2023

GROWING WATER SMART

THE WATER-LAND USE NEXUS GUIDEBOOK

CALIFORNIA

Ensuring a Prosperous Future and Healthy Watersheds Through the Integration of Water Resources and Land Use Planning

ACKNOWLEDGEMENTS

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ABOUT GROWING WATER SMART

Growing Water Smart, a program of the Sonoran Institute and the Babbitt Center for Land and Water Policy, a center of the Lincoln Institute of Land Policy, introduces communities to the full range of communications, public engagement, planning, and policy implementation tools to realize their watershed health and community resiliency goals. The Growing Water Smart workshop empowers local government leaders to adopt land use plans and policies that support water resilience. Interested individuals can learn more at www.growingwatersmart.org.

SONORAN INSTITUTE

ABOUT SONORAN INSTITUTE

The Sonoran Institute's mission is to connect people and communities with the natural resources that nourish and sustain them. We envision a Colorado River Basin where rivers flow, landscapes are healthy, and all communities thrive.

BABBITT CENTER FOR LAND AND WATER POLICY
A Center of the Lincoln Institute of Land Policy

ABOUT THE BABBITT CENTER FOR LAND AND WATER POLICY

The Babbitt Center for Land and Water Policy, a center of the Lincoln Institute of Land Policy, seeks to advance the integration of land and water management to meet the current and future water needs of Colorado River Basin communities, economies, and the environment. The Babbitt Center develops tools and best practices to guide decisions through research, training, and partnerships for sustainable management of land and water resources in the Basin and beyond.

CivicWell and Water Education for Latino Leaders provided research and insight into the 2023 update to the california water smart water-land use nexus guidebook.

CIVICWELL
Transforming Local Vision into Action

ABOUT CIVICWELL

CivicWell is a 501(c)3 nonprofit organization supporting sustainable solutions and the community leaders who implement them. It inspires, equips, connects, and cultivates leadership for local innovation and community change, especially for leaders responding to the climate crisis and its impacts on their communities.

Well
Water Education for Latino Leaders

ABOUT WATER EDUCATION FOR LATINO LEADERS (WELL)

WELL educates and trains local Latino elected officials about California water policy to promote timely and equitable actions that serve to develop a robust economy, healthy communities, and a resilient environment for all Californians.

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TABLE OF CONTENTS

ADDITIONAL RESOURCES

growingwatersmart.org

The Growing Water Smart Peer-to-Peer Network

INTRODUCTION

This guidebook serves as a compendium to the Growing Water Smart training and assistance program. It provides resources related to collaborative and holistic water resource management and land use planning that accelerates, or goes beyond, the requirements set forth by the State of California to support communities in becoming resilient to drought and other impacts of climate change.

Communities in California are facing population growth and a housing shortage juxtaposed by a hotter and drier climate that is decreasing precipitation and snowpack in Northern California to feed surface water supplies and declining groundwater aquifers. For local officials in California, these factors create an urgent need to effectively leverage tools, resources, and training to better integrate land-use and water planning to ensure communities are resilient to current and future water-related shocks and stressors. This guidebook provides strategies for the integration of water into land use plans and policies that help further the principles of making water conservation a California way of life, furthering water quality and watershed health, integrated water resource management, and water equity.

MAKE WATER CONSERVATION A CALIFORNIA WAY OF LIFE

By 2050, California's population is predicted to grow to 50 million, putting pressure on our state's already limited water resources. A growing population can escalate the costs of operating local utilities, the need for enhanced and expanded infrastructure, and the cost of acquiring new water sources if the supply is constrained. California has a residential housing shortage estimated at 4 million units, requiring aggressive development over several years to address the deficit. As climate change impacts produce hotter and drier years, it is increasingly urgent to assemble an effective mix of water supply and conservation measures to meet communities' drinking water needs reliably as they grow to overcome the housing deficit.

In the past, water resource managers and water providers have turned to supply-side management to meet the growing demand by investing in water acquisition, treatment, storage, and distribution projects – which all have significant price tags and are time and resource intensive. Additionally, this approach threatens access to safe, clean, and affordable water, which is considered a human right in California.[1]

Senate Bill 606 (Hertzberg) and Assembly Bill (AB) 1668 (Friedman), signed by Governor Brown in May 2018, build on the ongoing efforts to "make water conservation a California way of life." The bills establish a foundation for long-term improvements in water conservation and drought planning that will help the state adapt to climate change and longer, more intense droughts that result from it. These bills established new State agency authorities and local agency responsibilities, facilitating permanent water-use efficiency improvements.[2] In a 2022 report, the Pacific Institute determined that "urban water-use efficiency improvements [in California] could reduce statewide urban water use by 2.0 million to 3.1 million acre-feet per year (AFY). The reuse potential of municipal wastewater is 1.8 million to 2.1 million AFY, and the stormwater capture potential is 580,000 AFY in a dry year to as much as 3.0 million AFY in a wet year."[3]

Making water conservation a way of life requires applying the principles of efficiency, reuse, and recharge to land use plans, codes, and standards. Communities throughout the West have found that by increasing development density, adopting technological efficiencies, and establishing aggressive conservation programs, they have continued to grow in population without seeing a corresponding increase in water demand. Water-smart land use planning can reduce the negative financial impacts of increased water demand through efficiency and conservation measures implemented before, during, and after construction. When done well, this integration provides equitable access to resources in a manner that improves the cost-benefit ratio of capital investments by using the same amount of water and infrastructure to serve more people per dollar spent. This approach benefits the environment and ensures a more environmentally and financially sustainable future for all community members.

FURTHERING WATER QUALITY AND WATERSHED HEALTH

Every community lives within a watershed—a land area that channels rainfall and snowmelt to creeks, streams, rivers, and underlying groundwater aquifers.[4] The quantity and quality of water in rivers, streams, and groundwater aquifers depends on activities in the land area upstream from and surrounding those sources. Watersheds are delicate ecosystems, and tensions exist between preserving the natural environment and developing land for residential, commercial, industrial, or agricultural uses. While the degradation of land within a watershed comes with societal and environmental costs, careful management yields significant benefits. Holistically managed watersheds can store water supplies; reduce erosion and channel incision; increase infiltration into groundwater; reduce water treatment costs; and support habitat, biodiversity, recreation, and aesthetic values. Healthy watersheds and resilient natural systems can also help communities cope with increasingly extreme weather events such as floods, droughts, high temperatures, and wildfires.

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[1] California Water Code §106.3
[2] California Water Plan 2018 water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/California-Water-Plan/Docs/Update2018/Final/California-Water-Plan-Update-2018.pdf
[3] The Untapped Potential of California's Urban Water Supply: Water Efficiency, Water Reuse, and Stormwater Capture Heather Cooley, Anne Thebo, Sonali Abraham Morgan Shimabuku, Peter Gleick, Sarah Diringer pacinst.org/wp-content/uploads/2022/04/PI_California_Untapped_Urban_Water_Potential_2022-1.pdf
[4] U.S.G.S., Watersheds and Drainage Basins.

Fortunately, measures can be taken to maintain and improve watershed health through land use plans and policies. Development patterns, erosion control measures, vegetation management, habitat protection, floodplain regulations, and stormwater management all influence the health of the watershed and impact water quality and stream flows. Healthier watersheds lead to healthier plants, animals, and people.

FURTHERING INTEGRATED REGIONAL WATER MANAGEMENT

The earth's water cycle is a closed loop that circulates water between the oceans, the atmosphere, and the land via precipitation, drainage, and evapotranspiration.[5] Just as the natural environment treats water as a cycle, it is important that communities view their water supply—including wastewater and stormwater—as interconnected. Communities throughout California and the western states are facing prolonged challenges in trying to plan for and meet their water needs. Climate change impacts have created a new normal of lower water supply, but existing water management systems are based on 19th century laws and 20th century infrastructure that assumed more available water. Unless these outdated systems are reevaluated for current and future needs including aggressive housing development throughout the state, water management systems will fail to equitably address drinking water needs.

In 2002, California State lawmakers created the Integrated Regional Water Management (IRWM) Planning Act to encourage local entities to improve water quality and water supply reliability to meet the state's overall agricultural, domestic, industrial, and environmental water needs.[6] This is a voluntary, collaborative effort to plan and implement water management solutions on a regional scale, though it does not include land use in the water management considerations.

Another watershed management approach is known as One Water.[7] Conjunctive use of water (surface water, groundwater, recycled water, rainwater, stormwater, and desalinated water) is a must for a true integration of water resources management. By coordinating the development and management of water, land, and related resources, One Water maximizes economic and social benefits while minimizing impacts on the environment. A key step in this process is to change institutional structures to strengthen the coordination and collaboration between water supply and wastewater managers, flood control districts, land use planners, economic development managers, and other key officials.

FURTHERING EQUITY IN WATER

On September 25, 2012, Governor Brown signed AB 685, making California the first state in the nation to legislatively recognize the human right to water. Now in the Water Code as Section 106.3, the state recognizes that "every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes." The human right to water extends to all Californians, including marginalized individuals, groups, and communities in rural and urban areas. As communities identify and implement land use plans that prioritize water conservation, efficiency, and reuse, they remain responsible for ensuring that water infrastructure and clean water are distributed equitably and that there is enough water to meet all community members' needs.

WATER AND LAND USE INTEGRATION OPPORTUNITIES

California communities are charged with accommodating growing populations and supporting economic development and quality of life while managing increasingly variable and scarce water supplies, aging infrastructure, and the impacts of land and habitat degradation.

Regionally shared risks of extreme weather and wildfires make the interconnectedness of land and water particularly apparent. Across California, communities have experienced record heat, devastating wildfires, dry soils, ongoing drought, and damaging floods, alongside the health and economic impacts of the COVID-19 pandemic which in some places were exacerbated by limited access to safe and reliable water. These conditions disproportionally affect underserved communities and have highlighted the urgency to act now to build community, economic, and environmental resilience across regions and watersheds.

At the community level, each planning and regulatory mechanism that guides how and where a community develops provides an opportunity to strengthen the nexus between water and land use. Intervention points are described in Table 1. Determining where to intervene will depend on the community's political motivation and capacity, the water demand management initiatives that have been implemented to date, and the water-saving goals. The vision and goals defined in comprehensive and master plans will guide opportunities in other elements of a local government's land use policies and programs.

[5] U.S. Geological Survey. Evapotranspiration and the Water Cycle. www.usgs.gov/special-topics/water-science-school/science/evapotranspiration-and-water-cycle
[6] Association of California Water Agencies. Integrated Regional Water Management Policy Principles. www.acwa.com/resources/integrated-regional-water-management-policy-principles
[7] American Planning Association. Integrated Water Resource Management. www.planning.org/knowledgebase/watermanagement

TABLE 1: OPPORTUNITIES TO INTEGRATE WATER AND LAND USE PLANNING

INTERVENTION POINT	MECHANISMS	PURPOSE
WATER-SMART PLANNING	• Visioning with equity lenses • Information sharing and alignment • Public engagement (including underserved groups) and education • Regional partnerships • General plans • Urban water management plans • Local and regional water quality plans • Capital Improvement Plans • Hazard mitigation, response, and recovery Plans • Drought resiliency plans • "One Water" and IRWM plans • Climate action plans • Groundwater sustainability plans • State and federal water infrastructure improvement programs that prioritize underserved communities	Evaluates local water supplies, current and future demands, and related community and economic values. Establishes goals and objectives for managing the intersection of natural resources and the built environment toward a future that increases water security for everyone.
SUFFICIENT WATER SUPPLY FOR DEVELOPMENT	• California water supply rules • Water budgeting • Water allocation policies • Water demand offset programs • Annexation policies • Alternative water supplies	Links new development to water supply planning. Determines the requirements applied to new development for water resource management, conservation, and efficiency.
WATER-SMART LAND USE POLICIES AND PROCESSES	• Compact development • Water-efficient landscapes • Water-smart buildings • Development review processes	Directs how land is developed and the amount of water the developments will require.
HEALTHY WATERSHEDS	• Watershed protection • Green infrastructure • Low impact development	Protects the regional water quality and pairs the right water supply with the appropriate use.
EFFICIENT WATER DEMAND PROGRAMS	• Conservation rate structures • Conservation rebate programs • Water metering and audits • Consumer education messaging	Empowers and incentivizes landowners and renters to reduce water consumption. Links community-wide programs to water supply planning.

THE LAND USE-WATER NEXUS RESOURCE GUIDE

This guidebook is intended to help your community identify the most appropriate intervention points related directly to land use that will help you achieve your community's water resource management goals. It is divided into five sections:

Each section includes:

- A Case Statement justifying each approach.
- Toolboxes and Tools describing the specific policy or management actions for achieving water conservation and efficiency outcomes.
- Approaches for implementing the tools.
- Case Studies demonstrating how other communities have implemented one or more of the tools to integrate their water and land use planning efforts.

SECTION 1: WATER-SMART PLANNING

Summarizes the opportunities provided by integrating water and land use during planning processes.

SECTION 2: SUFFICIENT WATER SUPPLY FOR DEVELOPMENT

Provides a review of the State of California's requirement for new developments to have a sufficient water supply.

SECTION 3: WATER-SMART LAND USE POLICY IN CALIFORNIA

Provides planning principles to make a community's development pattern more water-smart.

SECTION 4: HEALTHY WATERSHEDS

Describes approaches for protecting water quality and maximizing the many forms of water that can support a resilient community.

SECTION 5: EFFICIENT WATER DEMAND PROGRAMS

Summarizes how a utility can manage the water demanded by households through market-based incentives and pricing mechanisms.

SECTION 1: WATER-SMART PLANNING

FOR A SUSTAINABLE FUTURE, COMMUNITIES MUST CREATE GUIDING PLANS THAT INTEGRATE LAND USE PLANNING WITH FORECASTED WATER AVAILABILITY AND WATER RESILIENCY GOALS.

CASE STATEMENT

The State of California provides guidance for drafting policies that link land use and water in required General Plans. General plans, in turn, must also be integrated with plans for water supply, infrastructure, water quality, and watershed health, and all must account for the impacts of climate change and natural hazards such as drought, wildfire, and flooding. To integrate planning processes, the silos between departments and agencies traditionally responsible for these topics must be broken down. Land use planners typically focus on how much and what type of growth may take place in their communities, while water resource managers focus on ensuring adequate water supply to meet demand. Integrating general planning, water planning, capital improvement planning, and climate resilience planning will require holistic thinking and cross-departmental collaboration. While many local planning officials and water supply managers are working diligently to comply with State water conservation and efficiency, water reuse, and water quality requirements, more can still be done to maximize the benefits of an integrated water and land-use planning approach.

Done successfully, this integrated approach can ensure that:

- A community's vision for the future considers the interrelated impacts of water, development, and climate change.
- The community's vision and goals for equity, sustainability, and resilience are expressed and aligned across plans for water resources management, community health, capital improvement, and economic development.
- Development occurs in a way that increases equity and protects the watershed, including ecological functions and the quality and quantity of water resources.
- Groundwater is sustainably managed in accordance with land use change

PLANNING DOCUMENTS

Most community plans share a nexus with water. The following plans offer the greatest opportunity to acknowledge and address water-related concerns in relation to community development and growth.

TOOLBOX: KEY LAND USE AND WATER PLANS

GENERAL PLAN

General plans offer a critical window to evaluate the interrelationship between land use patterns, community priorities, and available water resources in an era of increasing water scarcity. General planning provides one of the few opportunities for a community-wide dialogue about the future and to help communities understand:

- Projections for future population and drivers of growth.
- The type of development occurring in the community and where that development will occur.
- The source, capacity, and conditions of a community's water supply and water-related infrastructure.
- Adequacy, sustainability, and vulnerability of the water supplies.
- Stormwater and floodplain management for multiple benefits.
- Health conditions of the watershed.
- Current programs, projects, and opportunities for better collaboration.
- Value trade-offs faced in order to achieve the community's goals.

By state statute, every municipality or county in California is required to create a general plan.[8] The State's general planning requirements for municipalities and counties allow for, but do not require, a distinct water element.[9] However, throughout the required elements, particularly in Land Use, Circulation, and Conservation, there are often requirements related to the sustainable management of water resources. The Office of Planning and Research (OPR) General Plan Guidelines provide recommendations for integrating water resource management.[10] A few of these requirements and recommendations are shared below.

SB 1000 requires General Plans of regions that include underserved communities to incorporate an environmental justice element, which may also address water-related equity concerns.[11]

For example, the General Plan could:

- Address concerns about the sustainability of the aquifer/surface water as part of the discussion of water supplies needed to serve new development.
- Evaluate water conservation as a planning factor in its demand modeling.
- Identify goals and approaches for coordinating and consulting among departments and with local community groups and environmental justice and water advocacy entities to secure and preserve community water supplies.

[8] Cal. Gov. Code § 65300
[9] To review content of the California optional element visit http://opr.ca.gov/docs/OPR_COMPLETE_7.31.17.pdf
[10] Office of Planning and Research Guidelines 2017, 110
[11] Cal. Gov. Code §65302(h)

INTEGRATING WATER INTO YOUR GENERAL PLAN

The following table offers recommendations on how water can be addressed within required general plan elements.

ELEMENT	DESCRIPTION	RECOMMENDATION
Land Use	Requires municipalities to identify areas subject to flooding.	Further considerations should be included to address the water supply and water quality issues created by new development. This element should address considerations of density and where new development is placed with regard to existing water infrastructure and environmentally sensitive areas. For example,this element should: ● Account for rivers, creeks, streams, flood corridors and floodplains, riparian habitats, and land that may accommodate floodwater for purposes of groundwater recharge and stormwater management identified in the conservation element. ● Identify areas important to water supply or water quality to ensure protection. ● Analyze the water, water supply, wastewater, stormwater drainage, and structural fire protection needs or deficiencies for each legacy or disadvantaged unincorporated community. ● Be consistent with the conservation and open space elements regarding discouraging the premature and unnecessary conversion of open space land to urban uses.
Circulation	Requires a description of existing and proposed local public utilities and facilities coordinated with the land use map (including proposed water infrastructure and wastewater treatment and disposal infrastructure).	This element should identify the location and necessity of public utilities including water, sewers, and stormwater systems that are both “right-sized” to serve only the growth planned for in the land use element and also placed in areas that maximize efficiency and minimize impacts to the community?
Conservation	Addresses “the conservation, development, and utilization of natural resources,” including coordination between jurisdiction and water agency for new development.	The coordination of countywide water agencies with district and city water agencies, as well as groundwater sustainability agencies (if within a SGMA groundwater basin) is required. It should include thorough analyses of projected future water needs for domestic, agricultural, ecological and industrial uses, and should provide for the conservation of water supplies and protection of aquatic ecosystems as a beneficial use. This element should identify priority areas to conserve that offer the most effective conservation of water resources.
Open Space	Builds detailed policies that connect to the land use element.	Also in this element, the Office of Planning and Research recommends identifying areas important to water supply or water quality (infiltration areas, areas above groundwater supplies, wetlands, natural filtration basins, and priority recharge zones).
Safety	Requires hazardous zone mapping (flooding, dam failure, fires, etc.) and emergency management planning.	Floodplain mapping identifies higher risk areas where development should not occur.

Housing	Required to be revised and submitted periodically on a four, five, or eight year cycle, depending on various factors (Gov. Code §65588), and is subject to oversight from the state Department of Housing and Community Development to ensure adequate housing stock statewide to meet projected population growth.	This element should identify policies to invest in infrastructure and public facilities to ensure that adequate water, sewer, roads, parks, and other needed services are in place to serve existing and future resident communities in an equitable manner. Additionally, water and sewer providers should be consulted during the development and update of the housing element, and the local government must deliver the adopted housing element to their water and sewer providers, including a summary/quantification of their regional housing need allocation and any other relevant information.[12]
Water	While optional,[13] a water element (or water sections in all other relevant elements) can strengthen integrated water resource management and preparedness for hydroclimatic events such as droughts, floods, and fires.	There is a long-standing debate in California as to whether "water" should be a required element or if "water implications" should be woven into every element of a General Plan. In the absence of a requirement or statewide recommendation, local governments are strongly encouraged to consider a "both, and" approach: opting to develop the recommended yet still optional water element and incorporating water implications into all required elements of their general plan. At minimum, local governments should do one or the other.

URBAN WATER MANAGEMENT PLANS

Per California Water Code, §10610-10656 and §10608, urban water suppliers that supply over 3,000 acre-feet annually or serve more than 3,000 connections must prepare an Urban Water Management Plan (UWMP) every five years. The UWMP includes multiple interrelated elements that assess the reliability of a provider's water supplies over a minimum 20-year horizon, including:

- A long-term Water Supply and Demand Assessment that inventories water supply and infrastructure in an evaluation of a system's ability to meet its customers' needs. The state requires that the reliability of a provider's supply reliability be assessed under normal, dry, and multiple-dry years hydrologic conditions and a Drought Risk Assessment be conducted for the next five years.
- Beginning in 2022, a standalone Annual Water Supply and Demand Assessment must be submitted to the state, forecasting the upcoming year, any anticipated shortages, and possible actions.
- A standalone Water Shortage Contingency Plan (WSCP) that identifies a supplier's response to managing and mitigating an actual water shortage condition as a result of drought or other impacts to water supplies.
- A summary description of water conservation goals and targets that complies with the Water Conservation Act of 2009 (also known as SBX7-7), baseline, targets, and 2020 Compliance, and the demand management strategies to promote conservation and reduce water demand.

Small water suppliers—defined as those with fewer than 3,000 connections and serve fewer than 3,000 acre-feet—must develop an abridged water shortage contingency plan, annually report their water supply conditions and use by month, and upgrade their infrastructure to drought resilient standards if needed.[14]

[12] Gov. Code §65589.7 Water and Sewer Priority. See the HCD Memo at www.hcd.ca.gov/community-development/housing-element/housing-element-memos/docs/memo_sb1087.pdf
[13] Section 65303 of the California Government Code.
[14] Department of Water Resources, Drought Planning for Small Water Suppliers and Rural Communities at www.water.ca.gov/Programs/Water-Use-And-Efficiency/SB-552

GROUNDWATER SUSTAINABILITY PLANS

The Sustainable Groundwater Management Act (SGMA) requires local Groundwater Sustainability Agencies (GSAs) in designated high- and medium-priority basins to develop and implement Groundwater Sustainability Plans (GSPs) or to develop Alternatives to GSPs. GSPs provide a roadmap for how groundwater basins will reach long-term sustainability. Although local public agencies in basins designated as low and very-low priority are not required to do so, DWR encourages them to form GSAs and develop GSPs, update existing groundwater management plans, or coordinate with others to develop a new groundwater management plan in accordance with Water Code Section 10750 *et seq*.

To integrate water and land use planning within the Groundwater Sustainability Plan, the Department of Water Resources Sustainable Groundwater Management Program's Groundwater Sustainability Plan Guidance documents recommends the following Land Use Elements or Topic Categories of Applicable General Plans (Reg. § 354.8 f) be included in the plan:

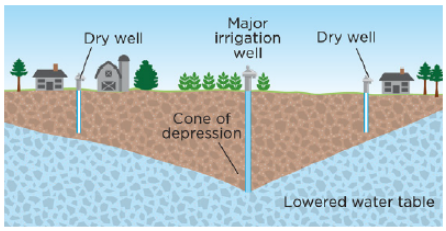
- Summary of general plans and other land use plans.
    - Information could include crop types and acreages, urban land designation, and identification of open spaces.
- Description of how implementation of the GSP may change water demands or affect achievement of sustainability and how the GSP addresses those effects.
- Description of how implementation of the GSP may affect the water supply assumptions of relevant land use plans
- Summary of the process for permitting new or replacement wells in the basin.
- Information regarding the implementation of land use plans outside the basin that could affect the ability of the Agency to achieve sustainable groundwater management.[15]

If groundwater is identified as a primary source of water, the Urban Water Management Plan must include the GSP's priorities as well as a description of coordination efforts with the GSA. In response, the GSA must provide the land use agency with a current version of its GSP along with other water management documents and a report of the anticipated effect of a proposed general plan action on the GSP's implementation.

GROUNDWATER HIGHLIGHTS

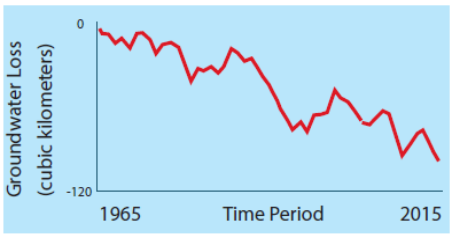
SIX UNDESIRABLE RESULTS AVOIDED WITH GSPS

Chronic lowering of groundwater



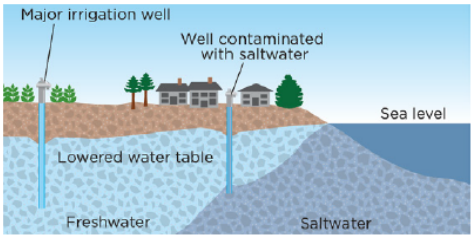
Risk of shallow wells going dry, increasing reliance on bottled water. Also negatively impacts wetlands and streams that rely on shallow groundwater.

Groundwater storage reduction



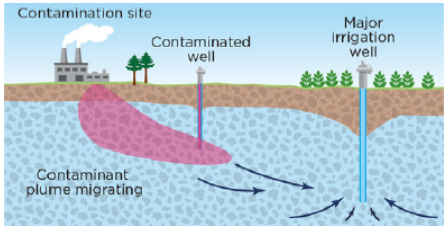
Less groundwater stored in the water "savings account" reduces the ability to be prepared for droughts and restricts future land use development.

Seawater intrusion



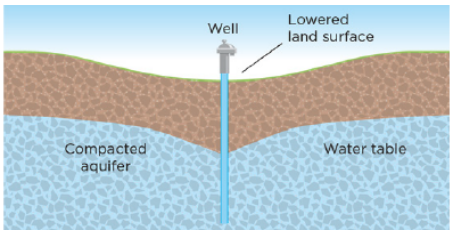
Increased salt levels from seawater intrusion impacts drinking water and irrigation supply, and harms aquatic life.

Degraded water quality



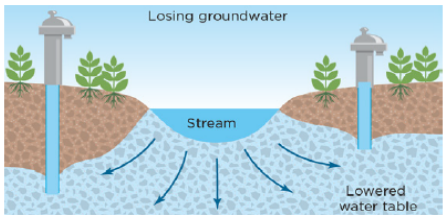
Violation of California's human right to water and community access to water used for drinking, cooking, and sanitation.

Land Subsidence ('sinking' due to over-pumping)



Damage to buildings and infrastructure, increased flood risk in low-lying areas, and lasting damage to groundwater aquifers.

Depletions of interconnected surface water



Overpumping may pull from surface waters (e.g. streams), impacting surface water users such as fisheries, marinas, and/ or consumers who rely on surface water for drinking.

[15] California Department of Water Resources. Groundwater Sustainability Plan Annotated Outline.

INTEGRATED REGIONAL WATER MANAGEMENT PLANS

In 2002, California State lawmakers passed the Integrated Regional Water Management (IRWM) Planning Act[16] to encourage local entities and water interest groups to improve water quality and water supply reliability at a regional level to meet the state's overall agricultural, domestic, industrial, and environmental water needs.[17] It is a voluntary, collaborative effort to plan and implement water management solutions on a regional scale, though it does not include local land use in the water management considerations. Across the state there are regional collaborative coordinating committees that work to support and address communities' local water needs in service of protecting the overall watershed health.

DROUGHT RESILIENCY PLANS

The 2018 Water Conservation and Drought Planning (SB 606 and Assembly Bill 1668) legislation provided a new framework for efficient water use and added requirements to strengthen local drought resilience for urban areas, vulnerable small water suppliers, and rural communities. The legislation listed recommendations for drought planning, which enabled the passage of Senate Bill 552 in 2022 that requires counties to prepare a drought resiliency plan either as a standalone document, or as part of other local plans.[18]

A drought resiliency plan is an evaluation of strategies to improve water conservation and water storage during wet years, and to reduce water demand in response to drought conditions. It should include specific demand-reduction measures and an adaptive management process after dry years to adjust for further improvements. This plan can be a standalone document or can be embedded or included in another local planning document.

"ONE WATER" PLANS

Integrated Water Resource Management, or "One Water," plans promote the holistic management of water in all its forms—drinking water, stormwater, wastewater, and source water for a city or county. These plans offer innovative, cross-departmental solutions at the local level to traditional water management practices to maximize the strategic use of all forms of water. One Water approaches can be integrated into planned development or sub-area plans to promote a water cycle approach to site and building plans. Collaboration is a key component of the planning process so that the various responsibilities of local municipal departments and community groups' needs are considered and addressed when developing a One Water plan.

An example of such an effort in California is the City of Los Angeles' One Water LA 2040 Plan. The One Water LA 2040 Plan serves as a roadmap that connects various local plans, ideas, and people so that the community will arrive at better and fiscally responsible water planning solutions. The plan identifies projects, programs and policies that will yield sustainable, long-term water supplies for Los Angeles to increase the community's resilience to drought conditions and climate change.[19]

LOCAL AND REGIONAL WATER QUALITY PLANS

Local and regional entities have several existing water planning authorities related to water quality control planning. Local plans and regulations around water quality are driven by federal Clean Water Act requirements related to reducing pollutant discharge. Stormwater Management Plans provide another opportunity for local entities to link water-related goals and policies across planning efforts and departments.

Local water quality control plans are connected through regional-level planning. Clean Water Act section 208 requires states to prepare area-wide waste treatment management plans (208 Plans). Pursuant to the Porter-Cologne Water Quality Control Act of 1969, California has nine regional Water Quality Control Boards that develop and update an area-wide Water Quality Control Plans.

Tying regional Water Quality Control Plans to local stormwater management plans and general plans (and vice versa) provides an opportunity to integrate goals, policies, and programs for stormwater infrastructure (including green infrastructure and low-impact development stormwater management options), sewer construction, and wastewater treatment facilities across local and regional planning efforts. It could also provide significant justifications for local decisions made on creating, updating, and implementing capital plans.

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[16] California Department of Water Resources, Integrated Regional Water Management, www.water.ca.gov/Programs/Integrated-Regional-Water-Management
[17] Association of California Water Agencies, Integrated Regional Water Management Policy Principles, www.acwa.com/resources/integrated-regional-water-management-policy-principles/
[18] California Department of Water Resources. County Drought Resilience Plan Guidebook. water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Water-Use-And-Efficiency/Urban-Water-Use-Efficiency/County/CountyGuidebook_DWR_20230307_ADA_508.pdf
[19] LA Sanitation and Environment, One Water LA, www.lacitysan.org/san/faces/home/portal/s-lsh-es/s-lsh-es-owla?_adf.ctrl-state=3p6j1lxdr_5&_afrLoop=1776138090786204#!

CAPITAL IMPROVEMENT PLANS

Planning departments, parks, public works, and water and wastewater utilities often rely on grants and bonds to invest in green and gray infrastructure improvements or new construction. Capital Improvement Plans (CIPs), which forecast and match projected revenues and capital needs over a multi-year period, provide the greatest opportunity to create a long-term investment strategy for the infrastructure improvements identified in a general plan or urban water management plan. A CIP ensures resources are allocated to community priorities.

HAZARD MITIGATION, RESPONSE, AND RECOVERY PLANS

County or municipal Hazard mitigation plans identify specific hazards likely to impact a community, including shocks such as drought, wildfire, extreme heat, or flooding. These plans identify pre-disaster risk reduction as well as post-disaster response activities. Planning should include the determination of how hazards can impact water infrastructure and plans for reducing vulnerability and risks.[20]

APPROACHES FOR INTEGRATING WATER INTO PLANNING DOCUMENTS:

- Link water supply and demand to projected land use patterns in both general plans, as well as water supply and wastewater management plans for a more granular understanding of water use by land use type.
- Meaningfully address water throughout the general plan, and thoroughly in a water resources element if applicable.
- Link water supply and demand, conservation, and recharge priorities and policies across related plans—including stormwater management plans and water quality plans—to address common resource concerns through a variety of approaches and authorities.
- Set aside land or identify locations in your future land use maps for water-related infrastructure such as groundwater recharge basins, multi-benefit land repurposing projects, and stormwater treatment and recovery wells.
- Use capital improvement plans to ensure investments are made in the physical infrastructure needed for water management such as treatment facilities and water reuse infrastructure; or in projects that manage stormwater through green infrastructure, infill development, hazard risk reduction, and watershed restoration.
- Monitor and evaluate plans, programs, projects, and policies to determine if the expected results are achieved and to improve future practices.[21]

CASE STUDY: WATER-SMART SUPPLY – CITY OF FRESNO

Until recently, the City of Fresno has been dependent on groundwater for about 88% of its water supply. Groundwater withdrawals have outpaced the rate of groundwater recharge. Over the past 100 years, the city has seen groundwater levels drop 100 feet. The City has an agreement to use Fresno Irrigation District canals to distribute water to Fresno Metropolitan Flood Control District (FMFCD) basins throughout Fresno for groundwater recharge during dry months. The City has budgeted more than $850,000 to construct the connections and make necessary improvements, such as flow monitoring, to allow for efficient recharge. The City has ongoing projects with the neighboring city of Clovis, the Fresno Irrigation District, and the FMFCD for groundwater recharge. This partnership delivers an average of 60,000 acre-feet of water to underground storage every year.

According to its 2020 Urban Water Management Plan, an increasing volume of rainwater can no longer soak through the soil to the groundwater aquifer as urbanization covers once open land with pavement, roads, and buildings. There is not enough storage capacity in the aquifer to serve the city's needs, and natural recharge is not able to keep up with pumping. More active recharge facilities—such as Managed Aquifer Recharge—are needed to replace the loss of natural recharge capacity.

The City's 2014 General Plan supports the use of a natural-drainage system in new development to capture and infiltrate water on-site. For the first time, the General Plan and development code limits the expansion of growth in undeveloped areas and redirects it to existing areas. This is accomplished through policies that support infill development and establish minimum rather than maximum densities. These policies are projected

[20] Links to Local Hazard Mitigation Plans can be found on the California Office of Emergency Services website at www.caloes.ca.gov/office-of-the-director/operations/recovery-directorate/hazard-mitigation/state-hazard-mitigation-planning
[21] Ahwahnee Water Principals, https://civicwell.org/civic-resources/ahwahnee-water-principles/

to slow urbanization and protect lands currently available for natural recharge for an additional 25 years. Because groundwater is seriously depleted and current recharge efforts are not keeping up with drinking water needs, the City is preparing to augment existing groundwater and surface-water supplies by bringing water from the Kings River to a newly constructed southeast surface-water treatment facility. The new water treatment plant provides an additional 72,000 acre-feet per year of treated water to the City's water supply and will alleviate groundwater depletion. After its launch in May 2018, and beginning in 2020, for the first time in its history the City provided more treated surface water than groundwater to its customers. In 2021 the city continued its efforts to increase its capture of recycled water by installing two new recycled water transmission mains in southwest Fresno, and recycled water extension to the MLK Activity Center also in southwest Fresno.

SECTION 2: SUFFICIENT AND SUSTAINABLE WATER SUPPLY STANDARDS

WATER SUPPLY SHOULD BE DEMONSTRATED AS SUFFICIENT AND SUSTAINABLE BEFORE ANY DEVELOPMENT IS APPROVED.

CASE STATEMENT

Water adequacy rules link supply-side management to demand-side management. Local governments are often able to set their own standards that: (1) establish water supply requirements based on specific parcels or uses or (2) require additional review and approval.

States across the West have adopted state statutes intended to protect communities from the threat of insufficient water supplies for new development, recognizing that:

- New development creates new water demand, which can be met through water conservation efforts across the board (e.g., more efficient appliances, changing to less intensive water landscaping), local water capture projects (e.g., recharge basins, rainwater harvest), and use of recycled water.
- Government has a role to play in ensuring sustainable and sufficient water supplies for new and existing property owners.
- Growth pressure on water supplies requires a stronger connection between land use approval and water planning at the state, regional, and local levels.
- Collaboration between local governments and water providers is essential to ensuring supply reliability.

CALIFORNIA SUFFICIENT WATER SUPPLY STATE POLICIES

Two pieces of legislation known as the "Show Me the Water" laws, SB 610 and SB 221, went into effect in 2002 and govern the development review process for an adequate water supply for new development that meets the threshold criteria.

"SHOW ME THE WATER" REQUIREMENTS SUMMARY		
BILL NUMBER	**SB 610**	**SB 221**
Requirement	Water Supply Assessments	Written Verifications
When Required	Water Supply Assessments are required at the beginning of the development process for residential projects of more than 500 units or specified commercial and industrial projects.	Written Verifications are required as a final check on water availability for residential projects of more than 500 units prior to final subdivision map approval.
Prepared By	Prepared by the public water system, as identified by the city as the lead agency.	Prepared by the agency providing water service to the project.
Approval Process	Adopted by the governing body of the water supply agency and included in the EIR being prepared for the proposed project under CEQA.[22]	May be completed and approved before, as part of, or after the CEQA process.

SB 610

SB 610 requires a **Water Supply Assessment** (WSA) for qualifying projects including residential developments with over 500 units; certain commercial and industrial projects; mixed used development that include any of the previous elements; any development where the proposed demand is equal to or greater than 500 residential units; or for any water provider with less than 5,000 connections, any proposed residential development that would account for an increase of 10 percent or more in the number of the water system's existing service connections.

As an evidentiary document for an Environmental Impact Report (EIR) pursuant to CEQA, the WSA must provide substantial evidence showing that sufficient water will be available to meet water demands for the project. The sufficiency analysis must consider the following and is most often based on the provider UWMP proposed to serve the new development:

- Meets the definition of a project.
- Quantification of a project's demand including types of uses, indoor and outdoor water demand, acreage of land uses, etc. including water demand projections for each land use type over a 20-year period in 5-year increments.
- The source(s) of proposed supply, proof of legal rights, proof of intent to acquire (e.g., contracts), and quantification of the identified source of the past five years.
- If the source is surface water, the historical record of water provider availability for at least 20 years over during normal, single dry and multiple dry years.
- If the source is groundwater, an analysis of the basin's capacity to meet the project's projected demand.

[22] The California Environmental Quality Act (CEQA) requires Environmental Impact Reports (EIRs) to inform government agencies and the public of a project's environmental impacts. The EIR proposes mitigations and alternatives for those impacts. An EIR must identify potential sources of water and analyze associated environmental effects. CEQA has been heavily enforced and therefore sets a precedent for project impacts on the environment. State Statute 40 Cal. 4th 412 (2007) laid out four principles:

1. An EIR must contain adequate information to allow decision-makers to "evaluate the pros and cons of supplying the amount of water" needed by the project. (ID at 158)
2. An EIR for a project to be built over a number of years needs to include future phases, not just the initial year. (ID at 158–159)
3. Future water supplies must "bear a likelihood of actually proving available." (ID at 159)
4. When "it's impossible to confidently determine that anticipated future water resources will be available," the EIR must discuss the replacement of alternative sources of water (ID at 159).

Water Code section 10911(c) designates local government decision makers, not the water provider, as responsible for the final determination of water sufficiency. However, the California Water Code does not define "sufficiency" for purposes of preparing a WSA leaving it to the local government to ensure the water provider conducts a thorough analysis of whether there will be enough water supply (down to the acre-foot) to satisfy demands for a project for 20-years in any of the normal, single-dry or multiple-dry year scenarios. The smaller the margin between water supply available and demand projected, the more a local government ought to consider alternative supplies and demand offset requirements as a condition of approval.

If a project relies on future water supplies that are projected to be available at a later date, there is a higher level of review that requires evidence of a future water supply, the costs to make that supply available, permitting and approval for infrastructure to deliver the water. Even though a project may not have sufficient water at the time of approval, if it is based on a future supply that is not reason enough to deny a project if the evidence shows the water will be available at the time of construction. However, legal precedent requires that the future supplies be certain, and not speculative. A water provider and/or projects projected supply should be carefully reviewed for costs, sources, permits, timing, and environmental impacts.

SB 221

SB 221 requires municipalities and counties to review for water supply adequacy for large projects that include a "subdivision" defined by statute as either a proposed residential development of more than 500 dwelling units or any proposed residential development that would account for an increase of 10 percent or more in the number of the public water system's existing service connections. Public water systems with fewer than 5,000 service connections are exempt. Proof of water availability is demonstrated by a **Written Verification** prepared by the water provider at tentative map and prior to final map approval. The verification must include specific "substantial evidence" which under SB 221 is most often based on the Urban Water Management Plan, a Water Supply Assessment prepared under SB 610, or the Groundwater Sustainability Plan although other planning documents as long as it can provide evidence. The analysis must also demonstrate that the conditions have not changed since plan adoption.

A "sufficient water supply" is defined by SB 221 as the total water supplies available during a normal, single dry, and multiple dry years within 20-year projections that will meet the water demands of the proposed subdivision, including agricultural and industrial uses. The factors analyzed include:

- The source(s) of supply.
- The historical record of water availability for at least 20 years demonstrating the water provider's capacity to consistently meet supply.
- The water agency's Urban Water Shortage Contingency Analysis includes actions to be undertaken by the water provider in response to water supply shortages up to 50% reduction in supplies. A development may still be able to have a sufficient water supply as long as the water agency has estimated and planned for the proposed development during the drought as part of the shortage contingency and the demand measures apply to residential development.
- Compliance with any water demand measures adopted by resolution, ordinance, or contract reducing the water supply allocated to a specific water use sector as long as it does not conflict with Section 354 of the Water Code.
- Amount of water the water provider may "reasonably" receive from another source including conjunctive use, reclaimed water, water conservation, and water transfer, and/or federal, state, and local water initiatives such as CALFED and Colorado River agreements.
- Water availability impacts on agricultural and industrial water users from the proposed subdivision with the service area.
- Where a subdivision relies on groundwater, proof of rights to extract water based on:
    - In an adjudicated basin, the order or decree for pumping rights.
    - In a high or medium priority basin, the most recently adopted groundwater sustainability plan/plan alternative or where no plan, DWR's information regarding present management conditions and projected overdraft.
    - In a low or very low priority basin, DWR's information regarding present management conditions and projected overdraft.
    - Demonstration of the water providers ability to still meet the obligation for local share of affordable housing required by statute.

If the project's verification relies on future water supplies that are projected to be available at a later date, the law requires a higher level of review and proof of evidence of the future water supply including written contracts or proof of valid legal water rights, the costs to make that supply available and copies of capital outlay plans, likelihood of permitting and approval for infrastructure to deliver the water, and any other regulatory approvals needed. While a project may not have sufficient water at the time of approval, the sufficiency determination is based on the evidence that shows whether the water will be available at the time of construction.

LOWER THRESHOLD PROJECTS

Given SB 610 and SB 221 only apply to certain projects, most California developments with less than the 500-unit threshold and affordable housing projects targeting low to very low incomes are exempt from these requirements. SB 221 also exempts any residential project in any already urbanized area previously developed for urban uses. For development projects that do not meet the higher threshold of SB 221 and SB 610, a project's water supply will be analyzed in an environmental impact assessment (EIR)under CEQA impacts to hydrology and water quality resources.

GENERAL PLANS, CEQA, AND WATER RESOURCES ANALYSIS

General Plans also have a role in understanding future water supply and new development. Under CEQA, General Plans are considered projects and must prepare an Initial Study of environmental impacts including water quality and hydrology. If there is a finding of significant impact, an Environmental Impact Assessment (EIR) must be prepared. In the draft EIR, CEQA guidelines include a review the General Plan, in particular the Land Use element, of whether:

- There will be a significant depletion in groundwater that a lowering of the groundwater table from future development would infringe upon the water supply of wells already permitted.
- The required supply of future development would be insufficient under current conditions and require the development of new water projects and supplies.
- The project will impact runoff and drainage and substantially impact surface and/or groundwater water quality.

When there is a finding of impact or insufficiency, the EIR must present how the impact will be mitigated or resolved. As new water supplies become scarcer and both new supplies and conservation and efficiency strategies more expensive, the EIR should serve as an important analysis for local governments in understanding the impacts of their project future land use patterns. Given the General Plan EIR serves as a basis for future project evidence and decisions under both SB 221 and SB 610, local governments should carefully and thoughtfully engage in their development to ensure the assumptions are as well prepared as possible.

GROUNDWATER HIGHLIGHTS

GROUNDWATER ADEQUACY

The Sustainable Groundwater Management Act (SGMA) aims to address the water and land use nexus, but falls short of comprehensively accounting for the overlap between Groundwater Sustainability Plans, Urban Water Management Plans, Water Supply Assessments, and Written Verifications. While Urban Water Management Plans now include groundwater supply assessments, the timelines for the two planning documents do not align, making coordination especially difficult. The state has not adopted metrics to define groundwater sustainability, leaving it to Groundwater Sustainability Agencies (GSAs) to establish their own goals and metrics. In 2016, Senate Bill 1262 amended the California Water Code[23,24] to incorporate Groundwater Sustainability Plan information into Water Supply Assessments and Written Verifications. However, since the plan does not supersede the land use authority within the basin, there is little guidance on how that incorporation should be implemented and what the effects will be.

[23] California Water Code §10910
[24] Government Code §66473.7

TOOLBOX: LOCAL REGULATIONS

WATER SUPPLY REQUIREMENTS:

As the statutory decision makers, local government should make explicit the information they use to make a determination of future water supply including:

1. **Definition of Sufficient and Sustainable Supply**: SB 210 defines sufficient water supply as the total water supplies available during a normal, single dry, and multiple dry years within 20-year projections that will meet the water demands of the proposed subdivision, including agricultural and industrial uses.
2. **Identified Water Source(s):** Clearly defined and identified allowable water sources, whether from a water provider, individual wells, shared wells, or cisterns.
3. **Water Rights Inventory:** Legal demonstration of future water source(s), either by the acquisition or dedication of surface water rights or the approval for future wells.
4. **Demonstrated Water Availability:** The expected availability of water supply under multiple conditions (dry and drier/single year/multiyear), consideration of climate change impacts and water supply timeframes (at minimum 20 years), and legal requirements or limitations for acquiring water from each source (consideration of pumping and recharge rates, water supply plans, or surface water allocations).
5. **Development Water Demand Projections:** A projection of the amount of water (water budget) that a proposed development will likely require at full buildout. The projection should account for uncertainties in multiple scenarios to prevent underestimation of water demand. Water budgets can also be applied at the site scale to measure and manage indoor and outdoor water use.
6. **Water Efficiency, Conservation, and Demand Management Practices**: The local government pre-development requirements or incentives for developments to reduce projected water demand through water efficiency and conservation practices.
7. **Underserved Water Users:** Historically underserved water users should be identified and engaged to reduce local inequities in developed areas as new developments are integrated.
8. **Compliance with Other Regulatory Requirements:** Development regulations can identify specific zones where water resources are particularly scarce or there are variations that trigger specific requirements (e.g., recharge zones, different water provider service areas, specific hydrological zones, etc.) where zoning density, mitigation standards, water conservation and efficiency requirements, and/or a water allocation policy.
9. **Maps**: Maps of geographic locations where different adequacy requirements or review processes apply. Building these in GIS can aid awareness and data management.
10. **Defined Review Processes and Criteria**: Specificity and guidance on what is required for the review (such as whether it is a Water Supply Assessment and/or Written Verification), when in the process it occurs (before, during, or post-development), and who conducts the reviews (which governing body and who else is involved).
11. **Engineering Standards for Water Distribution System**: The engineering requirements for a water system connection or distribution system should be clearly articulated in development regulations or specific guidelines should be referenced.
12. **Requirements for Augmentation (where necessary)**: New, uniform surface water augmentation criteria were adopted in 2018 by the State Water Resources Control Board to make it easier to augment supply with potable reuse.[25]

[25] California Water Code § 13560-13569

PROJECT-BASED WATER BUDGETING

Water providers and local governments use water budgets, also known as water allowances, as a tool to manage water supplies. The term water budget is applied to multiple practices, and they are often confused. In general, water budgets can be thought of in the context of:

- During development review to assess water adequacy.
- As part of a development or service agreement assigning a specific quantity of water to a development application.
- As part of a strategy to reduce or limit indoor or outdoor water demand.
- A conservation rate structuring strategy to incentivize water savings in individual households or businesses. These different purposes are summarized below.

As a development review tool. When used in the development approval process, it helps assess water availability and adequacy. A water budget summarizes the total water demand estimated for new development. It should include all uses of water (indoor, outdoor), reuse and/or recharge, and land use type (residential/commercial/industrial/agriculture). Local governments and water providers use a wide variety of methodologies to determine a development's water budget. These different methodologies vary in accuracy.

The most common methodologies include:

- Per capita per unit.
- Per standardized unit for a household or business (like equivalency units).
- Per historical use.
- Per individual indoor and outdoor calculations.
- Per acre/square foot

The water demand calculation is evaluated against existing supplies to determine if sufficient water is available to serve the development. While the water budget may be used solely for the development review process and extension of service, it can also be used to establish the "water allowance" for a development where the water provider then monitors the development for compliance with the approved water allowance.

As an outdoor water conservation tool. An outdoor water budget is a water management tool used to estimate and/or allocate the amount of water a landscape will require. California's MWELO includes an option to include a water budget taking into account evapotranspiration data, plant type(s), purpose and functionality of the landscape, irrigated landscape area, irrigation efficiency, and climate data.

As an indoor water conservation tool. An indoor water budget establishes how much water a new building may require. An indoor water budget is calculated based on the flow rates of the fixtures and the appliances that will be provided by the builder (e.g., toilets, faucets, shower heads, dishwashers). There are more and more off-the-shelf calculators available to estimate individual projects or household indoor and outdoor water budgets.

As a conservation water rate structure tool. For utilities, a water budget is the amount of water a customer is allotted annually and per billing cycle based on the size and use of the structure, quantity of outdoor landscaping, and historical water demand. Water budgets help promote water conservation by incentivizing water customers to stay within their budget as they pay more for exceeding their budget. Water budgets are often in tiered blocks with customer rates increasing for each tier they exceed.

APPROACHES FOR DEVELOPING A WATER BUDGET:

Develop a consistent water demand calculation methodology for assessing water adequacy. It is more accurate if it accounts for indoor and outdoor use type typologies and density.

Projects subject to the California Environmental Quality Act ("CEQA") and Water Code §10910(a) and 10912(a)(3), thus requiring a Water Supply Assessment will establish a water use budget to provide the basis for the water demand.

- Water budgets should include indoor and outdoor water uses, including:[26]
    - demand from indoor plumbing fixtures and account for occupancy counts, frequency of use, and duration time per occupant;
    - water demands for heating and cooling, accounting for climate conditions and days of operation;
    - demand from process water;

[26] City of Menlo Park, California Water Use Budget Guidelines. www.menlopark.org/DocumentCenter/View/20869/water-use-budget-guidelines

    - other indoor demand;
    - outdoor irrigation demand;
    - demand from other outdoor uses.
- For commercial and industrial, shift units of demand measurement for greater accuracy. Instead of water demand "per-acre," scale to a "per-unit" or "per-square-foot-of-building-area" calculation.
- For residential uses, align water allowances with building permit applications and water budget worksheets that account for fixtures, appliances, and irrigation.
- Align methodologies and data sources across partners. Communities that compare and coordinate data and information build a mutual understanding, improve communication, and reduce uncertainty about water availability.
- Connect water billing and actual land use data using GIS. Granularity and accuracy of estimations inform rate structuring and advance efficiency programs. It helps with understanding the water use patterns and trends of land uses and densities. While this approach requires significant capacity, it helps not only with water adequacy review, but other types of development applications such as what impact rezoning proposal could have.
- Utilize water allowances to establish a maximum amount of water for indoor and outdoor use. While there are many methodologies, some communities have moved to a water allowance, enabling the developer/builder to have flexibility in selecting fixtures, appliances, and landscaping within that budget.

WATER ALLOCATION POLICIES

With infinite supplies, the allocation of water is not an issue, but as communities across the West find themselves with water supply and demand gaps, communities are wanting to be more deliberate with how they allocate their remaining supplies to grow their community. A water allocation policy offers water providers and local governments a decision-making structure to dedicate their water resources in accordance with their community's needs and vision. An allocation policy is tailored to suit the strategic goals and priorities of a community by allocating its water supply to categories of development in a general plan such as specific land use types, economic development, affordable housing, water efficient development, or community infill or revitalization.

Without a water allocation policy, supply agreements are often made on a "first come, first serve" basis according to the California water rights code, which can unintentionally lead to resource-intensive development without compensatory benefit to the supporting community. In other scenarios, a development project with a high benefit to the community may remain on a waitlist without means to prioritize it when sufficient water becomes available.

California's Water Code establishes two requirements for water providers to prioritize water allocation. In Section 354 under water shortages, a water provider and local government may, "after allocating and setting aside the amount of water which in the opinion of the governing body will be necessary to supply water needed for domestic use, sanitation, and fire protection, the regulations" establish priorities in the use of water for other purposes as long as it does not discrimination between consumers using water for the same purpose(s). Additionally, in Section 106.31.7, a water provider is required to develop a water allocation policy for single and multi-family residential housing for lower income households to comply with the legislative policy granting priority to affordable housing development. These tools could be further developed to ensure water allocation is thoughtfully achieving community sustainability and quality of life.

APPROACHES FOR DEVELOPING A WATER ALLOCATION POLICY:

- Evaluate your water supply in terms of how it can support achieving your community plans, priorities, and build out.
- Determine what type of water allocation policy will best suit your water resource management needs. There are many ways to structure a water allocation policy. Some communities chose a tiered-allocation approach where they only evaluate a development application that crosses a higher water demand threshold while most other development projects remain unaffected by the policy. Other communities opt for a points-based system with points awarded for achieving community goals with a minimum score required to receive a water allocation. Others chose to distribute the community's remaining water supply in acre feet available for certain types of development consistent with the community's goals using a percentage-based[27] approach.
- Communicate the allocation policy as a tool for protecting the rights of your current water users and stewarding your community's natural resources.

[27] In 2018, the City of Pacific Grove, California, adopted a percentage-based water distribution regulation that allocated available water to the following uses: 50% commercial/non-residential, 25% residential, and 25% civic needs/council goals.
files.cityofpacificgrove.org/Document_Center/Resolutions%20&%20Ordinances/Ordinances/2018/18-015-water-distribution-regulations.pdf

WATER DEMAND OFFSET PROGRAMS

Water demand offset programs can address water supply shortages by requiring new development to offset its projected water demand either through water conservation in existing development or a direct transfer of water rights. The goal is that all new development, through partnerships between communities and developers, can be "water neutral" in the water supply system. Some communities provide an in-lieu fee alternative. This concept can also apply to offsetting energy, wastewater, air quality, historic preservation, or watershed health impacts. The Alliance for Water Efficiency's Net Blue Model Ordinance, user guide, offset methodology and example ordinances can support communities that are considering the establishment of a water demand offset program.[28]

APPROACHES FOR MANAGING A WATER DEMAND OFFSET PROGRAM INCLUDE:

- Establish a water bank or authority to monitor and administer the program.
- Determine the offset ratio. A ratio of 1:1 will maintain the current water supply-demand balance, and a 2:1 mitigation ratio will reduce the ratio of demand relative to supply. Wastewater reclamation projects are more reliable and are given a 1:1 offset value, and supplies created through demand management are considered temporary and are given a 2:1 ratio.
- If fee-based, ensure the charge reflects the costs of implementing the offset as well as administrative costs. Costs of developing new supplies are borne by the entity needing to offset demand. Fee schedules can be a flat rate or based on percentage.
- Require verification of sufficient water supplies and water budgets. Work completed by developers must include documentation and verification by local program administrators.
- Consider the timing of when the offset fee is paid to allow enough time to procure supplies with those fees by the time the new demand is created by the development.
- Promote infill development by giving priority access for new water supplies to new demands within the existing service area boundary. Consider maximizing development opportunities within the target area before approving development in new regions.

CASE STUDIES: TWO TYPES OF DEMAND OFFSET PROGRAMS

SANTA MONICA, CA

The City of Santa Monica is using "Water Neutrality" to achieve their goal of Water Self-Sufficiency by 2023 as part of their Climate Adaptation Plan. Water self-sufficiency means that the city will no longer rely on imported water, focusing solely on conservation and diversifying its own local supplies to meet current and future water demand. All proposed development must offset any water use greater than the 5-year historical average for the site. Developers can achieve this by:

1. Performing on-site or offsite plumbing fixture retrofits, or
2. Choosing to pay an in-lieu fee.

In-lieu fees fund the city's Water Neutrality Direct Install Program, which provides free installation of plumbing fixtures.

Project sites without historical water use only need to offset new water demands above the baseline, which is determined based on average annual water usage for customers in the same class with the same size meter. If the entire development project is classified as "affordable housing," the offset must only be 50% of the baseline, as compared to 100% for other offsets. Since its inception in 2017, the city has modified the program to streamline efficiencies and address potential inequities.

SANTA ROSA, CA

In 2022, the Santa Rosa City Council adopted a Water Demand Offset (WDO) Policy to create a way for the city to ensure new developments do not exceed the city's available water supply, and avoid having to stop new housing developments. The demand offset goal has been in the city's Urban Water Management plan since 2015, and with the adoption of the WDO, the city will be able to collect a fee in the case of insufficient water supply

[28] Alliance for Water Efficiency Net Blue: Supporting Water-Neutral Growth. www.allianceforwaterefficiency.org/resources/topic/net-blue-supporting-water-neutral-growth

at the time of final inspection. The policy applies only to new developments, and has not impacted proposed and newly approved affordable housing developments, which was a major concern. The WDO revenue will go to the Water Conservation Team to do water allocation projects like large scale water efficiency conversions (high-efficiency toilets and faucets) and landscape conversions. The city water department worked closely with the city land use planning department to ensure coordination and understanding of the purpose and goal of the WDO, and to communicate information about the WDO to potential applicants.

TOOLBOX: ALTERNATIVE WATER SUPPLIES

The use of alternative water supplies can ease peak pressure demands on a water treatment system during warmer months when irrigation demand increases. Alternative water supplies can also help diversify a water portfolio, allowing existing water supplies to be stretched further.

There are options available to water providers and communities for alternative water supplies:

1. Raw surface water
2. Rainwater harvesting
3. Recycled water
4. Greywater use
5. Stormwater harvesting (see the green infrastructure section)
6. Desalination (considered as a last resource given its cost and environmental impacts)

RAW SURFACE WATER

Communities may require outdoor irrigation, with appropriate water rights, to be supplied by untreated or “raw” surface water from ponds, lakes, ditches, and rivers. While these water sources take pressure off the treated water system, they should not be considered an unlimited water supply. Non-potable water should not be incentivized as a lower-cost option. All water should be considered a valuable resource and used efficiently. Therefore, conservation and efficiency requirements for raw water should be similar to other water sources.

RAINWATER HARVESTING

Rainwater harvesting is collecting runoff from roofs into storage systems. This reduces demand on freshwater supplies and the potable water system. California allows for rainwater to be harvested in rain barrels or cistern systems that funnel rooftop runoff to water collection tanks to be used with minimal to no treatment for landscape irrigation, dust control, and/or stock water supply.

Rainwater harvesting can provide water for landscaping and potable use. Though often done on residential properties, local governments can also provide standards for district-scale or commercial rainwater harvesting.

Local jurisdictions and water providers can require or incentivize rainwater harvesting in water conservation ordinances. Rainwater harvesting standards may involve specifications for technical equipment, installation, and maintenance for capturing, storing, and using rainwater at residences or commercial buildings.

RECYCLED WATER

Water recycling is the collection of wastewater for treatment and reapplication for beneficial uses. Recycled water is a reliable supply that is “drought-proof” and locally controlled.

Recycled water treated to non-potable or non-drinkable standards is often used for irrigation and some industrial uses. However, there are limits to non-potable reuse applications, and the costs of treatment, planning and operating a dual infrastructural system, and developing a means of storage must be considered. Therefore, as treatment technology has improved, some communities have opted instead to use an advanced purification process to treat their water further to reach potable or drinkable standards.

Potable water reuse systems can be direct or indirect. Direct reuse systems integrate the ultrapure treated water directly into the drinking water system or into the raw water supplying the system. While a growing handful of communities in the United States practice direct reuse, indirect reuse systems are far more common. In the latter, recycled water is treated to similarly high standards and is then released into another body of water, called an "environmental buffer," for storage. Environmental buffers can be groundwater—reached through either natural infiltration or injection wells—or surface water such as reservoirs, wetlands, or riverbeds. The blended water is eventually retrieved, treated again, and ultimately distributed into the drinking water system.

GREYWATER

Unlike recycled water, greywater is collected from non-sewage water (bathtubs, sinks, laundry) and used on-site for irrigation, with little treatment. By law, greywater is defined in California as "untreated wastewater that has not been contaminated by any toilet discharge, has not been affected by infectious, contaminated or unhealthy bodily wastes and does not present a threat from contamination by unhealthful processing, manufacturing, or operating wastes. Greywater includes but is not limited to, wastewater from bathtubs, showers, bathroom washbasins, clothes washing machines, and laundry tubs, but does not include wastewater from kitchen sinks or dishwashers."[29] Local governments can develop green building incentives or development standards to better promote and incorporate water reuse.

APPROACHES FOR USING ALTERNATIVE WATER SUPPLIES:

- Require non-potable water for irrigation but use it efficiently. Water used outdoors does not re-enter the treatment system and thus should not be considered an unlimited supply.
- Set the culture that all water is valuable, and non-potable water should not be incentivized as a lower-cost option, particularly if your community struggles to fund treatment or delivery infrastructure.
- Use and promote reclaimed or recycled water.
- Establish "purple pipe"[30] recycled water delivery systems in new development. Strategically place "purple pipe" in redevelopment projects to promote access to parks and other areas with large non-potable water demand.
- Incorporate on-site water recycling technologies at high-water-use industries in a water conservation ordinance.
- Direct industrial- or institution-scale air conditioning condensate into a water harvesting feature in the landscape design.
- Adopt a greywater ordinance or incentive for residential use.
- Promote rainwater harvesting. Develop rebate incentive programs for cisterns. Develop ordinances that target residential or commercial development.

CASE STUDY: SANTA MONICA SUSTAINABLE WATER INFRASTRUCTURE PROJECT

The City of Santa Monica has built two rainwater tanks to capture, treat, and recycle stormwater. The project, known as the Sustainable Water Infrastructure Project (SWIP), is designed to reduce the city's reliance on imported water. The recycled water can be used for irrigation, toilet flushing in buildings that have dual plumbing systems, and to recharge groundwater aquifers. The city currently derives almost 60-70% of its water from local groundwater naturally recharged from rain that falls into the Santa Monica mountains. It supplements the rest with imported water from Northern California and the Colorado River. Rain that falls on the city flows into the Santa Monica Bay through the Pico-Kenter storm drain. Now the system captures stormwater in a 1.6-million-gallon tank under the Santa Monica Pier parking lot and recycles it through the SWIP. The system is the first in the state of California to treat stormwater and inject it directly into the groundwater basin to recharge local supplies. The city estimates an average diversion of over 40 million gallons of stormwater away from the Santa Monica Bay each year into the SWIP. First envisioned in the 2018 Santa Monica Sustainable Water Master Plan, SWIP came online in the fall of 2022, and proceeded to meet expectations for rainwater capture during the wettest winters on record.[31] [32] [33]

[29] California Plumbing Code, Ch. 15 Alternative Water Sources for Nonpotable Applications, Pursuant to Health and Safety Code Section 17922.12
[30] Purple is the designated pipe color for conveying recycled water.
[31] Carpenter, Susan. "Santa Monica has captured most of its rain this winter." Spectrum News 1. March 14, 2023 www.spectrumnews1.com/ca/la-west/environment/2023/03/14/santa-monica-has-captured-almost-all-of-its-rain-this-winter
[32] Adams, Grace. "Recent rain puts Santa Monica's water infrastructure to work." Santa Monica Daily Press. January 7, 2023 www.smdp.com/2023/01/07/water-2/
[33] Sawicki, Emily. "Newly opened facility keeps dream of water self-sufficiency afloat." Santa Monica Daily Press. November 19, 2023. www.smdp.com/2022/11/19/newly-opened-facility-keeps-dream-of-water-self-sufficiency-afloat/

SECTION 3: WATER-SMART LAND USE POLICY IN CALIFORNIA

POLICIES, PROGRAMS, AND PROCESSES THAT GOVERN WHERE AND HOW DEVELOPMENT OCCURS CAN GREATLY IMPACT THE MANAGEMENT OF WATER RESOURCES.

CASE STATEMENT

Water demand is a function of household size, income, and lifestyle habits, as well as how communities are planned, designed, and maintained. To use less water, the best policy is to make water-smart development – using the development patterns, standards, and practices listed below – the most common type of development.

Efficiencies can be achieved through density and development patterns, building standards, site and systems design, and especially landscaping:

- Higher density and compact development consume less water than other development patterns.
- Residential land use types consume less water than others.
- High-performing, water-efficient plumbing and building standards reduce water consumption.
- Newer appliances and plumbing fixtures are more efficient than older ones.
- Xeric[34] and climate-appropriate plants and maintenance practices consume less water.
- Households that conserve water save money for themselves and the water provider while preserving water for other people and nature.
- Incorporating low impact development and green infrastructure at the site scale improves water quality, recharges groundwater, and reduces treatment costs.

To use less water, the best policy is to make water-smart development the only accepted approach to development. Three key tools are available for communities to do so:

- Promote higher density and compact development, especially where infrastructure already exists.
- Promote high-performing, water-efficient plumbing and building standards.
- Promote water-saving and regional climate-appropriate landscaping standards and maintenance practices.

[34] "Xeric" means "dry," and xeric plants survive and thrive with little water.

TOOLBOX: COMPACT DEVELOPMENT

While water conservation and efficiency efforts related to land use have primarily focused on outdoor watering and indoor plumbing fixtures, considerable benefits can be realized by encouraging more compact development patterns that emphasize transit and walkability, mixed and diverse uses, and environmental and social impacts.

Water usage studies consistently demonstrate that the greatest water consumption in urban areas is from large, single-family lots. More than 50% of water use from these homes is for outdoor use during spring and summer. In addition to landscaping efficiency and conservation, increasing development density can decrease water consumption due to reduced landscape irrigation water demand per dwelling unit.[35]

Promoting water-efficient land use patterns provides many additional benefits beyond saving water. It can support more efficient use of existing infrastructure, protect natural resources, promote walkability, control flooding, and enhance community vibrancy. Currently, between one-half and three-quarters of the developable land in much of California is zoned for single-family housing.[36] California continues to develop in sprawl patterns without adequate protection of open space. As wildfire threat intensifies, low-density development continues to occur at the wildland-urban interface despite the difficulty of supplying resources—such as fire protection and water supply—to this type of development. “Smart growth” approaches including compact building design, preservation of critical environmental areas, and directing development towards existing communities can minimize vulnerability to flooding, wildfire, and drought.

CivicWell’s Ahwahnee Principles for Resource-Efficient Land Use and the Ahwahnee Water Principles guide cities and counties on how to approach land-use decisions in accordance with community resources. The Ahwahnee Water Principles for Resource-Efficient Land Use can be adopted using the Model Water Resolution Template.[37]

APPROACHES THAT PROMOTE COMPACT DEVELOPMENT:

- Develop future land use plans that establish designated future growth areas where adequate infrastructure exists for accommodating growth at higher and/or more urban densities.
- Change the zoning code to permit smaller lot sizes and higher densities by right in designated districts.Make rezonings, annexations, and Planned Unit Development applications conditional on meeting water efficiency standards.
- Reduce or remove barriers to compact development such as minimum parking requirements, lot sizes, and lot setbacks.
- Ensure zoning code permits multiple types of residential development (e.g. multiplex, townhomes, apartments, accessory dwelling units) by right in designated growth areas to provide a diversity of housing options.
- Ensure the zoning code permits compact mixed-use development by right in designated growth areas.
- In exurban and rural areas, ensure the zoning code permits and incentivizes cluster and conservation development by right.
- Manage commercial uses by making water-intensive uses such as car washes and nurseries, conditional instead of by right. Permit based on standards to meet water conservation and efficiency standards such as water recycling.
- Provide incentives for increased densities using development or tap fee reductions and density bonuses.
- Use resident/stakeholder committees, public education, and outreach to help evaluate options, assess feasibility and public opinion, and prioritize actions.

GROUNDWATER HIGHLIGHTS

GROUNDWATER AND LAND USE POLICY

The reliance on groundwater in many California communities reveals the great need to integrate land use decisions with groundwater management. Through the development of Groundwater Sustainability Plans, land areas are identified as optimal for recharge. The California Department of Conservation recently created the Multi-benefit Land Repurposing Funding program to help communities and water districts to plan and implement

[35] Stoker, P., Chang, H., Wentz, E., Crow-Miller, B., Jehle, G., & Bonnette, M. (2019). Building Water-Efficient Cities: A Comparative Analysis of How the Built Environment Influences Water Use in Four Western US Cities. Journal of the American Planning Association, 85(4), 511-524
[36] Mawhorter and Reid. Terner California Residential Land Use Survey. (2018) https://ternercenter.berkeley.edu/california-land-use/
[37] Ahwahnee Water Principals, https://civicwell.org/civic-resources/ahwahnee-water-principles/

groundwater recharge projects and other water conservation measures. This program is an avenue to pursue groundwater recharge projects, as groundwater recharge is a strategy to provide benefits of land repurposing. Zoning should align with these designations to adequately protect recharge capacity. The plans will also outline a water budget for the entire basin; development projections should be calculated within that water budget.

TOOLBOX: WATER-EFFICIENT LANDSCAPES

In California, outdoor watering for urban landscapes accounts for 50 percent or more of water providers' total annual water demand.[38] Communities on the urban fringe and in rural areas use more outdoor water, as they tend to have larger properties.[39] New development and retrofitted landscape water efficiency standards are governed by 23 CCR 490 Model Water Efficient Landscape Ordinance (MWELO).[40][41] All local agencies must adopt, implement, and enforce the MWELO or a local Water Efficient Landscape Ordinance (WELO) that is at least as effective as the MWELO.

The MWELO applies to the following landscape projects:[42]

- New construction projects with an aggregate landscape area equal to or greater than 500 square feet requiring a building or landscape permit, plan check or design review;
- Rehabilitated landscape projects with an aggregate landscape area equal to or greater than 2,500 square feet requiring a building or landscape permit, plan check, or design review;
- Existing landscapes limited to Sections 493, 493.1 and 493.2; and
- Cemeteries. Recognizing the special landscape management needs of cemeteries, new and rehabilitated cemeteries are limited to Sections 492.4, 492.11, and 492. 12; and existing cemeteries are limited to Sections 493, 493.1, and 493.2.

Projects must submit a landscape documentation package that includes at minimum: project information, a water efficient landscape worksheet with hydrozone information and water budget calculations (maximum applied water allowance and estimated total water use), a soil management report, and landscape, irrigation, and grading design plans.

APPROACHES FOR ACHIEVING WATER-SAVING LANDSCAPES:

Projects and landscapes should follow these best practices for reducing outdoor water use:

- Follow and/or exceed baseline levels of water efficiency as described in the Model Water Efficient Landscape Code.
- Utilize plants best suited to the local climate, irrigated by hydrozone, selected from plant lists such as the Water Use Classification of Landscape Species (WUCOLS IV).[43]
- Limit the total landscaped area permitted (based on a percentage or square footage of the lot).
- Limit the type and area of turf grass allowed, based on square footage or total landscaped area.
- Utilize low flow and efficient irrigation system technology standards, including drip, bubblers, or low flow sprinklers.
- Utilize rain sensors with a shut-off device to reduce watering during natural rainfall events.
- Utilize smart sprinkler controllers and wireless flow meters to respond to weather data and allow personal scheduling, differentiated by hydrozone.
- Utilize Evapotranspiration (ET) sensors to adapt irrigation to changing weather and soil conditions.
- Utilize soil enhancements and mulch.

[38] Hodel, D. and D.R. Pittenger. 2015. 9%: Perspective on the California drought and landscape water use, University of California Cooperative Extension. ucanr.edu/sites/UrbanHort/Water_Use_of_Turfgrass_and_Landscape_Plant_Materials/Drought_and_Landscape_Water_Use_-_Some_Persspective/.

[39] Public Policy Institute of California Water Policy Center. Water for Cities www.ppic.org/content/pubs/report/R_1016EH3R.pdf

[40] The purpose of water-efficient landscape ordinances is to not only increase water efficiency but to improve environmental conditions in the built environment. Landscaping can replace habitat lost to development and provide other related benefits such as improvements to public health and quality of life, climate change mitigation, energy and materials conservation, and increased property values. water.ca.gov/Programs/Water-Use-And-Efficiency/Urban-Water-Use-Efficiency/Model-Water-Efficient-Landscape-Ordinance

[41] The MWELO is also referenced by Title 24, Part 11, Chapters 4 and 5 of the CALGreen Building Code.

[42] California Model Water Efficient Landscape Code govt.westlaw.com/calregs/Browse/Home/California/CaliforniaCodeofRegulations

[43] University of California Davis California Center for Urban Horticulture. Water Use Classification of Landscape Species ccuh.ucdavis.edu/wucols

- Schedule irrigation timing to limit evapotranspiration.
- Establish a water budget for outdoor water use, ideally tied to tiered rate structuring that sends a price signal to the ratepayer.
- Establish code enforcement and fines for violations of standards.
- Conduct training for landscape professionals on water-saving landscaping, such as Qualified Water Efficient Landscaping (QWEL) Training.[44]
- Establish water-efficient model maintenance standards and agreements—for HOAs and others—to use in contracting for landscape services.
- Utilize landscape design manuals that provide specific guidance to individuals and developers on water-saving tree and plant types and sizes, planting seasons, soil enhancement, mulching, and watering times appropriate for the local climate.[45]
- Promote and/or incentivize the use of individual household rainwater harvesting for outdoor irrigation. Since the 2012 passage of the Rainwater Capture Act, residents can use rain barrels and underground filtration systems for their outdoor landscape water needs.[46]
- Incentivize water-intensive landscape removal through rebates or direct install programs.
- Provide incentives for developers in the form of reduced new connection fees for the use of additional water-efficient landscape strategies in their projects.
- Maximize the use of greywater and recycled water for appropriate applications including outdoor irrigation, toilet flushing, and commercial and industrial processes.
- Install purple pipes in new construction and remodeled buildings to utilize existing or future recycled water.[47]
- Launch education campaigns to promote resident knowledge on water-efficient irrigation systems, watering practices, and "California friendly" landscapes (e.g., drought tolerant and native or non-invasive plants).
- Offer rebate programs for turf removal and replacement with low-water use landscaping and gray water system installation.
- Offer water audits that educate property managers and evaluate the water efficiency of systems.
- Utilize low impact development (LID) practices and green infrastructure projects that capture and utilize stormwater.
- Educate staff of HOAs and maintenance companies about water-efficient plants, soil health, and watering best practices.

CASE STUDY: WATER EFFICIENT LANDSCAPE ORDINANCE - SANTA ROSA

Santa Rosa adopted a local Water Efficient Landscape Ordinance that is at least as effective as the State's Model Water Efficient Landscape Ordinance.[48] The Santa Rosa WELO enacted the "Maximum Applied Water Allowance Requirement," which is a property's water budget that sets the upper limit of annual applied water for the established landscape. The ordinance requires a soil analysis report that identifies soil texture, infiltration rate, pH, total soluble salts, sodium, and percent organic matter. Based on the soil analysis report, the project applicant may have to incorporate soil amendments. Post-construction, the applicant must hire a professional to perform an irrigation audit to determine the water efficiency of the landscape design and irrigation equipment.

In 2017 and 2019, Sonoma County experienced devastating wildfires. As residents looked to rebuild, the Sonoma-Marin Saving Water Partnership took the opportunity to further promote water-saving landscaping approaches. Property owners with front yard landscaped areas less than 2,500 square feet may utilize the Free Landscape Design Templates prepared by the Sonoma Marin Saving Water Partnership.[49] The drawings may be modified to incorporate optional features such as rain gardens and adjusted to address the specific size of the landscaped area and the placement of the structure. Plants may also be substituted to address the owner's plant preference, and the plant totals shown on the templates may be reduced by 50% if the densities shown are not desired. The reduction does not apply to trees. The template plans meet all WELO requirements and no additional submittals are required.

[44] Qualified Water Efficient Landscapes. www.qwel.net
[45] Costello, L.R. and K.S. Jones. 2014. WUCOLS IV: Water Use Classification of Landscape Species. California Center for Urban Horticulture, University of California, Davis.
[46] Cal. Water Code §10573
[47] Ahwahnee Water Principals, Community Principle 7, https://civicwell.org/civic-resources/ahwahnee-water-principles/
[48] City of Santa Rosa Landscape Standards. www.srcity.org/2428/Landscape-Standards
[49] City of Santa Rosa Residential Landscaping Requirements. www.srcity.org/3528/Residential-Landscaping-Requirements

TOOLBOX: WATER-SMART BUILDINGS

The 2014 emergency drought declaration ultimately led to Governor Brown's 2016 Executive Order B-37-16, which codified the temporary statewide emergency water restrictions to "make conservation a California way of life." The Executive Order set the stage for Senate Bill 606 and Assembly Bill 1668 (both passed in 2018) to ensure longer-term conservation and efficiency efforts to increase drought resilience. These bills required coordination between the State Water Resources Control Board and the Department of Water Resources to establish long-term urban water use efficiency standards in 2022 for indoor residential use, outdoor residential use, water loss, and other uses. The legislation also requires water suppliers to set annual water budgets and prepare for droughts locally in their Urban Water Management Plans.

Reducing indoor water use in residences and businesses can be achieved through water-efficiency standards for indoor plumbing fixtures. California's Green Building Standards Code (CAL Green Code)—the first statewide green building code—was passed in 2007 in response to greenhouse gas reduction goals established by Assembly Bill 32.[50] The CALGreen Code was first published in 2010 and was most recently revised in 2022 (effective January 1, 2023). This version includes mandatory measures for water efficiency and conservation in residential and mixed use commercial buildings, including:

- Water-conserving plumbing fixtures and fittings;
- Submeters for multifamily buildings and dwelling units in mixed-use residential/commercial buildings;
- Standards for plumbing fixtures and fittings (see California Plumbing Code);
- Efficient water use in landscape areas (see local water efficient landscape ordinance).

CALGreen offers voluntary Tiers of additional measures to further reduce water use. These Tiers, or other local amendments to CALGreen that are more stringent than the baseline become mandatory if adopted by the local jurisdiction, and the adopted local ordinance and supporting findings must be filed with the Building Standards Council.[51]

WATER-RELATED RESIDENTIAL VOLUNTARY MEASURES:

- **A4.103.1** Infill, greyfield, or brownfield site is selected.
- **A4.106.2.2** Soil is protected by evaluating natural drainage patterns and implementing erosion controls and minimizing the amount of cut and fill needed for roads and driveways.
- **A4.106.3** Landscape design restores areas consistent with native vegetation species and patterns or utilizes at least 75% native CA or drought tolerant plants.
- **A4.106.6** Vegetated roofs installed for at least 50% of the roof area.
- **A4.303.1** Maximum flow rate of kitchen faucets shall not exceed 1.5 GPM at 60psi.
- **A4.303.2** Alternative nonpotable water sources are used for indoor potable water reduction.
- **A4.303.3** Install at least one qualified ENERGY STAR dishwasher or clothes washer.
- **A4.303.4** Install nonwater urinals and waterless toilets
- **A4.303.5** Install hot water recirculation systems
- **A4.304.1** Rainwater catchment systems that use rainwater generated by at least 65% of the available roof area.
- **A4.304.2** Eliminate the use of potable water for landscape irrigation.
- **A4.304.3** Landscaped irrigated areas less than 5,000 sq ft provided with separate submeters for outdoor potable water use.
- **A4.305.1** Plumbing piping installed to permit discharge of graywater from clothes washer or other fixtures to be used for landscape irrigation

[50] Cal. Code. Regs Title 24, Part 11.

[51] 2022 Guide to the 2022 California Green Building Standards Code (CALGreen) Residential. Health and Safety Code Sections 17958.5 and 18941.5 were amended by Assembly Bill 210 (Hayashi, Chapter 89, Statutes of 2009) to clarify this issue. The sections provide for cities and counties to make changes or modifications to building standards, including green building standards, due to local climatic, geological, or topographical conditions, and that Building Standards Law cannot limit local establishment of more restrictive building standards reasonably necessary due to the above-mentioned conditions.

WATER-RELATED NON-RESIDENTIAL VOLUNTARY MEASURES:

- **A5.103.2** Infill, greyfield, or brownfield site is selected.
- **A5.104.1** Reduce development footprint and optimize open space
- **A5.106.2-3** Projects mitigate stormwater runoff by employing at least two of the following LID methods: bioretention/filtration planters, precipitation capture, green roofs, roof leader disconnection, permeable paving, vegetative swales, tree preservation, soil quality, stream buffer, and volume retention.
- **A5.106.3.2** Manage 40% of the average annual rainfall on the site's impervious surfaces through infiltration, reuse or evapotranspiration.
- **A5.303.2.3.1-4** Tier 1 - Provide a schedule of plumbing fixtures and fixture fittings that reduce the overall use of potable water by 12% (Tier 1), 20% (Tier 2) or 25% (Tier 3). Nonpotable water systems can be used in these calculations to demonstrate water savings.
- **A5.303.3** Appliances and fixtures for commercial application should meet several conditions, including reduced maximum water factor, ENERGY STAR dishwashers, air cooled ice makers, water-efficient food steamers, ovens, and other appliances.
- **A5.303.4** Non-water urinals are installed.
- **A5.304.2** Separate meters or submeters installed for indoor and outdoor potable water use for landscaped areas of at least 500 square feet but no more than 1,000 square feet.
- **A5.304.6-7** Restore all landscaped areas disturbed during construction with local adaptive/noninvasive vegetation or restore at least 50% of the site area on previously developed or graded sites.
- **A5.304.8** Install a graywater collection system for irrigation.
- **A5.305.2** Irrigation systems use recycled water.

CASE STUDY: CITY OF NAPA

The City of Napa has adopted the 2022 CALGreen high performance building regulations for new development. In some cases, the regulations adopted by the City are more stringent than the baseline. For Residential projects, Water Efficiency and Conservation measures that are more stringent than CALGreen include kitchen faucet flow rate and Energy Star dishwasher/clothes washer requirements. On the Non-Residential side, Napa mandates an additional 12% indoor savings (Tier 1 Voluntary Measure) beyond the standard 2022 CALGreen fixture flow rates. Non-Residential projects must meet additional measures for specialized appliances including commercial clothes washers, dishwashers, ice makers, and food steamers. To minimize leaks, projects of all types are subject to a maximum static service pressure of 60 psi.[52]

TOOLBOX: DEVELOPMENT REVIEW PROCESS

The development review process encompasses the procedures necessary to ensure development applications meet a community's land use regulations. Each community's development review process varies slightly, but engaging water providers in the process can support water-resilient outcomes.

APPROACHES FOR INTEGRATED DEVELOPMENT REVIEW:

- Document the development review process. Identify opportunities to add water resource managers and other sustainability or resilience expertise to the process to identify and resolve water-related challenges or opportunities.
- Promote collaboration and build relationships with counterparts through regular meetings that maintain a shared understanding of the community's strategic vision and priorities.
- Ensure that water-related compliance challenges are addressed, and alternative approaches are considered early by involving water managers at pre-application meetings and preliminary plat reviews.
- Seek mutual agreement from water resources departments on final approval of land use decisions.

[52] City of Napa. High Performance Building Regulations. www.cityofnapa.org/579/High-Performance-Building-Regulations

- Ensure that the development is built, operated, and maintained as stated in the proposal by training site inspectors to recognize compliance with water-efficient design.
- Shape development agreements or planned unit developments (PUDs) to include water efficiency standards, alternative water use, or watershed protection efforts.
- Promote voluntary, incentive-based programs to implement creative development designs with open space, water-use offsets, and water-smart plumbing, landscaping, and rainwater harvesting systems (in new builds and/or retrofits). Developer incentives can encourage developers to exceed the required water efficiency standards.
- Develop guidance and user manuals to help residents and builders understand and comply with building and design codes.

SECTION 4: HEALTHY AND RESILIENT WATERSHEDS

THE EFFECTS OF INCREASING DEVELOPMENT, CLIMATE CHANGE, AND NATURAL HAZARDS CAN ALL DEGRADE THE QUALITY OF THE WATERSHED, IMPACTING BOTH WATER YIELD AND WATER QUALITY.

CASE STATEMENT

In addition to managing water use, it is important to safeguard California's water supply and its ecosystems. The quality and quantity of a community's water is inextricably linked to the health of its source watershed. Both human-induced and naturally occurring factors can degrade groundwater and surface water quality while also impacting water supply.

The way a community develops impacts water quality and the overall health of the watershed. By applying the principles and tools in this section, communities can reduce or reverse the impacts of:

- Pollution from urban water runoff.
- Sedimentation due to soil disturbances, vegetation loss, and erosion from roads and new development.
- Destruction of riparian areas due to development and climate change-induced shifts in hydrology.
- Increased stormwater runoff due to a rise in the use of impervious surfaces from development.
- Decrease or lack of water infiltration and groundwater recharge as a result of impervious surfaces and more rapid runoff.
- Impacts to water supply and water quality caused by drought, floods, and wildfires.

Local governments are strongly encouraged to coordinate with their Integrated Regional Water Management (IRWM) planning groups and Groundwater Sustainability Agencies to better align priorities, projects, and planning efforts (see Section 1 of this guidebook). All interested parties—from the headwaters to downstream users—should coordinate planning efforts in order to ensure robust watershed protection. As part of this collaboration, each community's geography and socio-ecological characteristics should inform its water management actions and guide its priorities (e.g., managing stormwater with green infrastructure; wildfire risk through forest management; demand for new supplies through water reuse; and detrimental impacts of growth through optimal land use, zoning, and site performance standards).

TOOLBOX: WATERSHED PROTECTION

Changing landscapes resulting from both human and natural forces have a significant impact on natural ecosystems and water resource availability. Safeguarding available water resources through watershed protection standards and policies is an important but often overlooked strategy in many communities. Watershed planning and protection often fall to grant-funded collaborative efforts led by non-profit organizations, sometimes working alongside local governments to restore ecological processes and functions.

A more impactful approach is watershed-sensitive planning at the municipal and regional scale, focusing on minimizing the negative impacts of new development. Watershed protection goals should be included in community planning efforts such as general plans, emergency management plans, and Integrated Regional Water Management plans. Some communities also reference watershed protection goals in their Urban Water Management Plans. Codifying these goals into policies and development codes is essential for preventing watershed degradation and enhancing community resilience. Furthermore, prioritizing forest management in the upper watershed can provide essential preventative actions to control wildfire, flooding, degradation of water supplies, and the resulting disruptive impacts to human and economic health.

STRATEGIES FOR WATERSHED PROTECTION STANDARDS

- Map ecologically sensitive areas, including: wetlands, riparian areas, groundwater dependent ecosystems, native habitats, infiltration zones, source water supplies, groundwater basins, and natural hazard-prone areas (such as floodplains and wildfire zones).
- Preserve and restore natural resources that are valued assets for flood protection, water quality improvement, groundwater recharge, habitat, and overall long-term water resource sustainability.[53]
- Establish plans for watershed management, stormwater management, and floodplain management that designate sensitive areas and establish goals for mitigation. These plans should be aligned with or integrated into existing plans for greatest consistency.
- Limit development in sensitive areas by clustering development within a smaller geographic zone, incentivizing infill development in less sensitive areas, and providing low-impact development standards/guidelines.
- Adopt development standards for stream buffers and setbacks to protect water quality.
- Adopt vegetation protection standards that minimize disturbance to vegetation within riparian corridors.
- Adopt stormwater management and site design standards that use best practices for low-impact development to reduce storm event runoff and increase water infiltration.
- Adopt site-level soil erosion mitigation standards for new development to reduce sedimentation and runoff and to protect water quality from land disturbance.
- Adopt surface and/or groundwater protection standards to minimize contamination of streams and shallow aquifers, thus protecting existing and potential future sources of drinking water.
- Participate in collaborative watershed restoration efforts to restore watershed functions through your Integrated Regional Water Management group.
- Identify the top multi-benefit and integrated strategies and projects, and implement these projects over less integrated proposals (unless crucial urgency demands otherwise).[54]
- Plans, programs, projects, and policies should be monitored and evaluated to determine if the expected results are achieved and to improve future practices.[55]

GROUNDWATER HIGHLIGHTS

GROUNDWATER AND WATERSHEDS

Although groundwater and surface water are managed independently, the two sources are inherently connected within a watershed. Resource

[53] Ahwahnee Water Principals, Community Principle 2, https://civicwell.org/civic-resources/ahwahnee-water-principles/
[54] Ahwahnee Water Principals, Implementation Principle 2, https://civicwell.org/civic-resources/ahwahnee-water-principles/
[55] Ahwahnee Water Principals, Implementation Principle 3, https://civicwell.org/civic-resources/ahwahnee-water-principles/

management at the watershed scale should incorporate groundwater management efforts. This can be done by incorporating Groundwater Sustainability Plans into the Integrated Regional Water Management Plan. Although the groundwater basin and watershed boundaries do not necessarily align because of re-designations, there are opportunities for collaboration among regional entities to coordinate grants, leverage funding, and implement multipurpose projects.

TOOLBOX: GREEN INFRASTRUCTURE AND LOW-IMPACT DEVELOPMENT

Green Infrastructure is an approach to stormwater management that emphasizes nature-based solutions that can reduce pollutant loadings by managing runoff as close to its source(s) as possible.[32] At the site level, practices known as Low Impact Development (LID) can retain and restore natural hydrologic patterns by keeping as much rainwater as possible from leaving the site. LID uses natural vegetation, detention basins, and porous materials to "slow the flow" and encourage the infiltration and harvesting of stormwater.

Some of the benefits of green infrastructure:

- Reducing peak flooding and treating stormwater on-site decreases pollutant loads and the risk of sewer overflow. Reducing the need for outdoor irrigation and landscaping; native plants can revegetate channels and basins, relying solely on rainfall.
- Planting trees and other plant materials mitigates heat by providing shade, sequestering carbon, and absorbing radiation from the sun. Trees and plants also absorb pollutants, thus improving soil and stream health, as well as air quality.
- Allowing stormwater to infiltrate into vegetation and soils improves groundwater recharge.
- Providing access to green spaces fosters active, healthy lifestyles.

The California State Water Board's Municipal Stormwater Program manages the state's municipal separate storm sewer systems (MS4) permit program, which is required under section 402 of the Clean Water Act. The MS4 program manages Phase I permits for municipalities over 100,000 and Phase II permits for municipalities under 100,000 across its nine regions. Municipalities use LID techniques and emphasize landscape-based site design features and porous pavement treatment systems to achieve permit compliance. Each of the state's regional permits is unique, with different LID requirements to support the watershed health and function priorities of each region. All new projects are required to implement the LID standards in order to reduce runoff and improve stormwater quality.[56]

EXAMPLES OF GREEN INFRASTRUCTURE

Creek Daylighting | Constructed Wetlands | Vegetated Roof | Bioretention Planter | Rainwater Harvesting | Permeable Paving

APPROACHES TO GREEN INFRASTRUCTURE

- Work with transportation and civil engineering professionals to update development standards and map areas of the

[56] California Water Boards. Municipal Stormwater Program. www.waterboards.ca.gov/water_issues/programs/stormwater

community (especially streets) that have the highest flood potential.

- When possible, use the minimum possible street width and direct runoff from pavement and buildings to vegetation-lined channels or rain gardens/recharge basins.
- Leverage green infrastructure methods to achieve multiple benefits including traffic calming, beautification, and placemaking.
- Incorporate water retention and detention basins into parks or other open space areas.[57]
- Design landscapes to utilize rain and storm water, retain runoff, decrease flooding, and recharge groundwater.[58]
- Preserve regional open space by clustering development, maximizing unpaved areas for stormwater retention.
- Use permeable surfaces for hardscapes wherever possible.[59]

COMMON LOW-IMPACT DEVELOPMENT AND GREEN INFRASTRUCTURE TECHNIQUES	
APPLICATION	**DESCRIPTION**
BIORETENTION BASINS, STORMWATER HARVESTING BASINS, AND RAIN GARDENS	Small- to large-scale planning areas containing shrubs, trees, and grasses designed to capture stormwater.
BIOSWALES	Shallows and uncovered channels that induce meandering and are placed deep within a drainage channel.
CURB OPENINGS AND CURB EXTENSIONS	Drainage inlets that divert stormwater into bioretention basins. Basins can be extended into the shoulder to expand the harvesting capacity with added traffic-calming effects.
DETENTION PONDS	Basins that provide flow control by collecting stormwater runoff.
PERMEABLE PAVEMENT, GRAVEL, OR PAVERS	Methods of paving that allow infiltration and can be used in low- to moderately trafficked areas like sidewalks and parking lots.

GROUNDWATER AND STORMWATER INTEGRATION

Stormwater is imperative for groundwater recharge. Runoff infiltrates the ground, recharging groundwater aquifers. When runoff gets contaminated, it can pollute the groundwater. However, coordinated groundwater and stormwater management is multi-beneficial. Infiltration basins can prevent stormwater flooding while also allowing for aquifer recharge. When using stormwater for groundwater recharge, it is important to consider the depth of the water table, soil permeability, amount of stormwater, quality of stormwater, and opportunities for treatment.

CASE STUDY: INFILTRATION PARKING LOT RETROFIT AT SAN DIEGO'S KELLOGG PARK

The Kellogg Park Green Lot Infiltration project, located in the La Jolla Shores community of San Diego, was designed to remove 18,000 square feet of asphalt concrete and replace it with permeable pavement that will allow the city to absorb large amounts of surface water. It also included elements that capture runoff from the parking lot and nearby public right-of-way. The captured water was then filtered to minimize pollutants. A "vegetated bioswale" and filter bed were added to further capture and infiltrate runoff.

Other project benefits include a reduction in the volume of stormwater and waterborne pollutants that could potentially reach the adjacent beach, enhanced aesthetics through landscaping features and trash enclosures, new curb ramps for improved accessibility, and improved drainage near

[57] Ahwahnee Water Principals, Community Principle 3, civicwell.org/civic-resources/ahwahnee-water-principles
[58] Ahwahnee Water Principals, Community Principle 4, civicwell.org/civic-resources/ahwahnee-water-principles
[59] Ahwahnee Water Principals, Community Principle, civicwell.org/civic-resources/ahwahnee-water-principles

current storm-drain inlets.

CASE STUDY: ELK GROVE NATURE PARK

From 2020 to 2022 The Cosumnes Community Services District planned and created a community park that specifically incorporates green stormwater infrastructure. The project seeks to mitigate the effects of climate-related weather events, improve community health, increase community access to green space and nature, and provides opportunities for education, employment and social inclusion. The green infrastructure uses natural processes to filter and slow the flow of stormwater to protect communities from flooding and restore waterways. The park includes rain gardens, bioswales, constructed wetlands, daylighted streams and permeable pavement. The project took two years from planning to implementation, and included numerous community engagement activities to design the features of the park. In 2021 volunteers worked in conjunction with District Staff to install the rain garden with over California native 300 plants.

SECTION 5: EFFICIENT WATER DEMAND PROGRAMS

RATE STRUCTURING, RETROFITS, INCENTIVE PROGRAMS, AND CONSUMER EDUCATION ENABLE WATER CONSERVATION AND EFFICIENCY OPPORTUNITIES FOR EXISTING DEVELOPMENT.

CASE STATEMENT

Water demand for a property can vary greatly due to size, type, and age. Additional factors such as season, weather, demographics (e.g., income and education level), infrastructure maintenance, and water conservation habits also contribute to the level of demand. Approaches for and mitigating water demand in existing development include rate structuring, fixture, appliance, and landscape retrofits, incentive programs, and consumer education programs. While any one of these efforts can reduce consumer water demand, a combination of these strategies will maximize water savings and greatly reduce water demand.

RATE STRUCTURING

For households and businesses sensitive to the price of water, rate structuring is an effective way to modify human behavior. Rate setting is complicated in California by strict utility regulations and tax law, as well as by the diversity in regional water supply infrastructure. However, the core principle of incentivizing water conservation by charging higher prices for higher usage can still be applied. Well-executed rate structuring can result in water use reductions and can expedite desired shifts in water use behavior while also ensuring the water agency remains solvent.

Common goals for adopting water conservation rate structures include:

- Sending a price signal to incentivize water conservation.
- Helping consumers invest in and manage efficient fixtures, appliances, and irrigation.
- Monitoring and communicating data about water usage to consumers.

While rate structuring can be extremely beneficial, it must be done equitably. More than a half-million California residents lack access to water that is reliably safe for drinking, but are still required to pay their utility bills. This is due in part to the inability of some small water systems to maintain their aging infrastructure or to keep up with regulations for both legacy and emerging contaminants.[60]

The Safe and Affordable Funding for Equity and Resilience (SAFER) program implemented through the passage of SB 200 (2019) established the Safe and Affordable Drinking Water Fund. The fund will provide tools and funding to help bring clean water to California communities that have, as of yet, been unable to ensure safe water at a reasonable cost. If implemented effectively, the program will ensure a more equitable distribution of resources and associated costs while also providing assistance to water agencies to ensure they can meet their customers' basic water needs.

[60] California Water Boards. Safe Drinking Water Program Overview Factsheet. www.waterboards.ca.gov/publications_forms/publications/factsheets/docs/faq_safe_drinking_water_program_overview_factsheet.pdf

TOOLBOX: CONSERVATION RATE STRUCTURING

Water agencies set rates to collect the revenue needed to operate the water utility, invest in infrastructure, and protect public health. California law restricts how public utilities can use revenue from property-related fees (such as water and wastewater). This complicates public utilities' ability to develop rate structures that meet their economic objectives and state conservation requirements.

During the historic 2012-2016 California drought, Governor Jerry Brown signed Executive Order B-29-15, under which Directive 8 ordered the State Water Board to guide local agencies in developing rate structures and pricing mechanisms for water conservation. These pricing mechanisms are complicated, however, by Proposition 218 restrictions that make it difficult for public water systems to implement rate structure changes.

The San Juan Capistrano decision of 2015[61] upheld Proposition 218's proportional cost provision, which requires water agencies to correlate their tiered prices with the actual cost of providing water at those tiered levels. The proportionality clause limits the ability of conservation-based pricing to respond to drought conditions. Even though the ruling indicates that the case "does not foreclose the use of conservation-oriented rate structures," many water agencies now avoid tiered rate structures for fear of legal challenges from their ratepayers. Private water suppliers (such as mutual water companies) face no such restrictions. There are approximately 1,200 mutual water companies in California.[62]

In a nationwide policy scorecard for 2022, water conservation rate structuring and eliminating the ban on water utilities using customer revenues for low income assistance were highlighted as key recommendations for California.[63]

Water rates are determined by two factors:

- The fixed costs of water are established by the costs of acquisition of water supply, and the costs to establish and maintain the infrastructure that treats and conveys the water; and
- The variable cost is based on the amount of water consumed by a customer. Water agencies are encouraged to set their rates so that the majority of their fixed costs are covered by the lowest possible water demand, so that the volume of water consumed by customers poses less risk to the agency's basic operations.

A variety of rate structuring strategies exist, but only two are generally applicable in California:

Budget-Based Rates

- Each customer is given a water budget based on property-specific characteristics (e.g. property type, number of people in the household, landscaped areas), which allocates the lowest cost of water for essential uses.
- Water use that exceeds the water budget or allocation is billed at a higher rate, proportional to the increased cost the agency incurs for providing that additional water to the customer.
- Also known as "allocated," "goal-based," or "customer-specific" water rates.

Tiered Rates

- Utility sets several rate tiers based on water usage.
- Customers are charged lower rates for water used in the lower tiers.
- Rates per tier increase as water use increases to reflect the cost incurred by the agency to provide the water.
- Also known as "inclining block" or "proportion-based" rates.
- A supplementary approach during times of water scarcity is a drought demand surcharge, where a supplier issues flat fees per water meter at each stage of a drought, regardless of the rate tier.

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[61] CAPISTRANO TAXPAYERS ASSOCIATION, INC. v. CITY OF SAN JUAN CAPISTRANO, 235 Cal.App.4th 1493 (2015). law.justia.com/cases/california/court-of-appeal/2015/g048969m.html

[62] Aligica, P. D., Ostrom, E., Ostrom, V., Tiebout, C. M., & Warren, R. (2014). Elinor Ostrom and the Bloomington School of Political Economy: polycentricity in public administration and political science (Vol. 1). Lexington Books.

[63] Alliance for Water Efficiency. 2022 State Policy Scorecard for Water Efficiency and Sustainability. www.allianceforwaterefficiency.org/2022Scorecard

STRATEGIES FOR CONSERVATION RATE STRUCTURES

- Develop a utility water conservation plan to clarify water conservation goals.
- Conduct a rate assessment to determine options for rate structuring.
- Develop an equitable rate structuring plan, and conduct community education and outreach to minimize opposition to potential rate increases.
- Adopt a conservation rate structuring strategy.

GROUNDWATER HIGHLIGHTS

PROPORTIONALITY AND PRICE SIGNALS

The proportional cost provision established by Proposition 218 (1996) limits the scale of price signal an agency can send to its customers through rate structuring. For example, in some areas of the state water is acquired and conveyed relatively inexpensively, and the relative cost difference to the agency for providing one unit of water to the next, on a per-customer basis, is minuscule. The agency could still set a conservation-based rate structure, but the minimal cost difference to the customer would be unlikely to influence their water use behavior.

On the other hand, in regions where water acquisition and conveyance have high costs (such as Southern California, where much of the water supply is imported over long distances), the cost to the agency of providing that additional unit of water to the customer is significant. The agency can pass that cost on to the customer to send a price signal that is more likely to change behavior. The more money a customer can save by reducing water use, the more likely they are to do so. Greater water conservation results might be obtained by structuring rates proportional to total water usage so that users with the greatest impact have the greatest incentive to conserve.

Proposition 218 also requires that agencies put all assessments, charges, and user fees out to a vote prior to creation or increase. These must be approved by a two-thirds supermajority, which limits the agencies' ability to cover their operating costs or raise capital for reinvestment.

CASE STUDY: MOULTON NIGUEL WATER DISTRICT'S WATER-SMART RATE STRUCTURING

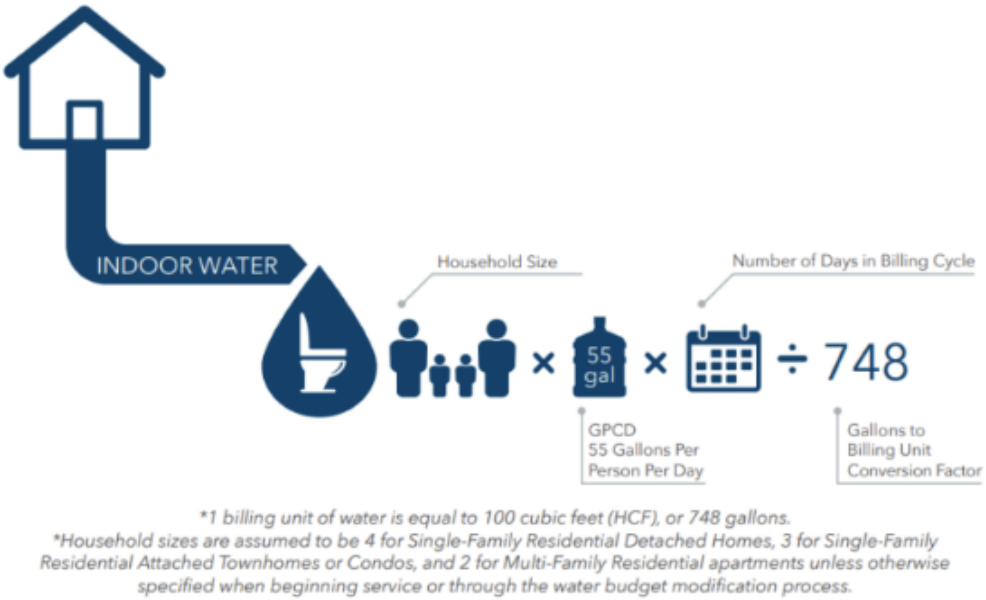

Image: Moulton Niguel Water District Residential Water Budgets.

Moulton Niguel Water District (MNWD) serves 170,000 customers in Laguna Niguel, Aliso Viejo, Mission Viejo, Laguna Hills, Dana Point, and San Juan Capistrano. In December 2017, MNWD approved new water budget-based rates. The rates are tailored for each customer and broken down into an indoor water budget and an outdoor water budget. The formula for single-family and multi-family residential customers is:

- Indoor Water Budget = Persons per household x 55 gal per person per day x days in billing cycle / 748 conversion factor (to calculate budget in HCF)
- Outdoor Water Budget = Irrigable area (sq. ft. per parcel) x Evapotranspiration x 0.7 plant factor x 0.62 / 748 conversion factor (to calculate budget in HCF).

Revenue from water rates that exceed the cost of imported water is designated to the District's Water Efficiency Fund to invest in water efficiency improvements to maintain reliability and fund new water supply projects. The fund receives the majority of its dollars from Tiers 3, 4, and 5 (charged incrementally) for residential customers.

TOOLBOX: POST-OCCUPANCY INCENTIVES AND EDUCATION PROGRAMS

Both land use planning programs and water providers can engage consumers and provide incentives and education on the benefits of using water efficiently. Using technology like advanced water meters and sub-metering helps tailor these post-occupancy interventions.

CONSERVATION REBATE PROGRAMS

Incentive programs can be a useful way to reduce current water demand for both residential and commercial water users. They can serve as a complementary way to involve current residents and post-occupancy developments in implementing water-smart building and design features. Providing rebates for homeowners and businesses to remove grass and retrofit water-smart plumbing fixtures is a well-tested tool that can generate meaningful water savings. Consider creative ways to support community participation in local conservation programs so that renters, elders, and other low-income community members can receive benefits.

APPROACHES FOR CONSERVATION REBATE PROGRAMS:

- Offer rebates to residents for installation of low-flow plumbing fixtures such as toilets and showerheads, appliances such as high-efficiency washing machines, and "smart" home water monitors to reduce indoor water use.
- Offer rebates to residents and commercial customers for "smart" irrigation controllers, xeric landscaping, and removal of turf grass to reduce outdoor water use.
- Use rebates or grants to incentivize homeowners' associations to remove turf grass and install water-efficient irrigation systems and controllers.
- Establish a rebate program for multi-family residential buildings with cooling towers to upgrade their conductivity controllers.

WATER METERING, AUDITS, AND LEAK DETECTION

Water customers—including commercial, industrial, and residential users—may not be aware that water leaks and inefficient fixtures could be unnecessarily increasing their water use. While water providers may perform their own system-wide water loss audits, they can also support and incentivize customers to do the same.

Water metering is a method of measuring water consumption. Advanced metering technology, called "smart meters," eases the data collection process and increases the specificity of the data. This increased granularity of information creates the opportunity for easily justifiable rate structures, rapid leak detection, and customized demand management programs. Utilities that pair metering and commodity rate structures report a 15% to 30% reduction in water consumption.

Recent droughts have motivated water providers to seek approval from the California Public Utilities Commission for plans for utility-wide advanced metering. In some areas where water providers have not yet designed a meter replacement initiative, municipalities can encourage consumers to

purchase their own meters to achieve water demand reductions on individual properties.

Furthermore, sub-metering multi-family, commercial, and outdoor uses can provide data granularity to empower the refinement and optimization of water policies, rates, and fees. The value of this information may be worth more than the cost of installing an extra meter.

Metering and the corresponding audits and interpretation can identify opportunities to modify water-consumptive behaviors. They can also detect leaks in the system and signal when infrastructural updates are necessary to mitigate water loss.

If residents of a property are renters, on a domestic well, or part of a small water supply system, issues of equity can arise around meter conversion, water use audits, and leak detection. Consider designing programs to include community members, like renters, who are responsible for paying the water bill but who might not have the funds or property rights to approve projects at their home.

APPROACHES FOR WATER METERING AUDITS AND LEAK DETECTION:

- Deploy leak detection equipment such as specialized meters temporarily attached to the main meter, in scenarios where low staff capacity limits on-site visits.
- Offer landscape audits that recommend watering schedules, infrastructure upgrades, and drought-tolerant plants.
- Offer audits at no cost to customers or pair it with an incentive, like a free fixture.
- Encourage participation by providing water audit results of public buildings as examples that demonstrate potential water-saving outcomes.
- Use the aggregated analysis of audit results to identify code and policy changes.
- Update your codes to allow individuals to install privately purchased metering devices on the utility meter and provide guidance on how to attach them in a way that avoids disturbance to utility operations.

TOOLBOX: CONSUMER EDUCATIONAL MESSAGING

There are many ways for planners and water providers to reach consumers with conservation messaging. Municipal and utility bills often include an educational insert about water efficiency tips, or other informational materials about water saving measures and consumer water efficiency programs like water-smart appliance rebates and lawn conversion offsets. Messaging techniques that promote a sense of control, offer social incentives, provide immediate rewards, and are framed positively are more effective in changing behavior.

APPROACHES FOR COMPELLING MESSAGING:

- Help your reader feel they have control or influence. Provide tangible acts or decisions they can make to “move the needle” toward a goal.
- People generally want to be either the same or better than their peers. Offer comparisons or share high compliance figures (e.g., “Nine out of ten residents follow these irrigation best practices to save water”).
- Near-term rewards make people feel good. This reward structure can even motivate behavior changes that relate to long-term goals or outcomes that are not immediately visible. The reward can be external or intrinsic.
- People are more likely to believe and act on positive rather than negative information. When given an opportunity to describe a trend, note progress toward goals.

CONCLUSION

The toolboxes outlined in this guidebook highlight some of the most effective strategies communities can employ to take a more holistic and sustainable approach to water management. There are opportunities for integrated water and land use actions throughout the planning process, from the visioning and planning stage through development review and in post-occupancy. All communities can apply an integrated water and land use intervention, maybe implementing additional strategies in their existing portfolio. Ultimately, by linking land use to water demand, California can wisely manage its limited resources in a way that sustains the state's thriving economies, healthy environments, and vibrant communities for generations to come.

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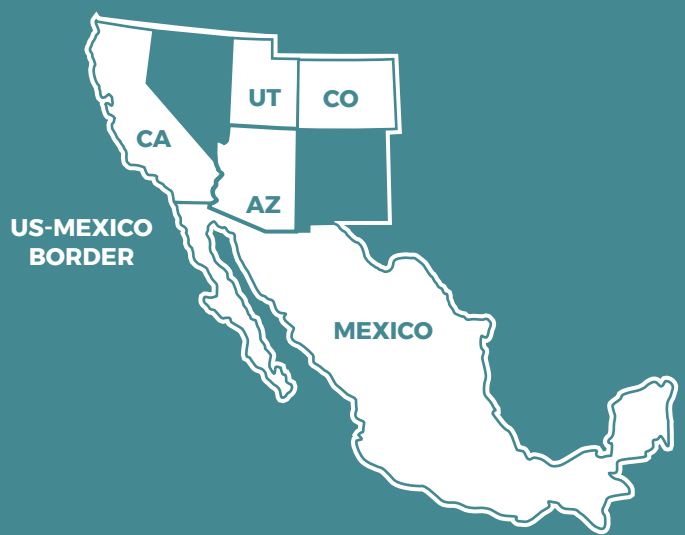

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