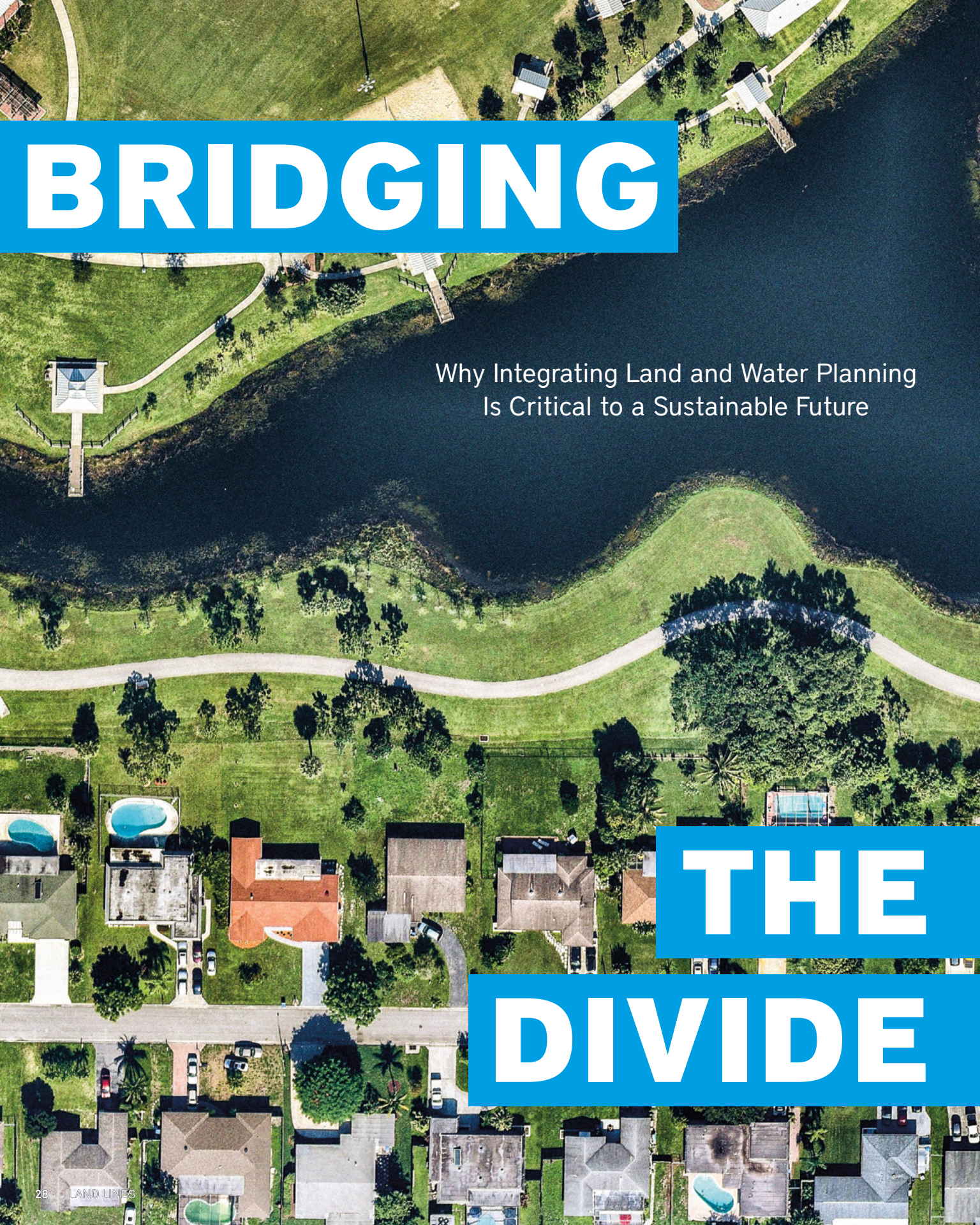

BRIDGING THE DIVIDE

Why Integrating Land and Water Planning Is Critical to a Sustainable Future

By Heather Hansman

RICK SCHULTZ doesn't hate grass outright. He can see the use for it in some places—kids should be able to play soccer somewhere, sure—but there's no need for it in road medians or sweeping lawns in arid places, says Schultz, a water conservation specialist at the municipally owned utility in Castle Rock, Colorado.

Located on the southern fringes of the Denver metro area, Castle Rock is one of the fastest-growing communities in the country. Its population has skyrocketed from 20,224 in 2000 to nearly 72,000 today. Seventy percent of Castle Rock's water supply comes from non-renewable groundwater, so as the town grew, officials had to figure out how to stretch that supply. In 2006, the water utility and the planning department started collaborating to address that issue.

The community created a water master plan that set guidelines—like where it made sense to have grass—to delineate how and where they could conserve water while still accommodating growth. Schultz says they had to think outside of traditional land use regulations and water supply patterns to work toward long-term sustainability, steering disparate parts of the planning process toward smart growth: "We needed to push the boundaries a little if we wanted a better outcome."

Since then, Castle Rock has introduced financial incentives, regulatory changes, and even behavioral science strategies to ensure that water supply is actively considered as part of every planning and development process. From offering incentives to developers who install water monitoring systems to requiring landscapers to pursue professional certification in water efficiency, Castle Rock has become a leader in this area, recognized by the state of Colorado for its efforts and for sharing best practices with other organizations.

In communities across the United States, water managers and planners are emerging from the silos they've traditionally operated in and finding new ways to work together. This is in part because climate change is causing turbulence for the water sector nationwide, in the form of prolonged droughts, damaging floods and wildfires, severe storms, and sea-level rise.

The urgency of developing resilience in the face of these threats is becoming increasingly clear. Collaboration is also increasing because, although communities face many different challenges and operate with countless variations on municipal structures, many are rediscovering a singular truth about land and water: when you plan for one, you have to plan for both.

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"Water engineers are beginning to recognize they cannot provide sustainable services without involving those in the development community—including planners, architects, and community activists," explains the American Planning Association's *Policy Guide on Water* (APA 2016). "Leading edge planners are reaching across the aisle to water managers to help advise on their comprehensive plans, not only to meet environmental objectives, but also to add value and livability, rooted in the vision of the community."

Credit: Nearmap via Getty Images.

How We Got Here

Picture the view from an airplane as you fly over rural areas or the outskirts of any major city: the way the right-angled boundaries of agricultural fields and housing plots contrast with the twisting braids of river channels and the irregular shapes of lakes and ponds. Land and water are very different resources. They have been managed differently—and separately—as a result.

The divide between water and land planning has deep roots. Although water is connected to all parts of sustainable growth, from ecosystem health to economic viability, planners and water managers have long worked separately. From volunteer planning boards in rural communities to fully staffed departments in major cities, planners focus on land use and the built environment. Water managers, meanwhile, whether they are part of a municipally owned utility, private water company, or regional wholesaler, focus on providing a clean and adequate water supply.

"I can't think of a single city where [planning and water management] are contained within a single division," says Ray Quay, a researcher at Arizona State University's Global Institute of Sustainability who has served as both assistant director of land planning and assistant director of water services in Phoenix, Arizona. Quay says regional and watershed-wide development choices about growth often don't line up with water supply.

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Rick Schultz, second from left, inspects a landscape watering system in Castle Rock, Colorado. The community has earned statewide recognition for its integration of land and water planning. Credit: Jerd Smith, *Fresh Water News* (www.watereducationcolorado.org/fresh-water-news).

"A typical divide would be that planners plan for growth while assuming the water utility will be able to supply water, while water utilities don't participate in decisions about community growth, they just build infrastructure to serve the new growth that comes to them," adds Jim Holway, director of the Babbitt Center for Land and Water Policy, which was created by the Lincoln Institute of Land Policy in 2017 to advance the integration of land and water management.

Ivana Kajtezovic, planning program manager at Tampa Bay Water, a regional wholesale drinking water utility in Florida, confirms that lack of alignment. "Tampa Bay Water doesn't have a say in growth in the counties and cities we serve," says Kajtezovic. "Our only mission is to provide drinking water, no matter the growth or the speed of growth. Land use decisions are made by the counties and cities we serve."

In a 2016 APA Water Working Group Water Survey, 75 percent of land use planners felt they were not involved enough in water planning and decisions (Stoker et al., 2018). "We know that land and water are connected, and no one ever argues that they're separate," says Philip Stoker, assistant professor of planning at the University of Arizona, who conducted the APA survey. "It's only people who have separated them."

This divide is partly a result of historical regulatory structures. "Water is very much state law–based, with some federal hooks into various

aspects of it," says Anne Castle, former assistant secretary for water and science at the U.S. Department of the Interior. Federal management involves regulations such as the Clean Water Act and agencies such as the U.S. Bureau of Reclamation, and water rights are allocated at the state level. Meanwhile, although there is federal and state oversight of some public lands, most of the regulation and planning related to private land happens locally or regionally, reflecting individual and community rights and desires. While there are state-level initiatives to "put more emphasis on the consideration of water in developing land," Castle says—including in Colorado, where she is based—there are still wide gaps in priorities and responsibilities.

Communities across the country are dealing with unique issues, of course, but Stoker's survey suggests the barriers to solving them are similar: lack of time and lack of resources; fear of losing jurisdictional power or surrendering control; and differences in education, experience, and technical language. It can be hard to surmount those issues. "Logically it should be easy, but when institutions grow up with a single focus, it's hard to change their mission and expand into other places," says Bill Cesanek, cochair of the APA Water & Planning Network. Cesanek says things work better when planners share the responsibility for determining where the water to meet future demands will come from.

Land and water planners have to work together, agrees Quay, and need to be realistic about where, how, and whether their communities can grow. "One of the really critical factors is political will," he says. "We should be thinking about what's most important for our community, and we should be allocating our water to that."

According to Holway of the Babbitt Center, that's becoming more common. "With growing demand for water in the face of increasing challenges to acquiring new water supplies, utilities and land planners are having to figure out how to work together to maintain a balance between supply and demand."

A recent Lincoln Institute working paper (Rugland 2021) provides a framework called a Toolbox Matrix for better defining the ways land and water can be integrated in practice. The Babbitt Center developed this framework with input from land use and water management experts across the United States. The framework identifies several primary ways communities can better integrate land and water:

- **collaborative processes:** setting up administrative and procedural priorities that encourage or incentivize collaboration;
- **planning:** engaging in plan making, public outreach, and implementation;
- **regulations, codes, and ordinances:** institutionalizing integrated land use and water management;
- **development review:** ensuring compliance for integrated action, as well as providing incentives and collaborative solutions with developers and builders;
- **water supply and infrastructure:** managing the physical aspects of water service, including source water protection and stormwater management;
- **post-occupancy demand management:** implementing programs that encourage residents and business owners to use water wisely and prevent pollutant discharge.

To explore the framework further, visit **www.lincolninst.edu/publications/working-papers/integrating-land-water.**

Erin Rugland is a program manager for the Babbitt Center for Land and Water Policy.

"Too Much, Too Little, Too Dirty"

According to the APA *Policy Guide on Water*, water-related threats often fall along familiar lines: not enough water, thanks to population growth and climatic stress on top of already fully allocated or overallocated water supplies; too much water, due to flooding and rising sea levels; or water quality compromised by agricultural and urban runoff. In every case, the urgency is growing:

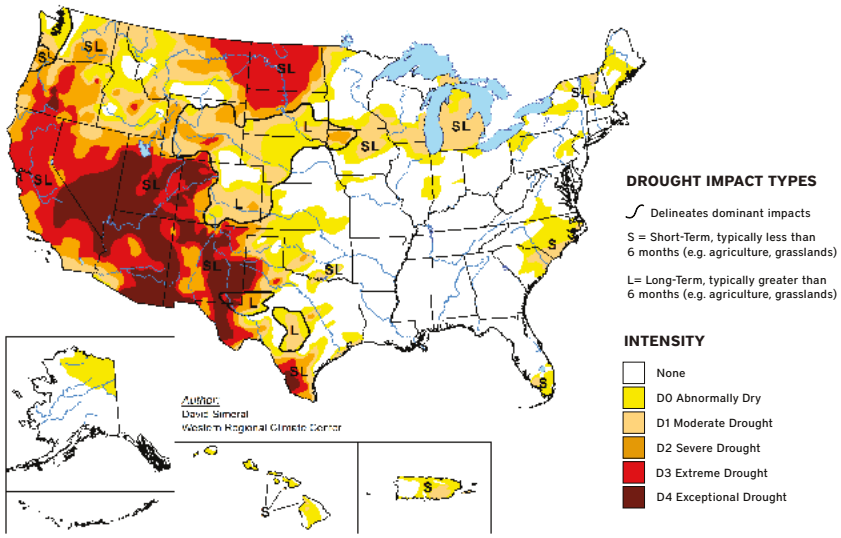
Not enough water. In the Southwest—especially the overtapped Colorado River Basin, which serves over 40 million people in seven U.S. and two Mexican states—persistent drought means diminishing snowpack, dwindling supplies in natural aquifers, and shrinking reservoirs. Researchers predict that Colorado River flows will decline by 20 to 35 percent by 2050 and 30 to 55 percent by the end of the century (Udall 2017).

The drought also has cascading impacts on water systems. For instance, increasingly frequent and large wildfires in dry western forests are causing watershed contamination in areas that haven't previously dealt with it, like the headwaters of the Colorado. During fires and for years afterward, according to the Environmental Protection Agency, water can be polluted by ash, sediment, and other contaminants, which forces water managers to scramble for solutions. "I do think there's a much greater trend of land use planning and water management collaboration occurring fastest in places that are facing scarcity," Stoker says.

Too much water. Over the last 30 years, floods in the United States have caused an average of $8 billion in damages and 82 deaths per year (Cesanek, Elmer, and Graeff 2017). As climate change fuels more extreme weather events, Quay says, floods are exceeding parameters defined by the Federal Emergency Management Agency that have traditionally guided planning decisions. Quay says it's hard to adapt because our stationary planning guidelines and laws aren't set up for those extremes.

Places like low-lying Hoboken, New Jersey—where rising sea levels and superstorms like Hurricane Sandy have inundated sections of the city—are building water system resilience into their planning. The city is incorporating features like artificial urban sand dunes that work as physical barriers and can divert storm surges to newly built flood pumps.

"The stormwater system is at the same level as the river—[stormwater] has nowhere to go, so they've had to build a really innovative resilience planning program," Cesanek says.



Map of drought conditions across the United States, May 2021. Credit: The U.S. Drought Monitor is jointly produced by the National Drought Mitigation Center at the University of Nebraska–Lincoln, the United States Department of Agriculture, and the National Oceanic and Atmospheric Administration. Map courtesy of NDMC.

Planners and water managers in the City of Milwaukee worked together to redevelop an abandoned railroad manufacturing area into Menomonee Park, which serves as both a public recreation area and a stormwater management tool. Credit: Menomonee Valley Partners, Inc.

Contaminated water. During heavy rains, which are increasingly frequent due to climate change, the combined sewer system in Milwaukee, Wisconsin, overflows into neighboring rivers and Lake Michigan, polluting the waterways, compromising the ecosystem, and affecting the water supply. "Stormwater gets into our combined and sanitary systems. Nothing is watertight," says Karen Sands, director of planning, research, and sustainability at Milwaukee Metropolitan Sewerage District (MMSD). Sands says MMSD has had to align at-odds geographic and jurisdictional layers to find solutions that protect the watershed. One of those solutions is the construction of 60-acre Menomonee Park, built in conjunction with city planners, which is expected to treat 100 percent of stormwater runoff from nearby industrial and commercial areas. It ensures a clean water supply now, and preemptively manages demand for the future.

Chi Ho Sham, president of the American Water Works Association (AWWA), a nonprofit international organization for water supply professionals, says one of the group's biggest concerns is water quality, particularly protecting water at the source, limiting pollutant use, and creating barriers to slow or prevent contamination. "From my point of view, our job is to work very collaboratively with landowners," he says. "Water managers cannot do it alone."

Infrastructure and Equity Issues

The U.S. population is projected to reach 517 million by 2050, with the fastest-growing cities in the South and West (U.S. Census Bureau 2019). You can't keep people from moving to Tempe or Tampa Bay, but this growth is occurring in regions where the pressure on water quality and quantity is already high. In some places, rapid growth has forced the hand of planners and water managers, who have implemented water conservation and reuse measures to ensure there will be enough water to go around.

To complicate matters, our nation's water infrastructure hasn't kept up with changing demographics. Old lead pipes are disintegrating, and water treatment plants are overwhelmed by the amount of water they need to process. In 2017, the American Society of Civil Engineers gave the nation's drinking water a D grade, estimating a cost of $100 billion for all the necessary infrastructure upgrades (ASCE 2017).

There is also a divide between places that can afford to upgrade their infrastructure and those that cannot. Addressing that inequity is crucial to securing future water supplies for everyone, says Katy Lackey, senior program manager at the nonprofit US Water Alliance, a national coalition of water utilities, businesses, environmental organizations, labor unions, and others which is working to secure a sustainable water future.

"We believe water equity occurs when all communities have access to clean, safe, and affordable drinking water and wastewater services, infrastructure investments are maximized and benefit all communities, and communities are resilient in the face of a changing climate," she says. Reaching that goal will require new ways of working.

How to Work Together Well

Integrated planning starts with getting people in the same room to understand the needs of their community, the gaps in current processes, and how they can better work together, says Holway of the Babbitt Center. From there, formalizing goals around planning and water is critical, whether those goals are reflected in a comprehensive or master plan for community development, in a more specific plan based on conservation and resilience, or in zoning and regulatory changes.

"We are focused on identifying, evaluating, and promoting tools to better integrate land and water, with input from a diverse group of practitioners and researchers," Holway says, noting that Babbitt Center Program Manager Erin Rugland has produced several publications for practitioners, including a matrix of available tools for integrating land and water (Rugland 2021) and two manuals focused on best practices (Rugland 2020, Castle and Rugland 2019).

Those who are focused on the importance of integrating land and water say there are several steps planners and water managers can take to ensure successful collaborations, including:

Formalizing goals around planning and water is critical, whether those goals are reflected in a comprehensive or master plan for community development, in a more specific plan based on conservation and resilience, or in zoning and regulatory changes.

Build relationships. Stoker found that getting people out of their silos is an important first step. "In the places that have been the most successful at integrating land and water planning, the utilities and planners were friends. They knew that if they worked together, they would benefit," he says. Stoker cites Aiken, South Carolina, where water managers helped build the comprehensive plan, as an example, adding that this kind of collaboration is important at every scale.

In Westminster, Colorado, water managers participate in preapplication meetings for any new development. From the beginning, they have a chance to advise on how choices made about things like plumbing and landscaping will impact a project's water use and fees.

The questions outlined here can help determine which issues to consider as part of a comprehensive planning process. To explore these categories further, visit www.lincolninst.edu/incorporating-water-comprehensive-planning. Credit: Babbitt Center for Land and Water Policy.

Water Management	Future Projections	Water Efficient Land Use
Where does our water come from?	What is our population, housing, and employment growth?	Are we collaborating on water issues?
How much do we have?	What are our development expectations?	How does our development process consider water?
How much water do various land use sectors use?	What water challenges do we face as a result of a changing climate?	How does our urban form impact our water use?
How do we pay for water system repairs and improvements?	How much water will we need?	Is water used efficiently outdoors?
How is water used or conserved?	Do current water supplies line up with projected demand?	Is water used efficiently indoors?
Is our water system sufficient, safe, and reliable?	How can water and land use be equitably managed?	How does land use impact our watersheds?

Participants in a Growing Water Smart workshop, which brings land use planners and water managers from the same community together for facilitated discussion and to create a local action plan. Credit: Sonoran Institute.

Westminster is one of 33 western communities that have participated in the Growing Water Smart program, a multiday workshop run by the Babbitt Center and the Sonoran Institute with additional funding from the Colorado Water Conservation Board and the Gates Family Foundation. Growing Water Smart brings small teams of leaders together to communicate, collaborate, and identify a one-year action plan.

"The heart of Growing Water Smart is getting land use planners and water managers from the same communities together to talk to each other, sometimes for the very first time," says Faith Sternlieb, senior program manager at the Babbitt Center, who helps facilitate the program. "Once they start sharing resources, data, and information, they see how valuable and important collaboration and cooperation are. It isn't that they didn't want to work together, it's that they truly thought they had everything they needed to do their jobs. But they don't often have the time and space needed to think and plan holistically."

"What has worked in my experience is to form relationships with the planners making decisions," confirms Kajtezovic of Tampa Bay Water. "To the extent possible, I communicate with them and explain the importance of source water protection."

Be creative and flexible. Once relationships are formed, creativity and flexibility are key. Because every community is facing different planning challenges, "context is incredibly important," says Quay. This is true not just among different regions, but within regions, and sometimes even from one community to the next. "What works in Phoenix won't necessarily work in Tempe [which is located just east of Phoenix], so we can't just adapt best management practices, we have to think about best for who." He recommends identifying a broad, flexible set of tools that can be used and adapted over time.

Be willing to learn. Because of specialization, planners and water managers "don't speak the same language," says Sham, who says the AWWA has been working on collaborative education about source water protection for members and landowners. Sometimes it feels like added work on the front end, and he says people can be reluctant to take on work that's not in their purview, but developing a shared language and understanding is crucial for long-term sustainability.

John Berggren helps communities coordinate land and water planning as a water policy analyst for Western Resource Advocates. He says one of his first steps is to educate local leaders and get them excited about including water in their comprehensive plans. "We get them interested and concerned about conservation, to create top-down support for planning departments and water utilities," he says. Once water is codified in a comprehensive plan, he says, that allows planners and utilities to come up with creative, progressive solutions.

Be comprehensive. The integration of land use and water planning works best when it is included in state-level regulations or in comprehensive plans at the community level. According to the Babbitt Center, 14 states formally incorporate water into planning in some form, and that number is growing. For example, the 2015 Colorado Water Plan set a goal that 75 percent of Coloradans will live in communities that have incorporated water-saving actions into land use planning by 2025; communities across the state are working on that process, and 80 communities would have to take action to hit the 2025 deadline. Colorado also recently passed state legislation that outlines water conservation guidelines for planning and designates a new position in the state government to support the coordination of land and water planning.

Since 2000, when Arizona passed the Growing Smarter Plus Act, the state has required communities to include a chapter in their comprehensive plans that addresses the link between water supply, demand, and growth projections. It's happening in less dry places, too. The Manatee County, Florida, comprehensive plan matches water quality with need to make the best use of non-potable water. It includes codes for water reuse and alternative water sources to increase availability, and to make sure that water gets to the most appropriate destination.

To incorporate water into comprehensive plans, Quay says, communities need a concrete idea of the type and amount of their available resources. Water managers and planners can then work together to identify new and alternative water sources like treated wastewater and graywater (household water that has been used for things like laundry and can still be used for flushing toilets); to identify projected demand; and to outline how to meet it.

Embrace the power of local action. Even if water-related planning is not mandated by the state or incorporated in a community's comprehensive plan, water managers and planners can still find ways to collaborate. More specific local plans can include water supply and wastewater infrastructure plans; hazard mitigation and resilience plans, like floodplain and stormwater management; demand management; watershed processes and health; and plans for interagency coordination and collaboration. If those variables feel overwhelming, Berggren suggests that planners look to their peer communities for best practices. Although each community is different, he says, "no one needs to reinvent the wheel."

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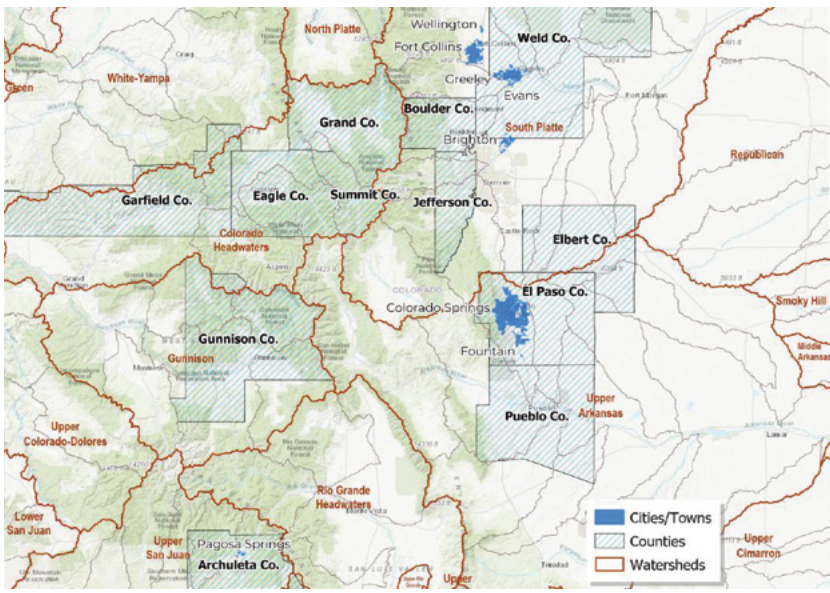

Growing Water Smart has trained and provided support for communities representing 62 percent of Colorado's population. The program has recently expanded to Arizona and expects to hold workshops in California and Utah within the next year. Credit: Sonoran Institute.

Local policy shifts can also include form-based codes that outline water-related aspects of the built environment. In Milwaukee, Sands says best practices for managing flooding and pollution include "updating municipal codes and ordinances to encourage green infrastructure and more sustainable practices." That green infrastructure, which mimics natural processes at the site level through things like bioswales and stormwater storage, can make communities more resilient to climate change, while restoring ecosystems and protecting water supply.

Water-wise policy shifts can also come in the form of zoning ordinances, like smaller lot sizes. Planners can use subdivision and land development regulations to promote on-site capture, infiltration, and slow release of stormwater. Some communities have adopted plumbing codes that require high efficiency fixtures, or building codes that permit water recycling, or submetering to increase efficiency in multifamily residences. Fountain, Colorado, has conservation-oriented tap fees, which incentivize developers to meet water efficiency standards beyond the building code. Developers can pay lower tap fees if they agree to options like using native landscaping or including efficient indoor fixtures across a development.

The benefits of integrating land and water planning are myriad, from measurable results like adapting plans for development to ensure an adequate water supply to more indirect, long-term effects like reducing conflict between water users as supplies shrink. Back in Castle Rock, Schultz and his colleagues have observed that water-focused land use ordinances can have a big impact, and can benefit quality of life as a whole. It hasn't always been easy, Schultz says, but the new way of doing things seems to be paying off: "We've shown that we can do better if we provide a good foundation."

Freelance journalist **Heather Hansman** is *Outside* magazine's environmental columnist and the author of *Downriver: Into the Future of Water in the West* (The University of Chicago Press 2019).

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