SECTION 10: RESEARCH AND DOCUMENTATION NEEDS AND SUPPORT

RECOMMENDATION #1: [Need Title]

Background

Both the 2013 California Water Plan and 2016 California Water Action Plan call for reducing water now and in the future as a first strategy to meeting the state's future water needs.

> *There is broad agreement that the state's water management system is currently unable to satisfactorily meet both ecological and human needs, too exposed to wet and dry climate cycles and natural disasters, and inadequate to handle the additional pressures of future population growth and climate change. Solutions are complex and expensive and they require the cooperation and sustained commitment of all Californians working together. To be sustainable solutions must strike a balance between the need to provide for public health and safety (e.g.,safe drinking water, clean rivers and beaches, flood protection), protect the environment, and support a stable California economy. (Update California Water Plan, 2016)*[1]

With 7 million more people projected to live in California by 2035 (Table 10-1), and in order to have a resilient environment and expanding our $2 trillion economy, we need more advances in water use efficiency and conservation strategies.

Table 10-1. Projected California Population Growth

2015	2020	2025	2030	2035
38,896,969	40,619,346	42,373,301	44,085,600	45,747,645

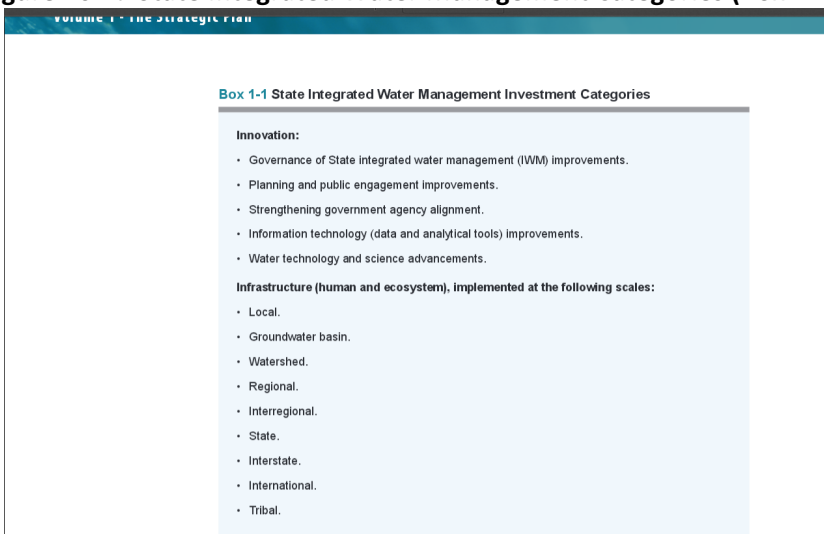
Source: California Department of Finance, Table P-1, Last accessed: January 28, 2016.[2]

The 2013 California Water Plan cites that its **"imperative to invest in innovation and infrastructure"** in its state integrated water resource management strategies the calls for need for "**advancement in water science and technology"** (Figure 10-1). This must apply to water conserving and/or efficiency technologies and approaches given with more than two to three decades of active conservation programs in many communities, the easier water efficient solutions have been employed.

[1] http://resources.ca.gov/docs/california_water_action_plan/Final_California_Water_Action_Plan.pdf

[2] http://www.dof.ca.gov/research/demographic/projections/

Figure 10-1. State Integrated Water Management Categories (Box 1-1).



Box 1-1 State Integrated Water Management Investment Categories

Innovation:

- Governance of State integrated water management (IWM) improvements.
- Planning and public engagement improvements.
- Strengthening government agency alignment.
- Information technology (data and analytical tools) improvements.
- Water technology and science advancements.

Infrastructure (human and ecosystem), implemented at the following scales:

- Local.
- Groundwater basin.
- Watershed.
- Regional.
- Interregional.
- State.
- Interstate.
- International.
- Tribal.

Source: 2013 California Water Plan, Volume 1, Chapter 2, Imperative to Invest in Innovation and Infrastructure. Last accessed: January 29, 2016

This is most certainly true extending beyond 2020, when SB X7-7 targets are met saving an estimated 2 MAF[3] as presented in Figure 10-2 below .Approximately half of the conservation savings are estimated in the landscape sector that has significant needs for scientific and technological research.

Figure 10-2. Projected Water Savings by Sector from SB X7-7

Table 3-4 Projected Savings by Sector[a]

Demand Reduction Sectors	Reduction	Projected Savings in 2020
Large landscape	3 gpcd	148,000 af
Commercial, industrial, and institutional	5 gpcd	170,000 af
Residential indoor	15 gpcd	739,000 af
Residential landscape	16 gpcd	789,000 af
Water loss control	5 gpcd	200,000 af
Total	**44 gpcd**	**2,046,000 af**

Notes:

af = acre-feet, gpcd = gallons per capita per day

[a] The figures in this table are a summary of projected savings that are detailed in preceding pages.

Source: 2013 California Water Plan, Volume 3, Chapter 3, Urban Water Use Efficiency. Last accessed: January 29, 2016

In the last 5 years, there has not been funding by state agencies to adequately support quantitative water conservation and water efficiency research, including landscape related research needs. The need for California to provide funding for research is now critical to understand where investments by the state through statewide rebates, programs and services are best prioritized and also have research adaptable to benefiting individual water utilities and other interested researchers and planners.

[3] 2013 California Water Plan, Volume 3, Chapter 3, Table 3-4. Last accessed January 31, 2015. http://www.waterplan.water.ca.gov/cwpu2013/index.cfm

To date in 2015, millions of dollars have been allocated by state and local agencies on turf removal programs resulting in millions of square feet of turf removed and replaced with water conserving plants without the ability to clearly to demonstrate or quantitate water savings through science-based research. The CUWCC cited in their report, "Turf Removal & Replacement: Lessons Learned", that "without sophisticated metering, let alone designated landscape meters, attributing water savings directly to turf replacement can be nearly impossible". To quote the distinguished mathematician and physicist, Lord Kelvin (1824-1907), "To measure is to know." If you cannot measure it, you cannot improve it. The need for science-based quantitative research is paramount to understand the impact of purported landscape conservation programs and initiatives. The extremely limited less than two dozen various landscape water conservation studies completed in California are dated with many more than 10 years old and have been primarily locally funded. As a result, most information to planners, governmental officials and others on estimated water savings is anecdotal and not objective, lacking basic scientific methodology (statistical design, treatment replication and reproducibility). Multi-year research is needed to minimize the effects of seasonal variation and to understand if water savings through conservation and efficiency can be sustained overtime.

In January 2010, MWELO was revised and one of the new requirements was to reduce the Evapotranspiration Adjustment Factor (ETAF) from 0.8 to 0.7 for a new landscape over 2,500 square feet, which would resulted in a 12.5% reduction in the required water budget. To date, there has been no study with data to confirm the benefits of water savings or other beneficial impacts or unintended consequences associated with the ETAF reduction. On December 1, 2015, the ETAF was decreased another 21+%, again resulting in significantly less water allowable water for the water budget of a new landscape. Again, there is no research on the horizon that will substantiate the reduction of the 0.7 ETAF to 0.55 for residential and 0.45 for commercial landscapes. With the "newly" revised MWELO statute, there will be a significant shift in how California landscapes will be designed, implemented and maintained in the future. How much shift has occurred in quantifiable water savings on landscapes through quantitative research is critical to understand where additional water savings are most feasible from outdoor urban water use. We need both pilot scale and readily transferable research findings given the diversity and complexity of our California environment and both existing and new urban landscapes.

An example of a state agency research program is the Research and Development Program under the California Energy Commission. This program has annual funding for energy research and has in place Electric Program Investment Charge (formerly Public Goods Charge) as the sustainable funding source. While a sustainable funding mechanism (such as a public goods charge) may be controversial in the context of water supplies, it is time for agencies, academia, industry, and NGO's to invest in and provide leadership for a sustainable water conservation research program for California, particularly focused on landscape. Given the embedded energy in the water supply, especially when pumping on peak to meet irrigation demands, this is a topic that mutual benefits and should either be allowed to have shared resources with the energy sector or have a stand-alone sustainable funding source.

Purpose Statement:

The Independent Technical Panel (ITP) recommends that the Department of Water Resources (DWR) collaborates with the California Urban Water Conservation Council (CUWCC) and academia such as the University of California (UC) to convene stakeholder meeting(s) to identify the priority needs for research that will result in short-, medium- and long-term conservation water savings. The CUWCC

currently has a research and evaluation and landscape committees that may assist in this effort. This effort could be a follow-on effort of the process used to develop the CUWCC's Market Transformation Framework for Sustainable Landscapes. It is envisioned that academic researchers would have a central role in facilitating the dialogue among stakeholders.

Prior to convening meeting(s), the Department of Water Resources or other organizations will conduct a science-based literature review for identifying research conducted on best management practices for water conservation, with a key emphasis for landscape, and a synopsis of what specific research has resulted in significant landscape water conservation through best management implementation. The outcome of this research could become a part of the CUWCC's new Water Conservation Wiki and also shared and leveraged by Department of Water Resources.

The Independent Technical Panel Recommends That:

The ITP recommends to State Legislature to appropriate $5 million to the Department of Water Resources for creating and implementing a road map for funding priority research needs that will result in water conservation. Furthermore, the ITP recommends that research money is identified for funding priority science-based research. Research projects will need to be multi-year and will need to demonstrate impact of research findings with empirical data and statistical analysis on the same scale and rigorousness as applied to and invested in the energy sector.

DWR will convene an industry stakeholder committee that will confirm priority research topics and defined requirements for proposal solicitation. A sample list of key topics is provided along with an example of a high priority research focus:

Potential Topics:

1. Irrigation Technology
    a. Low-cost, consumer friendly "standard" irrigation controller that can comply with one- or two-day mandatory water restriction. Having a "standard" controller for the majority of all residential homes will facilitate irrigation controller education by many organizations, industry professionals and institutions.
2. Social/Behavioral Modification (incentives)
    a. Effective stewardship messaging causing social/behavior change for promoting responsible water use without waste
3. Documentation
    a. Providing protocol manual for evaluation, measurement and verification of landscape water conservation
4. Programs (training and education)
5. Landscape Design (plants and hardscape)
6. Soil Technology
7. Irrigation Management
    a. Research to determine if existing and new landscapes can perform to the MWELO ETAF
8. Gray & Treated Water