulatory, but only in home rule communities and only if the local legislature adopts it as such by way of land development regulations, which does not happen often. (COLO. REV. STAT., §§ 30-28-106(2)(a), 31-23-206(1).)

[69] COLO. REV. STAT., §§ 30-28-113, 31-23-301 (2015).

standards are especially important when water resources are scarce since they can be used to govern landscape plantings and irrigation systems in order to conserve water use. The State of Colorado requires its counties and municipalities to enact and enforce subdivision standards through their planning commissions.[70] Subdivision regulations should carefully look at and provide for the adequacy of the water supply for each proposed development.

d. Site Plan Regulations

Site plan regulations are similar to subdivision regulations except they apply when a parcel of land is to be developed without being subdivided. Large sites can be used for condominium projects, shopping malls, or manufacturing operations and need to be regulated as much as subdivisions, particularly with respect to water conservation.

e. Conditional & Special Use Permits

A special or conditional use is one that is generally compatible with that zone's uses but may be denied if it does not fit in with the overall characters of the zone. These uses are subject to conditions, rather than allowed as-of-right, because they are associated with land uses that impact the surrounding neighborhood and environment more than land uses permitted as-of-right in the applicable zoning district. Before approval, local governments often require additional review for conditional and special use permits by imposing special conditions on them that must be enforced.

3. Role of Local Boards

a. Governing Body

The governing, or legislative, body of a local government is responsible for creating the local planning and zoning commissions and adopting zoning and other land use regulations. Notably, governing bodies in Colorado are explicitly authorized to adopt zoning ordinances to regulate land uses and building construction.[71] The law does not require that the governing body adopt the master plan but, in practice, it does in many communities upon referral from the planning commission.

b. Planning Commission

The planning commission, sometimes called a planning board in home rule communities, may be created by local governments and most take advantage of this power. In jurisdictions required to adopt a land use master plan, once a planning commission is

[70] COLO. REV. STAT., §§ 30-28-133, 31-23-214 (2015).
[71] COLO. REV. STAT., §§ 30-28-111, 31-23-301 (2015).

created, it is tasked with formulating and adopting the plan.[72] Although not required, most planning commissions also choose to refer the master plan to the local legislature (governing body) for their adoption. In most communities, the development or updating of subdivision and other land use regulations is done by the local planning commission, which is also responsible for reviewing, approving, and conditioning proposed subdivisions and other developments.

c. Board of Adjustments

The Board of Adjustment is an administrative branch that normally hears applications from landowners who are seeking variances for development that does not meet the strict letter of the zoning law. The governing body of the community can allow that this board provide other similar functions.

4. The Comprehensive or Master Plan

a. Purpose

The purpose of a comprehensive or master plan is to create a blueprint for future development and preservation of a community that can later be referenced when making land use decisions. One of the principal purposes of the master plan is to guide the creation and adoption of the local zoning law. Colorado law states that the purpose of a master plan is to guide "a coordinated, adjusted, and harmonious development of the municipality and its environs which will…best promote the health, safety, order, convenience, prosperity, and general welfare" of the citizens.[73] This same guidance applies to counties.[74]

b. Organization of the Comprehensive/Master Plan

Comprehensive or master plans may be organized in different ways but a few major components are often present.[75] These components include issue identification, land use, public infrastructure, public services, resource protection, economic development, and implementation plan. These areas can be further broken down into subsections such as background information, goals, objectives, and strategies. The data collection necessary to flesh out these categories takes time and effort by both planners and the public who should be engaged from the inception to fruition of the planning process. The master planning process and the plan itself provide communities with an excellent opportunity to

[72] See COLO. REV. STAT., § 30-28-106, 31-23-206(4).
[73] COLO. REV. STAT., § 30-23-107 (2015).
[74] COLO. REV. STAT., § 31-23-206 (2015).
[75] The only comprehensive master plan element *required* by State statute is tourism. COLO. REV. STAT., §§ 30-28-106(5), 31-23-206(5).

incorporate water supply planning with water demand, which is greatly affected by the density and design of land uses and developments permitted by zoning.

5. Zoning

a. Purpose & Effects of Zoning

Zoning regulates and restricts the height, number of stories, size of buildings and structures, and, in the case of a form-based code, the form of buildings. It also governs the percentage of a lot that may be occupied, the size of lots and open spaces, the density of population, and trees and other vegetation on building sites.[76] Zoning divides the community into different zones and, within each district, the land uses and details of development differ. Among the many consequences of zoning is the pattern of development that it creates and the density of population it allow.

b. The Nature of Zoning

Zoning is a legally and politically sensitive process since it regulates the use and enjoyment of privately owned land. Property owners cannot sustain an argument that zoning, in general, denies them their property rights because they hold title to land subject to the police power of the state and local governing bodies' power to promote and protect the public interest. Zoning, however, must be adopted in strict accordance with established legal processes, must allow landowners some economic use of their land, and must clearly achieve a legitimate public purpose.[77]

c. Conformance of Zoning to the Comprehensive/Master Plan

In practice, the comprehensive/master plan sets forth the planning commission's policies regarding the most desirable use of the land, while zoning contains the detailed standards for accomplishing the plan's goals and objectives. Zoning is the key strategy that communities use to implement the plan's principles. The initial adoption of the comprehensive zoning ordinance affecting all or most of the land within the community must be in conformance with the master plan. Home rule communities may further provide that all zoning actions, including the rezoning of specific parcels of land, and other land use regulations must be in conformance with the master plan. Individual parcel rezonings may be challenged as "spot zoning" if they do not comply with the comprehensive plan.

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[76] COLO. REV. STAT., §§ 30-28-113, 31-23-301 (2015).

[77] These principles were determined in a few seminal cases: Euclid v. Ambler Realty Co., 272 U.S. 365 (1926); Penn Cent. Transp. Co. v. New York City, 438 U.S. 104 (1978); Lucas v. S.C. Coastal Council, 505 U.S. 1003 (1992); Dolan v. City of Tigard, 512 U.S. 374 (1994); Nollan v. Cal. Coastal Commission, 483 U.S. 825 (1987).

d. As-of-Right Uses & their Accessory Uses

As-of-right (by-right) or permitted uses cannot be denied unless they do not meet other building code criteria. As-of-right and accessory uses are those that zoning prescribes within a particular district.

e. Rezoning

Rezoning is the process by which a local government reviews their zoning code and makes adjustments or rezones specific areas that have changed or are undergoing change that affects the logic and public purpose of the current zoning ordinance with respect to these specific parcels or areas.

6. Planned Unit Developments (PUDs)

The State Legislature of Colorado passed the Planned Unit Development Act to increase the flexibility of standards governing the development of larger sites in order to meet current trends.[78] The planned development process gives local governments latitude to negotiate almost every aspect of development of these parcels in exchange for land use approval, subject to specific conditions affecting each PUD. This puts pressure on developers to design long-term site plans that require considerable planning and forethought. However, this does not exempt PUD applications from having to comport with other mandatory legislation pertaining to development approvals. For example, Colorado requires a demonstration of adequate water supply for projects with more than 50 units.[79]

7. Development Agreements

Local governments may enter into agreements with private developers to increase the likelihood of a project being completed. For instance, a local government may agree not to rezone an area for a certain time period to ensure an approved project will not be interfered with in such a way. If the agreement is approved in accordance with state statutory procedures, the developer's rights to develop in the manner agreed may vest or be guaranteed to a specified time period.

8. Regional Planning

[78] COLO. REV. STAT., §§ 24-67-101 et seq.

[79] COLO. REV. STAT., §§ 29-20-303 to -304 (2015) ("A local government shall not approve an application for a development permit unless it determines in its sole discretion, after considering the application and all of the information provided, that the applicant has satisfactorily demonstrated that the proposed water supply will be adequate").

Local governments in Colorado are encouraged to contract with their neighboring localities to create efficient and mutually beneficial partnerships capable of providing any function or service they are authorized to legislate such as land use planning, subdivision, and zoning. However, each local government has the right to approve or disapprove of an intergovernmental agreement (IGA) when it directly affects land within that municipality or county. **Regional planning commissions** engage with multiple municipalities and may work in conjunction with counties. Counties and municipalities are expressly able to be part of more than one regional planning commission.[80] This is likely because the regional plan is not controlling and acts as an advisory document unless adopted by the municipality and county with sufficient detail to be binding.[81] If a project is going to affect more than one municipality within a region, the commission may interfere unless it finds the project to be strictly local in nature. **Metropolitan planning organizations** are focused on compliance with federal transportation laws regulating planning and providing transportation funding. These regions are required to develop twenty-year plans that are aggregated and evaluated for the purpose of crafting and solidifying a statewide plan.

[80] COLO. REV. STAT. § 30-28-105.
[81] COLO. REV. STAT. §§ 29-20-105, 30-28-105.

D. The Water Planning Process

Historically, everything related to water planning has been handled within the water utility world. As mentioned elsewhere in this module, the land use side of the equation stated, "We're growing, we're going to need water for the new development". The water side of the equation then stated, "We've got you covered. How much do you need?". That was usually the extent of the collaboration.

Over the past 15 years or so, Colorado has crossed a threshold into a very different world than was originally contemplated. For the first time a water supply gap has been identified, population continues to increase and drought and climate change threaten water supplies. The water planning process has become even more important with pressure on water providers to solve many of the looming future crises. This section will focus on the water planning process with particular focus on integrated water resource planning and water efficiency planning.

1. Types of Water Plans

There are a number of water plans that a water utility, special district, or local government can create to suit their water management needs. Plans can be written separately for water supply, wastewater, storm water, water quality, and water efficiency, among others, or can be combined into one integrated plan. In Colorado, the only water plan required of water providers by statute is a water efficiency plan. This requirement only applies to water providers delivering over 2000 acre feet annually to retail customers.

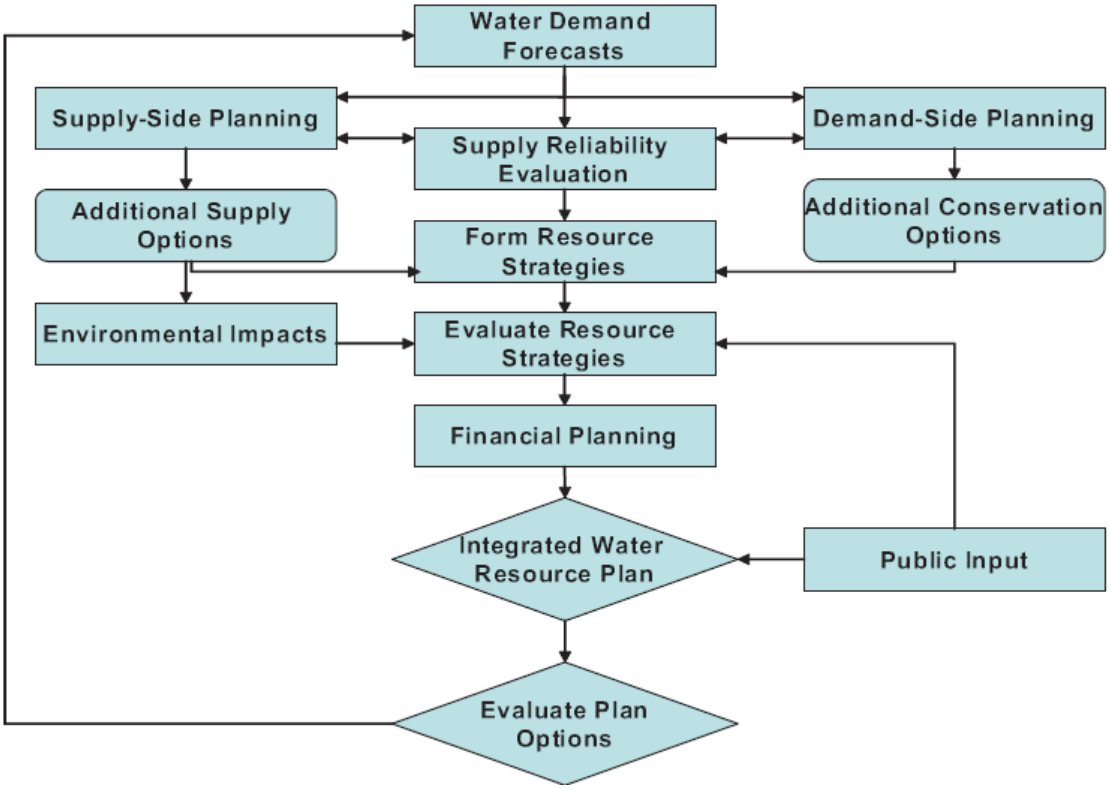
The goals and issues examined in any plan will vary with the nature of the community, its management responsibilities, and its water resource management challenges or opportunities. Some communities might not control all utilities within their political boundaries, such as a separate wastewater enterprise that covers multiple communities. Or for example, older communities may focus more on infrastructure repair/replacement while growing communities may focus more on acquisition of new water supplies.

The bottom line is that whatever suite of water plans that exist in a community, there is an important and necessary link that should be made explicit between these water plans and the land use planning efforts of the community. Every water plan has a set of goals that define the actions to be taken to manage the water resource to its full potential while planning for uncertainty and variability.

The following examples are adapted from Water Resources Planning: AWWA Manual of Water Supply Practices, M50, Second edition, focusing on Integrated Resource Planning and considers the integration of demand and supply plans. These examples are a simplified overview of the Integrated Water Resource Planning (IWRP) process. Much as a community comprehensive master plan should include water resource planning in it, a community's IWRP process should also include land use elements. The comprehensive and

flexible approach of the IWRP lends itself to the inclusion of different elements that can affect supply and demand.

Figure 13-1 Integrated Resource Planning (AWWA M50 Manual of Water Supply Practices; pg. 318)



2. Demand Forecasting

One of the most important aspects of water planning is demand forecasting. Although no planner can predict the exact future, tools to project potential future demand can be used to plan new infrastructure and assess supply reliability. Demand forecasting varies in complexity from just multiplying future population projections by current per person water use, to highly complex econometric models.

A difficult part of demand forecasting is accounting for water efficiency savings and incorporating them into future demand scenarios. Part of these water savings can be viewed as 'passive' brought on by the natural replacement of indoor fixtures spurred by federal regulations from 1992; while another part is more 'active' resulting from public education and incentive programs. As a result of federal regulations, state planning efforts, local incentive programs, and the increasing cost of water, per capita water use is declining across the United States. A key question to ask is whether or not water demand planning takes into account land use plans and vice versa.

3. Supply Reliability

The other side of the coin is supply planning and reliability. One of the main jobs for water supply planners is to ensure the functioning of a reliable water system that provides clean, dependable water supply twenty-four hours per day, every day of the year. Not only does this include quantifying the availability of enough water to supply their community, but it also focuses on the reliability of those supplies. Many factors affect the reliability of existing water resources, such as climate change, drought, sedimentation in reservoirs, and outstanding legal issues. A safety factor is usually included in any supply projections to ensure a system can withstand disruptions and emergency shortages.

Scenario planning is increasingly being used in the water planning community to ensure that multiple futures are taken into consideration so as not to commit all resources toward one future that may or may not occur. For example, Denver Water and the Colorado Water Conservation Board (CWCB) use the scenario planning approach to assess multiple potential "water futures" understanding that betting on one deterministic future is probably wrong.

EXAMPLE OF SCENARIO PLANNING

CWCB Scenario Planning in Colorado's Water Plan

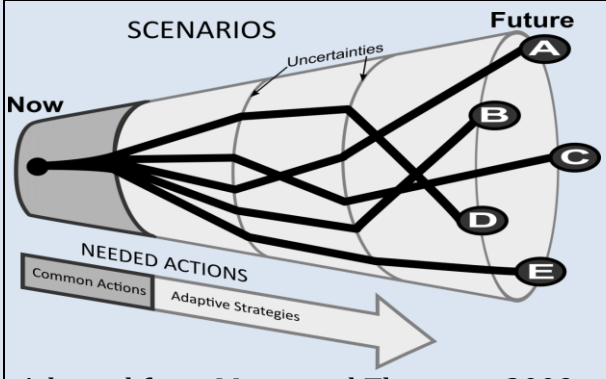
The following is taken from Colorado's Water Plan (CWCB, 2015): Given the uncertainties of future water supply and demands, the CWCB adopted a planning approach used by many major water planners across the West: scenario planning.[82] The use of scenario planning assumes that the future is unknown and provides flexibility in responding to various future conditions.[83] Rather than trying to predict the future by looking at the past, scenario planning allows us to identify and account for key uncertainties operating within the planning period.

The CWCB explored the implications of multiple plausible futures with stakeholders, such as the Interbasin Compact Committee (IBCC) and River Basin Roundtables, through a multi-year process. Given the unpredictability of factors driving Colorado's future, such as climate change, economic and population growth, and social values, the ability to plan for multiple scenarios presents a much more comprehensive tool to plan and prepare for Colorado's future. Descriptions of several futures were developed and used to identify and evaluate a prospective series of implementable projects and initiatives called portfolios. One goal of this work was to identify projects and policies that occur on multiple pathways. These common actions would therefore apply to multiple futures and can be planned for and prioritized first while still monitoring uncertainties that can redirect recent trends.

[82] Kees van der Heijden, SCENARIOS: THE ART OF STRATEGIC CONVERSATION (John Wiley & Sons eds., 2nd ed. 2005); *see*, Denver Water, San Diego.
[83] PETER SCHWARTZ, THE ART OF THE LONG VIEW 3 (Doubleday, 1991).

By implementing successive sets of common actions over time, decision makers can have greater confidence that the policies and investments made in the near term will also be viable in the longer term. The near and longer term actions combine with the scenarios to create a forward-looking pathway of actions that both anticipate and prepare for the emerging needs of the future. In the near term, our way forward is to implement actions common to all or most of the envisioned futures that can be implemented immediately, whereas the adaptive strategies are dependent on the specific scenario and will be evaluated based on future information. Planned actions and strategies would then be reevaluated and updated based on the status of predetermined "signposts" or decision points that help to reveal whether past uncertainties now have more clarity (Figure 1). For water in Colorado, these uncertainties include water needs, water supply, and Colorado's social values. Use of scenarios enables planners to respond and adapt to still emerging issues and to explore the opportunities and challenges that each possible future presents without reducing options available going forward.[84]

Figure 1- Scenario Planning Identifies Successive Set of Common Actions that Apply to Multiple Futures



Adapted from Marra and Thomure, 2009

Potential changes in future M&I water demand and available water supply were among the most important drivers considered by all the basin roundtables when developing their portfolios. The IBCC then developed a list of nine high-impact drivers to factor into the scenario development process since these will greatly influence the direction of Colorado's water future:

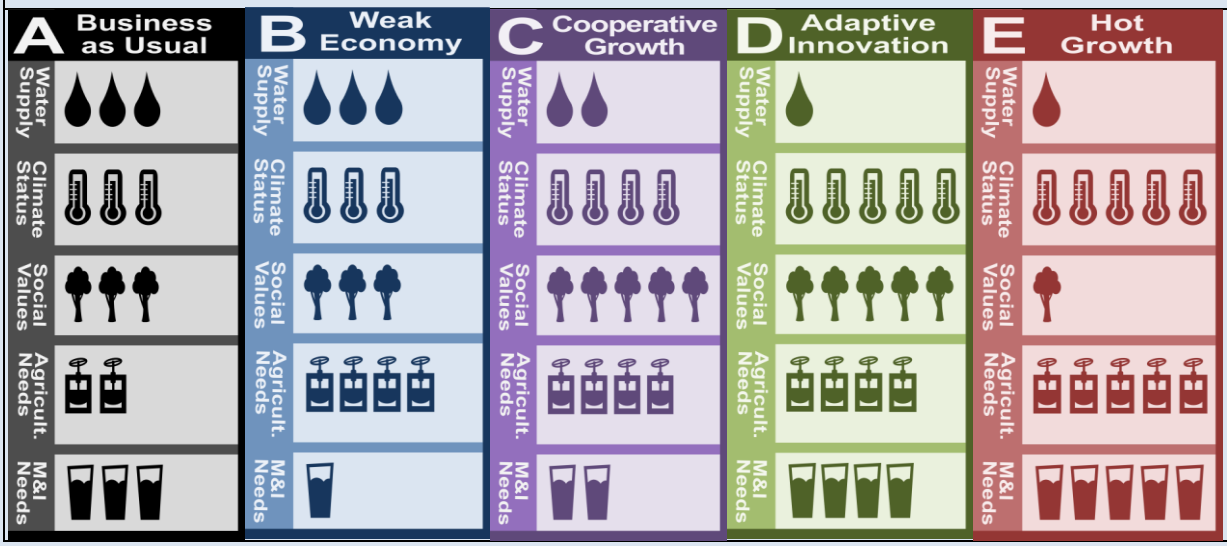
- Population/Economic Growth
- Social/Environmental Values
- Climate Change/Water Supply Availability
- Urban Land Use/Urban Growth Patterns
- Energy Economics/Water Demand
- Level of Regulatory Oversight/Constraint
- Agricultural Economics/Water Demand
- M&I Water Demands
- Availability of Water Efficient Technologies

Using these drivers, the IBCC developed five scenarios that represent plausible futures. The scenarios, visualized in summary form below, represent how Colorado's water future might look in 2050 even though the actual future at that time will likely contain a mixture of

[84] Kees van der Heijden, SCENARIOS: THE ART OF STRATEGIC CONVERSATION 1 (John Wiley & Sons eds., 2nd ed. 2005); *see*, Denver Water, San Diego.

multiple scenarios. The descriptive names given to the scenarios portray the overall essence embodied in their respective views of the future.[85]

Figure 2- Scenarios



The five scenarios collectively capture a broad range of future supply-and-demand possibility and uncertainty. Of the five scenarios, "Business as Usual" is the most conventional while "Adaptive Innovation" and "Hot Growth" are the most difficult to prepare for because of the high water demands combined with the effects of climate change. The challenge is not to pick the most likely or attractive future; rather, it is to develop the capacity to be prepared for all of them.

If successfully implemented, this adaptive water strategy provides a roadmap to a still evolving future. Given the many vagaries inherent in predicting future conditions, the plan must be a living document. As new critical drivers arise or as decision points change over time, the scenarios and associated response-action portfolios will need to be reassessed and revised in subsequent updates to the Statewide Water Supply Initiative.

4. Resource Strategies

Resource strategies are the alternatives that combine new supply development and demand reduction alternatives into a manageable number of combinations. Several options are available to meet imbalances between supply and demand, including water importation from other parts of the state, expanding existing infrastructure, water efficiency, water

[85] COLORADO WATER CONSERVATION BOARD, IBCC ANNUAL REPORT, 7-8 (2013), http://www.sjwcd.org/wp-content/uploads/2013/11/Rprt-IBCC-13.pdf.

reuse, and regional partnerships, among others. Water efficiency programs themselves are equally diverse and may focus on indoor or outdoor measures, target residential or non-residential customers, or involve whole water system management. By examining all these options equally, the utility approaches the management of the resource in an inclusive manner that can determine the most cost-effective and community-appropriate water supply and demand alternatives.

5. Evaluation

Much like other forms of planning, evaluation of alternatives in water planning is critical. Resource strategies are evaluated on cost/ROI, reliability, environmental impact, public acceptance, and other factors. Up until recently (the last 15 years here in Colorado), water efficiency alternatives were not seriously considered as part of the resource strategy mix. That has changed, as has the idea of taking a more integrated approach when looking at all potential water sources.

6. Financial Planning

Financial planning within the water planning process is crucial to the financial sustainability and health of the utility. Setting appropriate rates and tap fees to recover cost of service is an important and complex process – made all the more difficult by declining per capita use and the high fixed costs endemic to the water industry. In order to provide high quality drinking water and maintain a sustainable business model, a water utility must understand the extent of future demands in terms of appropriate amount of new supply, maintenance of existing infrastructure, capacity of treatment facilities, and the costs associated with these elements. A specific area that transcends water and land use planning is the idea of recovering costs for new water infrastructure based on how compact the new development is and how much infrastructure is required to service that new development. This could be viewed as a density bonus of a kind that incentivizes more compact development versus more far-flung development. This would be a very different and more granular way to look at water infrastructure costs and land use patterns. Financial planning is an area where land use and water planning affect each other directly in many ways and should be considered together when planning for a sustainable financial water future.

7. Water Efficiency Planning Process

As noted earlier, the Colorado Water Conservation Board (CWCB) requires that water providers seeking state funding have an approved and current water efficiency plan on file

with the CWCB.[86] The CWCB provides guidance for what should be contained within a water efficiency plan in its *Municipal Water Efficiency Plan Guidance Document*.[87] Throughout the Water Efficiency planning process there are touchpoints with the land use planning process where water efficiency measures and processes can be inserted and vice versa.

The following overview of the water efficiency planning process (along with the matrix later in this module) in Colorado can assist land use and water planners understand where those touchpoints are. The following is excerpted from CWCB's *Municipal Water Efficiency Plan Guidance Document*.[88]

The five steps of the water efficiency planning consist of the following:

- *Step 1: Profile of Existing Water Supply System* – Collection and development of supply-side information and historical supply-side water efficiency activities.
- *Step 2: Profile of Water Demands and Historical Demand Management* – Collection and development of demand data and historical demand management activities.
- *Step 3: Integrated Planning and Water Efficiency Benefits and Goals* – Identification of how water efficiency will be incorporated into future water supply planning efforts and development of water efficiency benefits and goals.
- *Step 4: Selection of Water Efficiency Activities* – Assessment, identification, screening, and evaluation process to select and fully evaluate a portfolio of water efficiency activities for implementation.
- *Step 5: Implementation and Monitoring Plans* – Development of an implementation and monitoring plan.

Steps 1 and 2 entail the collection of supporting background supply- and demand-side information necessary for the development of an effective plan. This information is carried into Steps 3, 4, and 5. Step 3 focuses on the development of efficiency goals and outlines the benefits of the water efficiency plan. Steps 4 and 5 comprise the bulk of the plan development where the water efficiency activities are selected and implementation and monitoring plans are developed. The public review and local adoption of the water efficiency plan are not part of the five steps described above; however, they are a requirement for a State approved plan and are described more in depth in Guidance Document Section 4.6.

While Figure 3 presents these steps in sequential order, it is important to note that components of certain steps cannot be fully completed until information from latter steps is obtained. This iterative process is presented as arrows in Figure 3 and outlined below:

- *Steps 1 and 2* – Obtain background supply- and demand-side data in Steps 1 and 2.

[86] Covered entities, those water providers delivering more than 2,000 acre feet of water annually, are required to have a CWCB approved water efficiency plan on file with the CWCB if they are seeking funding from the State of Colorado.

[87] Colorado Water Conservation Board & AMEC, Municipal Water Efficiency Plan Guidance Document (2012).

[88] Colorado Water Conservation Board & AMEC, Municipal Water Efficiency Plan Guidance Document 11-13 (2012).

- *Step 3* – Develop preliminary benefits and preliminary goals based on the identified benefits and information from Steps 1 and 2.
- *Step 4* – Develop screening criteria and evaluation factors based on the preliminary goals and information acquired in Steps 1 and 2, and develop a portfolio of water efficiency activities with estimated water savings. Revisit Step 3.
- *Step 3 Iteration* – Develop modified demands based on the water saving estimates developed in Step 4 and if applicable, identify potential modifications to facilities and water purchases.
- *Step 4 Iteration* – If necessary, return to Step 4 to finalize the water efficiency activity portfolio.
- *Step 3 Iteration* - Finalize the goals and benefits based on the final water efficiency activity portfolio and modified demands.
- *Step 5* – Develop the implementation and monitoring plans and address potential revenue changes.

It is noteworthy that some of the background or context of the water efficiency plan is usually derived from other water plans already in existence, such as master supply plans or demand studies. The unique part of a water efficiency plan is which actions will be outlined to help manage the supply and demand context. This is the area where the nexus between land and water planning is most apparent.

E. Getting Started: How to Engage the Process or Lead It

Colorado communities are being called to action. Presented with the opportunity to embrace growth while planning for water conservation, communities can rise to the occasion by integrating land use and water planning and promoting water-efficient land use development patterns. To plan and integrate properly, however, a community must first figure out where it *is* in order to determine where it needs to *go*. That is the purpose of this Section.

1. Whom to Bring Together

To perform this integration ably, a community must bring together a cross-section of individuals involved in both land use and water planning. As discussed above under *Working Together*, it is critical that land use planners and water planners collaborate as they examine the assumptions and standards in their plans and laws.

Water and sanitation districts need to develop water supply plans based upon realistic estimates of future water demand. This demand depends greatly on future land use types (such as multifamily, small lot, or large lot residential development), as denser developments with less landscaping use significantly less water than larger lot single family homes (as discussed under *Working Together*, above). In order for water providers to develop realistic estimates of future demands and to rely on those for water supply planning (versus projecting future demands based on historical demands), the land use plans need to ensure certain factors that directly affect demands are enforceable through the plating process, whatever trigger that may be. Water supply planners normally generate conservative demand estimates but if there is a strong basis to assume that land use codes will result in reduced demand, they can plan differently. It is imperative, therefore, that water planners connect with and collaborate with land use planners in order to accurately estimate, monitor, and enforce land use provisions directly affecting future water demands.

Water and sanitation districts in Colorado may also develop water conservation plans that focus on a variety of conservation measures including allowed plant types, soil amendments, efficient irrigation system standards, tree sizes, turf limitations, rain sensors, water harvesting practices, fixture efficiency standards, and many more. Many of these water conservation measures can be implemented by local governments through zoning and subdivision regulations and should be contained in the community's comprehensive plan.

As an organizing structure, **communities should bring together land use and water planners (sometimes from multiple districts) to form a Water and Land Use Planning Integration Team.** To accomplish adequate integration and implement strategies effectively over time, this team would also benefit from the involvement of additional departments—local and regional—charged with water supplies, water conservation, and

infrastructure development and maintenance. Key to this effort will be the support and assistance from local decision makers. They must be brought in early on and asked to participate or, at the very minimum, be briefed periodically on progress and the direction of the group. Finally, just as in a typical planning process, a member of the Team should be selected to lead the assessment process and set an agenda for moving forward—someone to champion the effort and lead the charge.

2. What to Review

For a Water and Land Use Planning Integration Team, the first step toward integrating land use and water conservation planning is to review its water supply and conservation plans and related code provisions, and to assess the disconnect between these documents and the community's comprehensive plan, sustainability plan (should one exist), land use and other development codes (zoning, site plan, subdivision, building, plumbing), and other regulations and initiatives (including related supplemental regulations, incentives, development permits, development agreements, development moratoria, and post-occupancy enforcement measures). The Team could also review state-specific land use and water laws and any applicable regional plans or other efforts. This review, and the assessment discussed in the next section, will make the benefits of cooperation clearer, as land use and water planners learn more about each other and the scope of services that each provides.

3. What to Discuss

The Water and Land Use Planning Integration Team can begin its assessment with an analysis of how much water conservation language is already present in the comprehensive plan, and whether that information is accurate and complete. Here, water planners can offer land use planners information on water demand, where it is likely to occur, and its variability and seasonality. The Team can then move on to evaluate whether the existing language establishes a concrete policy (or policies) and whether that policy includes ample recommendations for zoning and other strategies needed to implement actions that reduce water consumption. This could be followed by an assessment of opportunities to integrate water conservation language into the plan. For example, although water conservation may not be explicitly mentioned as part of a comprehensive plan goal or objective, consider whether the existing plan already presents strategies and implementation techniques that foster water-efficient growth. Such strategies and techniques might be those related to a compact land use pattern, green building development, green infrastructure measures, cluster-development provisions, and the like. Where such strategies and implementation techniques exist, there is already an opportunity to integrate water conservation language into the plan's goals and objectives. The assessment should then turn to the extent to which the local land use regulations, building code, plumbing code, and development approval process are consistent with the comprehensive plan policies on water conservation. Communities may use the **Self-**

Assessment Questions provided as an accompanying Exercise for this Module (see *Appendix A*) as a guide through this process.

The Water and Land Use Planning Integration Team should also discuss the opportunity to integrate land use planning elements (such as demand projections that factor anticipated land uses) into water planning documents. These elements should ultimately be integrated for clarity and consistency, but are, of course, not regulatory. Land use documents can provide important information about a number of water planning issues, including:

- Plans and regulations that are likely to affect demand projections;
- Incentives that can be used to reduce demands;
- Where in the distribution system future demands are likely to occur; and
- The magnitude and seasonality of those demands.

A major benefit of this dialogue is that it will educate the water community on intended land use and growth patterns while informing the land use community of water supply issues and opportunities. The "Self-Assessment Questions" exercise for this Module should provide significant direction—making more obvious the opportunities available for improved integration. See the Water Supply Planning section of this module for Integrated Water Resource Planning elements to consider.

4. Where to Go Next

After the Self-Assessment Questions, which should help highlight the opportunities available for improvement, the next clear step is to address these opportunities in the comprehensive plan. The Water and Land Use Planning Integration Team may find the **Matrix of Land Use Implementation Techniques**, provided as *Appendix B* this Module, helpful in creating a road map for further work. This Matrix presents water-conserving strategies and implementation techniques for the comprehensive plan and then indicates where they might ultimately be integrated in more detail within the community's zoning, subdivision, site plan, building, and plumbing codes. This provides both water and land planners a framework for drafting a comprehensive and inclusive water conservation element, which should then influence the addition of water conservation implementation techniques into the community's land use regulations.

While addressing the opportunities for improvement in the comprehensive plan, the Water and Land Use Planning Integration Team may also consider planning for adjustments to any applicable water conservation management plans. The **Matrix of Water Conservation Management Plan Components**, provided as *Appendix C* to this Module, will be helpful in creating a road map for this effort. This Matrix uses the same water-conserving strategies and implementation techniques as those in the comprehensive planning matrix (*Appendix B*) but indicates where they might ultimately be integrated in more detail within the water conservation plan(s). This provides water planners a framework for mirroring the initiatives to be integrated into the local comprehensive plan.

Once review and amendment of the comprehensive plan (and possibly the water conservation plan) are complete, using *Module 2: The Comprehensive Master Plan*, communities should next use *Module 3: The Zoning Code* to perform a gap analysis on the local zoning code. This same gap analysis can be performed on other land use documents and related programs and processes. This should include at a minimum, site plan standards and subdivision regulations, but could also include the local sustainability plan, building code, plumbing code, non-zoning development incentive programs, development agreements, development moratoria, post-occupancy enforcement procedures, and the like. (Modules on some of these related topics are forthcoming.)

The Water and Land Use Planning Integration Team should review these existing codes, programs, and processes for appropriate and effective strategies, identify those that are missing (using this Module series), and develop a process for amending each to include missing elements and eliminate barriers. While doing so, the Team should remember that, **in order to facilitate water-conserving growth, developers must know that local codes and development processes are clear, transparent, and predictable**. The local approval process must be as expeditious as possible and allow developers the flexibility they need to meet market demands in a timely manner. Part of the integration and amendment process is to pay attention to and accommodate these concerns, while achieving water-conservation goals.

To implement water conservation strategies effectively over time, there are additional steps that should be considered.

1. The efficiency of integrating land use and water planning can be increased by coordinating these efforts in conjunction with adjacent local governments with shared issues, and with regional organizations that have technical information and needed resources.
2. The integration discussed throughout this Module and others ultimately comes down to a series of policy decisions and approvals by a community's local leaders. The Water and Land Use Planning Integration Team should consider whether local policy-makers understand the water shortage issues, relationship between growth management and water supplies, and link between development patterns and water efficiency well enough to make informed decisions. If not, the Team should schedule work sessions to describe the purpose of and reasoning behind already established water conservation goals, and present evidence from this Module series and other sources to enable informed decision-making when policy-makers are asked to approve amended plans and regulations.
3. Although a Water and Land Use Planning Integration Team may be established for this analysis and update effort, communities should be sure this process does not end after initial amendments. As noted in above under *Working Together*, local governments and water providers should establish procedures for ongoing, coordinated planning based upon their new, deeper understanding of the interdependence of both systems and how they can be leveraged for greater effect. These procedures may be institutionalized once senior decision-makers have seen the benefits of coordinated efforts.

4. In order to ensure that new plans, regulations, and processes are properly implemented, the local staff and boards involved in the review and approval process must be trained regularly on the new specifications and policies.
5. Finally, throughout all of these steps, the public must have regular opportunities for involvement and engagement, so that the credibility and transparency of local government is maintained and the water conservation tools and procedures implemented have strong and continuing public support.