

# Water Issues and the University of California's Research Agenda



**Supporting Vibrant Ecosystems,  
Healthy People & Economic  
Development for California**

Dr. Glenda Humiston  
February 2, 2016



# UC CE

## UC Cooperative Extension

- 200+ local Advisors who live and work in the communities they serve
- 130+ Campus-based UCCE Specialists

## Agricultural Experiment Station

- 650+ academic researchers across the entire UC system

## Research and Extension Centers

- 9 locations statewide

## Statewide Programs & Institutes

- Ag Issues Center
- Integrated Pest Management Center
- Nutrition Policy Institute
- Sustainable Ag Research & Education
- Water Research Institute
- Youth Development and 4-H



University of California, Division of Agriculture and Natural Resources  
**California Institute for Water Resources**

*Developing research-based solutions to water-related challenges*



**Home**  
 About the Institute  
 Programs  
 Research and Outreach Projects  
 Tools and Resources  
 Publications  
 Keep in Touch

**QUICK LINKS**  
 Our Blog: The Confluence  
 Drought resources  
 Nitrogen Hazard Index

California Institute for Water Resources

**Drought resources**  
 In the midst of historic drought, California's academic institutions serve as a tremendous resource.  
[Visit our drought pages](#) for events, experts, and informational resources.



**Follow us on Twitter**

 **UC Water Institute:**  
 RT @CAagwater: California Drought Causes... River Flooding?  
<http://t.co/FGMXolCb0Y> #cawater #cadrought  
 Posted 6 hours ago

 **UC Water Institute:**  
 RT @ucanr: Join us tomorrow at 10AM PST to talk about clean and #sustainable #water access at our #TwitterChat w/@SaludToday!  
<http://t.co/n...>  
 Posted 8 hours ago

California hub of the national network of water research institutes supported by the federal Water Resources Research Act of 1964.

<http://ciwr.ucanr.edu/>

- ✓ Integrate CA's research, extension, & education programs
- ✓ Connect academic institutions with water managers & users
- ✓ Develop relevant and timely science-based information for improved decision-making

- Gwen Arnold, UC Davis: efforts [to locally restrict high-volume hydraulic fracturing](#), a new and controversial natural gas and oil drilling in California.
- Roya Bahreini, UC Riverside: [water management and air quality in the Salton Sea](#), where low water levels are leading to increased dust from the dry lakebed.
- Igor Lacan, UC Agriculture and Natural Resources: [performance of trees used in street side stormwater management](#) to increase groundwater infiltration.
- Jonathon London and Carolina Balazs, UC Davis: assessing [Integrated Regional Water Management and environmental justice](#) approaches to address lack of safe and affordable water in disadvantaged communities.
- Clarissa Nobile, UC Merced: high-tech metagenomic approach to research [biofouling of groundwater wells across the state](#), which has the potential to be a costly challenge.

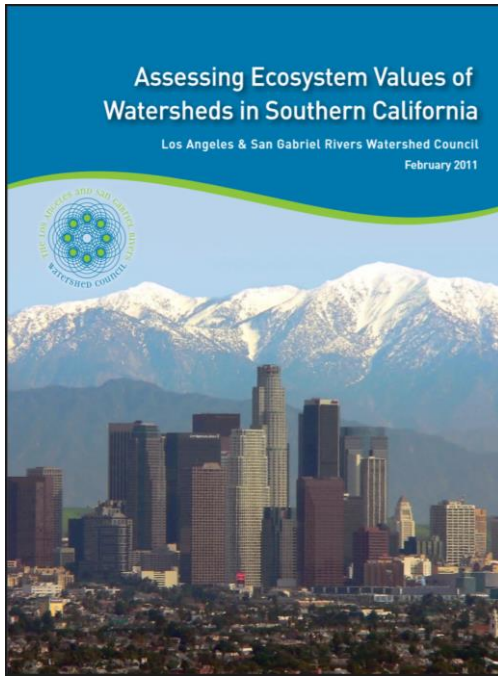


The New Zealand mudsnail, *Potamopyrgus antipodarum*, is an aquatic invasive species first found in the US in 1987, now spread throughout the western states. First seen in California late 1990's and now in the Santa Monica Mountains and elsewhere in CA.

## “New Zealand Mudsnails in the Santa Clara River”.

UCSB: Tom Dudley

UCCE Advisor: Sabrina Drill



**Project Lead:** UCLA Institute of the Environment

**Partners:**

CA Office of Environmental Health Hazard Assessment  
Los Angeles & San Gabriel Rivers Watershed Council  
Pacific Southwest Research Service, USFS  
University of Southern California

**Technical Advisory Committee Member:**

UC Cooperative Extension Advisor: Sabrina Drill

Science-based, report card approach designed specifically to assess the health of environment and communities in the Southern California region at the watershed-scale. The approach can be implemented by agencies that have regulatory or other responsibility in land, water, air, and infrastructural management.



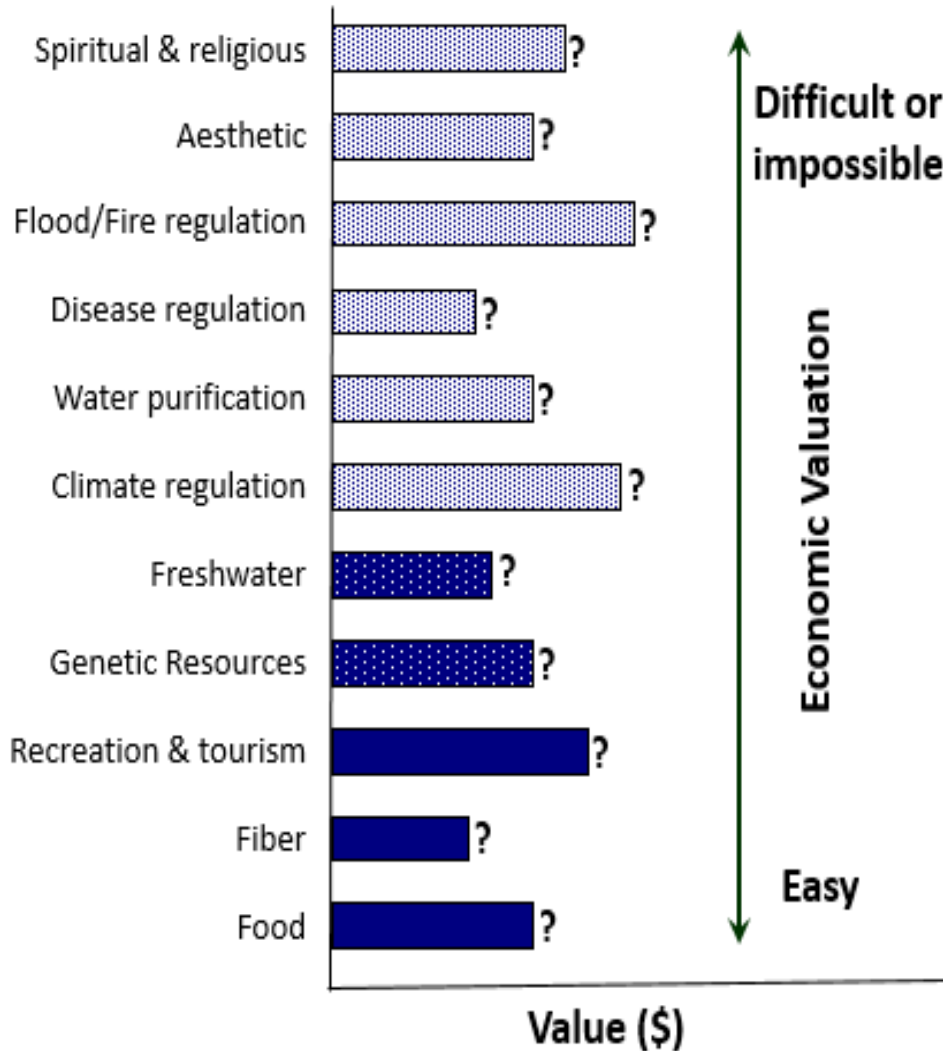
The UC ANR California Naturalist Program fosters a diverse community of naturalists to promote stewardship of California's natural resources through education and service.



California Naturalist Program works with UC Natural Reserve System on programs and to train volunteers. Initial sites include:

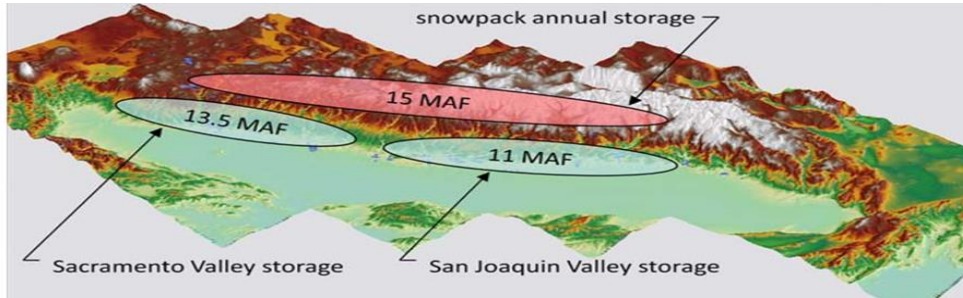
- ✓ UCB Sagehen Creek Field Station
- ✓ UCM Merced Vernal Pools and Grassland Reserve
- ✓ UCM Sierra Nevada Research Station-Yosemite Field Station
- ✓ UCSB Sedgewick Reserve
- ✓ UCSB Kenneth Norris Rancho Marino Reserve at Camp Ocean Pines
- ✓ UCSD Elliott Chaparral Reserve
- ✓ UCSD Kendall-Frost Mission Bay Marsh Reserve
- ✓ UCSD Dawson Los Monos Canyon Reserve

# Ecosystem Services are Vital Natural Capital





# Healthy watersheds in Sierra & Cascade ranges could produce 9–16% more water for California.



**“Effect of forest management on water yields and other ecosystem services in Sierra Nevada forests”.**

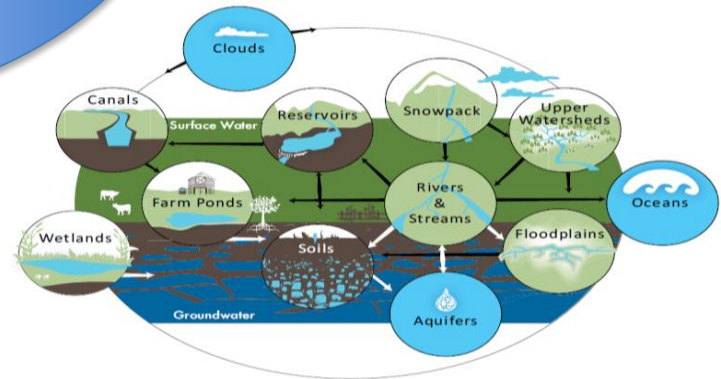
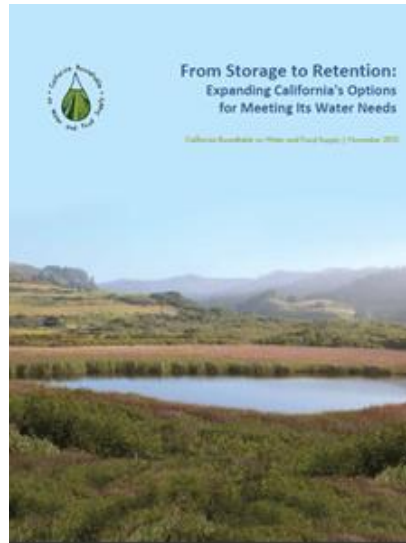
UCM: Roger Bales

UCB AES Faculty: Kevin O’Hara

UCCE Specialist: Bill Stewart

UCCE Advisor: Susan Kocher

[http://aginnovations.org/images/uploads/CRWFS\\_Storage\\_FI\\_NAL.pdf](http://aginnovations.org/images/uploads/CRWFS_Storage_FI_NAL.pdf)



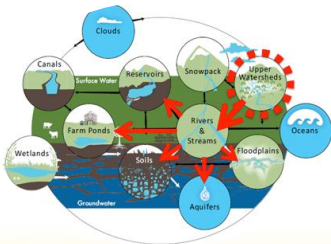
# “Layers” of Funding & Economic Activity Will be Needed



Value of Biobased Products will help finance forest health activities – probably not enough.



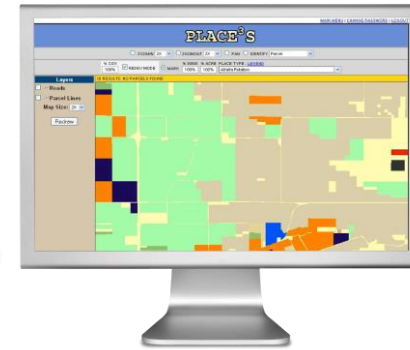
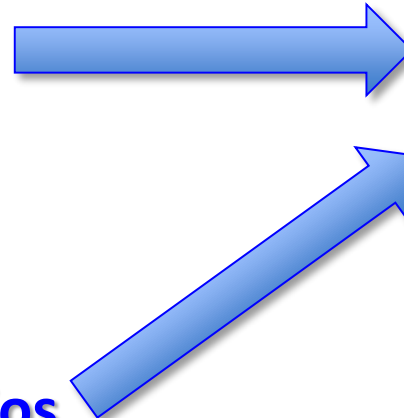
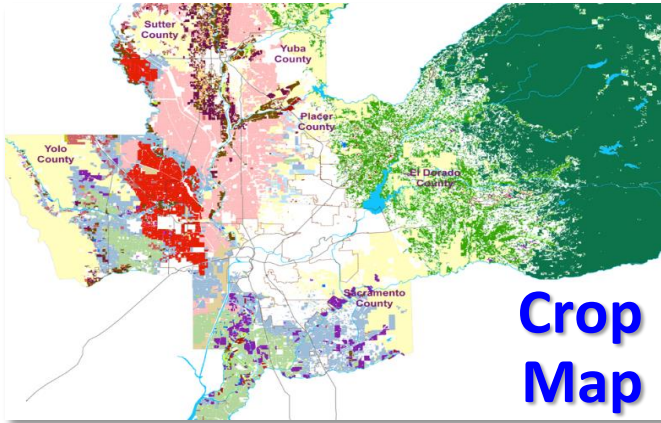
Augment with Cap & Trade Credits



Need to monetize value of “reclaimed” water from forest health activities!

# Rural-Urban Connections Strategy

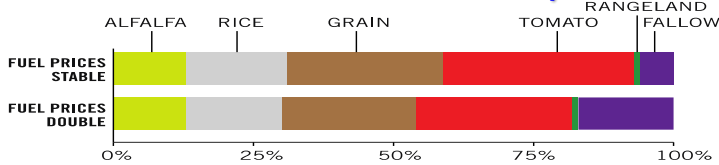
Sacramento Area Council of Governments • [www.sacog.org/RUCS](http://www.sacog.org/RUCS)



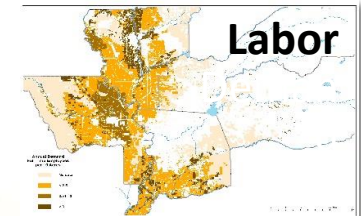
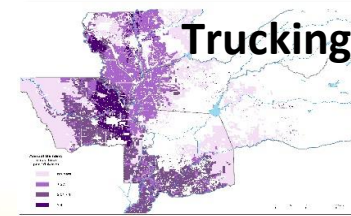
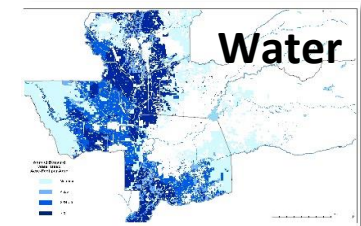
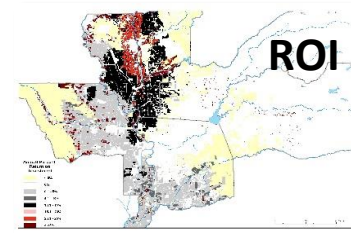
**RUCS  
Scenario  
Analysis  
Tool**

## Modules Informing Scenarios

### Market Affects on Crops



### Local Market Food Production



Healthy Communities Healthy Food Systems Healthy Environments

**Healthy Californians**

University of California  
Agriculture and Natural Resources

# Pursuing Net-Zero Water Use for Ag

U.C. Davis: Jess Jackson Sustainable Winery Building

Showcasing “smart” technology that maximizes environmental capabilities of winery, brewery, and food-processing complex.

- ✓ Automated systems to clean equipment
- ✓ High-purity filtration of rainwater
- ✓ Off-peak processing, ...and more!



**90% of water & chemicals from each cleaning cycle is captured and processed for future use, being used as many as 10 times.**



# Working Landscapes

*Agriculture ~ Forests ~ Fisheries ~ Mining  
Watersheds ~ Energy ~ Recreation ~ Habitat*

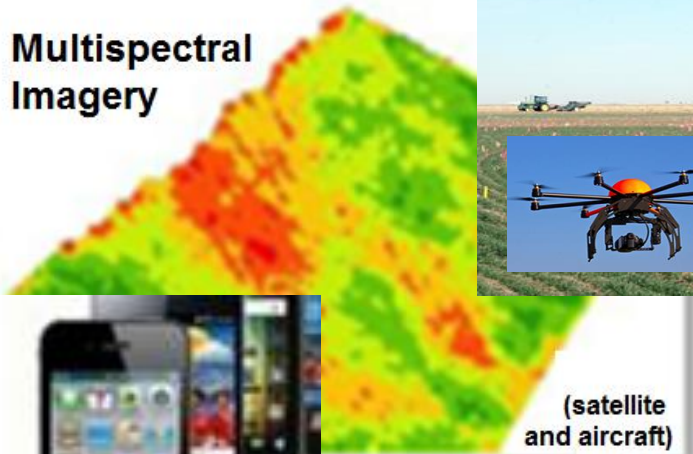


**1.2 Million Jobs in California**  
**\$318 Billion Direct Sales & Exports**  
**272,000+ New Jobs in Five Years**

[www.caeconomy.org/resources/entry/2013-california-economic-summit-playbook](http://www.caeconomy.org/resources/entry/2013-california-economic-summit-playbook)  
2012 Data developed by Center of Excellence Research Office, CA Community Colleges

# Growth in Food, Fiber & Natural Resources' Sectors Require Innovation & New Tech

Multispectral Imagery



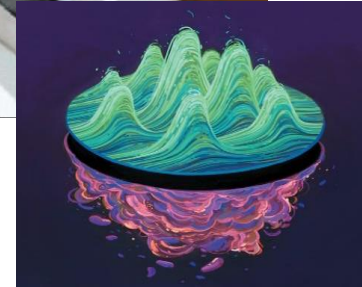
Ag Drones

Test kit detects foodborne pathogens

By Jenni Spinner, 09-Jul-2013



Food Safety



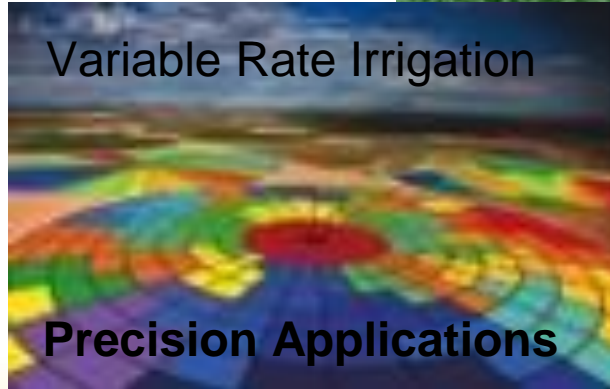
Wireless Soil Sensors



(satellite and aircraft)



Variable Rate Irrigation



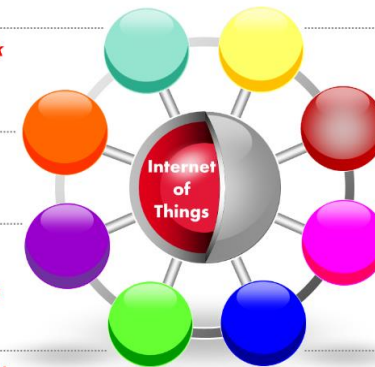
Precision Applications

A dynamic global network infrastructure

with self configuring capabilities

based on standard and interoperable communication protocols

where physical and virtual "things"



have identities, physical attributes, and virtual personalities

use intelligent interfaces,

and are seamlessly integrated

into the information network.

Healthy Communities Healthy Food Systems Healthy Environments

Healthy Californians

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# Strategy for a Sustainable California

**= SYNERGY**

*Synergia (Greek):* creation of a whole greater than the sum of its parts.

*Synergos (Greek):* "working together".



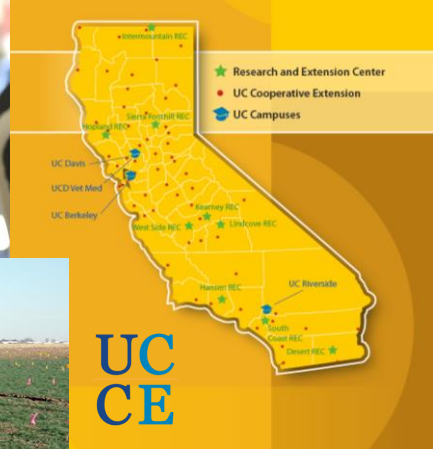
Healthy Communities Healthy Food Systems Healthy Environments

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Lindcove Research and Extension Center



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