My Life in Water

California Water & Environmental Forum Annual Meeting

September 23, 2024

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Expression of Gratitude to People Outside the Department of Water Resources

- A. Rakib Khan and Shamsia Khan: My father and mother
- N. Jasmin Khan: My wife
- Dr. Lindell Ormsbee: Ph.D. Dissertation Supervisor
- Dr. E. Sabri Motan: Master’s Thesis Supervisor
- Dr. Misganaw Demissie: Supervisor, Illinois State Water Survey
- Dr. Young Yoon: Supervisor, Montgomery Watson
- Dr. Saquib Najmus: Colleague, consulting life
- Dr. Ali Taghavi: Colleague, consulting life
- Quamrul Siddique: Mentor, Chief Engineer, Local Govt Engg. Dept., Bangladesh
- Rebekah Christensen: Chair, Cal-IPGCA Program
- Kathleen Web: Mentor, Cal-IPGCA Program
- Eileen Salenik: Program Manager, Snake River Resources Review, USBR
- Gary Nuss: Water Practice Director, CH2M Hill

Expression of Gratitude to People Inside the Department of Water Resources

- Kamyar Guivetchi: Manager, Division of Planning
- Christina McCready: Supervisor, Technical Support & Integrated Data
- Rich Juricich: Supervisor, Integrated Data & Analysis
- Paul Massera: Program Manager, California Water Plan, Division of Planning
- Mohammad Rayej: Senior Engineer, Division of Planning
- Paul Shipman: Senior Engineer, Division of Planning
- Eric Hong: Supervisor, Conjunctive Management
- Tracy Hinojosa: Supervisor, State Water Project Operations Office
- Carl Hauge: State Hydrogeologist
- Dr. Francis Chung: Manager, Bay Delta Office
- Maury Roos: State Hydrologist
- Dr. Tariq Kadir: CWEMF, Convenor/Past Convenor; also, Bay Delta Office
- David Roose: Manager, State Water Project Operations Office

Some of My Favorite Projects

- Tulare Lake Hydrologic Region Water Budget Pilot Study
- Central Coast Hydrologic Region Water Budget Pilot Study
- Handbook for Water Budget Development: With or Without Models
- California Water Budget for Hydrologic Cycle Water Accounting (CalWB)
- California Water Plan Update 2023 Future Scenarios Study (Project Advisor)
- Implementation of the Open and Transparent Water Data Platform (AB 1755)
- California's Groundwater Update 2013: A Compilation of Enhanced Content for California Water Plan Update 2013
- Strategic Data and Framework for Integrated Water Management
- Delta Operational Alternatives for Operational Decisions for the State Water Project
- DSM2 Real-time Modeling Documentation
- Snake River Decision Support System

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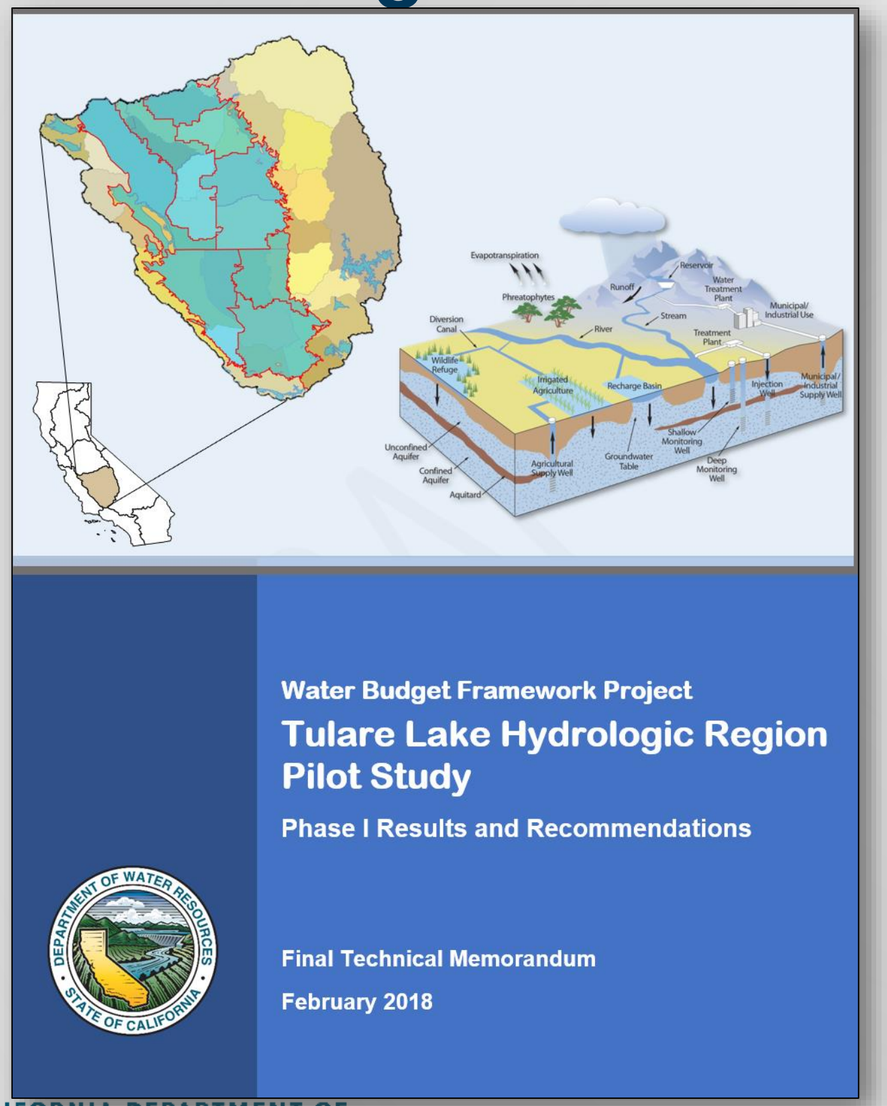
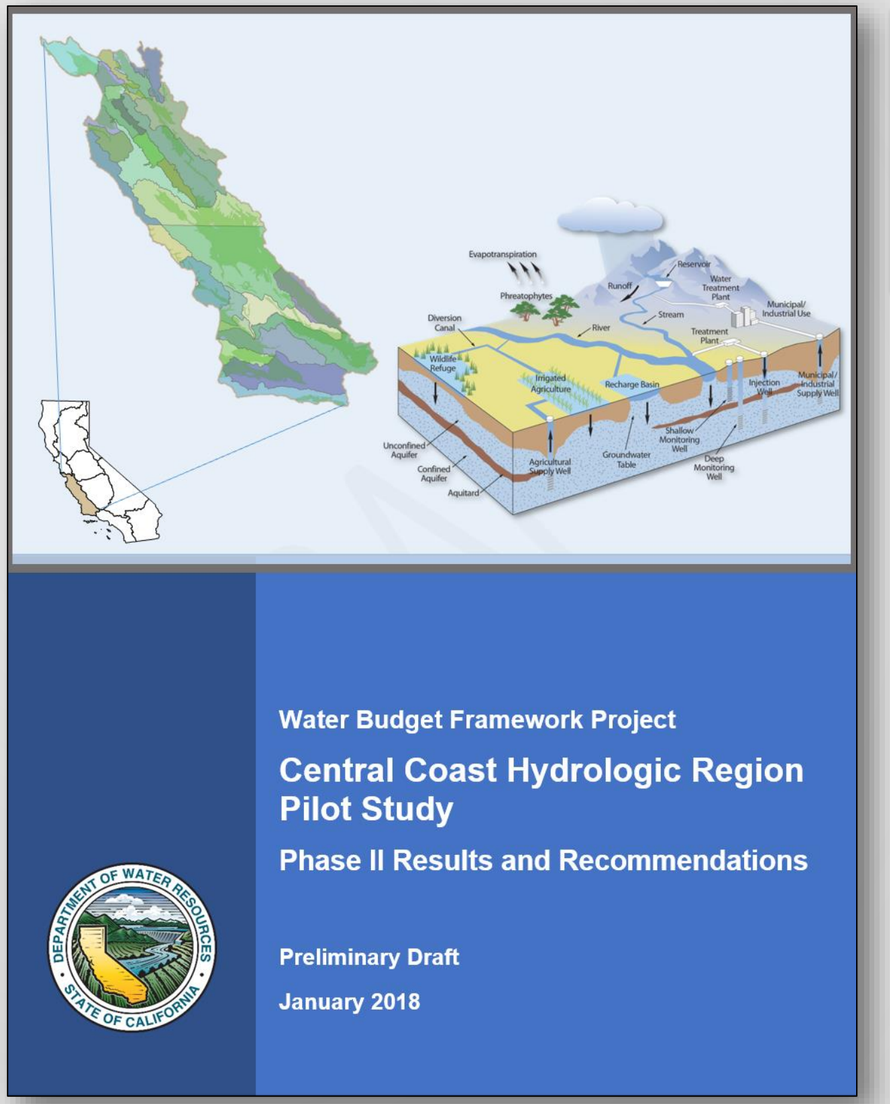
Tulare Lake and Central Coast Hydrologic Region Water Budget Pilot Studies





Key Project Team Members
Abdul Khan (PM)
Rich Juricich
Steve Ewert
Paul Shipman
Saquib Najmus
Frank Qian

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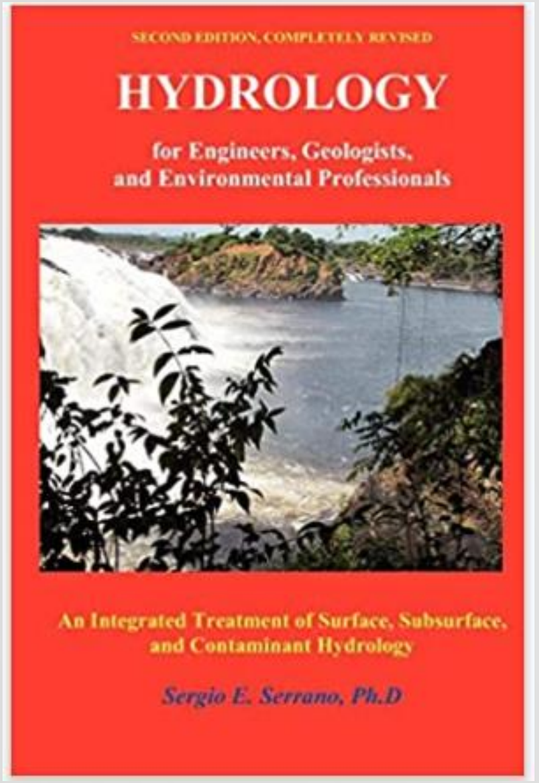
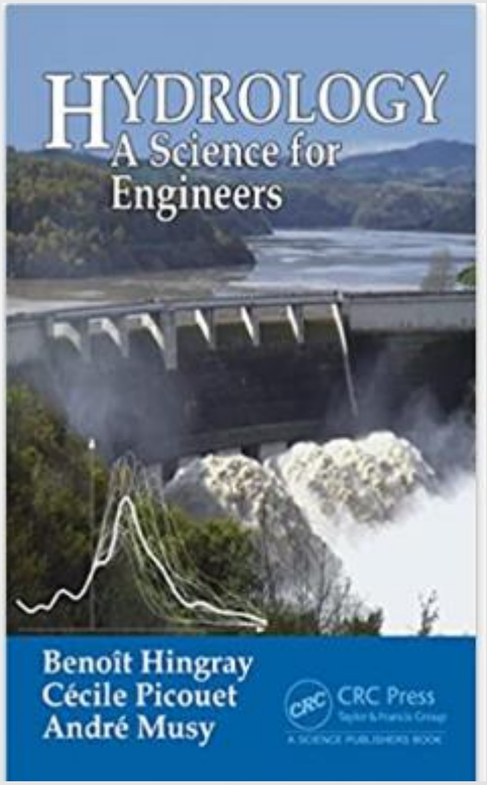
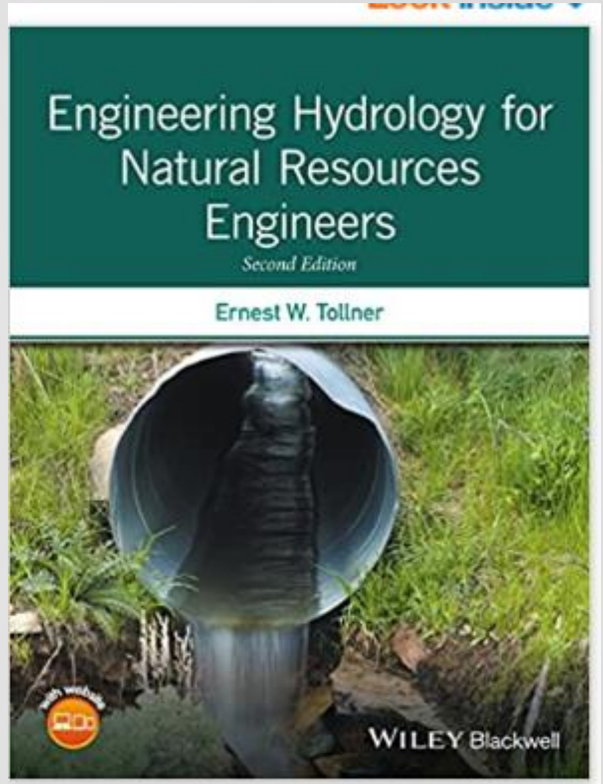
Pilot Study Findings

Several factors hindering water budget development

1. No single, comprehensive reference is available on water budget







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2. The hydrologic cycle is often considered in a fragmented way

Reservoir Operators
- Surface water availability analysis.
- Focus on the surface water system.

Water District Managers
- Water supply and use analysis.
- Focus on the land system.

Groundwater Basin Managers
- Groundwater availability analysis.
- Focus on the groundwater system.

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3. Inconsistent definitions are used

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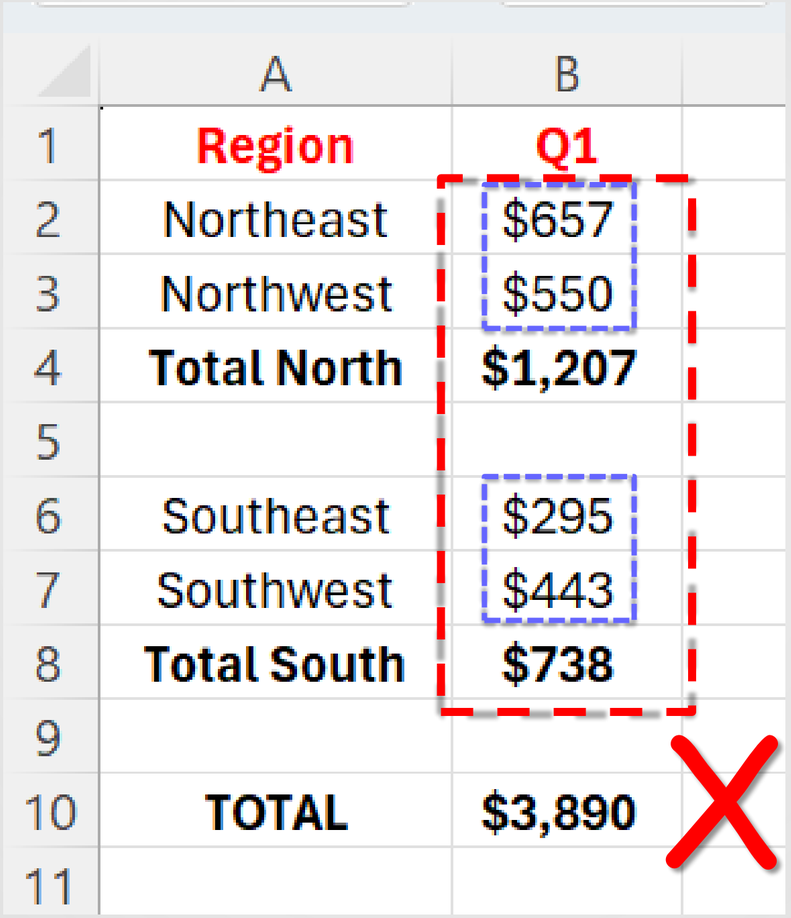
4. Non-standardized ways of water accounting are practiced



	A	B
1	**Region**	**Q1**
2	Northeast	$657
3	Northwest	$550
4	**Total North**	**$1,207**
5		
6	Southeast	$295
7	Southwest	$443
8	**Total South**	**$738**
9		
10	**TOTAL**	**$3,890**
11		

5. Absence of guidance on two important areas makes lives of water practitioners difficult

No guidance to help make decisions on

- when to use a modeling approach
- when to use a non-modeling approach

No systematic case studies for developing water budgets

- with a model
- without a model

6. Poor documentation of water budgets is the norm

7. Dispersed and disparate data sources cause inconsistencies

Handbook for Water Budget Development: With or Without Models

1. First of its kind, single-volume, practical reference for developing water budgets
2. 3-D systems approach for total water budget
3. Common vocabulary
4. Standardized water accounting templates
5. Decision trees to select an approach, and case studies
6. Guidance on documenting water budget
7. Data resources directory

Key Project Team Members
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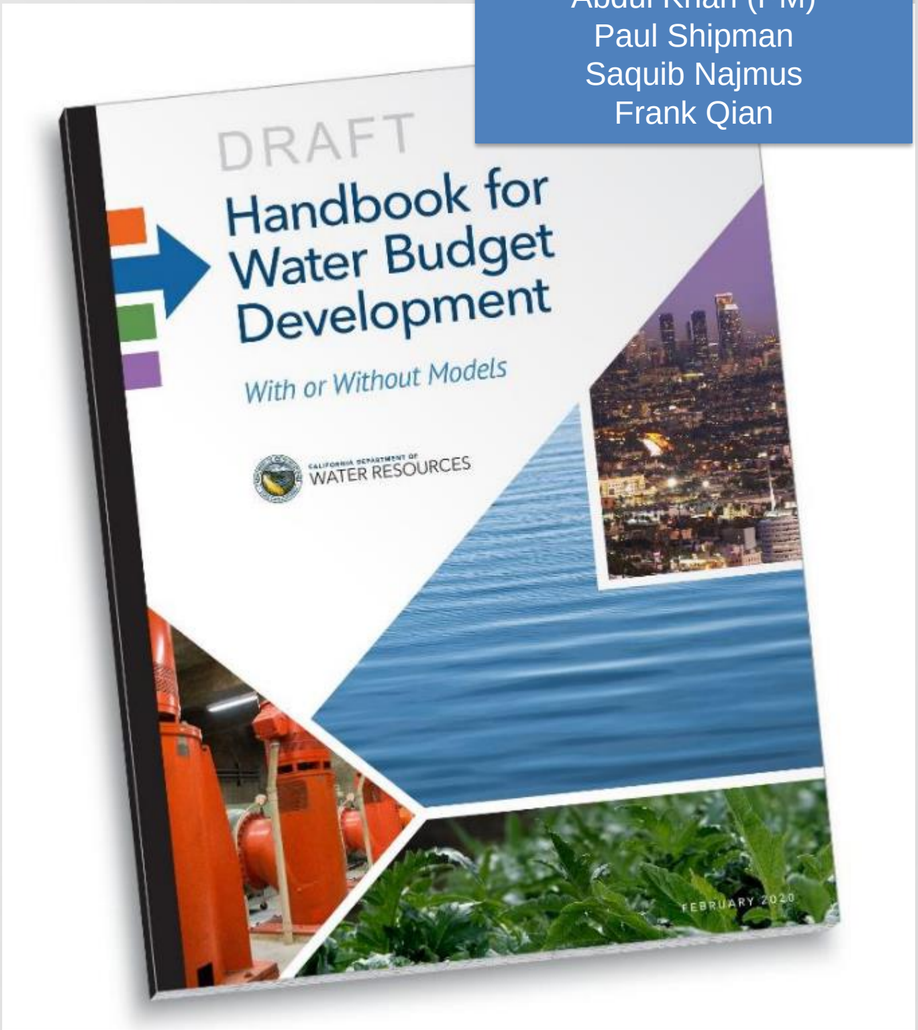

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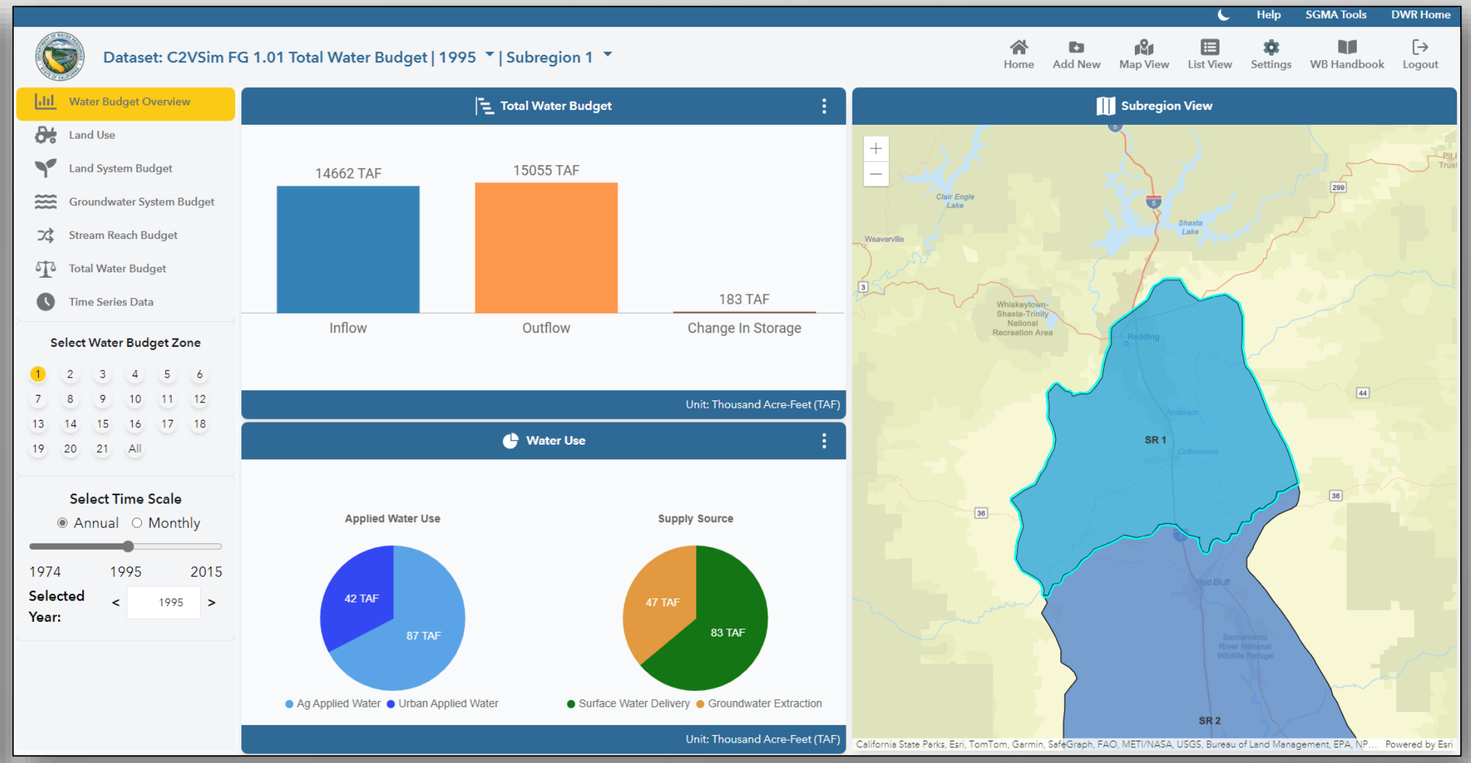
California Water Budget for Hydrologic Cycle Water Accounting (CalWB)

Key Project Team Members
Abdul Khan (PM)
Paul Shipman
Saquib Najmus
Frank Qian
Thierry Rutaganira



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What Next?

Roadmap for Statewide Water-Accounting and Water Budget

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Frank Qian

Vision

The State of California and its water agencies have a comprehensive, documented, and demonstrated process to develop total water budgets at different spatial scales, including local, regional, and statewide levels.

Steps

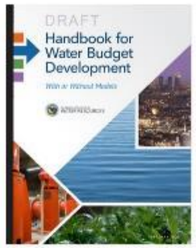
- Assess current state of water budgeting
- Identify desired future state of water budgeting
- Develop a roadmap to go from the current state to the desired future state
- Implement the roadmap (subject to funding availability)

Water Accounting System for California

PROCESS | TECHNOLOGY | PEOPLE

FOUNDATION

Water Budget Handbook



- *Common Vocabulary*
- *Accounting Rules*
- *Standardized Templates*
- *Data Sources*
- *Documentation*

+

Supplemental Guides

Data Sources
Evapotranspiration • Stream Gages
Precipitation • Groundwater Levels

ANALYTICS

EDF/CWDC Water Accounting Platform
Operational Water Accounting

What	Who	Scale
• *Water allocation and water use*	• *GSAs/GSPs*	• *APN*
• *Operational water budget*	• *Water districts*	• *District*
• *Local water trading*	• *Land owners*	• *Basin*
• *Direct ingestion of OpenET*		

Modeling

- *Model scenarios*
- *Stream aquifer Interaction*
- *Sub-surface flows*
- *Inter-basin flows*

Cal WB
Hydrologic Cycle Water Accounting

What	Who	Scale
• *Total water budget*	• *State and regional agencies*	• *Basin*
• *Comprehensive water tracking*	• *GSAs/GSPs*	• *Watershed*
• *Trend analysis & insights*	• *Water Districts*	• *Hydrologic region*
• *Regional water trading*		• *Statewide*
• *Ingest water budget data streams*		

Water Budget Data Streams
Water plan current conditions & future scenarios • GSPs
AWMP • UWMP • Watershed/Regional plans

REPRESENTATIVE USE CASES

- *Utilize OpenET to find my crop water need by field*
- *Track water in the land system to understand the supply and demand gap*
- *Sell available water or buy water to cover shortage*
- *Track water trades and credits to support operational water accounting*

- *Help optimize allocation of scarce water resources to meet demands*
- *Analyze impacts of proposed management actions to inform decision making*
- *Provide transparency through an accessible on-line tool to help communication and engagement with stakeholders*

- *Track water through the entire hydrologic cycle to understand inter-basin flows, stream-aquifer interactions, and undesirable effects to better manage groundwater basin*
- *Evaluate inter-basin or regional water trading scenarios and their impacts on sustainability indicators to ensure compliance with SGMA*
- *Interactively visualize temporal and spatial changes in water budget components under a range of management actions to help inform decisions*
- *Evaluate water budgets under different water year types to assess vulnerabilities under climate change scenarios*

Statewide Reporting
California Groundwater • Water Plan
Water Resilience Portfolio

CALIFO
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Last Updated 9/23/2024

Thank You!