Stakeholder Participation in Groundwater Sustainability Planning:

Enhancing Effectiveness Through Technical Assistance

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Union of Concerned Scientists

Groundwater Resources Association of California Conference 2017


Science
and
for a
healthy planet
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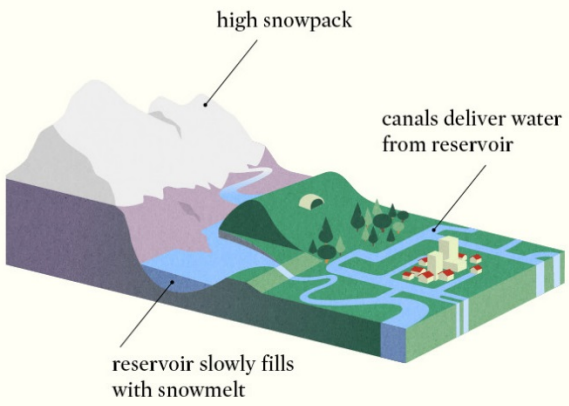
Climate Change Impacts on California Water Supply

Union of Concerned Scientists

Winter

HISTORICAL



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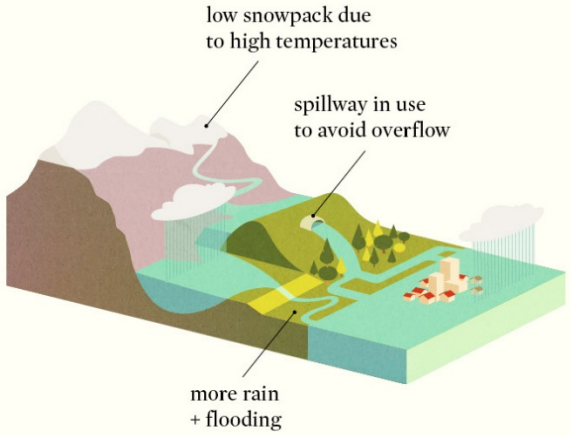
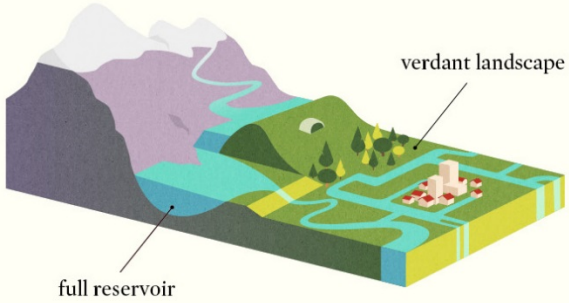


Summer

HISTORICAL



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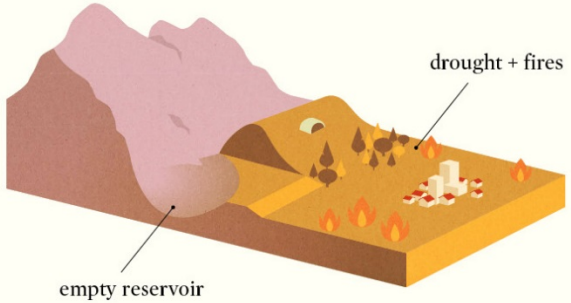
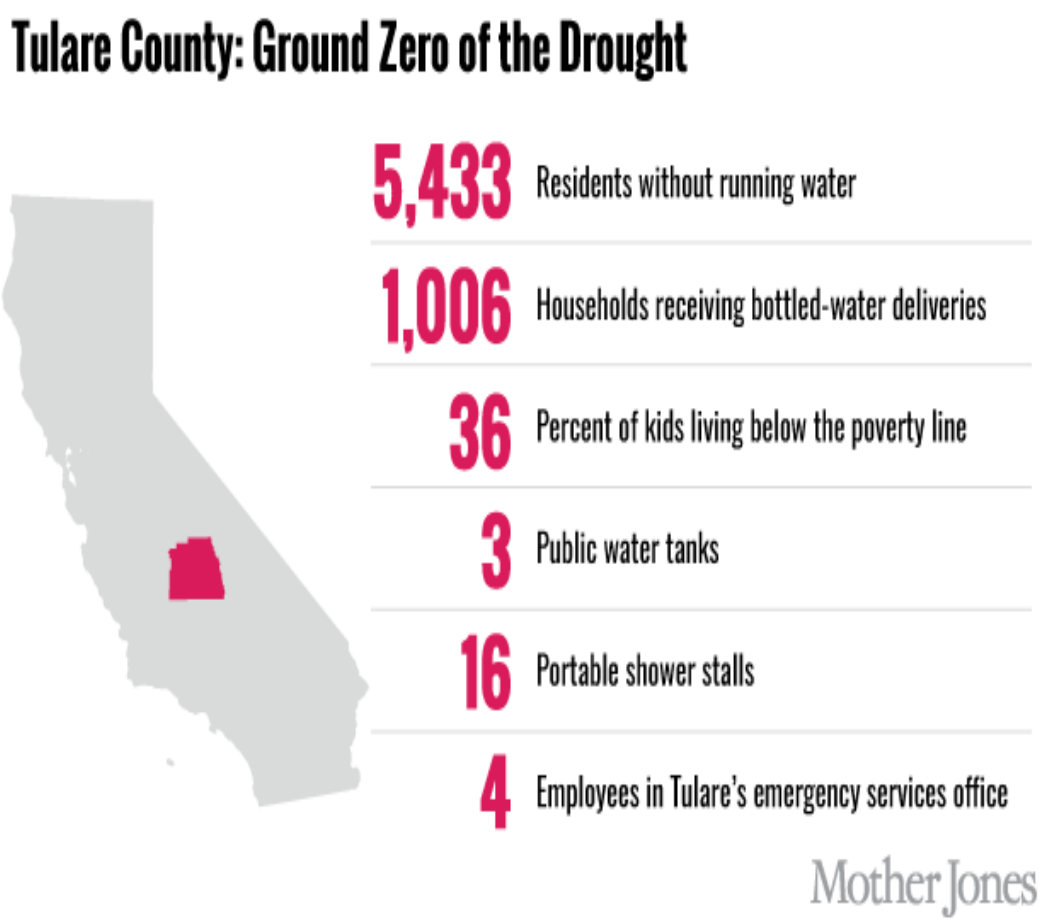


Drought Response Snapshot:

CA spent $148 million in Tulare County alone (for both the emergency response and implementing long-term solutions)

2015 Emergency Response Snapshot:



Stakeholder Engagement

Summary of Statutory Requirements for Stakeholder Engagement in SGMA

During GSA Formation:

- ✓ "Before electing to be a groundwater sustainability agency... the local agency or agencies shall hold a public hearing" (CA Water Code Sec. 10723 (b)).
- ✓ "A list of interested parties [shall be] developed [along with] an explanation of how their interests will be considered" (CA Water Code Sec. 10723.8.(a)(4)).

During GSP Development and Implementation:

- ✓ "A groundwater sustainability agency may adopt or amend a groundwater sustainability plan after a public hearing" (CA Water Code Sec. 10728.4).
- ✓ "Prior to imposing or increasing a fee, a groundwater sustainability agency shall hold at least one public meeting" (CA Water Code Sec. 10730(b)(1)).
- ✓ "The groundwater sustainability agency shall establish and maintain a list of persons interested in receiving notices regarding plan preparation, meeting announcements, and availability of draft plans, maps, and other relevant documents" (CA Water Code Sec. 10723.4).
- ✓ "Any federally recognized Indian Tribe... may voluntarily agree to participate in the preparation or administration of a groundwater sustainability plan or groundwater management plan... A participating Tribe shall be eligible to participate fully in planning, financing, and management under this part" (CA Water Code Sec. 10720.3(c)).
- ✓ "The groundwater sustainability agency shall make available to the public and the department a written statement describing the manner in which interested parties may participate in the development and implementation of the groundwater sustainability plan" (CA Water Code Sec. 10727.8(a)).

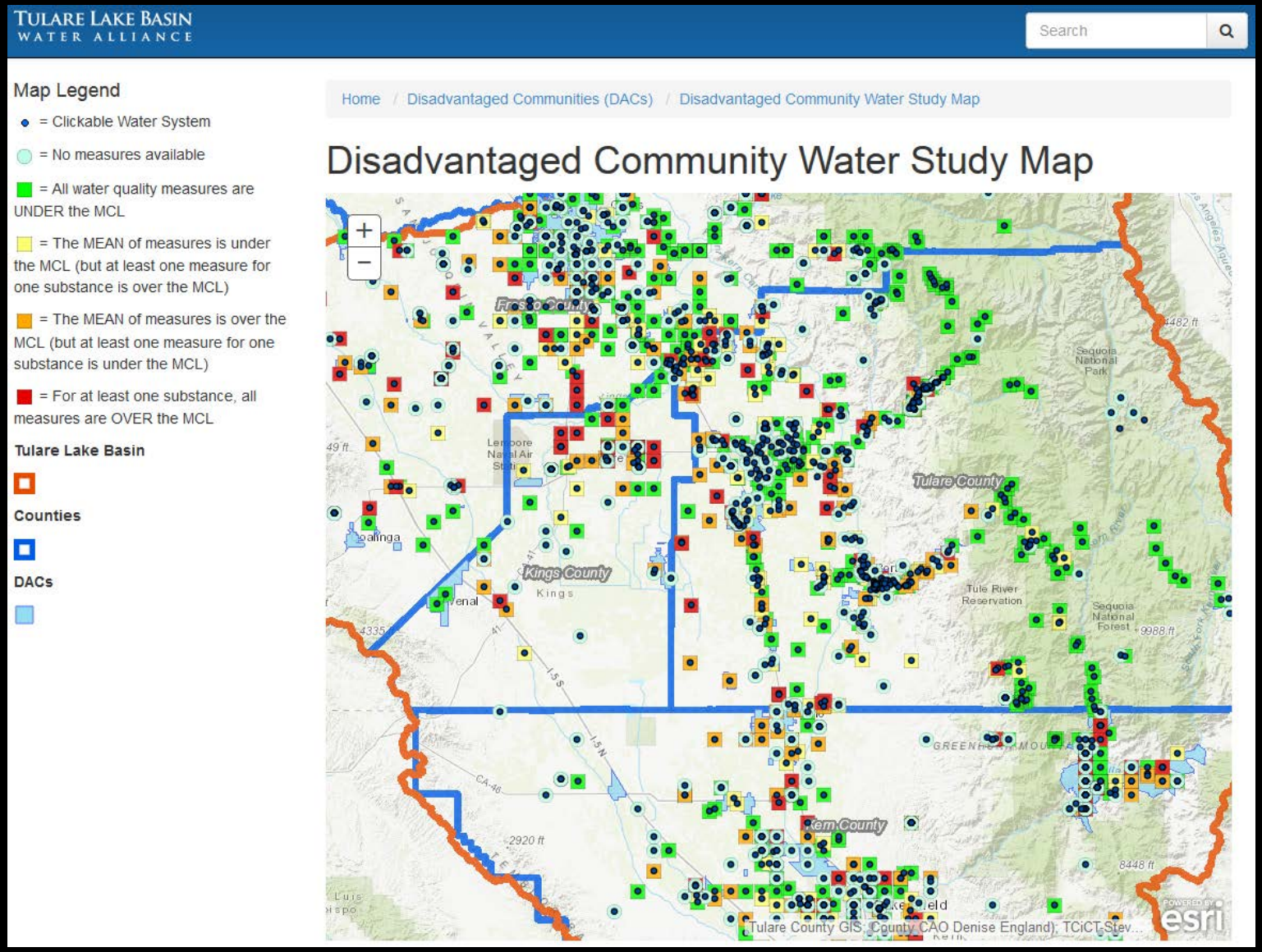
Throughout SGMA Implementation:

- ✓ "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater" (CA Water Code Sec. 10723.2).
- ✓ "The groundwater sustainability agency shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the groundwater basin" (CA Water Code Sec. 10727.8(a)).

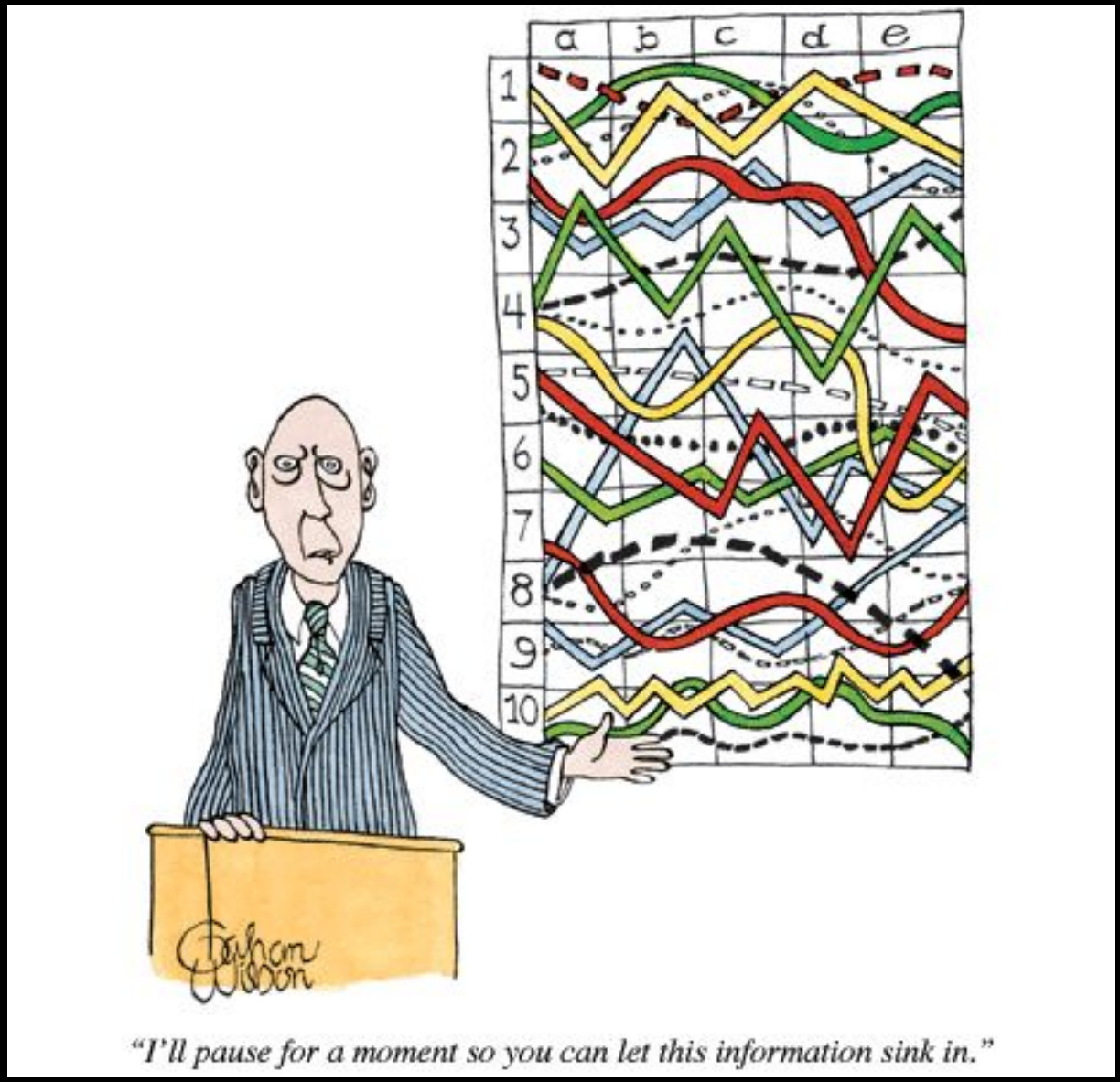
It can be challenging…

"Our main goal is to please our stakeholders... except when their processes are complex... or when they have too many requirements... or when they are hard to deal with."

…but you can't argue with results



Another challenge: technical material



"I'll pause for a moment so you can let this information sink in."

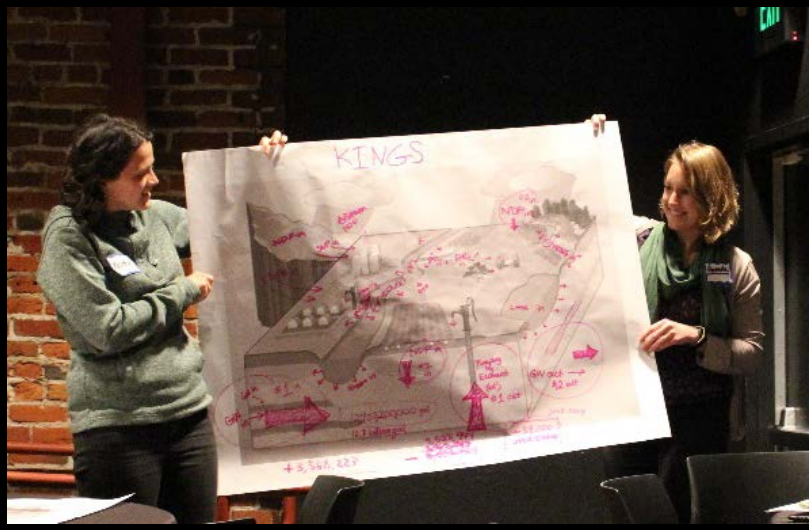
Technical Assistance Partnership

1. In-person workshops

2. Technical assistance tool

3. Toolkit

1. Workshops


KINGS


Climate Change: Fundamental Change
to CA Water System

2. Technical Assistance Tool

3. Toolkit

Getting Involved in Groundwater

A Guide to California's Groundwater Sustainability Plans

Union of Concerned Scientists

Participe en el manejo de su cuenca

Guía para entender los planes de sustentabilidad de aguas subterráneas de California

Union of Concerned Scientists

Toolkit

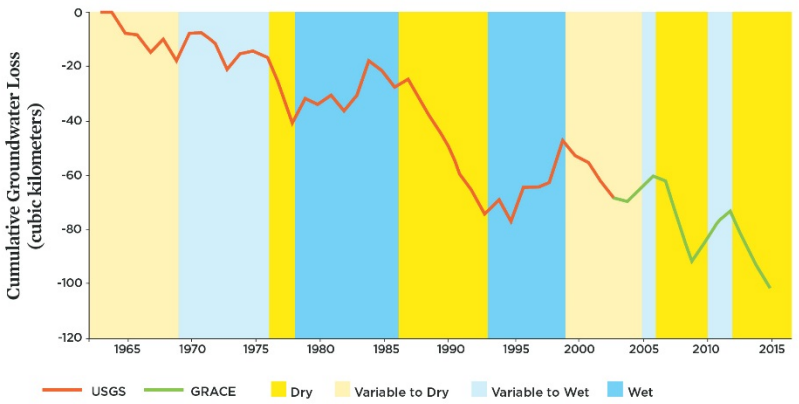
Understanding the Groundwater Conditions in Your Basin

Understanding the current groundwater conditions in your basin will help you to collaborate to create the best sustainability plan. In California, there are currently 515 groundwater basins or subbasins. While some basins' boundaries follow city or county lines, most boundaries are based on the hydrogeology of the area. A groundwater basin is typically bound on all sides by features that affect the water's flow, such as impermeable rock, a seismic fault, or the ocean.

Undesirable Results

California's groundwater basins are vulnerable to six types of undesirable results (explained in Figures 1–6), which the sustainability plan aims to avoid. You will want to know whether your basin is currently experiencing any of these undesirable results or if it's likely that it could in the future.

FIGURE 1. Significant and Unreasonable Reduction of Groundwater Storage

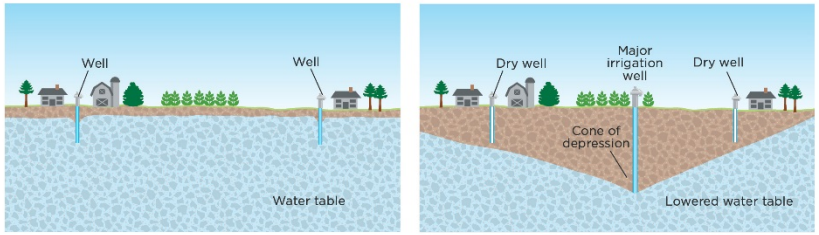


*During the drought from 2012 to 2016, California got 60 percent of its water supply from groundwater. However, this drought only compounded an old problem: consistent **overdraft** of groundwater—when more is taken out than is replaced—has been occurring in California's Central Valley over the last 50 years. Drawing down our groundwater storage puts natural areas and communities at great risk. During the drought, many residents' wells dried up. Reduction of groundwater could mean that there may not be enough groundwater during dry times to meet our needs, or it may become more difficult to access.*

Note: The red line shows data from groundwater model simulations calibrated by the US Geological Survey (USGS) from 1962 to 2003. The green line shows Gravity Recovery and Climate Experiment (GRACE) satellite-based estimates of groundwater storage losses. Background colors represent different water years.

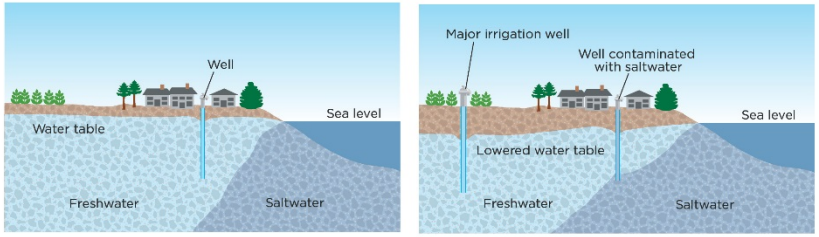
SOURCE: ADAPTED FROM FAMIGLIETTI ET AL. 2014.

FIGURE 2. Significant and Unreasonable Lowering of Groundwater Levels



*Regardless of your basin's total volume, the level—its distance from the surface—matters, too. Groundwater is often available to those with the deepest well. With deeper and deeper wells going in, shallower drinking water wells are drying up. While this is related, of course, to the reduction in overall quantity of water, it may also be caused or exacerbated locally by a **cone of depression** (a lowering of the water table that develops around pumped wells), shown above. If your neighbor puts in a deep well next door, that's going to have a bigger impact on your well than if someone at a distance across the basin does.*

FIGURE 3. Significant and Unreasonable Seawater Intrusion



*Freshwater is less dense than saltwater, and therefore floats on top of saltwater in an aquifer. When freshwater is pumped out of the aquifer, its weight on the saltwater is diminished, letting the saltwater rise and flow toward the source of the pumping. This can result in **saltwater intrusion** into drinking water and agricultural water supplies.*

Deep wells, such as major irrigation wells, can have adverse effects on neighboring shallower wells, causing them to run dry or become contaminated.

Toolkit

Defining Your Basin's Sustainability Goals

A sustainable groundwater basin is one operating within its **sustainable yield**—the maximum quantity of water that can be withdrawn without causing an undesirable result. Therefore, achieving sustainability means avoiding undesirable results, and each basin must define specific sustainability goals to that end.

Sustainability Is (Mostly) Subjective

As previously mentioned, there is no technical definition for sustainability. It is not simply the presence or absence of a result like land subsidence that is in itself undesirable; rather, it is the extent to which the result is undesirable. For each undesirable result, the local community will decide *how much* damage is acceptable, or conversely, *how much* repair is desired. Despite the flexibility around local sustainability goals, there are a couple of clear boundaries that limit the interpretation of sustainability. The California Water Code, first, says that one basin's definition of sustainability cannot threaten others' ability to achieve their sustainability goals (Section 10733(c)), and, second, indicates that both continued overdraft and significant depletion of interconnected surface waters are unacceptable long-term strategies (Section 10735.2(a)(5)).

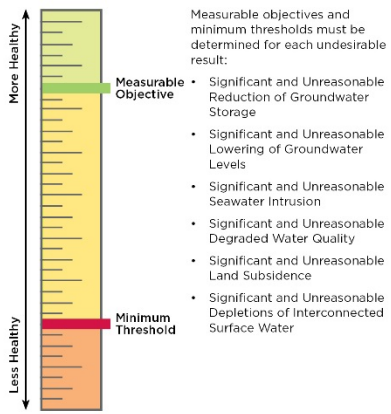
Minimum Thresholds and Measurable Objectives

While there are several components of sustainability, here we focus on the concept of **minimum thresholds**, or failure points—numeric values that basins will use to define undesirable results. Minimum thresholds may vary across time and space.

An example of a minimum threshold varying in time is a groundwater level threshold that is lower in the summer than the winter. A minimum threshold varying across space could be land subsidence that threatens major public infrastructure, but only in populated areas of the basin. In this basin, the minimum threshold for subsidence will likely be more conservative in the populated areas than unpopulated areas.

Once a GSA has set minimum thresholds, it will need quantitative measures of success. **Measurable objectives** are more forward-looking goals that may not be achieved until 2040 (2042 for lower-priority basins). Here, then, we focus on minimum thresholds and refer you to our previous publication *Measuring What Matters: Setting Measurable Objectives to Achieve Sustainable Groundwater Management* by J. Christian-Smith and K. Abhold (2015) via *www.ucsusa.org/CAgroundwatertoolkit*, if you are interested in learning more about measurable objectives, specifically.

FIGURE 7. Setting Goals for Undesirable Results



For each of the undesirable results, the GSA must establish a measurable objective, or goal, and a minimum threshold, or lowest acceptable measurement. The measurable objectives and minimum thresholds for each result are interrelated, and determining them is a complex process.

CRITICAL QUESTIONS

- **Does the minimum threshold exceed an existing federal, state, or local standard?**
  - Where there are existing standards, these standards have the force of law and cannot be weakened by SGMA. (See the online toolkit, which summarizes existing policies and case law related to each undesirable result.) In some cases, standards and regulatory processes may exist that can guide your basin's threshold-setting process.
- **Was the threshold developed through a transparent public process?**
  - SGMA has numerous procedural requirements to ensure that the public can participate in decisions. Were these requirements followed?
  - SGMA requires the active engagement of diverse stakeholders. How were their views and concerns incorporated into your basin's planning process?
- **Does the threshold violate the threshold of neighboring basins?**
  - Neighboring basins can affect each other's groundwater balances. The law states that a GSP may be found inadequate if it adversely affects a neighbor's ability to comply. Therefore, it is important to understand how your basin's management may affect neigboring basins.
- **Does the threshold allow negative impacts to continue or worsen?**
  - For example, minimum thresholds may allow lowering groundwater levels, land subsidence, and seawater intrusion to continue or even worsen. In such cases, who or what would be affected? A **vulnerability analysis**, which looks at who and what will be affected by certain threats, may be needed to answer this question.
  - Are the negative impacts reversible?
  - Is it possible to mitigate these negative impacts through an agreement with the affected communities? For example, if groundwater levels continue to drop and dry out drinking water wells, is there a plan to provide alternate water sources?
- **For any of the proposed management actions, are levels of uncertainty particularly high?**
  - Any long-term planning process inherently involves uncertainty, and it is critical that such uncertainty be acknowledged. In cases in which there are few data points, a long time lag between an action and its consequence, or little ability to forecast future conditions, it is wise to develop more conservative thresholds.
- **Does a given threshold conflict with thresholds for other undesirable results?**
  - Undesirable results interact with each other; therefore, after thresholds are chosen for each undesirable result, it will be critical to ensure that none of the thresholds have negative effects on the others. For instance, the threshold for chronic overdraft of an aquifer may allow seasonal fluctuations in groundwater levels dramatic enough to increase land subsidence during certain times of the year.
- **How will we know when we have crossed a minimum threshold?**
  - Before finalizing a threshold, make sure that the monitoring network has the necessary accuracy and speed. It needs to provide measurements with enough accuracy to alert you when you are approaching a threshold and do so without undue delay, enabling you to take appropriate management actions in time.

Toolkit

Engaging in Your Groundwater Sustainability Plan Process

The new law is important not only because it is the first statewide requirement for groundwater management, but also because it includes unprecedented requirements for stakeholder engagement in water planning. GSAs are required to encourage the active involvement of diverse social, cultural, and economic elements of the population within the groundwater basin (see the online toolkit for a list of engagement requirements).

Every GSA must develop a list of interested parties to contact regarding plan preparation, meeting announcements, and availability of draft plans, maps, and other documents. In addition, the GSA must explain how it will take into account these parties' interests and those of all beneficial uses and users of groundwater. Figure 8 includes a list of parties who should be involved according to the law.

There are several entry points into the planning process depending on your interests and concerns. Engage early and often! Here are some prime opportunities:

- **Put your name on the "interested parties" list.** Contact your GSA and be added to its list, and you will receive information about meetings and the planning process.
- **Attend public meetings.** GSAs are required to hold public meetings that offer time for community members to share their questions, perspectives, and concerns. Public meetings are one opportunity to ask the "critical questions" suggested throughout this guide. Don't be shy; your questions will help to shape the process. Make sure the answers you receive are understandable.

Courtesy of Water Forward

Getting engaged often starts with learning more about your groundwater basin, as these community members are doing. Check out the online version of this toolkit for more learning and technical assistance resources.

FIGURE 8. Whose Interests Must Be Considered in Groundwater Sustainability Planning?

Kelly M. Grow/California DWR

Interested parties include:

- General public
- Agricultural users
- Domestic well owners
- Municipal well operators
- Public water systems
- Local land-use planning agencies
- Environmental interests
- Surface water users
- The federal government
- California Native American tribes
- Disadvantaged communities

There are many groups whose interests must be considered in order to create an effective and equitable groundwater sustainability plan that qualifies for state approval. Everyone has an opportunity to engage, but at varying levels, including as board members, committee members, or audience members. Take a look around your GSA meetings and take note of how different groups are being represented.

- **Chime in during public comment periods.** Public comment periods will be opened after a GSP has been submitted to the state. Here you'll have an opportunity to describe how your critical questions were addressed (or ignored) and provide additional feedback.
- **Take part in the five-year updates.** At least every five years, GSAs must update their plans. These updates will offer many of the same opportunities for your involvement.
- **Join the groundwater sustainability agency's board.** Among many other responsibilities, GSA board members will vote whether to approve a GSP for submission to the state.
  - Even if you are not on the GSA board, you may want to engage with board members to discuss your interests and concerns.
- **Join an advisory committee.** Advisory committees, such as technical advisory committees or stakeholder outreach committees, may be consulted in the development of GSPs.

Process for Adopting a GSP

There is a three-step process for GSP approval:

1. The plan must be approved by the GSA board at a public meeting. This is required to follow an open process, which includes public meetings, comment periods, and stakeholder outreach.
2. The plan must be submitted to the California Department of Water Resources. The deadline for submitting a plan in **critically overdrafted basins** is January 31, 2020, and for medium and high-priority basins is January 31, 2022 (see Department of Water Resources Bulletin 118 via *www.ucsusa.org/CAgroundwatertoolkit* for more information about basin boundaries and characteristics), after which they will be posted online and available for public comment. The department has up to two years to evaluate each plan and the public comments in order to determine whether the plan is: 1) adequate, 2) conditionally adequate (has minor deficiencies that may be corrected within 180 days), or 3) inadequate.

Toolkit

Understanding Water Budgets and Models

Water budgets and models are tools that will help you understand your basin's groundwater conditions, set sustainability goals, implement your plan, and measure progress.

Water Budgets

The **water budget** is a critical element of a GSP. Water budgets track a variety of important pieces of information and can be used to help estimate a groundwater basin's sustainable yield, the amount of water that can be drawn out without causing an undesirable result. This section does not review any specific water budget, but will help you understand what a water budget can and cannot tell you, the degree of certainty associated with the data, and how a water budget can help you choose potential management actions.

A water budget is like a household budget. It accounts for all the water that enters and leaves your groundwater basin, by category. Your sources of income are **inflows** and your expenses are **outflows** (quantified in **acre-feet**, or the amount of water it takes to cover one acre of land one foot deep, which equals 43,560 cubic feet). Just as your household budget categories may differ from those of your friends, there are many ways to characterize the inflows and outflows in a water budget. (Check out the online toolkit for a list of commonly used water budget terms.)

Safe Yield vs. Sustainable Yield

It is important to distinguish between safe yield and sustainable yield: GSAs are tasked with determining their sustainable yield. **Safe yield** simply ensures that inflows are equal to or greater than outflows, avoiding a reduction in groundwater storage. Sustainable yield, on the other hand, is the amount of pumping you can have without causing *any* of the six undesirable results, not just a reduction in groundwater storage. To go back to our budget analogy, you could attain safe yield by not spending more than your income, but if you can't afford rent on that budget, it's not sustainable. Undesirable results are like housing, food, and clothing—they are necessary to address through your budget process to maintain quality of life. A GSA may determine that sustainable yield is less than the safe yield in order to avoid the other five undesirable results.

BOX 1.

Capabilities and Limitations of Water Budgets

A water budget is useful for understanding information about a whole basin, but undesirable results can be localized to just one part of a basin.

Water Budgets Alone CAN:	Water Budgets Alone CANNOT:
Provide information about your basin as a whole	Provide information about specific places within the basin
Determine safe yield	Determine sustainable yield
Describe the past	Project into the future
Report on overdraft	Report on undesirable results

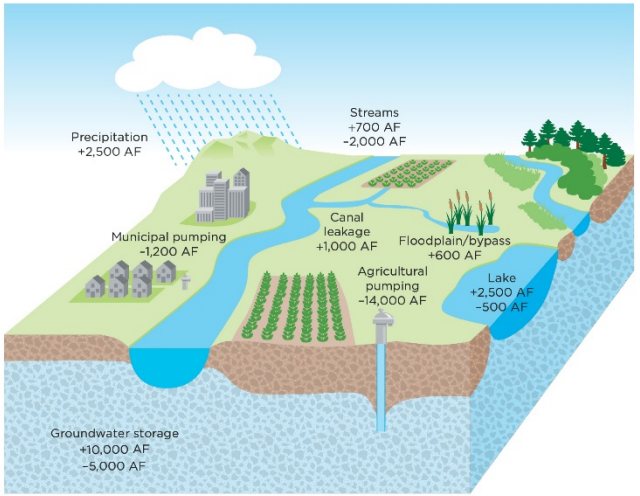
Hydrologic Models

If a water budget tells you what is happening, then a **hydrologic model** tells you where, when, and why it's happening. Because most undesirable results will require some sort of spatial analysis, most basins will use a hydrologic model, which can show three-dimensional information that is geographically specific within your basin. If you think about a groundwater basin as being broken into hundreds of smaller units, a groundwater model is essentially calculating all of the water budget components within each unit for each month of each year. A groundwater model can both look backward and project forward. It can be checked against historical data to ensure that its results roughly match past experience, and it can simulate how things may change in the future with population change, land use change, and climate change. Importantly, groundwater models allow you to test "if . . . then" scenarios to consider the impacts of different possible management actions.

If a new model is developed for a GSP, the model must consist of **public domain, open-source software**. Open-source software makes its code, or the computer calculations that it is based on, public and freely available, whereas **proprietary software** often requires costly user licenses to access. While the use of a model is not *explicitly* required by the law, the state has thus far provided no examples of an acceptable equally effective method. (See the online toolkit for more information about models' legal requirements.)

Models can play a critical role in translating your sustainability goals into your groundwater sustainability plan's minimum thresholds. Because groundwater models enable users to explore the effects of different management actions on groundwater levels in a basin, these models commonly serve as the basis for groundwater management decisions. For example, if a GSA establishes a minimum threshold for groundwater levels in the basin, a model can help convert that threshold into the amount of groundwater pumping that can be sustained or the amount of artificial **recharge** (replenishment) needed.

FIGURE 9. Conceptual Water Budget for One Month in a Hypothetical Basin



Here, a hypothetical basin's water budget for a single month is represented in a visual way, referred to as a conceptual water budget. Inflows to the aquifer are labeled with a plus sign (+) and the total volume of water, measured in acre-feet (AF). Outflows are labeled with a minus (-) sign. This basin's largest source of groundwater this month is groundwater storage, or the water that flows within the aquifer across the basin boundary (10,000 AF). The largest outflow is agricultural pumping (14,000 AF). To calculate whether a basin is overdrafting, subtract the total of all outflows from the total of all inflows. If the number is negative, the basin is in a state of overdraft. In this example, the basin's total inflows amount to 17,300 AF. The outflows total 22,700, meaning the basin has overdrafted by 5,400 AF this month.

Toolkit

Collaborating with Technical Experts

This guide does not assume that you will learn how to construct water budgets or run hydrologic models; rather, it is designed to equip you with a basic knowledge of what they are and what they can and cannot do.

In most cases, water budgets and models will be produced by technical experts used by the GSA, whether hired as members of the staff or external consultants. These experts should use sustainability goals and community values to inform the models' assumptions and parameters. In the best case, technical experts can help to create a shared understanding of basin conditions and clarify the choices and trade-offs between different management actions.

Importantly, experts should be partners in this process. While they do not drive the group's decisionmaking, they can inform it and help to clarify the consequences of different options. Experts should be asked about how they will communicate with the GSA and stakeholders to ensure that everyone understands the process and the desired results. Experts should be asked about how they will integrate social values and preferences into technical tools and what information they will consider in constructing a series of future scenarios for stakeholders and the GSA to consider. Finally, GSAs that hire external experts should consider how to ensure that the GSA retains access to and control over the data and models that are developed for its basin, as both will need to be updated continually.

Unlike these geologists in Gridley, California, you don't have to know how to inspect a monitoring well to participate in groundwater sustainability planning. Experts and the local groundwater sustainability agency should work collaboratively with the public and other stakeholders to design and implement an effective and equitable sustainability plan.

CRITICAL QUESTIONS

- **What are the pros and cons of developing internal GSA capacity versus hiring external technical experts?**
  - There will likely be differences in terms of cost, access to data and the model's code, frequency of model runs, and variety of scenarios.
  - If the GSA uses an internal expert, it will need to identify someone to oversee him or her.
- **Does the technical expert have any possible conflicts of interest?**
  - Conflicts of interest could include everything from nepotism to financial gain from a certain outcome. They should be avoided. At a minimum, engineers or consultants who are helping develop the GSP should not be involved in or allowed to bid on the planning, designing, or construction of water projects, as this would create an obvious incentive to state or embed a preference for particular outcomes.
- **How will the expert ensure meaningful stakeholder input informs sustainability goal setting?**
  - The role of a technical expert is to integrate community values into technical tools and provide information about the potential consequences of different management actions. To do either effectively, the expert must have nuanced information from stakeholders about community values and preferences.
- **How will the expert share the differing assumptions that drive different scenarios and their results?**
  - Experts should be prepared to provide a number of different future scenarios, not just one result, as this is what will help a community decide between different management options.
- **How will the expert communicate to ensure that the GSA and stakeholders have the necessary information to understand the project process and results?**
  - At a minimum, technical experts should comply with the GSA's communications plan for interacting with stakeholders. Ideally, the GSA and expert should develop a specific plan for communicating technical issues, and the expert should have the willingness and skills to discuss complex, technical information with non-experts.
- **Is the expert working with other groundwater basins, particularly neighboring groundwater basins?**
  - If working with neighboring basins, how would he or she help to ensure that all use *the same* data and assumptions?
  - If not working with neighboring basins, how would he or she ensure that both use *consistent* data and assumptions?
- **Is the expert familiar with integrated surface water-groundwater models?**
  - If yes, you may consider asking them to describe how they used them in past projects, and whether they accounted for future projections of land use, climate change, population growth, etc.
  - If no, what kind of tools would they use that would be considered equivalent to an integrated surface water-groundwater model?
  - As the state has not identified any equivalent tool to a model, you may consider asking them how they can ensure your basin will comply with the law.

continued

Resources

- Take the toolkit with you today – disperse widely
  - Sneak peak! Available online soon
  - Release event October 26th in Fresno
- Collaborating for Success (report)
  - http://bit.ly/2yeIsty
- Technical assistance tool
  - www.ucsusa.org/groundwater-technical-assistance-tool
- Curriculum for training
  - Contact Coreen about adapting for your GSA

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Phone: (510) 809-1566


Thank You
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