



ANNUAL REPORT **2024**



**CALIFORNIA
INSTITUTE
FOR WATER
RESOURCES**



California Institute for Water Resources

The California Institute for Water Resources (CIWR) integrates California's research, extension, and education programs to develop solutions for water management challenges. CIWR focuses on:

- Leading and supporting water resources research in collaboration with academic and agency partners in California
- Communicating research through engagement, extension, and media
- Coordinating resources across California's academic institutions and connecting researchers, communities, industry, and public agencies.

CIWR is based within University of California Agriculture and Natural Resources (UC ANR). Through our projects and programs, we work with collaborators across the state, including: University of California (UC) campuses and the Cooperative Extension (UCCE), California State University (CSU) campuses, federal and state agencies, local governments, and community-based organizations.

History

The first UC Water Resources Center was funded by the California State Legislature in 1957 to provide research and training for water resources in the state. The Center was alternatively housed at UCLA, UC Berkeley, UC Davis, and UC Riverside through 2009.

In 2011, the California Institute for Water Resources was founded as a statewide entity within the University of California, the state's land grant institution, which supports Cooperative Extension.

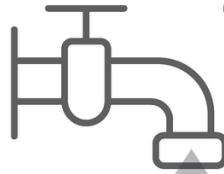
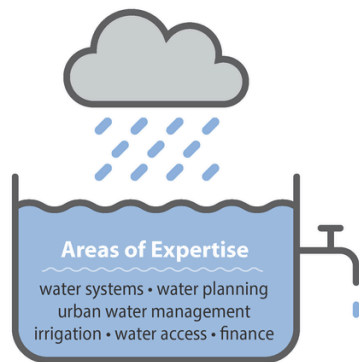


Yolo Bypass, Yolo County, California

IMPACTS

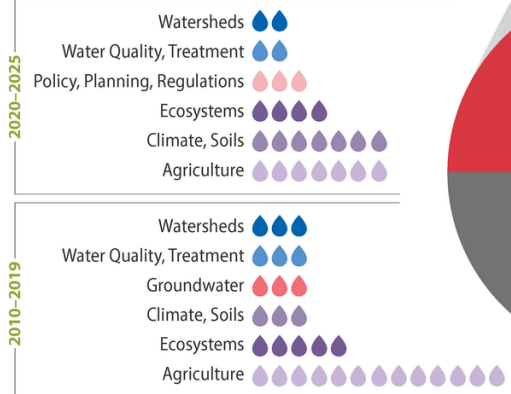


California Institute for Water Resources ciwr.ucanr.edu



- leadership team
- climate smart agriculture
- nitrogen-irrigation
- fellows and students
- affiliate researchers and 2023 early career research grants

Topics of CIWR-Funded Research Projects



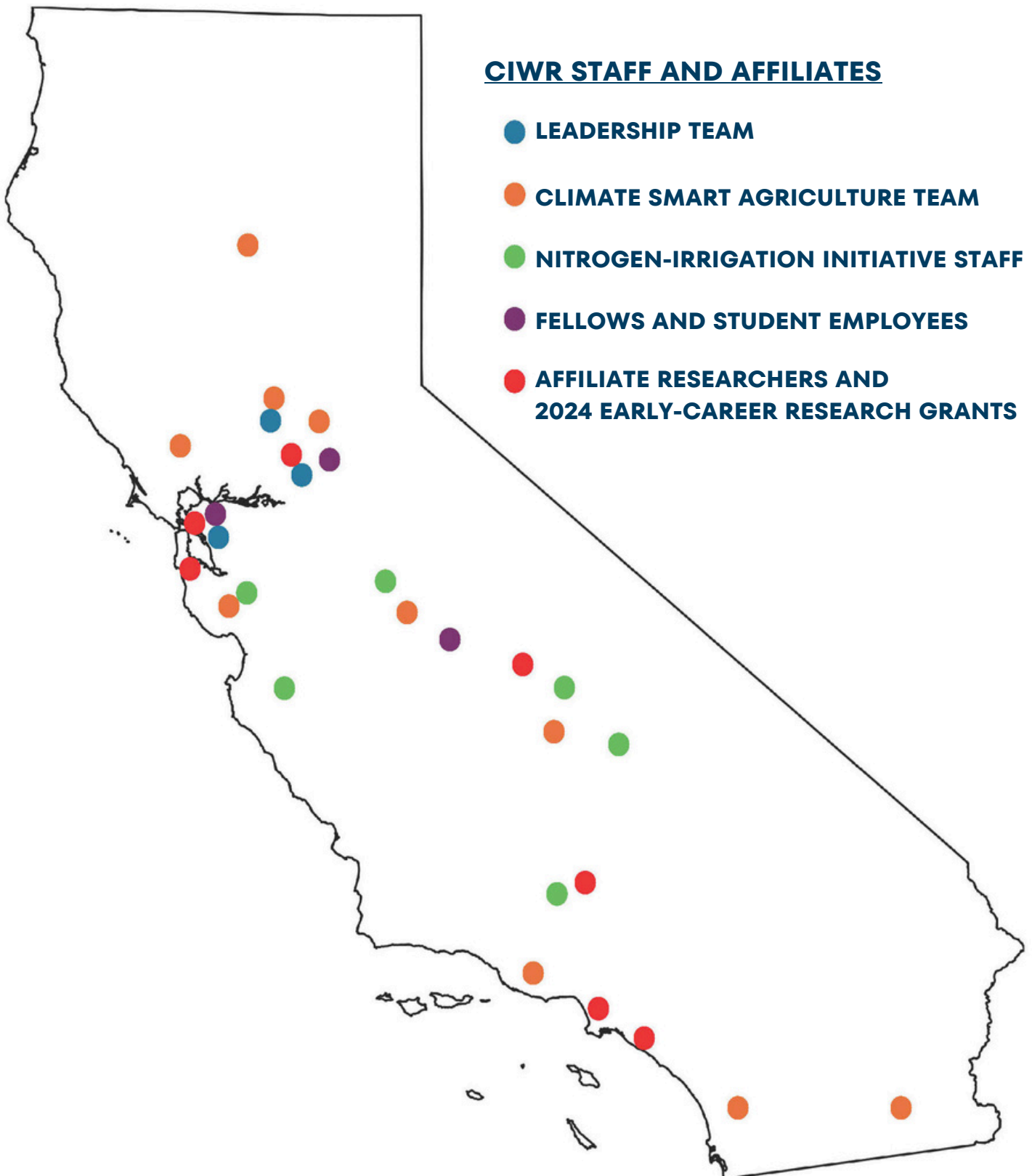
4 seasons of the walter talk podcast

1million views

10,000 followers

UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources

LOCATIONS



PEOPLE



Hope Hauptman, Ph.D.

Project Scientist

Erika Cassio Madrazo, Ph.D.

Project Scientist



Erik Porse, Ph.D.

Director, Cooperative

Extension Specialist

Divya Prakash, M.A..

Research Specialist



Camilo Salcedo, Ph.D.

Project Scientist

Rachel Shellabarger, Ph.D.

*Academic Coordinator, Nitrogen and
Irrigation Initiative Program Manager*



Sam Sandoval Solis, Ph.D.

*Faculty Affiliate, Professor of
Cooperative Extension, UC Davis*

Daniel Swain, Ph.D.

*Associate Professional Researcher,
Climate Scientist*



Hope Zabronsky, M.S.

*Academic Coordinator, Climate
Smart Agriculture Program Manager*

Climate Smart Agriculture Team



Nicki Anderson

*Community Educator, Ventura
& Santa Barbara Counties*



Caddie Bergren

Community Educator, Merced County



Amanda Charles

*Community Educator, Sonoma,
Marin, & Mendocino Counties*



Danielle Duyst

*Community Educator,
Tulare & Kern Counties*



Michael Jaquez

Community Educator, San Diego County



Lizzeth Medoza

*Community Educator, Glenn,
Butte, & Tehama Counties*



Heather Montgomery

*Community Educator, Sutter
& Yuba Counties*



Ana Resendiz

Community Educator, Imperial County



Bailey Smith Helman

*Community Educator, Santa Cruz,
Monterey, and Santa Clara Counties*

PROGRAMS & PROJECTS

CIWR runs programs and projects in collaboration with partners throughout California, all focused on applied research, extension, and education for 21st Century water management.

WATER SYSTEMS

Water Resources Research



CSA

Climate Smart Agriculture



NIWR

National Institutes for
Water Resources



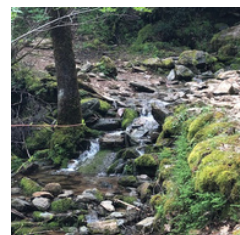
NII

Nitrogen and Irrigation Initiative



STUDENTS AND FELLOWS

Supporting Water Futures



WATER SYSTEMS

Research Projects in Water Resources

CIWR focuses on applied research for water management through systems-based and participatory approaches. We work with collaborators across California's universities and the Cooperative Extension.

Projects

California Wastewater Needs Assessment

As part of a first-of-its-kind assessment of water-related sanitation needs in California, CIWR conducted a baseline study of community-based needs and is visiting communities throughout the state experiencing wastewater challenges through a field campaign.

COEQWAL: Collaboratory for Equity in Water Allocation

CIWR is supporting a use case of the COEQWAL project focused on drinking water. The use case will evaluate risks to community water systems in the Sacramento-San Joaquin Delta dependent on surface water given changes in climate and system operations. CIWR is leading an evaluation of water system reliability in South-of-Delta water systems that rely on the State Water Project for demands.

Urban Water Systems and Finance

CIWR's projects are developing demand forecasting tools and evaluating changes in urban water agency finances over time with drought and system growth. We have developed statistical, hydrologic, and decision-support software to understand how urban water demand will change in the future and evaluate the financial viability of water systems using large-scale data analysis.

Systems Modeling of Nitrogen Management

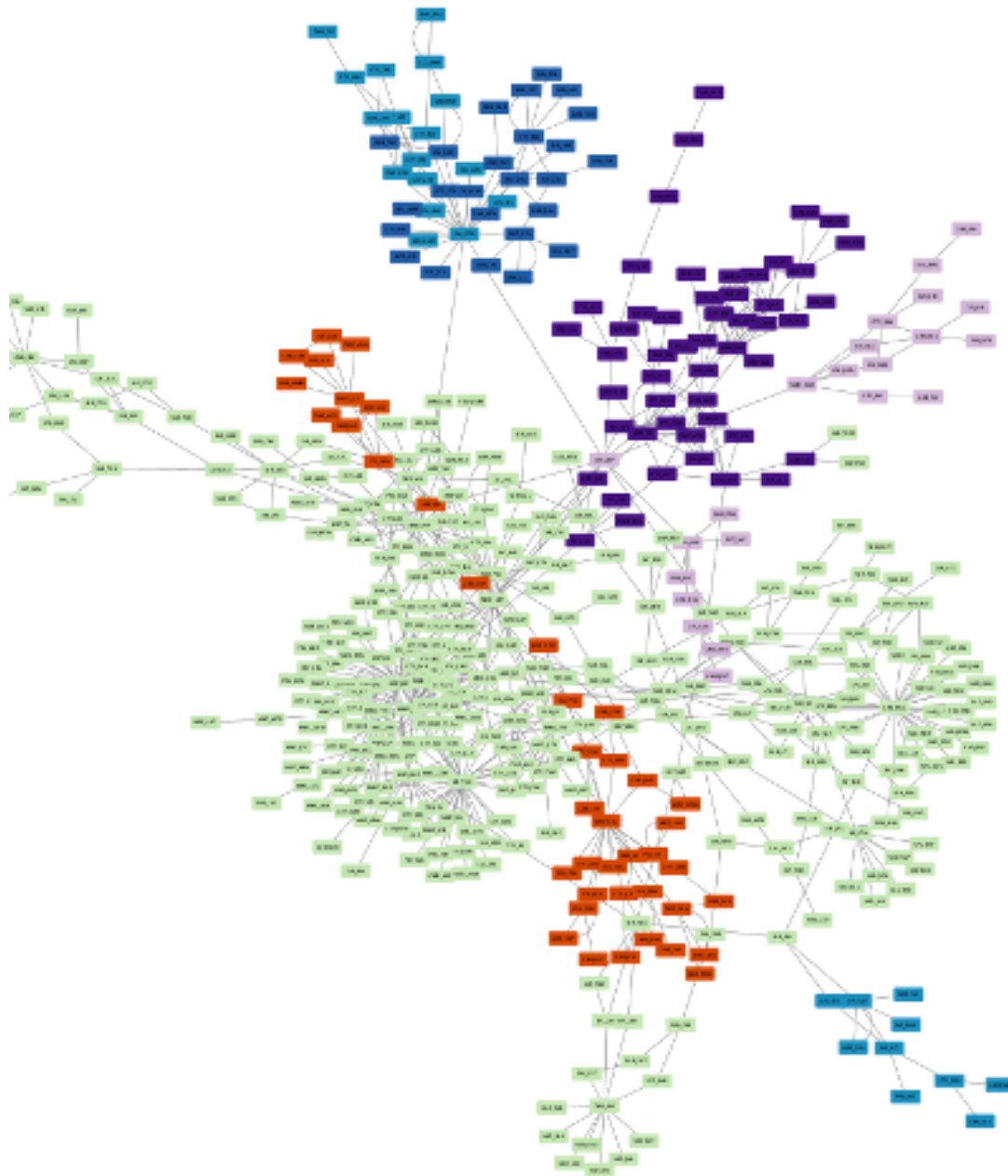
CIWR is evaluating drivers of decision-making for nitrogen management and developing statistical and simulation models to understand the effectiveness of enhanced management practices for fertilizer and irrigation use.



Sacramento River, California

Resilience Planning for Urban and Community Water Systems

As part of the COEQWAL project and through a drinking water use case led by Kristin Dobbin of UC Berkeley, CIWR is analyzing water supply resilience and vulnerability for Southern California urban and community water systems that rely on the State Water Project for a portion of supplies. CIWR is developing network modeling to evaluate future risks for urban water demand given current and future water availability.



Understanding Community-Based Needs for Wastewater and Sanitation

Through the California Wastewater Needs Assessment, a statewide collaboration led by Greg Pierce and the UCLA Luskin Center, CIWR conducted a baseline survey of community wastewater needs and began a field campaign to bring “stories to the data”. CIWR collected and analyzed survey results from 112 experts, non-profits, and managers to understand baseline needs and identify hotspots of sanitation issues.



CALIFORNIA WASTEWATER NEEDS ASSESSMENT (WWNA): BASELINE SURVEY

The California Wastewater Needs Assessment (WWNA) is a four-year project (2023-2027) to provide information on California's sanitation system needs for wastewater in communities served by both, small and large wastewater systems. In the project's early phases, the University of California Agriculture and Natural Resources (UCANR) team, conducted a baseline survey of sanitation issues to provide a rapid assessment that illustrates the scope of challenges faced by communities across the state.

Overview

The WWNA team conducted outreach to understand community sanitation needs.

The outreach was divided into three parts. First, a survey collected information on sanitation issues and needs in communities. Survey responses were sought from government agencies, technical assistance providers, private sector companies, journalists, academics, university extension, non-governmental organizations, and community advocates.

Second, a spatial database of communities with increased vulnerability to inadequate wastewater services was compiled based on survey results to locate potential hotspots. The database includes locations of mobile home and recreational vehicle (RV) parks, farmworker housing, federal and state campgrounds, disadvantaged communities, and tribal communities.

Third, a field campaign will visit sites identified by the survey and surrounding areas to provide more context to survey results and document first-hand accounts of known issues, these efforts will be described in a follow up report.



Part 1. Survey

Administer a baseline survey to understand community-based needs for sanitation access across the state as identified by experts and community leaders.



Part 2. Spatial Analysis

Create a spatial database with data on key types of communities and housing. Analyze the data for trends and clustering patterns, then publish the database for use by agencies and researchers.



Part 3. Field Campaign

Characterize on-the-ground issues of water-related sanitation through outreach by speaking with key actors and documenting stories. (In progress)

Part One. Survey Results

The WWNA project team sent the survey to 166 potential respondents and received 112 answers (response rate of 67%). Of the respondents, 71 offered information on specific communities where they know sanitation issues exist. From these, 36% said that they know of these issues because “they live or work” in the communities, and 34% said they have a “professional relationship or responsibility to the community,” all demonstrating that survey results largely draw from first-hand experiences.

Importantly, survey results refined definitions being used for two concepts:

“Sanitation is the access to safe, functional, affordable, and dignified collection and disposal of wastewater from human uses (domestic and industrial); including adequate sanitation systems, practices, and wastewater treatment to protect public health and the environment.”



“Sanitation equity is achieved when social, geographic, economic, cultural, and demographic attributes no longer predict people's access to or quality of sanitation.”

Starting in 2023, CIWR and the FEWS-US Lab at UC Merced (Colleen Naughton), in collaboration with UC Berkeley's GrizzlyCorps program, have developed and published educational resources for drinking water and water quality in California. We surveyed existing materials and developed fact sheets on water quality contaminants and testing, as the first in a line of extension materials available for communities and agencies to help provide information for communities with questions on water quality and safety.



FEWS-US Lab
at UC Merced
<https://fews-us.org/>)

List of Contaminants

Primary Drinking Standards

Primary drinking water standards protect public health by limiting the levels of contaminants in drinking water that pose significant health risks. [9]

Secondary Drinking Standards

Secondary standards include contaminants that may affect cosmetic or aesthetic characteristics of drinking water (taste, smell, color) [10]

REGULATED CONTAMINANTS WITH PRIMARY DRINKING WATER STANDARDS: Enforceable standards and treatment technologies to protect public health by limiting the levels of contaminants in drinking water. The most regulated contaminants listed are 1,500.									
SUBSTANCE (UNIT OF MEASURE)	YEAR	MCL (MGL)	PHM (DGL)	AVERAGE (DGL)	RANGE	DETECTED	LOCATION	VIOLATION	TYPICAL SOURCE
Asbestos (ng/L)	2012	0	0.004	3.5	ND-7.7	ND	Environ	Environ	Environ of natural deposits, from outcrops, gases and electronic production wastes
Barium (mg/L)	2012	2	0.21	0.07-0.47	ND	ND	Environ	Environ	Discharges of all mining wastes and from metal refineries, environ of natural deposits
Cadmium (mg/L)	2012	0.05	0.01	0.01	0.01-1.04	ND	Environ	Environ	Discharge, water discharges, added to treatment
Chromium [Total] (mg/L)	2012	0	100	0.01	ND-16	ND	Environ	Environ	Discharge from steel and pulp mills and chrome plating, environ of natural deposits
Fluoride (mg/L)	2012	2	1	0.11	ND-18	ND	Environ	Environ	Environ of natural deposits, water additive for promoting strong teeth; discharge from fertilizer and fertilizer manufacture
Organophosphorus Pesticides (ppb)	2012	0	0	0.1	ND-11	ND	Environ	Environ	Environ of natural deposits
Organophosphorus Pesticides (ppb)	2012	0	0	0.1	ND-11	ND	Environ	Environ	Environ of natural deposits
Radon (Bq/L [226 Bq/L])	2012	5	0.05	0.01	ND-11	ND	Environ	Environ	Environ of natural deposits
Nitrate (as N) (mg/L)	2012	10	10	2.4	0.03-5.0	ND	Environ	Environ	Discharge from leaching from fertilizer use, leaching from septic tanks and sewage, environ of natural deposits
Trichloroethylene (PCE) (mg/L)	2012	5	0.06	0.06	ND-2.2	ND	Environ	Environ	Discharge from factories, dry cleaners, and auto shops (metal degreaser)
Total Trihalomethanes (TTHM) (mg/L)	2012	0	N/A	0.25	ND-10	ND	Environ	Environ	Byproduct of drinking water disinfection
Uranium (mg/L)	2012	0	0.01	0.01	ND-0.7	ND	Environ	Environ	Environ of natural deposits

REGULATED CONTAMINANTS WITH SECONDARY DRINKING WATER STANDARDS: There are 96 PHEs, 363 Gs, or mandatory secondary health effects legislation for these contaminants. (Environ of natural deposits, water additive for promoting strong teeth; discharge from fertilizer use, leaching from septic tanks and sewage, environ of natural deposits)									
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References [1] - [10] are located here:

FWEWS
LAB

Website: <https://fweews.us.org/>
Email: enoughnot2@buccinert.edu
Number: (209) 259-8651

GET IN
TOUCH

Website: <https://ciwr.ucan.edu/>
Email: annw@ucan.edu
Number: (530) 240-2612

UC ANR
CIWR



Climate Smart Agriculture Program

In 2018, UC ANR and the California Department of Food and Agriculture (CDFA) developed a joint program to provide technical assistance in applying for and implementing Climate Smart Agriculture practices, which help agricultural producers build climate change resilience, increase water-use efficiency, and reduce greenhouse gas emissions.

UC ANR's team of Community Education Specialists provides technical assistance, outreach, and education to increase the adoption of climate smart agriculture practices targeted at soil health, manure management, and water use efficiency across California. Through the Climate Smart Agriculture team's programs and outreach, we:

- Establish and maintain grower connections
- Develop and present flyers, case studies, blogs, and newsletters
- Lead trainings, field days, on-farm visits, and workshops
- Participate in research and communicate findings
- Support project design, application, implementation, monitoring, and verification of CDFA's financial incentive programs
- Tailor assistance to especially support socially disadvantaged, non-English speaking, and priority population farmers and ranchers

Impacts

Since 2019, UC ANR's Climate Smart Agriculture Team has provided in-depth technical assistance to more than 2,700 farmers and ranchers in 33 counties, including presentations at 56 field days. The CSA team has supported over 506 successful projects that are expected to save an estimated 10.2 billion gallons of water and reduce greenhouse gas emissions by more than 433,800 metric tons of carbon dioxide-equivalent.



On-Farm Training with the Climate Smart Agriculture Team

NIWR

National Institutes for Water Resources

CIWR represents California in the National Institutes for Water Resources, a national network of water institutes in states and territories. NIWR institutes work with the U.S. Geological Survey (USGS) to support water research and student training through the Water Resources Research Act (WRRRA). In California, CIWR uses WRRRA funds to support projects by early-career researchers at University of California campuses, California State University campuses, and UC Cooperative Extension (UCCE) offices. For the 2023-2025 grant cycle, CIWR's funded projects include:

- **Jackie Atim** of Kearney Agricultural Research and Extension Center (sorghum production)
- **Nail Moonilall** of UC Davis (regenerative agriculture)
- **Erin Bray** of San Francisco State University (river modeling)
- **Kristin Dobbin** of UC Berkeley (drinking water system consolidations)
- **Sarah Light** of UCCE Sutter-Yuba (cover crops)
- **Abdelmoneim (Moneim) Mohamed** of UCCE Stanislaus, San Joaquin, and Merced Counties (modeling for deficit irrigation)
- **Chris Olivares Martinez** of UC Irvine (groundwater contamination and climate change)
- **Jorge Pesantez** of CSU Fresno (water distribution systems demand)
- **Danielle Zoe Rivera** of UC Berkeley (community-based flood risk resilience)





Nitrogen and Irrigation Initiative

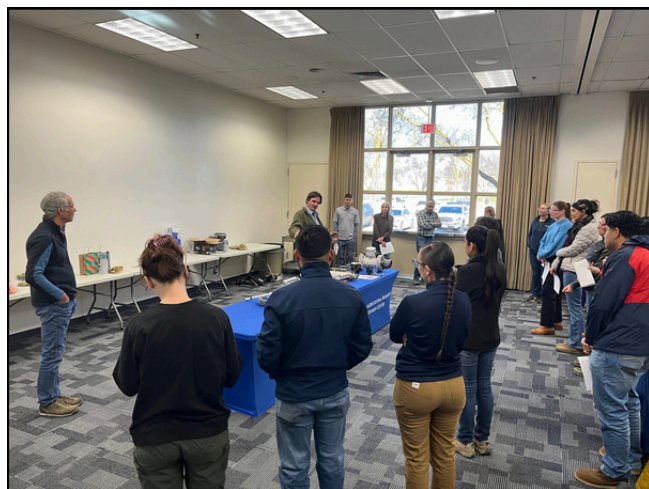
The Nitrogen and Irrigation Initiative (NII) is a joint program for research and extension, with the goal of improving nitrogen and irrigation management in California. Through the program, UC ANR Advisors, Specialists, and Staff Research Associates (SRAs) deliver educational content, training, and consultations to growers and consultants in the San Joaquin Valley and Central Coast. The NII is a collaboration of CDFA, UC ANR, and UC Davis. Within UC ANR, the program is led by the Kearney Agricultural Research and Extension Center (KARE) and CIWR.

We work directly with growers, farm workers, and consultants to improve nitrogen use and irrigation efficiency. UC ANR Advisors and staff researchers collaborate with growers to deliver science-based, practical information for on-farm nitrogen and water management.

Activities

The NII program focuses on four main activities to improve irrigation and fertilizer management:

- *Educational Resources*-
Printed materials, videos
- *On-Farm Trials*-
Demonstrations to promote best practices for irrigation and nitrogen management
- *Training Events*-
Webinars, workshops, field days, trainings, and one-on-one field visits
- *Grower Consultations*-
Individualized grower consultations to make recommendations and assist with implementation

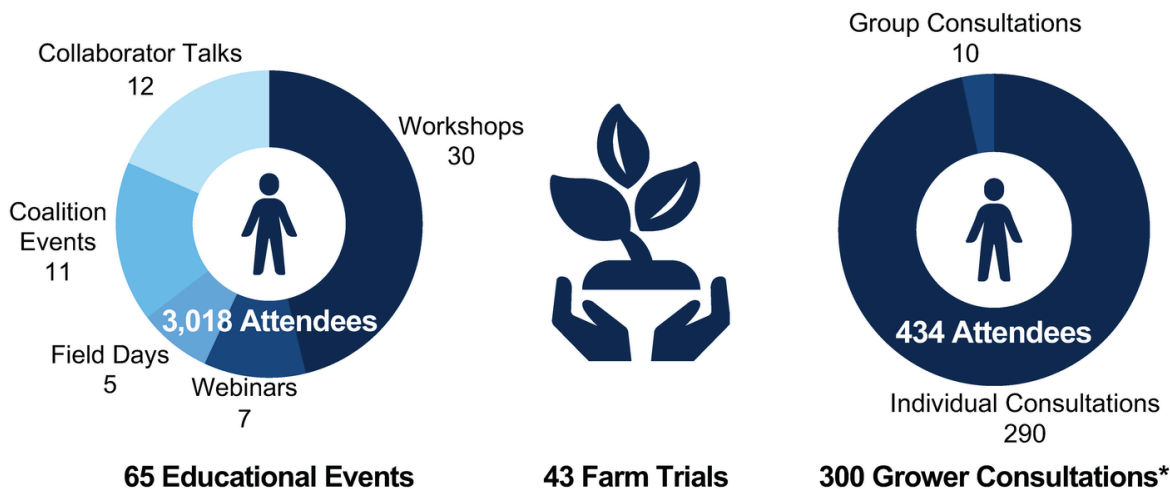


Nitrogen Management Training Workshop

<https://nii.ucdavis.edu/>

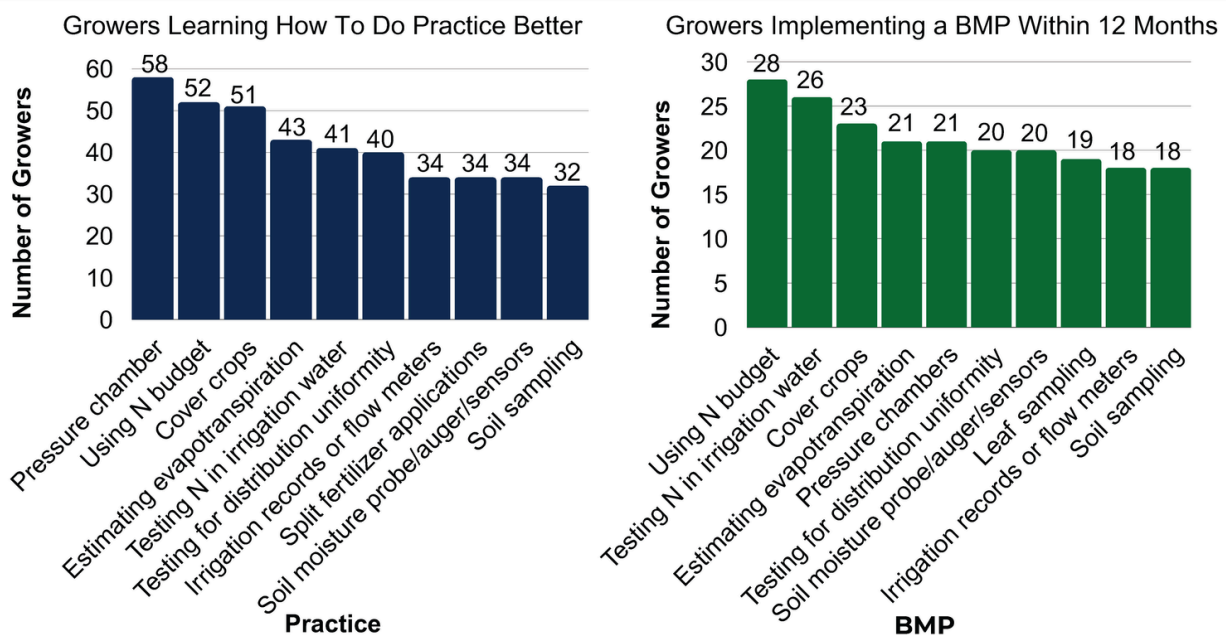
NII Impacts

OUTREACH ACTIVITIES



*Individual and group consultations include both new and follow-up visits to provide on-farm assistance.

EARLY OUTCOMES & LONG-TERM IMPACTS



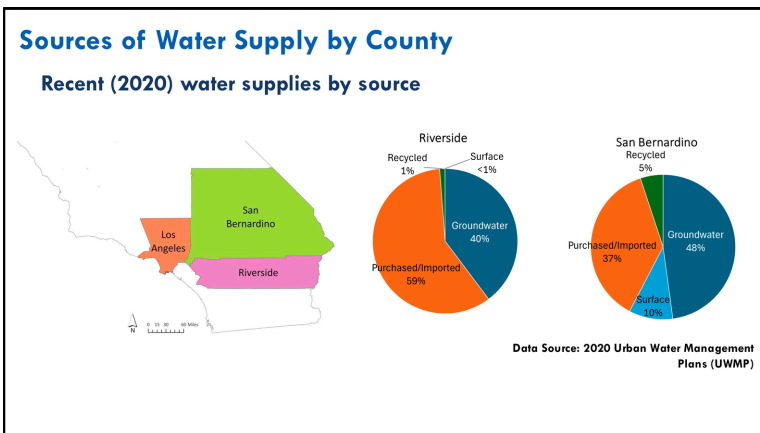
STUDENTS AND FELLOWS

Supporting Water Futures

Student employees and fellows at CIWR work with our staff on applied research projects for water resources policy and management. Our students undertake projects ranging from data analysis and modeling to development of extension and outreach materials. Since 2023, CIWR has hosted fellows from UC Berkeley's GrizzlyCorps program.

Examples of Projects

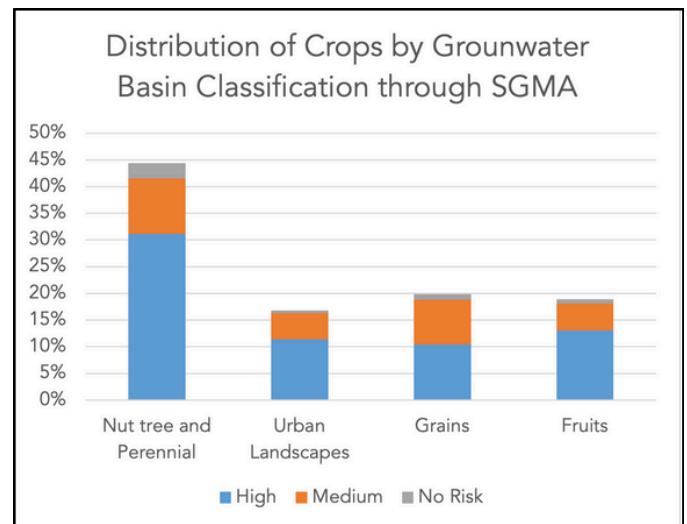
Assessing Urban Water Supply Resilience



Evaluating Crops in Groundwater Dependent Areas of California

2024 CIWR Student Employees and Fellows

Celeste Navarrete (GrizzlyCorps Fellow)
Omar Elnashar (UC Davis)
Bethany Rader (Oregon State University)
Ben Witeck (UC Berkeley)
Riley Currey (Sacramento State)





EVENTS

In 2024, CIWR sponsored more than 100 events with partners through the Climate Smart Agriculture program, the Nitrogen and Irrigation Initiative, and projects.

Selected Workshops, Presentations, and Events

Healthy Soils and SWEEP at Yolo County Spray Safe Event. Presentation on *Soil Health and Water Efficiency Practices*. Feb. 7, 2024.

2024 Irrigation Training Workshop with Climate Smart Agriculture and NII Programs. Parlier, CA. February 21-22, 2023

Wastewater Needs Assessment Advisory Group: Year 2 Quarter 1 Meeting: Presentation on Baseline Survey of Community Needs. (Virtual). July 26, 2024. (Co-Organizers).

COEQWAL Drinking Water Use Case: Public Workshop (Virtual). August 13, 2024. (Co-Organizers).

Workshop to Plan for Upcoming Commercial, Industrial, and Institutional Landscape Irrigation Regulations. May 14, 2024. Sacramento, CA. (Co-Organizers).

Water and Environmental Justice in California. American Water Resources Association 2024 Conference. Part of a panel on scaling water solutions for key challenges. September 30, 2024. St. Louis, MO. (Co-Organizers).

Selected Workshops, Presentations, and Events (continued)

Groundwater Management, Science, and Policy in the Western U.S. American Water Resources Association Annual Conference. St. Louis, MO. September 30, 2024. (Panel Co-Organizers).

Integrated Water and Land Management Transitions in California: Merging Research and Policy. October 16-17, 2024. UC Merced. (co-sponsored with UC Merced's Secure Water Future).

Innovative Research: Engaging With Universities. California Water Efficiency Partnership. San Jose, CA. May 30, 2024. (Panel Participant).

Enhancing Utility Operations Through Academic Collaborations. California Water Association 2024 Conference. November 7, 2024. Monterey, CA. (Panel Participant).

Droughts, Atmospheric Rivers, and Floods, Oh My! Sunnyvale Sustainability Speaker Series: Water in a Changing Climate. January 24, 2024. (Panel Participant).

Water Supplier-Driven Research Accelerator Roundtable. California Water Data Summit. August 15, 2024. San Diego, CA (Session Co-Organizers).

Climate Smart Agriculture Adoption Across California. 2024 California Climate and Agriculture Summit. CalCAN Annual Conference. Presentation. Davis, CA. October 29-30, 2024.

CDFA Healthy Soils Week Farm Tour with California Legislative Offices. Presentation on *Technical Assistance to Agricultural Producers*. Woodland, CA. December 4, 2024. (Co-Organizers).

Climate Smart Agriculture Incentives for Producers. 2024 Almond Board of California Annual Conference. Sacramento CA. December 10-12, 2024.

Tour of Dos Rios State Park, Modesto, CA



PUBLICATIONS

Reports, Articles, and Abstracts

Gross, Marie-Philine, Alvar Escriva-Bou, Erik Porse, and Andrea Cominola. "CaRDS-the statewide California Residential water Demand and Supply open dataset." *Scientific Data* 11, no. 1 (2024): 632.

Courtney Crosson, Stephanie Pincetl, Caroline Scruggs, Neha Gupta, Rashi Bhushan, Sybil Sharvelle, Erik Porse, Andrea Achilli, Adriana Zuniga-Teran, Gregory Pierce, Dominic L. Boccelli, Charles P. Gerba, Melinda Morgan, Tzahi Y. Cath, Bruce Thomson, Steve Baule, Steve Glass, Mark Gold, James MacAdam, Luke Cole, Mead Mier, Catlow Shippek, and Thomas Meixner. (2024). "Advancing a Net Zero Urban Water Future in the United States Southwest: Governance and Policy Challenges and Future Needs." (2024). *Environmental Science and Technology Water*.

Nitrogen and Irrigation Initiative Impact Report. (2024). Nitrogen and Irrigation Initiative Progress Report: Fall 2021-Summer 2024. (Co-Author). Prepared by the California Department of Food and Agriculture and the California Institute for Water Resources.

Erik Porse. Policy Approaches to Wastewater Management in the U.S. Rosenberg International Forum on Water Policy: Madrid Workshop. January 28, 2025. Madrid, Spain.

Marie-Philine Gross, Alvar Escriva-Bou, Erik Porse, and Andrea Cominola. Leveraging explainable Machine Learning to discover trade-offs between water supply and demand management strategies in California. European Geophysical Union 2024 Conference. April 18, 2024. Vienna, Austria.

Pathways to Climate Smart Agriculture in the San Diego Region of California. Samuel Ikendi, Vikram Koundinya, Esther Lofton, Heidi Holmquist, Erin Spaniel, Hope Zabronsky, Prakash Jha, Lauren Parker, Natalia Pinzon, Lesle Roche, Mark Cooper, Stephen Ostojka, Daniele Zaccaria, and Tapan Pathak. (2024). Conference Proceedings: National American Association for Agricultural Education. Manhattan, Kansas.

CIWR Supported Research

Pesantez, J. E., Vizanko, B., & Berglund, E. Z. (2024). Modeling a game to shift peak water demands: WaterTime leaderboard. *Journal of Cleaner Production*, 470, 143241.

NUMBERS

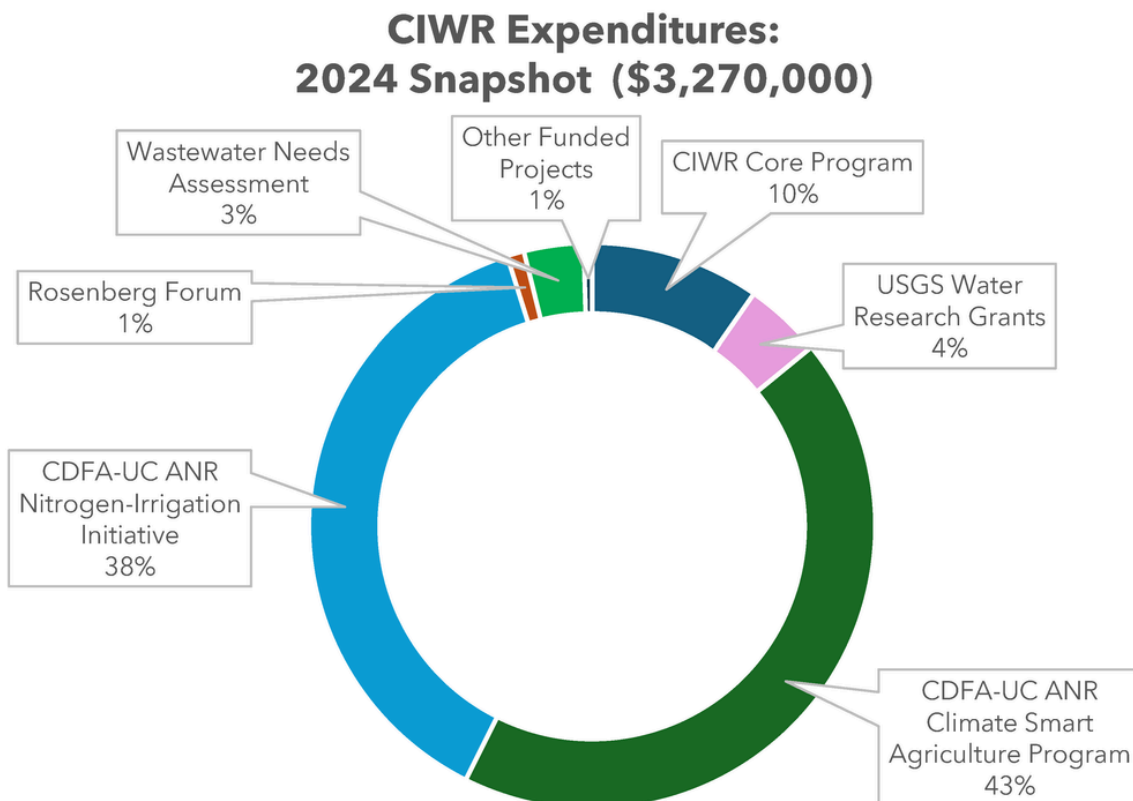
Networks of Collaboration

As a statewide program within the University of California, our staff, students, and fellows are based in counties and at campuses across California to serve communities throughout the state.

31 researchers, educators, students, and fellows

28 counties

\$3.2 million of state and federal funding for projects throughout California.



COMMUNICATIONS

An Active Voice in California Water

CIWR is a leader in research communications for water management in California. We promote innovative and diverse views in water management through social media, webinars, and outreach, including Twitter/X (10,000+ followers), YouTube (1 million+ views), LinkedIn, Bluesky, and The Confluence Blog.

CIWR maintains informational resources and tools on drought management, water research history, and nitrogen management.

CIWR's Lead Faculty Affiliate Sam Sandoval Solis maintains the

California Virtual Water Tour

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UC ANR / The Confluence / Patterns and drivers of water-wise landscaping for urban water conservation

The Confluence

Article

Patterns and drivers of water-wise landscaping for urban water conservation

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Front yard with water-wise landscaping. Photo Credit: Cadenasso Lab, UC Davis

California's urban water agencies have long relied on conservation measures to promote reliability and manage costs. Since landscapes are a large portion of water demand in California cities, many water agencies encourage water conservation by incentivizing the replacement of water-intensive turf lawns with water-efficient or "water-wise" landscaping.

ALUMNI

Leadership

We all stand on shoulders. CIWR's current programs and projects are a direct result of a decade of work by its founders:

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is a hub for water research, extension, and education programs in California. Our mission is to bring knowledge into practice through collaborations that address water resource challenges.



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