California
WATER COMMISSION

Governor's Executive Order N-10-19 (EO) directs the California Natural Resources Agency, California Environmental Protection Agency, and California Department of Food and Agriculture, to prepare a climate-resilient water portfolio. The order includes direction to seek input on the portfolio.

The EO lists seven principles to be embodied in the portfolio, which include prioritizing a multi-benefit approach that:

- Utilizes natural infrastructure
- Embraces new technologies
- Encourages regional approaches among water users sharing a watershed
- Incorporates successful approaches from other regions
- Integrates investments, policies, and programs across state government
- Strengthens partnerships with local, federal and tribal governments, water agencies, irrigation districts, and other stakeholders

This portfolio will guide State activities in water for the next four years.

Given its unique position as a non-regulatory body with a statutory responsibility to advise the Department of Water Resources, the California Water Commission is well suited to consider high level policy and institutional issues. The Commission has scheduled two listening sessions to develop recommendations for contributions to the portfolio.

Water Resilience Portfolio Initiative: Listening Session 2

WORKBOOK

August 27, 201

Contents

Listening Session Goals

The listening session today (August 27) is the second of two listening sessions. The first listening session, held on June 19, 2019, explored the projected impacts of climate change to the state's water systems and what a State portfolio might contain or address.

This August 27 session focuses on how to improve California's fragmented system of governance to enable more flexible water management. Among other things, the Commission is interested in considering how California could better integrate land use and water planning, and how the State can improve planning processes to efficiently produce actions to achieve climate-resiliency.

During this session, the Commission will hear from a group of selected experts in governance and planning, who will present their views and ideas in a discussion with the Commission. The Commission will also take public comment.

Listening Session

The Commission will consider California's institutional capacity to achieve a climate resilient water portfolio. The Listening Session is divided into two parts, to be followed by a facilitated discussion among the Commissioners and the invited speakers, as well as members of the audience.

Part 1-- Wisdom from the Field

Panelists:

- Sharon Farrell, Golden Gate National Parks Conservancy
- Tim Washburn, Sacramento Area Flood Control Agency
- Adriana Renteria, Community Water Center
- Lynn Rodriguez, Ventura County IRWM and the Roundtable of IRWM Regions

Panelists provide brief descriptions of the current context for water planning and project implementation.

Panel Questions

Notes

As a person working to address land and water management issues:

1. What is an example of something you have worked on that can contribute to climate resiliency?

2. What impediments have you experienced in your efforts to achieve a climate resilient result?

3. What is working now that we should continue?

4. What changes or improvements to governance and/or Institutions would allow for a more effective process?

Part 2--Discussion with Observers of California's Water Management Systems

Panelists:

- Mark Lubell, PhD, Professor, Department of Environmental Science and Policy, Director, Center for Environmental Policy and Behavior, University of California, Davis
- Mike Kiparsky, PhD, Director, Wheeler Water Institute, Center for Law, Energy & the Environment
- Felica Marcus, former Chair of the State Water Resources Control Board
- Tara Moran, PhD, Research Associate, Program Lead, Sustainable Groundwater, Stanford University Water in the West;
- Gary Bobker, The Bay Institute

Panelists respond to questions on California's water governance and the capacity of our institutions to craft and implement climate resilient solutions.

Panel Questions

Notes

Thinking about California's water governance and the capacity of our institutions to craft and implement climate resilient water management solutions:

1. How should we define water governance and institutional capacity? What does that include?

2. What are current examples of institutions and governance models that have the potential to deliver climate resilient solutions? What are the features that make this approach viable?

3. What are the tools (policies and standards expressed in statute, data, incentives (carrots), and enforcement mechanisms (sticks)) that should be in place to plan and implement integrated, climate-resilient water management with measurable outcomes and adaptability?

Commission and Group Discussion

The Commission, the panelists and invited experts will join together in a group discussion.

Invited Experts:

- Mike Dettinger, USGS (Retired), Scripps Institute, UC San Diego
- Rob Swartz, Regional Water Authority and Sacramento Groundwater Authority
- Kamyar Guivetchi, Department of Water Resources
- Debbie Franco, Governor's Office of Planning and Research
- Veronica Garibay, Leadership Conference
- Stuart Drown, Deputy Secretary for Innovation and Accountability, CalGovOps

Discussion Questions

Notes

Understanding that many of the suggestions we have heard are not new:

1. What needs to be done to help State and local officials to make hard decisions and to be more agile?

2. Is SGMA a potential governance model for developing local or regional climate resilient portfolios of actions that could be combined to produce a statewide plan? What about other models?

3. What other incentives (carrots), and enforcement mechanisms (sticks), should be included as mechanisms to achieve a climate resilient water system?

4. What could the State do to facilitate inclusion of land use into watershed or IRWM plans?

Audience Questions, Comments and Suggestions

Audience members are invited to add to the discussion.

Discussion Questions

Notes

1. What, if any, questions of clarification do you have for the previous presenters? [Questions should address topics addressed by the presenters and seek to understand more about what was said.]

2. What comments or suggestions do you have related to today's discussion topics?

3. What, if any, questions, comments or suggestions do you have related to the climate resilient water portfolio beyond the discussion topics today?

Audience members are welcome to submit additional written comments to cwc@water.ca.gov by September 6, 2019.

Background Information

In June the Commission heard three views of the components of a climate resilient water portfolio. Caitrin Chappelle from the Public Policy Institute of California (PPIC), John Cain from River Partners, and Dr. Robert Wilkinson from the U.C. Santa Barbara's Bren School of Environmental Science and Management described the expected impacts of climate change on California's hydrology, and recommended that the portfolio focus on four broad areas: improving the water planning regime, managing existing water infrastructure, changing water allocation rules, and finding adequate funding. The panel also recommended that the State should prioritize multi-benefit approaches to manage flood risk and restoring ecosystem functions. A recap of all the speaker presentations begins on Page 10.

PostScript

Shortly after the June 19 listening session, Professor Jay Lund, U.C. Davis Center for Watershed Sciences, posted a thought-provoking piece on his California WaterBlog, entitled "Sustaining integrated portfolios for managing water in California."[1] In it, he considers how California might better employ water management portfolio approaches, and what the State's functions should be. These include:

- Supporting local and regional fund-raising to pay for water infrastructure;
- Creating a common water accounting, science, and technical support across state agencies;
- Bringing the State's interests in sustaining ecosystems and public health into local and regional water management portfolios; and
- Integrating portfolios across regions and agencies.

Professor Lund included a "modest proposal" for improving the state's current planning and regulatory framework, which he describes as creating "a brutal, expensive, and impossibly slow incrementalism that impedes effective portfolio development and implementation."

Problems with California's water governance and planning structure have been noted before. In its 2010 report, "Managing for Change: Modernizing California's Water Governance," the Little Hoover Commission described reforms adopted in 2009 that were intended to improve the Delta's environmental health, while improving water supply reliability for water users that rely on the Delta. The Commission stated that California's "conflicted water governance structure will impede

[1] https://californiawaterblog.com/2019/06/23/sustaining-integrated-portfolios-for-managing-water-in-california/ (Referenced August 8, 2019)

progress in achieving these policy goals… Key functions in the state level are not aligned in a way that will allow California to adequately manage and plan for the future, or the full potential of these water reforms." (Note that this was written before the State adopted urgent mandates to recharge aquifers, manage groundwater, and address the effects of climate change in water planning.)

In its transmittal letter to Governor Schwarzenegger and legislative leaders, the Little Hoover Commission wrote:

> California is living with a water governance structure created in a different time for a different purpose. The water governance system in place for the last 40 years gives priority to agricultural and urban users, even as new laws and court actions in the decades since have required allocating more water to the environment and to endangered species, a reallocation that the current system is not capable of handling. California needs a new water governance model that recognizes this reallocation and manages existing supplies and plans for future needs in ways that anticipate a growing population, support a thriving economy and accommodate a healthy environment. [2]

The Little Hoover Commission suggested several reforms around governance, including reorganizing the Department of Water Resources and the State Water Board to create a structure that has planning and management as its core mission. Although none of the proposed reforms were implemented, the report describes the sources of uncertainty and alignment that contribute to "brutal incrementalism."

Managing for Change: Modernizing California's Water Governance

Little Hoover Commission, 2010

The case for a new Department of Water Resources was made by an Assembly committee in early 1956, which found that California's water, flood control, water planning and control of major upcoming water delivery projects warranted better administration and organization.

"The State's present water administration, which, by its very nature, is characterized by overlapping authority, confused lines of responsibility, fragmented functions, and uncoordinated policies, is incapable of carrying out a program of this kind effectively and efficiently," the committee wrote. "Our present lack of organization creates confusion in a situation that demands unity. It encourages buck-passing instead of fixing responsibility. It delays the development of new water supplies while the demands for water multiply as a result of population increases and an expanding economy. Finally, it fails to provide the kind of framework that is required if the State is to secure the benefits of unified, integrated, and responsible administration of its water resources.

California must act now if serious water shortages are to be avoided in the future. More than 50 years later, many of the concerns the committee identified remain.

Source: Assembly Interim Committee on Government Organization. February 8, 1956. "A Department of Water Resources for California.

[2] Cover letter to the Little Hoover Commission's report, "Managing for Change: Modernizing California's Water Governance

In response to California's planning and regulatory scheme, water managers, land stewards, and community stakeholders work collaboratively. Through watershed management plans, integrated regional water management (IRWM) plans, and sustainable groundwater plans, stakeholders are tackling a myriad of water and land use problems. Collaborative approaches are necessary to solve the multiplicity of stacked problems, all which stem from the State's complex and fragmented approach to water administration, which calls for:

- multiple state mandated plans for agriculture and urban water management, as well as water-use-efficiency (conservation) plans;
- that must be agreed to by multiple jurisdictions within watersheds or other regions; and
- that must meet multiple state and federal agency requirements to protect water quality and threatened and endangered species.

There is no shortage of examples of beneficial projects running into obstacles of our own making. Planning and obtaining regulatory approvals can take decades. (The selected readings, beginning on page 13, include several articles that document these issues and possible solutions.)

Clearly, this "brutal incrementalism" is not ideal for responding to the urgent challenges of our changing climate. The question is what institutional changes should California make to govern more effectively, to make hard decisions, and to achieve a climate-resilient water management system?

Recap of June 19, 2019 Listening Session Presentations

Climate Change and the Water Resilience Portfolio

Presented by Caitrin Chappelle, Associate Director at the PPIC Water Policy Center

Water management is at the forefront of climate change adaptation in California. This presentation described five anticipated impacts of climate change to our water systems:

- Warming temperatures;
- Shrinking snowpack;
- Shorter wet seasons;
- More volatile precipitation; and
- Rising sea levels.

Rising temperatures increase evaporative loss and soil moisture deficits, raise the demand for urban and agricultural irrigation, reduce surface water quality, and require more cold water for instream flows. A shrinking snowpack impacts the amount of and timing of runoff, which in turn affects the total water budget, water quality, and reservoir temperatures. A shorter wet season leads to increased demand for early and late season irrigation and increased demand for wetlands and the ecosystem. It also reduces spring inflow to reservoirs and reduces opportunities for managed aquifer recharge. As precipitation patterns become more volatile there will be increased pressure to expand flood reserves and maintain carryover storage, as well as an uncertainty about flood recharge opportunities and aquifer storage and pumping. With accelerated sea level rise comes increased salinity in coastal aquifers and a threat to water quality and levee stability in the Delta. By taking the necessary actions to prepare for a changing climate, California will also improve current water management. Actions needed to increase our resiliency to climate pressures include:

- Improve planning for drought and floods;
- Upgrade water infrastructure;
- Update water allocation rules; and
- Find the money.

There are reasons for optimism. The urban sector has been busy adapting and investing; the agricultural community has been innovating, improving efficiency, and working toward groundwater sustainability; and there is progress in supplying safe drinking water to rural communities. But overall, we need a fundamental change in course to providing water for the environment. Preparing for the future, with a more flexible, ecosystem-based management approach, will require strong leadership.

A Water Resilience Portfolio for California

Presented by Bob Wilkinson, Emeritus Professor, University of California, Santa Barbara Bren School of Environmental Science and Management

This presentation framed considerations for developing resilience strategies, multiple benefits analysis and approaches, and portfolio development in the context of climate change. Professor Wilkinson recently co-authored a study with the Pacific Institute, "Moving toward a Multi-Benefit Approach for Water Management," which proposes a framework for systematically identifying and incorporating the multiple benefits and trade-offs of water management strategies into decision-making processes.

The concept of resilience--the ability of a system to bounce back—includes three qualities:

- Sensitivity –the degree to which a system will respond to a change in conditions.
- Adaptability—the degree to which adjustments are possible.
- Vulnerability—the extent to which change may damage or harm a system.

Potential impacts of climate change on water resources include the acceleration of the hydrologic cycle and increased precipitation on a global average basis; increased ratio of rain to snow in mountainous regions, causing earlier runoff and reduced natural storage; increased evaporation and transportation due to warmer temperatures; increased frequency and intensity of both droughts and floods due to increased variability; and an increased demand for water due to higher temperatures.

Options for responding to these changes include:

- Mitigation measures, to reduce the pace and magnitude of the changes in global climate;
- Adaptation measures, to reduce the adverse impacts on human well-being; and
- Suffering the adverse impacts not avoided by mitigation or adaptation.

Climate response strategies can include water conservation, water recycling, and urban runoff and stormwater capture. Professor Wilkinson suggested that the challenge facing the writers of the portfolio is to decide whether California's strategy will be to obtain more water, or to find ways to meet demands for water in cost-effective, equitable ways, while avoiding environmental impacts and restoring natural systems.

Water Supply Benefits of Multi-Benefit Flood Management Projects

Presented by John Cain, Conservation Director for River Partners

This presentation highlighted the water supply benefits of floodplain restoration with a focus on the opportunity for integrating flood management in the San Joaquin Valley with implementation of the Bay-Delta Water Quality Control Plan and the Sustainable Groundwater Management Act (SGMA). Restoring floodplains along the lowland rivers of California's Central Valley is one of the best ways to protect public safety and restore fish and wildlife habitat as the state's hydrology changes. Multi-benefit flood management projects not only give rivers more room to safely accommodate large floods, but they also improve water supply reliability, water quality, recreational opportunities, and habitat for fish and wildlife.

Multi-benefit flood management projects improve water supplies by:

- Reducing conflicts over water for endangered species and water supply;
- Reducing agricultural water demand;
- Improving water quality;
- Retaining water in aquifers; and
- Improving reservoir operations and storage.

As described in the Central Valley Flood Protection Plan 2017 Update, predicted flood magnitudes in the San Joaquin River watershed are expected to increase by 60 to 80 percent relative to historical conditions. Wise land use and floodplain management, with inundation leading to improved habitat and aquifer conditions, are sure to play an important part of California's strategy for adapting to these changing conditions.

Following these presentations, the Commission and panelists discussed key issues in developing a climate-resilient water portfolio. The conversation included establishing ecosystem water budgets; allowing flexibility in water allocation through an outcome-oriented approach; reducing conflict between consumptive users and ecological purposes; stressing the importance of water use efficiency; restoring floodplains; seeking multi-benefit solutions; and increasing local/regional collaboration.

Summaries of Selected Readings

See Bibliography for links to documents.

Sustaining Integrated Portfolios for Managing Water in California

Jay Lund, California WaterBlog, June 23, 2019

How might California better employ water management portfolio approaches, expanding on local and regional successes for single purposes to broader multi-purpose successes regionally and statewide?

Separating environmental regulations from water infrastructure, operations, and management has not been successful enough. Environmental management must become more than regulations, to become more operationally focused on the active operation and development of habitats and water for ecosystems, often involving land owners and other agencies. If environmental regulations are not shaped to be compatible with other actions, such as infrastructure design and operations and the management of water demands, then the collective portfolio will be at best sub-optimal and at worst a failure.

In his modest proposal, Lund suggests that the state needs a new vision for the California Water Plan, compatible with SGMA/groundwater planning, voluntary environmental agreements, Prop 1 storage project implementation, drought preparedness, and the many other well-intended state and regional efforts. A potential new framework for water and regulatory planning in California would place development and approval of a statewide interagency plan under the California Water Commission, perhaps modestly reconstituted, with the plan becoming part of the budget process for the major state agencies involved. In recent years, the California Water Commission has developed a reputation and role as a neutral party crossing agency and stakeholder lines. This interagency plan would also become a nexus for reconciling regulatory actions and rolling up local and regional plans.

This approach would preserve what local, regional, and state agencies are already doing well, while bringing agencies together to make improvements and better address areas that lack integration and well-developed portfolios. Some fundamental changes in state regulation and planning would better prepare California for developing and operating effective water management portfolios in an era of rapid change.

A Water Portfolio Planning Report Card for California

Jay Lund, California WaterBlog, May 26, 2019

Major problems are rarely solved with a single solution or a single problem-solver. Portfolio-based planning and management tries to do many things in an organized and coordinated way. Good portfolios provide a foundation for flexibility and help hedge against uncertainties. California's most advanced water management portfolios are by local and regional urban water suppliers seeking to diversify supplies and manage demands, often in cooperation with neighbors. These efforts almost always involve cooperation with outside agencies.

California's recent droughts and floods show the success of portfolio approaches. The extreme events from 2012-2017 were more easily managed and caused less damage when agencies had developed effective portfolio water management approaches. The areas hardest hit lacked preparation based on portfolio planning. Lund goes on to grade the various aspects of our water systems, with urban water use scoring on the high end (A-), while ecosystems merit a D due to "poor development and integration of science."

Three barriers that might hinder the development of effective portfolio management:

- Intellectually, people who would be involved in portfolio approaches must sufficiently understand and be willing to deal with its complexity and flexibility.
- Organizationally, portfolio management requires arranging more people in more complex ways, which could lead to a host of legal, funding, coordination, personnel, and sociology issues.
- Politically, those involved must be sufficiently unafraid of a portfolio approach and the challenges that arise because they will most often require entanglements and risks with outsiders for cooperative activities.

California's portfolio water management must grow beyond narrow objectives and into a greater and less adversarial balancing across objectives. Organizing state, local, and regional activities to achieve such balancing and integration might be the biggest challenge.

Shifting the Regulatory Paradigm Toward Bold Immediate Action for a Resilient California

California Landscape Stewardship Network

How do we reduce persistent barriers to environmental stewardship, conservation and restoration of California's lands that are unintended consequences of essential environmental regulations? As public and private land managers face a suite of increasingly complex challenges, they seek new paradigms for managing our lands. Our challenge is to reframe the conversation from a focus on risk to a focus on imperative.

Inadequate or piecemeal conservation presents significantly larger risk than bold, educated, and scalable action. Existing regulatory streamlining efforts do not address or incentivize larger, more complex efforts. Building trust, a shared vision, and collaboration between landowners, conservation groups, and resource agencies is critical to address regulatory barriers to restoration. Ironically, there exists large-scale streamlining of environmental regulations in other sectors of the economy, while large-scale environmental restoration remains hamstrung by concerns about risk to the environment.

How do we shift the regulatory paradigm to enable larger, more comprehensive, and more meaningful conservation work to be implemented in a cost-effective, time-sensitive manner that focuses on the imperative of action and the risks of inaction? There have been significant advances in permitting efficiencies over the last 15 years. This paper contains numerous examples of projects that have helped "move the dial" towards changing the culture of risk.

Optimum Land Use and Water Alignment

Office of Planning and Research's 2015 Land Use and Water Regional Workshop

Optimum alignment occurs when land use and water plans, decision-making, and management are coordinated in a way that achieves maximum efficiency, consistency, sustainability and resilience in the use and preservation of both resources and in relationship with other resources. In addition, optimum alignment maximizes benefits to and minimizes undesirable impacts on people, wildlife, the economy and the environment.

Conditions that support optimum alignment include a favorable political climate; a commitment to data collection, quality, and common metrics; an integrated system that stretches beyond land use and water and includes other key resources like energy, air, and food; and the ability across the state to co-manage and maintain resilient land and water systems able to withstand and make use of greater climatic variability.

Some key steps toward optimum alignment:

- A state commitment to developing and maintaining data and tools in one clearinghouse for state, local, and federal data.
- Encourage stronger interagency coordination at the state scale, and more state agency engagement at the local level.

- Institute water rate structures that drive customers to be good water stewards while assuring that water agencies can cover their basic operating costs.
- Streamline statewide regulation to achieve desired outcomes.
- Develop procedural requirements that assure the consistency of information across sectors, the need for stronger collaboration, and the need for shared and consistent principles and goals.
- Require water agencies to use relevant general plans to project demand.
- Formally define interdependence and mutual needs shared among users; build and enhance partnerships.
- Assure that water planning and management occurs through a larger sustainability lens.
- Stronger messages need to come from state leaders about the importance of aligning land use and water.
- State, regional, and locals should collaborate to better educate urban communities about the costs and value of aligned land use and water decisions and stewardship in rural communities including headwaters and working lands.

Stakeholder Perspectives – Recommendations for Sustaining and Strengthening IRWM

Department of Water Resources

Integrated Regional Water Management (IRWM) is a comprehensive and collaborative approach to managing water to concurrently achieve social, environmental, and economic objectives. IRWM is helping California move away from a legacy of fragmented, divisive, conflict prone, and sometimes ineffective water management practices by supporting cooperation among agencies and other stakeholders.

Stakeholder visions and needed actions for sustaining IRWM:

- Improved alignment with government policies, regulations, and programs;
- Strengthen practices to meet regional and statewide water management challenges;
- Improve services by DWR to better meet the needs of IRWM regions; and
- Communicate value to increase understanding about the nature, value, and successes of IRWM among the public, elected representatives, and resource management professionals.

IRWM regions can serve as the primary “building blocks” for integrated water management at larger scales; and potentially serve as a suitable forum and framework to help Groundwater Sustainability Agencies achieve integration and sustainable groundwater management. The future of IRWM is dependent on the continued investment and support from federal, State, and local agencies and California Native American Tribes as well as increased public recognition and appreciation of IRWM.

California Water Plan Update 2018 Chapter 3: Actions for Sustainability

State of California, California Natural Resources Agency, Department of Water Resources

Managing water resource systems for sustainability requires changing the status quo, addressing challenges, and strategically planning for long-term resiliency. State government must address challenges related to aging infrastructure, ecosystem decline, decision-making, and public funding.

State and regional entities play unique roles in water management. The State should partner with federal, Tribal, regional, and local entities to implement the recommended actions:

- Improve integrated watershed management by strengthening state support for integrated regional water management and vulnerable communities, supporting the role of working landscapes, and promoting flood-managed aquifer recharge (Flood-MAR) and sustainable groundwater management practices.
- Strengthen resiliency and operational flexibility of existing and future infrastructure and promote long-term management.
- Restore critical ecosystem functions by addressing legacy impacts, facilitating multi-benefit water management projects, and quantifying natural capital.
- Empower California's under-represented or vulnerable communities, expand Tribal involvement in regional planning efforts, and engage proactively with disadvantaged community liaisons.
- Improve inter-agency alignment and address persistent regulatory challenges by incorporating ecosystem needs into water management infrastructure planning and implementation, streamlining ecosystem restoration project permitting, and addressing regulatory challenges.
- Support real-time decision-making, adaptive management, long-term planning, comprehensive water resource data collection, climate science and monitoring efforts, and explore ways to develop stable and sufficient funding.

Wading through the Watershed Program: An Assessment of the CalFed Statewide Watershed Program (2000-2014)

Sierra Institute for Community and Environment

This report describes the results of an assessment of California's $92 million investment in community-based watershed initiatives between 2000-2014. Consisting of two distinct grant programs, watershed project grants and watershed coordinator grants, the Watershed Program emerged as part of a long-term planning process initiated in 1994 by CalFed.

Key themes relevant to the effectiveness of watershed coordination efforts include:

- Advancing a clear vision of success;
- Watershed coordinators as third-party facilitators;
- Watershed coordinator training;
- Approaches to community-based strategies;
- The clash of ecological and social issues and perceived effectiveness, particularly in urban settings;
- Who impacts and is affected by watershed restoration and the challenge to engage relevant stakeholders;
- Maintenance of implementation projects and aging project sites; and
- Organizational capacity.

Granting agencies should support flexible objectives and performance measures that allow for adaptive approaches and that can capture opportunities that emerge during grant work.

Clear communication, promotion of a collaborative agenda, and the ability to articulate a collective vision are key to the effectiveness of watershed coordinator facilitation. The lack of full stakeholder engagement typically stems not from a place of intention, but from a lack of knowledge about how to most appropriately engage diverse stakeholders, particularly those from disadvantaged, underserved or marginalized groups.

Long-term maintenance of projects must be considered at the outset to avoid project failure resulting from misunderstanding of on-going and long-term project maintenance costs and reliance on those lacking capacity to maintain projects. Increased investment in soft infrastructure is necessary to advance landscape-scale conversations and work that advances forest-watershed connections and landscape health in an era of anthropogenic climate change.

California Precipitation

Mike Dettinger is a hydrologist for the U.S. Geological Survey

This article describes the unique and extreme variance in California's precipitation, and thus, its water supply. The State's typical year-to-year deviations of precipitation amount are two to five times as large as anywhere else in the country, the reason why we never seem to settle down to average conditions. Typical fluctuations are between about 60-70 percent of normal and 150-200 percent of normal, from year to year.

Our wild year-to-year precipitation fluctuations is due to our most extreme and wettest storms, which in turn are almost entirely atmospheric-river storms. In a given year, if a few less atmospheric rivers than normal show up, we are in drought. If on the other hand a few more than normal show up, then we are in a flood year. Californians needs to recognize that floods and droughts are part of the same variability and manage them jointly together.

All credible climate-change models indicate that the overall water supply in California will become ever more dependent on those extremely wet storms (not the small to medium storms) with climate change. There is no clear signal how precipitation accumulations may change. Although precipitation changes are uncertain, climate models agree that California will become warmer. The increased temperatures will mean more of the precipitation will fall as rain instead of snow which will change the timing of river flows in the state. Efforts are underway to develop a metric to track the rain versus snow percentages and identify regions that are vulnerable to this transition that is already beginning.

Bringing Water and Land Use Together

Local Government Commission

While water management and land-use planning remain highly fragmented across the state, we are making progress toward a more integrated approach, especially when setting new state level policies, regulations and guidance. Reconnecting water and land use will ensure vibrant, resilient communities for all. Unfortunately, the disconnect is far more common across the country than the integrated approach we so desperately need. Disregard for interconnected systems has led to segregation of land-use planning agencies and water management agencies statewide.

Integrating water management and land-use planning is critically important to the resilience of our state but must be achieved through actions that enhance equity. Proper inclusionary planning and management gives a voice to all community members, and ensures equity across investments, benefits, and risks.

Statewide challenges include:

- Leadership for integrated solutions. Developing a coalition of leaders for integration, both within and across each of California's major regions, will help realign priorities, shift behavior, and change the existing segregated approach to planning.
- Limited natural resources. Water is a limited resource. California's complex hydrology coupled with its incredibly fragmented water governance system limits how much water is available to each community at any given point in time. Land is also a limited resource. Much of the state's developable acreage is in high demand for future growth, which threatens the protection of agriculture, open space and natural ecosystems.
- Reaching a shared perspective. Although water and land use are intrinsically connected, they are often distinctly separate sectors among government agencies and officials who each have their own vocabulary, perspectives and beliefs. Traditional sector–based approaches threaten equitable, efficient water and land-use planning.

Efforts to integrate water and land use must be tailored to the specific needs and priorities of each region. The greatest variations between regions that impact water and land use integration include:

- Population density and related development patterns;
- overall cost of living;
- local water quality and supply factors; and
- current status of coordinated planning.

These factors must be considered when determining the best opportunity for integration or specific recommendations to pursue.

The Struggle for Water Justice in California's San Joaquin Valley: A Focus on Disadvantaged Unincorporated Communities

UC Davis Center for Regional Change

In California, lack of access to clean, safe, and affordable water is a threat to public health and well-being and violates the state's newly codified Human Right to Water. In low-income communities located outside city boundaries (disadvantaged unincorporated communities or DUCs), drinking water is often unsafe to drink. Few of these communities have the economic resources or political clout to form municipal governments; in many cases they do not meet the legal criteria for incorporation. Meanwhile, many cities engage in "leap frog" annexation and development policies that purposefully exclude DUCs inhabited by lower-income people and people of color, depriving these communities of municipal services. California's legislature, regulatory agencies, and water suppliers need to undertake more concerted and well-resourced efforts to ensure that the Human Right to Water is ensured for all California residents.

Key findings from this study include:

- DUC drinking water systems are mostly small and fragmented;
- Many DUC residents have unsafe drinking water;
- There are racial and ethnic disparities in access to safe drinking water; and
- Safe drinking water is often close at hand.

Residents of DUCs in the San Joaquin Valley face problems in securing access to safe drinking water. Public policies for funding safe drinking water in this region are not coordinated, and do not address the small and historically under-resourced water systems that prevent access to safe drinking water. The lack of public access to data and the limited coordination of state data tools obscure the historic and systemic factors that drive racial and ethnic inequality in access to safe drinking water.

Here are some possible solutions to these problems:

- Develop and strengthen consolidation and extension mandates and incentives;
- Create larger, more stable, more equitably distributed, and coordinated sources of funding that focus on addressing historic patterns of inequitable access to resources;
- Ensure that local governments comply with land use and annexation laws to address the legacies of discriminatory local planning practices;
- Improve public access to data and planning tools, enhance existing data systems, coordinate research efforts; and
- Develop new publicly accessible data and mapping tools to improve local and regional planning.

Managing for Change: Modernizing California's Water Governance

Little Hoover Commission

California needs a structure for water governance that has planning and management of the state's valuable water resources as its core mission. Such a structure is essential for California to address the supply challenges ahead while supporting its environment, accommodating its population growth and ensuring the conditions that allow its economy to thrive. For California to successfully manage the water it has and make useful plans for its future, water planning, management, rights and enforcement need not only to be located together, but fully integrated. This will require coordinating planning and management with regulatory responsibilities. The state, however, is hindered by an out-of-date governance system, one that does not adequately prioritize or integrate the importance of water supply planning and management with water rights accounting and enforcement.

The Little Hoover Commission recommends restructuring planning, management and oversight of the state's water resources into a centralized Department of Water Management within the Natural Resources Agency. The new department would be California's key contact point for local and regional government agencies and districts for water use, planning and management, as well as the primary contact for federal agencies.

Key Functions of Department of Water Management:

- Water Management

    - Measuring water supplies and water use throughout the state;
    - Ensuring efficient use of existing storage capacity;
    - Environmental and scientific research and analysis;
    - Data collection to support irrigation management;
    - Flood protection;
    - Dam safety; and
    - Facilitating water transfers.
- Water Rights Administration.
    - Tracking water commitments to users through water right permits and licenses;
    - Enforcing the water right permit system to prevent illegal or unauthorized use;
    - Issuing water right permits or changing existing permits where un-appropriated water has been demonstrated to exist; and
    - Ensuring water transfer applications meet water right permit conditions.
- Water Planning.
    - Anticipating future needs and developing programs to reduce water use and increase efficiency;
    - Developing storage strategies to increase future supply flexibility;
    - Developing the California Water Plan; and
    - Overseeing the Integrated Regional Water Management program and other grants and loan programs.

The Commission also recommends expanding the role of the California Water Commission, and creating a separate, independent publicly owned entity to operate the State Water Project.

Small Disadvantaged Community Participation in Groundwater Sustainability Agencies

Kristin Dobbin, PhD student, University of California, Davis

The Sustainable Groundwater Management Act (SGMA) of 2014 has begun a period of major policy change for groundwater users across California. Under SGMA, Groundwater Sustainability Agencies (GSAs) have a responsibility to "consider the interests of all beneficial uses and users of groundwater" including but not limited to Disadvantaged Communities (DACs).

This research brief provides an initial quantitative description of small DAC participation in SGMA as a basis for future research and discussion. Key findings include:

- SGMA impacts nearly half of all small DACs;
- Small DACs are found in many GSAs (109 of 269);
- Despite their prevalence, nearly half of small DACs have gone unrecognized; and
- Less than 20 percent of small DACs are participating in GSA governance.
- Unincorporated small DACs are participating in SGMA at a rate four times less than incorporated small DACs.
- Less than 20 percent of GSAs mentioned advisory boards or stakeholder committees in their notifications to DWR.

Because many DACs are primarily, or completely, reliant on groundwater, studying DAC involvement in SGMA is important for understanding the future of the human right to water in the California. While SGMA impacts nearly one half of small DACs in the state, less than one in five are formal participants in the SGMA process. An important next step to understanding small DAC involvement in SGMA will be to investigate the role of small DACs on GSA committees as well as through other public engagement avenues.

Community Perspectives on SGMA Implementation: Challenges and opportunities for integrating small and rural drinking water stakeholders and interests

Kristen Dobbin, Jessica Mendoza, and Michael Kuo

This report details the results of 23 interviews with 31 representatives of small, low-income communities who rely on groundwater for their drinking water-supplies. The findings suggest community stakeholders are highly interested in SGMA and desire to be involved in its implementation. The experience of small and rural communities was diverse, yet many similarities arose across the interviews, including six common challenges and concerns about SGMA implementation:

1. Resource constraints to participation
2. Accessibility
3. Transparency
4. Lack of formal representation
5. Limited opportunities to provide meaningful input and feedback
6. Lack of addressing drinking water interests and opportunities

Those interviews had many recommendations and suggestions for better integrating small and rural drinking water interests into the SGMA process:

- Establish a Memorandum of Understanding or Agreement with your local GSAs;
- Attend GSA meetings as much as possible, monitor their agendas and provide comments and questions;
- Coordinate with other small and rural communities to elevate and advocate for drinking water priorities;
- Educate your local GSA about drinking water priorities, regulations and requirements; and
- Reach out to your GSA with your contact information and preferred means of communication.

Recommendations and best practices were also suggested for GSAs and state agencies. The extent to which state, regional and local actors can work together to find and implement inclusive solutions will determine the degree to which SGMA ultimately accomplishes its stated goal to "protect communities, farms, and the environment against prolonged dry periods and climate change, preserving water supplies for existing and potential beneficial use."

Untapped Opportunity: Local Water Boards and the Fight for Water Justice

Charlotte Weiner, Community Water Center

Across the state, local water boards shape drinking water access and regional water management. These public, democratically elected institutions provide critical representation in the rural,

unincorporated communities most vulnerable to the impacts of water inequity. As a closer look reveals, these boards are falling short of their democratic ideal.

Across California, more than one million residents are exposed to unsafe drinking water each year. Though the Human Right to Water is law, access to safe drinking water falls along lines of race, class, and place. Nowhere are the contours of this inequity more evident than in the southern San Joaquin Valley, where many low-income, Latino residents live in small, rural communities. Many water systems that serve small communities lack the economies of scale, technical capacity, and requisite tax base to build, operate, and maintain infrastructure to treat contaminated water. Most fundamentally, all unincorporated communities lack the layer of political representation that city governments afford. These democratically-elected water boards, we argue, should not exist apart from our understanding of local democracy. Instead, they hold the potential to form the very roots of local democracy — and to translate the Human Right to Water from aspiration to action.

Recommendations include:

1. Create local water board leadership pathways and invest in trainings for potential and current water board leaders
2. Advance public understanding of local water boards' roles and responsibilities
3. Continue research on representation and accountability in elected seats that shape the Human Right to Water

Capacity Building for Collaboration: A Case Study on Building and Sustaining Landscape-Scale Stewardship Networks in the 21st Century

Leigh Goldberg Consulting

With the growing complexity and scale of environmental, social, and economic challenges facing the long-term stewardship of working and conserved public and private lands in the United States, place-based collaborative networks are very likely the future vehicle to keep pace with and meet these challenges. Both start-up seed capital and sustainable, consistent funding streams are essential to successful networks, and yet many landscape-scale stewardship networks in the U.S. face numerous challenges when it comes to financing their collective work.

The five most significant financing challenges facing landscape stewardship networks are:

1. Landscape stewardship networks have unique capacity needs;
2. Deep, cross-boundary collaboration is still a maturing field;
3. There is a shortage of significant, stable public funding to steward and sustain conserved lands;
4. Landscape stewardship tends to hold less overt funder appeal; and
5. Natural landscape problems are often "out of sight, out of mind"

The study also uncovered numerous success stories, which they group into these four themes:

1. Launching with Humble Beginnings

2. Strategically Investing in Network Building
3. Strategically Leveraging Dollars for Scaled-up Benefit
4. Empowering Local Public Investment Decisions

Current trends for funding collaborative landscape stewardship and conservation indicate decreases in public funding, shifting priorities in private philanthropy, and increased competition for limited resources. While these trends can seem daunting when seeking resources to build and sustain network capacity, they can also inspire a sector-wide call to action for bolder thinking, greater risk-taking, and a renewed commitment to organizing a multi-sector response to address these issues. The situation is ripe for landscape stewardship practitioners to rise to the occasion and embrace these funding challenges and success stories as an opportunity for collective action.

Additional Research Supporting the Case Study Findings

California Landscape Stewardship Network

Two reports, "Pathways Forward: Progress and Priorities in Landscape Conservation," and "Assessing the State of Landscape Conservation Initiatives in North America: A Survey and Report" support and complement the case study "Capacity Building for Collaboration: A Case Study on Building and Sustaining Landscape-Scale Stewardship Networks in the 21st Century."

"Pathways Forward" explores the central role of collaboration in landscape conservation, and how it is built on trust, respect, and authentic stakeholder engagement. Coordination and collaboration are key, as well as shared ecological and cultural information. It reimagines communications and engagement in the landscape conservation era, identifying the power of storytelling to connect people to the land, to each other, and to a shared body of knowledge. The study stresses the importance of advanced science-based planning to analyze landscape values and understand them as dynamic systems. It also recognizes landscape conservation as a critical climate mitigation and adaptation strategy. It also explores the investment potential, both private and public, in ecosystem services, and determines that funding collaboration is central to landscape conservation success. The final chapter is devoted to policy alignment, and offers five-year benchmarks for success at the local, state, federal, and tribal level.

"Assessing the State" considers some key insights, including how landscape conservation has emerged as an essential approach to addressing the complex challenges of the 21st century, how it is not defined by size, and collaboration is key to its success. Landscape conservation initiatives are often characterized by informal governance structures and exhibit a "nested" arrangement that allows impact across scales. While ecological considerations continue to drive virtually every initiative, a diversity of additional complementary priorities is also emerging. While the landscape conservation approach carries specific, unique challenges, there are also commonalities and lessons to be learned that can help advance the field. All in all, the Network for Landscape Conservation has a valuable role to play in connecting the broader community.

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Assessing the State of Landscape Conservation Initiatives in North America: A Survey and Report
Network for Landscape Conservation

Speaker Biographies

Gary Bobker, Program Director, The Bay Institute
Gary Bobker oversees the work of the Bay Institute's scientists and policy experts to enforce and strengthen baseline environmental protections for the Bay estuary, provide guidance and oversight to long-term restoration plans and projects, and reform Central Valley water use and agricultural runoff practices. Since he joined The Bay Institute in 1992, he has helped negotiate a number of landmark environmental agreements; led the environmental community's efforts to secure new state and federal water quality standards for the estuary and to shape other regulatory and planning initiatives; and co-authored numerous technical reports on Bay-Delta issues. Previously, he served as West Coast staff director for the National Toxics Campaign, as Northern California staff director for the California Natural Resources Federation, and as pollution prevention research analyst for the Citizen Action Coalition. Bobker also served for many years as chair of the CALFED Program Ecosystem Roundtable, as Program Coordinator for the Environmental Water Caucus, and as a member of the Board of Directors of the San Francisco Estuary Institute.

Sharon Farrell is the Executive Vice President of Projects, Stewardship and Science with the Golden Gate National Parks Conservancy. Ms. Farrell has worked for more than 25 years as an ecologist, community programs and project manager, and park planner. She has a background in landscape-scale stewardship, vegetation management, restoration ecology, natural resources planning, and community and partnership development. Sharon currently oversees the implementation of numerous watershed-scale open space projects, programs and partnerships in the San Francisco Bay Area, with a focus on community participation in multi-jurisdictional stewardship and science programs. Ms. Farrell also facilitates two landscape-level multi-agency and stakeholder networks: One Tam in Marin County, and the California Landscape Stewardship Network - a peer-exchange network of networks supporting cross-boundary landscape-scale stewardship partnerships. The CA Network seeks to operationalize the practice of landscape-scale stewardship through finding innovative solutions to shared partner needs and challenges, recognizing that cross-boundary and cross-sector collaboration is essential to scaling the impact regional landscape stewardship efforts.

Michael Kiparsky is the founding Director of the Wheeler Water Institute within the Center for Law, Energy & the Environment at the UC Berkeley School of Law. Under his leadership, the Institute has grown into a widely recognized voice on a range of California water issues. Dr. Kiparsky has worked on technical and policy aspects of water resources management for 15 years, and his primary interest lies at their intersection. He has published academic articles and technical reports on a range of topics including governance and policy of complex water systems, climate change impacts and adaptation, water innovation, and science for decision-making. His work has appeared in media outlets including The Sacramento Bee, the San Francisco Chronicle and the Los Angeles Times, and through his engagement activities is regularly used by state and local decision-makers. He was previously on the faculty at the University of Idaho, and has experience in consulting, non-profit, and agency settings. Dr. Kiparsky earned an A.B. in Biology from Brown University and a Ph.D. from U.C. Berkeley's Energy and Resources Group, where he was an NSF Graduate Research Fellow, a Udall Scholar, a CALFED Science Scholar, and the first ACWA Steve

Hall Water Law & Policy Scholar. He was recently named one of "Nine Experts to Watch on California Water Policy" by Water Deeply.

Mark Lubell is a professor in the UC Davis Department of Environmental Science and Policy and Co-Director of the Center for Environmental Science and Behavior. He is an interdisciplinary environmental social scientist who studies cooperation problems in environmental policy using quantitative and qualitative methods. He received his Ph.D. in political science from the State University of New York at Stony Brook. His research topics include water governance, sustainable agriculture, and climate change adaptation. Dr. Lubell is currently a member of Science Advisory Committee for the Delta Science Program, and the Regional Shoreline Adaptation Plan Leadership Advisory Group guiding the Bay Conservation and Development Commission's regional sea-level rise adaptation plan for San Francisco Bay.

Felicia Marcus most recently served as a Member and Chair of the California State Water Resources Control Board, appointed by Governor Jerry Brown. Before her appointment to the Board, Marcus served in positions in government, the non-profit world, and the private sector. In government, Felicia served as the Regional Administrator of the U.S. EPA Region IX in the Clinton Administration where she worked extensively on the range of environmental issues under EPA's jurisdiction. Prior to that, Felicia headed Los Angeles Department of Public Works at a time when the department went from garnering lawsuits to garnering national awards for environmental initiatives and performance. In the non-profit world, she was the Western Director for the Natural Resources Defense Council, and was the Executive VP/COO of the Trust for Public Land. Throughout these roles she was known as an adept manager of large institutions with complex project management and/or public policy development and implementation responsibilities. She was a private and non-profit sector attorney in Los Angeles. She earned her JD in 1983 from New York University and her AB cum laude from Harvard College in East Asian Studies in 1977.

Tara Moran is Program Lead for Stanford University's Water in the West Sustainable Groundwater Program. Her research focuses on the technical requirements of sustainable water management, including data collection, sharing and integration. She is particularly interested in understanding the role of data and information in water management decisions and the governance structures to support them. She holds a first-class honors B.Sc. in Environmental Science and a Ph.D. in Geography from the University of Calgary, Canada.

Adriana Renteria, Regional Water Management Coordinator at the Community Water Center
Through participating in Sustainable Groundwater Management Act (SGMA) implementation efforts, Adriana works to support transparent and inclusive regional groundwater planning efforts that protect drinking water needs by facilitating capacity building and stakeholder engagement. Adriana also coordinates the Community Water Leaders Network (CWLN), a leadership network that supports local elected water decision makers by providing access to relevant and timely information on drinking water issues, technical support on water governance issues, and access to a peer network of values-aligned elected officials dedicated to the human right to water.
She received a Bachelor of Arts in Environmental Studies and Economics from UC Santa Cruz. Before joining CWC, Adriana worked at UC Santa Cruz's American Indian Resource Center as the

Coordinator for People of Color Sustainability Collective, hosting programming around environmental justice topics and leading research highlighting the many diverse ways that communities of color have practiced sustainability.
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Lynn Rodriguez, Manager of the Watersheds Coalition of Ventura County IRWM Program, has been a water resource management professional for many years, focusing on water use efficiency, urban water management and Integrated Regional Water Management in Ventura and Santa Barbara counties. She currently manages the Watersheds Coalition of Ventura County (WCVC) Integrated Regional Water Management (IRWM) Program. In collaboration with stakeholders in the region, she prepares and oversees IRWM plan development and implementation and manages the ongoing stakeholder engagement process. She also serves as co-chair of both the statewide IRWM Roundtable of Regions and the LA-Ventura Area Disadvantaged Community Involvement Task Force. She has served on numerous local, statewide and national water management-related committees and is a graduate of UCSB. She is passionate about water issues and spending time exploring the outdoors.

Tim Washburn retired from the Sacramento Area Flood Control Agency (SAFCA) in June 2017 and is currently employed by the Agency as a retired annuitant. He served as SAFCA's agency counsel from 1990 to 2009 when he was appointed as the agency's Director of Planning. He has represented SAFCA in all aspects of project planning, finance, legislative advocacy, land acquisition, and environmental compliance. Before joining SAFCA, Mr. Washburn served as a Deputy City Attorney for the City of Sacramento. He graduated from the University of California, Berkeley in 1983 and received his law degree from the University of California, Davis in 1986.