CALIFORNIA

GROWING WATER SMART
THE WATER-LAND USE NEXUS GUIDEBOOK

ENSURING A PROSPEROUS FUTURE AND HEALTHY WATERSHEDS THROUGH INTEGRATED WATER RESOURCES AND LAND USE PLANNING

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

SONORAN
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ABOUT GROWING WATER SMART

Growing Water Smart, a program of the Sonoran Institute and Lincoln Institute of Land Policy's Babbitt Center for Land and Water 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. California communities can learn how they can integrate land use and water planning through the California-based Growing Water Smart curriculum, authored by the Local Government Commission.

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 resilient communities living in harmony with the natural world, where flowing rivers and healthy landscapes enable all people and nature to thrive. Our work transcends borders, bringing together diverse communities to promote civil dialogue about complex conservation issues that know no boundaries. All aspects of our work are guided by inclusivity and collaboration to create positive environmental change in the western United States and northwestern Mexico.

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 communities, economies, and the environment. The Babbitt Center develops tools and best practices to guide decisions through research, training, and partnerships for management of land and water resources. We recognize that water is the lifeblood of the American West and land use decisions are made every day that shape our water future. Coordination of these land and water use decisions is critical for ensuring resilient and sustainable communities.

TABLE OF CONTENTS

SHIFTING OUR FOCUS FROM SUPPLY TO DEMAND SIDE MANAGEMENT

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, if the water supply is constrained, the cost of acquiring new sources. In the past, water resource managers and water providers have turned to supply side management to meet growing demand by investing in water acquisition, treatment, and storage and distribution projects. However, these options come with a significant price tag and can be more resource intensive.

An alternative to these costly investments is more efficient use of existing supplies. Increasingly, communities are turning to demand side management—an approach that seeks to reduce the demand for water. A demand side approach generally includes:

- **Water Conservation:** Encouraging water users to reduce how much water they use by modifying behaviors.
- **Water Efficiency:** Encouraging or requiring the use of technology, building or site designs that uses less water.
- **Water Reuse:** Treating or converting gray and black water to replace or augment water supply.

One of the more promising strategies in water demand management is integrating land use planning with water conservation and efficiency. Communities throughout the West have found that by increasing development density, utilizing technological efficiencies, and aggressive conservation programs, they have been able to continue to grow without acquiring new supplies. This threatens access to safe, clean, and affordable water, which is a considered a human right in California.[1] Water smart land use planning can reduce the negative financial impacts of increased water demand through efficiency and conservation measures implemented prior to, during, and after construction. When done well, this integration provides equitable access to resources in a manner that increases the cost to benefit ratio of capital investments by using the same amount of water and infrastructure to serve more people per dollar spent. This approach not only benefits the environment and ensures a more environmentally and financially sustainable future for all community members.

[1] Cal.ifornia Water Code §106.3

OPPORTUNITIES FOR INTEGRATING WATER AND LAND USE

The planning and regulatory mechanisms that guide how and where a community develops each provide an opportunity to strengthen the nexus between water and land use. Determining where to intervene will depend upon a community's political readiness and capacity, what water demand management initiatives have been initiated to date, and the level of aggressiveness desired in achieving water saving goals. The intervention opportunities include:

INTERVENTION POINT	MECHANISMS	PURPOSE
Planning & Policy Making	Water Plans General Plans Capital Improvement Plans	Establishes goals and objectives for managing the intersection of natural resources and the built environment.
Pre-Development	Water Adequacy Laws Water Supply Assessments Written Verifications	Links new development to water supply planning.
At Development Review	Zoning and Subdivision Regulations Annexation Policies Planned Development Policies Development Agreements	Determines what water resource management, conservation and efficiency requirements are applied to development.
At Building & Construction	Building, Plumbing and Landscaping Codes	Links new development to water supply planning.
Post-Occupancy Education	Conservation & Efficiency Incentives Outdoor Watering Restrictions Water Budgets & Auditing	Empowers and incentivizes homeowners and renters to reduce water consumption.

THE LAND USE-WATER NEXUS RESOURCE GUIDE

This resource guide 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:

SECTION 1 **Planning & Policy Making**
Summarizes the opportunities provided by integrating water and land use during planning processes.

SECTION 2 **Ensuring Adequate Water Supply for Development**
Provides a review of the State of California's requirement for new developments to have an adequate and sustainable water supply.

SECTION 3 **Water Smart Land Use Policy**
Introduces planning principles that can make a community's development pattern water smart.

SECTION 4 **Healthy & Resilient Watersheds**
Provides guidance on how to protect your water supply to support community resilience and ecological systems.

Section 5 **Conservation Rate Structuring**
Summarizes how a utility can manage water demanded of households through market-based incentives and pricing mechanisms amidst the confusing California legislation that often prevents water agencies from doing so.

Each section includes:

1. A **rationale** for why a particular approach should be considered.
2. A **case statement** that provides justification for each approach and what water saving impacts can be expected.
3. A **toolbox** of the particular policy or management actions a community can take to achieve water conservation and efficiency outcomes for this approach.

The **Resource Appendix** includes a resource list of additional guides, case studies and sample policies.

SECTION 1:

PLANNING & POLICY MAKING

The sustainability of a community is dependent upon the availability of water; consideration of future water needs is imperative to decision making.

CASE STATEMENT

The State of California provides limited guidance for drafting policy that links land use and water in required planning documents. Yet general planning, water planning, and capital improvement planning are all interrelated. This is particularly true in regard to California's natural drought-fire-flood cycle, which is intensifying due to climate change. To integrate planning processes, the institutionalized isolation between departments and agencies traditionally responsible for planning and operations 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 tend to focus on ensuring adequate water supply to meet demand. Integrating water resource and land use management can ensure that:

- A community's vision for the future considers water and growth together;
- Urban water management plans and capital improvement plans are consistent with the vision for future land use, as well as the community's sustainability and resilience goals;
- Development occurs in a way that protects the watershed (e.g., ecological functions, water quality and water supply); and
- Groundwater is sustainably managed in accordance with land use changes.

TOOLBOX: VISIONING AND PLANNING

1. VISIONING

Some communities incorporate a robust visioning process into their general plans or water resource management plans. A visioning process identifies how a community can intervene to most positively influence the development of their community in response to change. Some of these visioning exercises take the form of clarifying community values and choosing from a series of desirable future scenarios.

The normative approach to long range planning aims to create a clear vision for the future, most frequently through visualization tools that illustrate alternative futures. These models assist in decision making by assessing the impact of different development patterns on a set of indicators such as water demand, air quality, and vehicle trips.

The exploratory approach evaluates how a community may need to adapt and manage different outcomes for a variety of scenarios. This approach is most effective when used to consider and strategize responses to uncertainties. The use of exploratory scenarios is being applied across the West, in water departments striving to be more proactive in addressing water, growth, and climate change impacts.

2. GENERAL PLANNING

General plans guide how a community will manage future land use, and the implications of that land use on a wide variety of functions, including: transportation networks, parks and open space, natural resources, housing, economic development, and future infrastructure needs. General planning provides one of the few opportunities for a community-wide dialogue about the future.

By state statute, every municipality or county in California is required to create a general or master plan.[2] The State's general planning requirements for municipalities and counties allow for, but do not require, a water element.[3] SB 1000 requires General Plans of regions that include disadvantaged communities to include an environmental justice element, which may refer to water-related equity concerns.[4] Integrating all water-related goals into one plan or plan element ensures the complex interrelationships between water systems, human systems, and ecological processes are considered together-—and done so in an equitable manner.

General plans provide an excellent educational opportunity 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, distribution systems, and water related infrastructure;
- Adequacy, sustainability, and vulnerability of the water supplies;
- Health conditions of the watershed;
- Current programs and projects; and
- The inevitable tradeoffs faced in order to achieve the community's goals.

A general plan can help a community identify opportunities to integrate water by including goals for:

- Water supply and demand management;
- Wastewater treatment and disposal;
- Watershed processes and health;
- Floodplain and stormwater management; and
- Interagency coordination and collaboration.

Several options exist for incorporating water management and planning into the general planning process, as well as the plan itself. The Office of Planning and Research's (OPR) General Plan Guidelines of 2017 provide further recommendations for addressing land and water reclamation, pollution control and prevention, watershed protection, groundwater recharge, and stormwater management.[5] Additional guides on integrating water into planning documents from Western Resource Advocates and the Babbitt Center for Land and Water Policy are provided in the Appendix.

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

INTEGRATING WATER INTO YOUR GENERAL PLAN		
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 in regard to existing water infrastructure and environmentally sensitive areas.
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).	Should be as detailed and descriptive as possible to best inform the land use element.
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 is required. It should include thorough analyses of projected water supply and demand, in order to comprehensively plan for the community’s future.
Open Space	Builds detailed policies that connect to the land use element.	OPR 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, etc.) and emergency management planning.	Could be tied to the other elements in relation to water.
Housing	Required to be updated every 5 years 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.	Adopt 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.
Water	While optional, a water element (or water sections in all other relevant elements) can strengthen integrated water resource management and drought preparedness.	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, we strongly encourage local governments 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 the very least, local governments should do one or the other.

3. 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.

4. ADDITIONAL PLANS

California has myriad voluntary and mandated plans that can—and should—be leveraged to connect water and land use planning:

PLANNING DOCUMENTS			
PLAN	**PURPOSE**	**SCALE**	**LEAD ENTITY**
REGIONAL			
Agricultural Water Management Plan	Evaluates water use and efficiency measures. Required if serving more than 25,000 irrigated acres.	Individually or regionally	Agricultural Water Suppliers
Regional Transportation Plan / Sustainable Community Strategy	Long-term blueprints of a region’s transportation system, which aligns transportation, housing, and land use decisions to achieve greenhouse gas emission reduction targets. Required by state and federal legislation.	Regional	Regional Metropolitan Planning Organizations
Integrated Regional Water Management Plan	Comprehensive planning document to encourage development of voluntary regional strategies for management of water resources. This is a voluntary, non-regulatory document.	Integrated Regional Water Management Planning Region	Integrated Regional Water Management Group

PLANNING DOCUMENTS, CONTINUED			
PLAN	**PURPOSE**	**SCALE**	**LEAD ENTITY**
LOCAL			
Floodplain Management Plan	Designed to reduce the impacts of future flood events in a project area, including but not limited to addressing those measures to be undertaken by the local sponsor to preserve the level of flood protection provided by the project.	Local	City or County
Community Plan	Used to plan the future of a particular area at a finer level of detail within the general plan; provides policy direction for areas of city or county; supplements the general plan.	Community area, as defined by the plan	City or County
Specific Plan	Connects the general plan and zoning regulation. Separately adopted from the general plan. Must be consistent with the general plan. May be required by the legislative body of the general plan.	Community area, as defined by the plan	City or County
Local Hazard Mitigation Plan	Provides community's long-term strategy to reduce disaster losses. Required for funding from Federal Emergency Management Act	Local	City or County
Climate Action & Adaptation Plan	Outlines the specific activities that a city or agency will undertake to reduce greenhouse gas emissions and adapt to a changing climate. Although they are voluntary, they are one way to satisfy the State's California Environmental Quality Act requirements for general plan updates.	Local	City or County
Regional Housing Needs Assessment	The California Department of Housing and Community Development quantifies the need for housing within each jurisdiction during specified planning periods. It is mandated by State Housing Law that the RHNA is included in the general plan housing element, which is required to be updated every 5 years.	Local	City or County
Urban Water Management Plan	Assesses the reliability of water sources over a 20-year horizon and describes demand management measures and water shortage contingency plans. Required if the urban water supplier provides over 3,000 acre-feet of water annually or serves more than 3,000 urban connections. See Section 2 for more detail.	Water supply jurisdiction (size varies)	Urban Water Supplier

STRATEGIES FOR PLANNING & POLICY MAKING

- Link water supply and demand to projected land use patterns, not just growth projections, in both general plans and water plans.
- Use visioning processes and scenario planning to assess vulnerabilities and uncertainties impacting water resources as the future unfolds
- Add water to the relevant sections of a general plan (listed above), create an independent water element in the general plan, or add a supplemental water conservation or water master plan.
- Use the Capital Improvement Plan to ensure investments are made in physical infrastructure for water management, or projects including stormwater management, green infrastructure, growth area infrastructure, disaster mitigation, and watershed restoration.
- Monitor and evaluate plans, programs, projects, and policies to determine if the expected results are achieved and to improve future practices. (Ahwahnee Water Principles: Implementation Principle 5)

GROUNDWATER HIGHLIGHTS

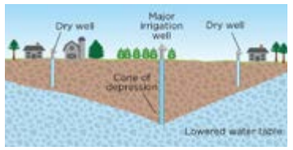
GROUNDWATER MANAGEMENT PLANS

The 2014 Sustainable Groundwater Management Act directed formation of groundwater sustainability agencies (GSAs) in high and medium priority basins (as determined by Bulletin 118). These basins are required to develop Groundwater Sustainability Plans (GSPs) to achieve their self-defined sustainability goals and avoid six state-defined "undesirable results": groundwater-level declines, land subsidence, seawater intrusion, groundwater-storage reductions, interconnected surface-water depletions, and water-quality degradation.

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 Groundwater Sustainability Agency. In response, the GSA must provide the land use agency a current version of its GSP(s) as well as other water management documents, and a report of the anticipated effect of a proposed general plan action on implementation of the GSP.

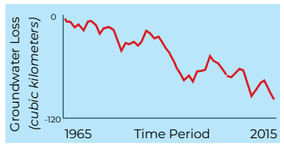
SIX UNDESIRABLE RESULTS AVOIDED WITH GSPS

Chronic lowering of groundwater



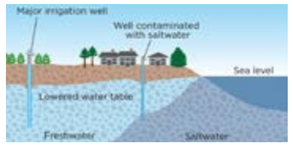
Risk of shallow wells going dry, increasing reliance on bottled water. Also negatively impacts wetlands and streams that rely on shallow groundwater.

Groundwater storage reduction



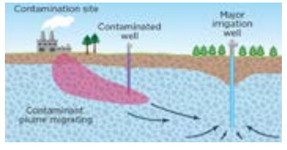
Less groundwater stored in our water "savings account" reduces our ability to be prepared for droughts and restricts future land use development.

Seawater intrusion



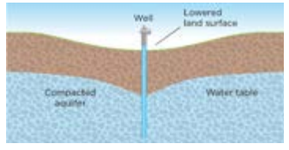
Increased salt levels from seawater intrusion impacts our drinking water, irrigation supply, and harms aquatic life.

Degraded water quality



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

Land subsidence (gradual '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 surgace waters (e.g. streams), impacting surface water users such as fisheries, marinas, and/or consumers who rely on surface water for drinking.

Union of Concerned Scientists **https://www.ucsusa.org/resources/groundwater-management-guide**

CASE STUDY

WATER SMART SUPPLY – FRESNO

Until recently, the City of Fresno has been dependent on groundwater for about 88% of its water supply. Unfortunately, the rate of groundwater recharge has been inadequate to keep up with the amount being withdrawn. Over the past 100 years, the city has lost 100 feet of water from the aquifer. The City recently struck an agreement to use Fresno Irrigation District canals to distribute water to Fresno Flood Control District 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 had ongoing projects with the neighboring city of Clovis, the Fresno Irrigation District and the Fresno Metro Flood Control District for groundwater recharge. This partnership is delivering an average of about 60,000 acre-feet of water to underground storage every year.

According to its Urban Water Management Plan, an ever-increasing volume of rain water 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. The new General Plan and development code, for the first time, limit the expansion of growth on undeveloped areas and redirects it to existing areas. This is accomplished through policies that support infill development and that establish minimum rather than maximum densities. These policies are projected to slow the urbanization of the city's sphere of influence 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 the current 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.

SECTION 2:

ENSURING ADEQUATE WATER SUPPLY FOR DEVELOPMENT

California requires new developments of a certain size to identify and get approval from their water source—however that requirement does not necessarily ensure an adequate and sustainable supply.

CASE STATEMENT

Water adequacy rules link supply side management to demand side management. States across the West have adopted state statutes intended to protect communities from the threat of not having adequate water supplies for new development, recognizing that:

- New development creates new water demand;
- Government has a role to play in ensuring sustainable and adequate water supplies for new and existing property owners;
- Growth pressure on water supplies requires stronger connection between land use approval and water planning at the State, regional, and local level; and
- Collaboration between local governments and water providers is essential to ensuring supply reliability.

California is estimated to have a housing gap of approximately 3.5 million homes through 2025.[6] Between half and three-quarters of the developable land in much of the state is zoned for single-family housing only.[7] California continues to develop in sprawl patterns, without adequate protection of open space.

[6] Woetzel, Jonathan, et al. "A tool kit to close California's housing gap: 3.5 million homes by 2025." McKinsey Global Institute (2016): 307-329.
[7] Mawhorter and Reid. Terner California Residential Land Use Survey. (2018)

As sprawling, low-density development continues to occur at the wildland urban interface, wildfire threat continues to rise with the changing climate. This type of development is difficult to provide resources to—such as fire protection and water supply—and therefore raises the question: where and how do we build in a resilient manner? Proactively evaluating development for a growing population can minimize vulnerability to wildfire through "smart growth" approaches.

TOOLBOX: WATER ADEQUACY

California requires water suppliers to speak to the vulnerability of water supplies in their Urban Water Management Plans and create a water shortage contingency plan.[8] Two pieces of legislation known as the "Show Me the Water" laws, SB 610 and SB 221 (differentiated on the next page), attempted to address water adequacy for new development. The lack of enforcement, however, has minimized the law's effectiveness.[9] Urban Water Management Plans are similarly not reviewed (by the Department of Water Resources) for completeness, thus threatening their effectiveness over their 20-year plan horizon.

The state has not been able to maintain an effective regulatory role in ensuring water adequacy. Local governments can approve developments with insufficient water supply as long as the public water system provides a plan for obtaining the additional needed supply.[10] Unlike other states with water adequacy standards, California developments less than the 500-unit threshold are exempt from these requirements.[11] Despite the legal requirement of local governments to prove adequate water supply, there is wide variation across the state in how effectively water adequacy requirements[11] are integrated into the development code. As such, Written Verifications, Water Supply Assessments, and Urban Water Management Plans do not achieve their intended purpose of ensuring a reliable water supply. Municipalities, therefore, have greater responsibility to ensure adequate and sustainable water supply for their desired (or necessary) growth.

The California Water Conservation Act of 2009 required that the state reduce urban water demand by 20% by 2020.[12] Water providers are required to report this data through Urban Water Management Plans, which also require that they assess the reliability of water sources over a 20-year planning timeframe and describe demand management measures and water shortage contingency plans. These plans must be updated every five years to support long-term resource planning and water supply sustainability. Urban Water Management Plans have become increasingly difficult to prepare, and therefore are susceptible to legal challenge.

[8] Gov't. Code § 66473.7(a)(2)
[9] Ellen Hanak, Show Me the Water Plan: Urban Water Management Plans and California's Water Supply Adequacy Laws, 4 Golden [9] Gate U. Envtl. L.J. (2010).
[10] Ibid.
[11] As of this writing, the California legislature is considering SB 971, the Drought Resilient Communities Act, which would require counties and small water suppliers in drought-prone regions to develop water shortage contingency plans.
[12] Water Code §10608.20(b)(4)

"SHOW ME THE WATER" REQUIREMENTS		
BILL NUMBER	**SB 610 (2001)**	**SB 221 (2001)**
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 public water system, as identified by the city as 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.	May be completed and approved before, as part of, or after the CEQA process.

Not every project that is subject to the requirements of SB 610 is also subject to the mandatory water verification of SB 221 (e.g., if subdivision map approval is not required). Likewise, not every project that is subject to the requirements of SB 221 must also obtain a SB 610 water supply assessment.

Best practices linking water supply to new development all contain similar elements. The following components should be included in an adequate water supply requirement:

1. **Definition of both Adequate and Sustainable Supply:** California statute does not include a clear definition of an adequate and sustainable water supply as quality, quantity, dependability, and availability. Communities should include these definitions, as well as any relevant additional description of these indicators.
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. Most communities require water demand projections at pre-development, and then securing the actual water rights post-development.
4. **Demonstrated Water Availability:** The expected availability of water supply under multiple conditions (drought and normal), water supply timeframe (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 should include pre-development requirements or incentives for developments to reduce projected water demand through efficiency and conservation practices.
7. **Uniform or Specific Area Application:** Effective development regulations apply to all new development or define 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.).
8. **Maps:** Maps of geographic locations or zones where different adequacy requirements or review processes apply. Building these in GIS can aid awareness and data management.
9. **Defined Review Processes:** 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 (before, during, or post-development), as well as who conducts the reviews (which governing body and who else is involved).
10. **Engineering Standards for Water Distribution System:** Except for individual wells, the engineering requirements for a water system connection or distribution system should be clearly articulated in development regulations, or specific guidelines should be referenced.
11. **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.[13]

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[14,15] 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 effectiveness will be.

[13] California Water Code §13560-13569
[14] California Water Code §10910
[15] Government Code §66473.7

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.[16]

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 is impossible to confidently determine that anticipated future water sources will be available," the EIR must discuss replacement or alternative sources of water. (ID at 159)

[16] Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova

CASE STUDY

WATER SMART COLLABORATION - EAST PALO ALTO

In 2016, the city of East Palo Alto issued a moratorium on development because the city couldn't guarantee that there would be enough water for new projects. East Palo Alto, which has been a historically low-income community, had only just been incorporated as a city the year before and was rapidly growing. Additionally, the city's water needs were managed by a county agency that later dissolved.

City officials began the hunt to find new water sources – which would result in new, groundbreaking partnerships. They knew that other cities in the region had more water than they needed. They hoped to find two municipalities to agree to transfer their water to East Palo Alto - something that had never been done before in the region. They eventually focused their attention on two cities: Mountain View and Palo Alto

For a one-time fee of $5 million, Mountain View transferred 1 million gallons of their water daily to East Palo Alto. Mountain View saw an advantage in selling some of their water because they had contracts with the San Francisco Public Utilities Commission that stipulate purchasing a minimum of 8.9 million gallons of water per day, and the city was only using 7 million gallons a day.

East Palo Alto city officials then struck a deal with Palo Alto to collaborate on three different projects, one of which was a water transfer agreement of half a million gallons a day from Palo Alto's own allocation of water. The other two projects were a bridge project and traffic signal synchronization. Palo Alto did not seek payment for the water transfer because the deal was part of multiple cooperative projects between the cities.

By creating these unique and co-beneficial projects with their neighbors, the city of East Palo Alto can now move forward with the sustainable growth plans envisioned in their General Plan.

SECTION 3:

WATER SMART LAND USE POLICY

As population, average temperature, and aridity increases, demands on water supply and water-related infrastructure—including water treatment plants, delivery systems, wastewater and watersheds—will also increase.

CASE STATEMENT

Water demand is a function of many factors, such as household size, income, and conservation behaviors/habits. Yet it is also a function of how we plan, design, and maintain our communities. Thinking strategically about where and how we build our communities makes a huge impact on water usage. Efficiencies can be achieved through density and development patterns, building standards, site and systems design, and especially landscaping. We know that:

- Certain building types and development patterns consume or conserve more water than others;
- Certain land use types consume more water than others;
- Newer appliances and plumbing fixtures are more water efficient than old ones;
- Certain types of landscaping plants and trees either consume or conserve more water than others; and
- Households that conserve water save money for themselves and the water provider, and save water for other people and nature.

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:

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

TOOLBOX: SMART GROWTH AND/OR 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.[17]

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.

[17] 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

The Local Government Commission's Ahwahnee Principles for Resource-Efficient Land Use and the Ahwahnee Water Principles [listed below] guide cities and counties in 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**.[18]

IMPLEMENTATION STRATEGIES & PRINCIPLES

AHWAHNEE PRINCIPLES FOR RESOURCE-EFFICIENT COMMUNITIES	AHWAHNEE WATER PRINCIPLES
The general plan should be updated to incorporate the **Ahwahnee Principles for Resource-Efficient Communities** and the **Ahwahnee Water Principles**.	Water supply agencies should be consulted early in the land use decision-making process regarding technology, demographics and growth projections.
Rather than allowing developer-initiated, piecemeal development, local governments should take charge of the planning process. General plans should designate where new growth, infill or redevelopment will be allowed to occur.	City and county officials, the watershed council, Local Agency Formation Commissions, special districts, and other stakeholders sharing watersheds should collaborate to take advantage of the benefits and synergies of water resource planning at a watershed level.
Prior to any development, a specific plan should be prepared based on the planning principles. With the adoption of specific plans, complying projects could proceed with minimal delay.	The best, multi-benefit and integrated strategies and projects should be identified and implemented before less integrated proposals, unless urgency demands otherwise.
Plans should be developed through an open process and participants in the process should be provided visual models of all planning proposals.	From start to finish, projects and programs should involve the public, build relationships, and increase the sharing of and access to information.
	Plans, programs, projects and policies should be monitored and evaluated to determine if the expected results are achieved and to improve future practices.

[18] **lgc.org/who-we-are/ahwahnee/h2o-principles/adopt/**

GROUNDWATER HIGHLIGHTS

GROUNDWATER & 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. 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.

STRATEGIES FOR PROMOTING COMPACT DEVELOPMENT

- Prioritize infrastructure investments that support existing communities, especially underserved communities, before new development.
- At pre-development design review, make rezoning, annexations, and Planned Unit Development (PUD) applications conditional on meeting water conservation standards.
- Change the zoning code to permit smaller lot sizes and higher densities by right in designated districts.
- Incentivize transit-oriented development that is integrated into the regional land use planning structure.
- Reduce or remove development standard barriers to compact development, such as parking requirements, minimum lot sizes, lot setbacks.
- Craft height limitations appropriate to the local climate and context; evidence shows water demand begins to climb once a cooling tower is needed for the building.
- Change zoning code to permit multiple types of residential development (e.g., multi-family, townhomes, apartments, accessory dwelling units, etc.) by right in designated growth areas to diversify single family homes.
- Change zoning code to permit compact, mixed-use development by right in designated growth areas.
- In exurban and rural areas, change zoning code to permit and incentivize cluster and conservation development by right.
- Manage commercial uses by making water-intensive uses (such as car washes, nurseries, etc.) 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 utility fee reductions/ waivers and density bonuses.

TOOLBOX: WATER EFFICIENT LANDSCAPING

In California, outdoor watering for urban landscapes accounts for 50 percent or more of water providers' total annual water demand. Communities on the urban fringe and in rural areas use more outdoor water, as they tend to have larger properties to water.[19] Communities working to make landscaping water-smart can integrate tools to reduce water demand from new construction or promote landscape retrofits for existing development. Best practices that can be adopted voluntarily —or integrated into development codes— include:

- Plants best suited for the local climate, irrigated by hydrozone, following Water Use Classification of Landscape Species (WUCOLS IV) guidelines.[20]
- Total landscaped area permitted (based on percentage or square footage of lot).
- Type and area of turf allowed, based on square footage or total landscaped area.
- Low flow and efficient irrigation system technology standards, including drip, bubblers, or low flow sprinklers.
- Rain sensors with a shut off device to reduce watering during natural rainfall events.
- Smart sprinkler controllers and wireless flow meters to respond to weather data and allow personal scheduling, differentiated by hydrozone.
- Evapotranspiration (ET) Sensors to adapt irrigation to changing weather and soil conditions.
- A water budget for outdoor water use, ideally tied to tiered rate structuring that sends a price signal to the rate payer.
- Soil enhancements and mulching.
- Scheduled irrigation timing to limit evapotranspiration.
- Code enforcement and fines for violations of standards.
- Training for landscape professionals on water saving landscaping, such as Qualified Water Efficient Landscaping (QWEL) Training.[21]
- Model Maintenance Standards and Agreements—for HOAs and others—to use in contracting water demand management focused landscape services.

[19] Public Policy Institute of California Water Policy Center. Water for Cities. **ppic.org/content/pubs/report/R_1016EH3R.pdf**
[20] University of California Division of Agriculture and Natural Resources. Water Use Classification of Landscape Species **https://ucanr.edu/sites/WUCOLS/**
[21] Qualified Water Efficient Landscaper. **http://www.qwel.net/**

GROUNDWATER HIGHLIGHTS

GROUNDWATER & STORMWATER INTEGRATION

Stormwater is imperative to groundwater recharge. Runoff infiltrates groundwater, thus contaminating the groundwater. However, coordinated groundwater and stormwater management is multi-beneficial. Infiltration basins can prevent stormwater flooding while also allowing for aquifer recharge. There are many considerations to take into account when using stormwater for groundwater recharge, such as: depth of water table, soil permeability, amount of stormwater, quality of stormwater and opportunities for treatment.

STRATEGIES FOR PROMOTING WATER-SAVING LANDSCAPES

POLICY AND REGULATORY STRATEGIES

- Conduct an assessment of water-saving potential by comparing annual water demands on a new property against an older property, or properties with comparable area, plantings, and irrigation methods.
- Use existing 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.[22]
- Promote and/or incentivize the use of individual household rain water harvesting for outdoor irrigation. Rainwater capture was unlawful in California without proper permits, until the 2012 passage of the Rainwater Capture Act. Now, residents can use rain barrels and underground filtration systems for their outdoor landscape water needs.[23]
- Incentivize water-intensive landscape removal, through rebates or direct install programs.
- Provide incentives for developers in the form of reduced new connection fees for use of water-efficient landscapes in their projects.
- Change your subdivision code to regulate residential, commercial, and public landscaping standards (see toolbox above):
- Maximize the use of graywater and recycled water for appropriate applications including outdoor irrigation, toilet flushing, and commercial and industrial processes.
- Purple pipe should be installed in all new construction and remodeled buildings in anticipation of the future availability of recycled water.[24]

[22] 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.
[23] Cal. Water Code §10573
[24] Ahwahnee Water Principles: Community Principle 7

NON-REGULATORY STRATEGIES

- Education campaigns targeted to property owner behavior change;
- Rebate programs for turf removal and replacement with low water use landscaping;
- Rebate programs for graywater system installation;
- Education about water efficient irrigation systems and “California friendly;” landscapes (e.g., drought tolerant and native or non-invasive plants);
- Water audits that educate property managers and evaluate water efficiency of systems;
- Low impact development (LID) practices, including green infrastructure projects that capture stormwater through rain gardens and biofiltration.

CASE STUDY

WATER EFFICIENT LANDSCAPE ORDINANCE - SANTA ROSA

The Water Efficient Landscape Ordinance (WELO) seeks to prevent water waste and excessive use, protect local water supply, and promote climate appropriate approaches to outdoor water use. The ordinance, last revised in 2015, applies to all new and rehabilitated landscapes tied to building permits.

The Santa Rosa WELO enacted a new “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 which 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 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 used this as an opportunity to further promote water saving approaches to landscapes. The partnership provided free landscape templates for homeowners to redesign their landscapes in a water-efficient and fire-wise manner.

More information about the County’s recovery efforts can be found on thier website, **https://www.sonomacountyrecovers.org**

TOOLBOX: WATER SMART PLUMBING FIXTURES AND BUILDING EFFICIENCY

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 require coordination between the State Water Resources Control Board and the Department of Water Resources to establish long-term urban water use efficiency standards (by June 30, 2022) for indoor residential use, outdoor residential use, water losses 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.[25] Governor Brown’s 2015 Executive Order (B-29-15) aimed to increase water efficiency still further by updating Title 20 Water Efficiency Standards accordingly:

Fixture	E.P.A. WaterSense products	California Title 20 Water Efficiency Standards*[26]	Federal Standards
Residential toilet	1.28 gallons / flush	1.28 gallons / flush	1.6 gallons / flush
Bathroom faucet	1.5 gallons / minute	1.2 gallons / minute	3.0 gallons / minute
Showerhead	2 gallons / minute	1.8 gallons / minute	2.5 gallons / minute

**Rates for appliances sold or offered for sale after January 1, 2016*

[25] Cal. Code. Regs Title 24, Part 11.
[26] Cal. Civ. Code §1101.1-1101.9

STRATEGIES FOR PLUMBING FIXTURES AND BUILDING EFFICIENCY STANDARDS

- Adopt building code standards that permit the use of water recycling systems.
- Adopt building code standards for sub metering of multifamily units and indoor/outdoor water use.
- Incentivize the replacement of older, less efficient toilet and faucet technologies with water wise models by providing rebates or free fixtures.
- Create incentives for developers to receive lower new service connection fees for achieving water efficiency standards beyond the building code.
- Include dual plumbing (that allows graywater from showers, sinks, and washers to be reused for landscape irrigation) in new development.[27]
- Incorporate urban water conservation technologies (such as low-flow toilets, efficient clothes washers, and more efficient industrial equipment) in all new construction and retrofitted in remodeled buildings.[28]

[27] Ahwahnee Water Principles: Community Principle 6
[28] Ahwahnee Water Principles: Community Principle 8

CASE STUDY

WATER DEMAND OFFSET PROGRAM - SANTA MONICA

The City of Santa Monica is using "Water Neutrality" to achieve their goal for 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 their 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 a 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 only has to 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.

SECTION 4:

HEALTHY & RESILIENT WATERSHEDS

Increasing development, climate change impacts, and natural hazards can all degrade watershed function, affecting both water supply and water quality.

CASE STATEMENT

In addition to managing water use, it is important to safeguard California's water supply. 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. Examples include:

- Pollution from urban and agricultural runoff and natural disasters, especially following wildfires;
- 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; and
- Inconsistency in water supply caused by periodic and intense droughts punctuated by flash flood events.

Local governments are strongly encouraged to coordinate with their Integrated Regional Water Management (IRWM) planning groups to better align priorities, projects, and planning efforts. All interested parties – from the headwaters to downstream users – should coordinate planning efforts in order to ensure adequate watershed protection. As part of this collaboration, each community's geography and socio-ecological characteristics should inform their water management actions and guide their priorities (eg. 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 California communities. Watershed planning and protection often falls to grant-funded collaborative efforts led by non-profit organizations sometimes working alongside local governments to restore ecological processes and functions.

GROUNDWATER HIGHLIGHTS

GROUNDWATER AND WATERSHEDS

Although groundwater and surface water are dissected in their management, the two sources are inherently connected within a watershed. Resource management at the watershed scale should incorporate groundwater management efforts. This can be done by incorporating Groundwater Sustainability Plans into the Integrated Regional Watershed 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.

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. Elevating these goals into concrete policies and development codes is essential to preventing watershed degradation and enhancing community resilience. Furthermore, funding forest management in your upper watershed can provide essential preventative actions to control wildfire, flooding, degradation of supplies and the disruptive impacts to human and economic health that result.

STRATEGIES FOR WATERSHED PROTECTION STANDARDS

- Map all ecologically-sensitive areas, including: wetlands, riparian areas, native habitats, infiltration zones, source water supplies, groundwater basins, and natural disaster-prone areas (including flood and fire 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.[29]
- Adopt plans for wildfire mitigation, watershed management, stormwater management, and floodplain management that designate sensitive areas and establishes goals for mitigation. These plans should speak to existing plans, so that priorities do not conflict and actions do not interfere with one another.
- Limit development in sensitive areas by clustering homes within a smaller geographic zone, incentivizing infill development in less sensitive areas, and providing low impact design 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 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 (planning and projects) to restore watershed functions through your Integrated Regional Water Management group.
- Identify the top multi-benefit and integrated strategies and projects, then implement these projects over less integrated proposals (unless crucial urgency demands otherwise). [30]
- Plans, programs, projects, and policies should be monitored and evaluated to determine if the expected results are achieved, and to improve future practices.[31]

[29] Ahwahnee Water Principles: Community Principle 2
[30] Ahwahnee Water Principles: Implementation Principle 2
[31] Ahwahnee Water Principles: Implementation Principle 3

CASE STUDY

BALLONA CREEK WETLANDS

Today, more than 95% of Southern California's wetlands have been lost due to human development – the largest loss of any region in the nation. Wetlands are important for many reasons - they are a water filtration system, a source of groundwater recharge, an air purifier, a rest stop for birds, shelter for young fish, and great source of local pride and reverence.

The Ballona Wetlands sit on land owned by the State of California, just south of Marina del Rey. They were once a 2,000-acre area overflowing with fish and waterfowl. Almost 100 years ago, Ballona Creek was transformed into a nine-mile concrete flood protection channel, which blocked the flow of saltwater, and reduced the amount of freshwater in the wetlands. Today, the topography is mostly cement, leaving only a small percentage of wetlands in this watershed. Cemented streets have led to increased runoff and pollutant infiltration, which ultimately makes its way to the Ballona Creek, and eventually to the Pacific Ocean.

After the State acquired the land, they released a study that explored a range of potential infrastructure improvement projects, new structures, and more access and activities for the public. Partnerships were formed in order to investigate the feasibility of features such as bike trails, community centers, outdoor classroom and paths.

Stakeholders have witnessed progress being made since then, such as the Milton Street Park project (a $3MM linear park) adjacent the bike trail, which has added aesthetic appeal and a much-needed rest stop for users of Ballona Creek trail. Significant bike path improvements in recent years include native landscaping, artist-designed gates, benches, drinking fountains, murals and other projects by public agencies and local non-profit organizations. Other opportunities include the integration of an educational component to the creek, i.e., using the creek as an outdoor classroom. These measures are being pursued to ensure that the younger generation better understands and appreciates what the creek has to offer to their neighborhood, but even more importantly to the region at large. For more information on the Ballona Creek Revitalization Plan, see **www. ballonarestoration.org**

Examples of Green Infrastructure

TOOLBOX: GREEN INFRASTRUCTURE AND / OR LOW IMPACT DEVELOPMENT

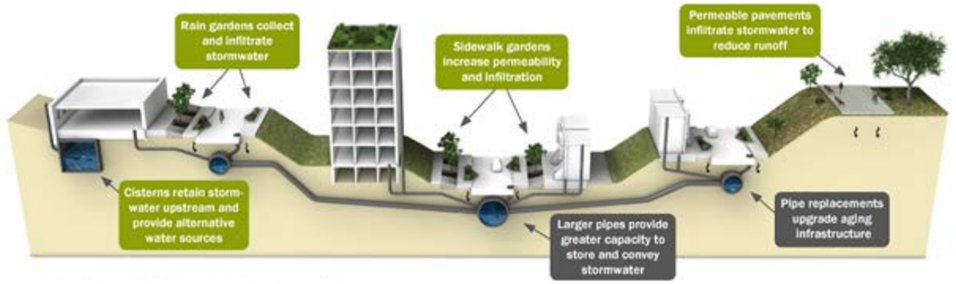
Green Infrastructure is an approach to natural resource management that emphasizes nature-based solutions. Within Green Infrastructure, a subset of practices and methods known as Low Impact Development (LID), includes approaches that can reduce pollutant loadings by managing runoff as close to its source(s) as possible.[32] These include retaining and restoring natural hydrologic patterns by using landscape and site design to keep as much rainwater as possible from leaving the site or directing it to say, a district park, instead of designing a site to funnel stormwater off site as fast as possible. LID uses natural vegetation, detention basins, and porous materials to "slow the flow" and encourage the infiltration and harvesting of stormwater.

The California State Water Resources Control Board (State Water Board), the agency which manages the state's National Pollutant Discharge Elimination System (NPDES) permit, requires municipalities to use LID techniques and emphasizes landscape-based site design features and porous pavement treatment systems for permit compliance. Each of the state's ten 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.

Some of the many benefits of green infrastructure include:

- Reducing peak flooding and treating stormwater on-site reduces pollutant loads and risk of sewer overflow.
- Reducing the need for outdoor irrigation and landscaping; native plants can revegetate channels and basins, relying solely on naturally-occurring 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.

[32] **Barrier Buster Fact Sheet #2: Terminology of Low Impact Development Distinguishing LID from other Techniques that Address Community Growth Issues.** United States Environmental Protection Agency. 2013-07-24.



COMMON LOW IMPACT DEVELOPMENT AND GREEN INFRASTRUCTURE TECHNIQUES	
APPLICATION	**DESCRIPTION**
Bioretention basins, stormwater harvesting basins and rain gardens	Small to large scale planting areas within the hardscape containing shrubs, trees and grasses.
Bioswales	Shallow and uncovered channels that induce meandering, and are placed inline within a drainage channel.
Curb extensions and chicanes	Traffic calming measures which widen the sidewalk and/or narrow the street for a short distance.
Curb openings	Drainage inlets that divert stormwater into bioretention basins.
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.

STRATEGIES FOR GREEN INFRASTRUCTURE

- Work with transportation and civil engineering professionals to update development standards and map areas of the community (especially streets) that have the highest flood potential
- When possible, use the minimum street width possible, and direct runoff from pavement and buildings to vegetation-lined channels.
- Use green infrastructure methods for traffic calming, beautification, and place making.
- Consider placing green infrastructure along areas with high speed vehicles or with bicycle and pedestrian traffic.
- Incorporate water holding areas into the landscape, such as creek beds, recessed athletic fields, ponds, cisterns, and other features.[33]
- Design all aspects of landscaping—from the selection of plants to soil preparation and installation of irrigation systems—so as to reduce water demand, retain runoff, decrease flooding, and recharge groundwater.[34]
- Preserve regional open space by clustering development, maximizing unpaved areas for stormwater retention.
- Use permeable surfaces for hardscapes whenever possible.[35]

[33] Ahwahnee Water Principles: Community Principle 3
[34] Ahwahnee Water Principles: Community Principle 4
[35] Ahwahnee Water Principles: Community Principle 5

CASE STUDY

INFILTRATION PARKING LOT RETROFIT AT SAN DIEGO'S KELLOGG PARK

The Kellogg Park Green Lot project, located in the La Jolla Shores community of San Diego, was designed to remove 18,000 square feet of asphalt concrete – replacing it with permeable pavement that will allow the city to absorb large amounts of surface water. They also included elements that allowed them to 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 also added to further capture and infiltrate runoff.

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

SECTION 5:

WATER CONSERVATION RATE STRUCTURING

Utility pricing, or rate structuring, can incentivize consumers to use less water and maximize conservation.

CASE STATEMENT

Water demand for a property can vary greatly due to size and type of property, season, weather, demographics (e.g., income and education level), and conservation habits. For individual households and businesses sensitive to the price of water, rate structuring is one of the more effective ways 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. Even though rate setting must be carefully performed for each agency, the core principle of incentivizing water conservation by charging higher prices as a customer uses more water can still be applied. Well-executed rate structuring can result in significant 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:

- Reducing daily peak usage;
- Reducing seasonal peak usage; and
- Reducing total system demand.

While rate structuring can be extremely beneficial, it must be done with equity at the forefront. More than a half-million California residents lack access to water that is reliably safe for drinking, and yet 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 keeping up with regulations for both legacy and emerging contaminants.[36]

[36] waterboards.ca.gov/publications_forms/publications/factsheets/docs/faq_safe_drinking_water_program_overview_factsheet.pdf

The new Safe and Affordable Funding for Equity and Resilience (SAFER) program implemented through recent passage of SB 200 (2019) established the Safe and Affordable Drinking Water Fund. The fund will provide tools and funding to help provide 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 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.

TOOLBOX: CONSERVATION RATE STRUCTURING

Water agencies set rates to collect the revenue they need to operate the water utility, invest in their 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.

[37] 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.

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 miniscule. 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, regions in which water acquisition and conveyance is highly costly (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 could save by reducing water use, the more likely they are to do so.

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. to coordinate grants, leverage funding, and implement multipurpose projects.

The San Juan Capistrano decision of 2015 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 range of conservation-based pricing to respond to drought conditions. Even though the ruling indicates that the San Juan Capistrano case "does not foreclose the use of conservation-oriented rate structures," many water agencies have been scared off from tiered rate structures for fear of legal challenges from their rate payers. Private water suppliers (such as mutual water companies) face no such restrictions. There are approximately 1,200 mutual water companies in California.[37]

Water rates are determined by two factors:

1. The fixed costs of water as 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
2. The variable cost based on the amount of water consumed by a customer. Water agencies are encouraged to set their rates so as 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 (such as property type, number of people in the household, and landscaped areas), which allocates the lowest cost 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.

CASE STUDY

WATER SMART RATE STRUCTURING MOULTON NIGUES WATER DISTRICT

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 now 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/person/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 exceeds 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. For more information on MNWD's outreach about the rate change, check out **mnwd.com/waterbudgetbasedrates**

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.

CONCLUSION

The toolboxes outlined in this workbook highlight some of the most effective strategies communities can employ to manage local water demand.

Ultimately, by linking land use to water demand, we can wisely manage our limited resources in a way that sustains California's thriving economies, healthy environments and vibrant communities for generations to come.

APPENDIX: GROWING WATER SMART RESOURCES

This section highlights some of the best research, tools, guidebooks and policies from California, other western states, federal agencies, and non-profit organizations that relate to land use and water resource management.

CLIMATE RESILIENCE

1. California's Fourth Climate Change Assessment provides information to build resilience to climate impacts, including temperature, wildfire, water, sea level rise, and governance. **Statewide Summary Report**

PLANNING & POLICY MAKING

2. Western Resource Advocates' comprehensive guidebook for local planners, **Integrating Water Efficiency Into Land Use Planning in the Interior West**
3. A manual from the Babbitt Center for Land and Water Policy describes how to include water in Colorado's local planning documents. **Incorporating Water into Comprehensive Planning: A Manual for Land Use Planners in the Colorado River Basin**
4. A **Model Water Resolution** to adopt the Ahwahnee Water Principles

ENSURING ADEQUATE WATER SUPPLY FOR DEVELOPMENT

DEVELOPMENT PATTERNS

5. This guide illustrates strategies for more efficient development patterns. **Essential Smart Growth Fixes for Urban and Suburban Zoning Codes**
6. The American Planning Association, as part of its Sustaining Places program, has developed guidance on integrating water into comprehensive plans. **Planners and Water report.**

WATER SUPPLY FOR DEVELOPMENT

7. A study of water supply adequacy requirements among states by Anne Castle. **Assured Water Supply Laws in the Western States**
8. Factsheet on the relationship between development decisions and water management in California. **Water Smart Housing Development**
9. Workbook to assist water demand projections for land use in California, including an explanation of the methodologies for projecting water demand by either dwelling unit or per acre. **Land Use/Water Supply Analysis Guidebook**
10. Reviewing the effectiveness of California's water supply adequacy laws, by Ellen Hanak. **Show me the Water Plan**
11. Reviewing water neutral development programs, by Jennifer Harder. **Demand Offsets: Water Neutral Development in California**

WATER SMART LAND USE POLICY

LANDSCAPING

12. A database of California native plant species including assessments of irrigation water needs for over 3,500 taxa. **Water Use Classification of Landscape Series**
13. A collection of landscaping resources by region. **Green Gardens Group Landscape Guidelines**

WATER AND LAND USE INTEGRATION

14. This report identifies strategies for community foundations and other local leaders to leverage the multiple benefits of an integrated, collaborative planning approach. **Bringing Water and Land Use Together**
15. A literature review and case study compilation by Net Blue. **Water Offset Policies for Water-Neutral Community Growth**

HEALTHY & RESILIENT WATERSHEDS

16. Recommendations for a **California Watershed Approach to Landscape Design**
17. A factsheet on strategies to address **Urban Stormwater Management**
18. This report describes 75 smart growth policies, a majority oriented to the watershed. **Protecting Water Resources with Smart Growth**

CONSERVATION RATE STRUCTURING

19. Association of California Water Agencies, 2007, **Proposition 218 Local Agency Guidelines for Compliance**
20. White paper addressing California water rate challenges and recommendations. **An Overview of the "New Normal" and Water Rate Basics**
21. Alliance for Water Efficiency **Financing Sustainable Water**

GENERAL WATER RESOURCES

- **Alliance for Water Efficiency**
- **American Water Works Association**
- **EPA Water Sense**
- **US Water Alliance – One Water Initiative**
- **Integrated Water Management**

Be Resilient.

ResilientWest.org

Growing Water Smart Workshops are helping leaders build capacity and implement action plans to steward their community's future by ensuring clean, reliable water for people, nature and industry.

Through a new partnership between the Sonoran Institute, Babbitt Center for Land and Water Policy, and Local Government Commission, we are able to deliver this program in California.

To sponsor a workshop in a community you care about, contact Sonoran Institute.

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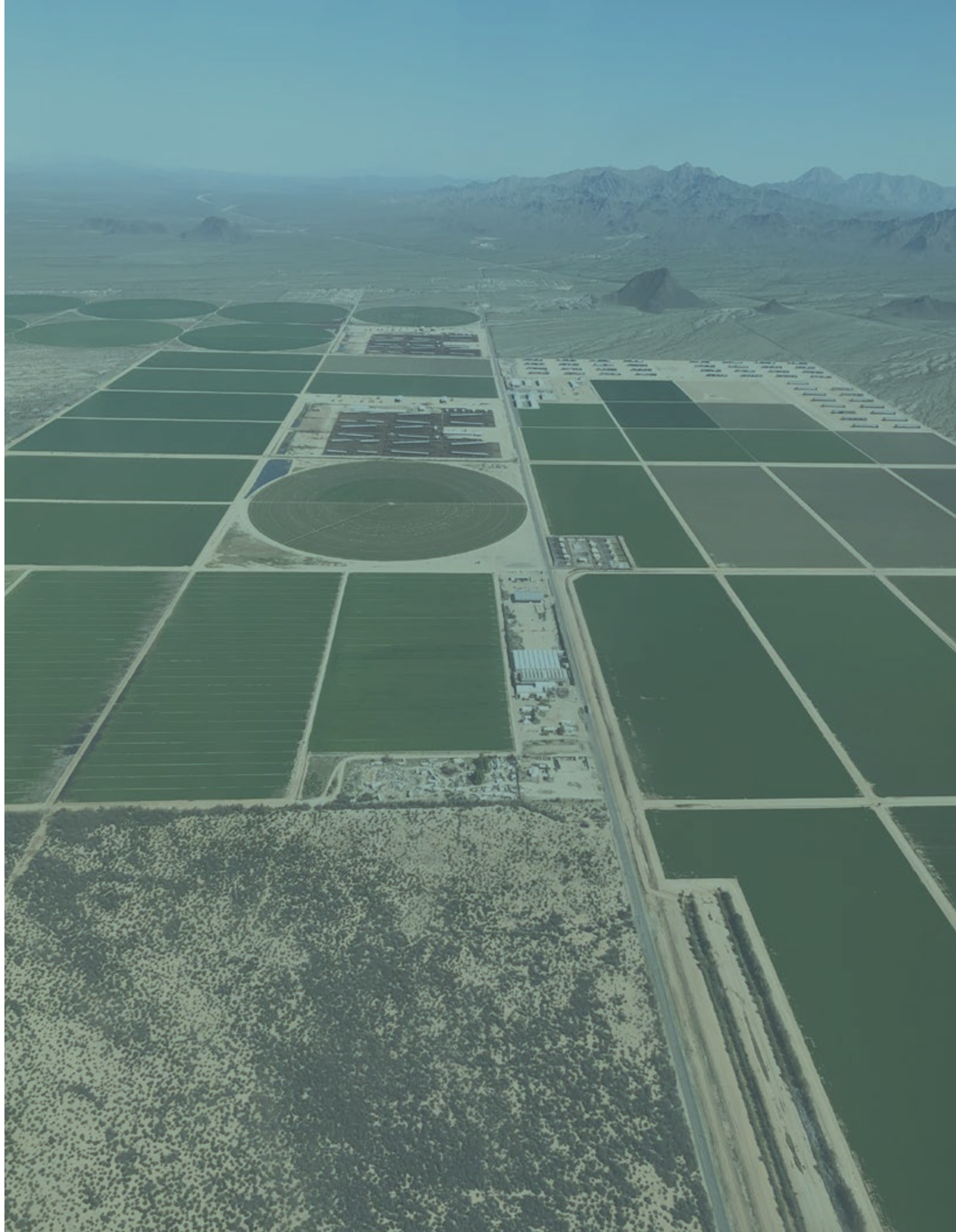

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