

Thanks to Students and CWEMF

Jay R. Lund

Has-been Professor of Civil and Environmental Engineering

Vice-Director, Center for Watershed Sciences

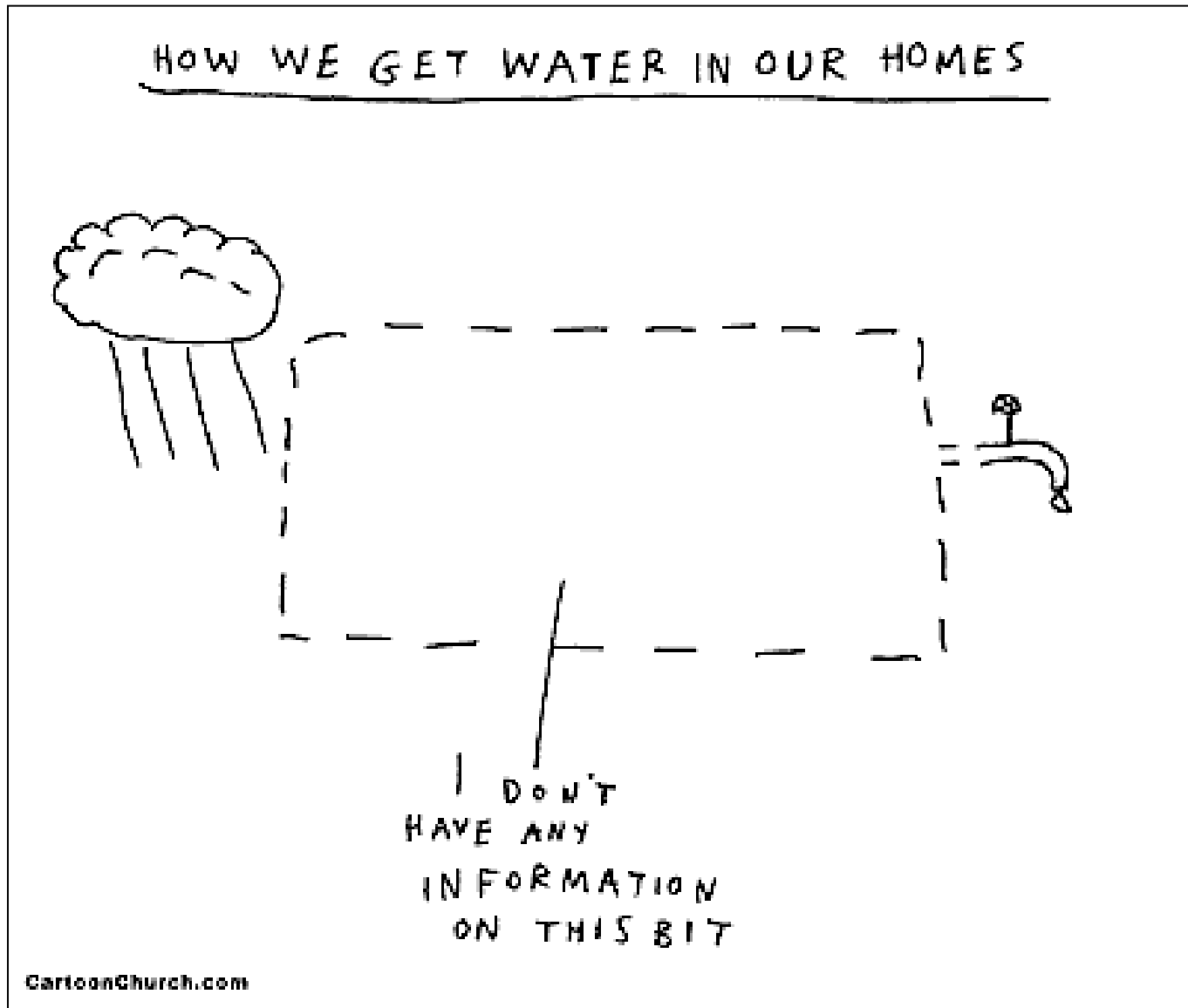
University of California, Davis

CaliforniaWaterBlog.com

NOBODY LIKES US
"BIG PICTURE"
PEOPLE



Ubiquity of substantial ignorance



Thanks to CWEMF!

1. How I began learning about California's water system
2. Great venue for engaging & connecting students
3. Learning from broad range of folks
4. A great place to test ideas and communications
5. Fun people, problems, and ideas!

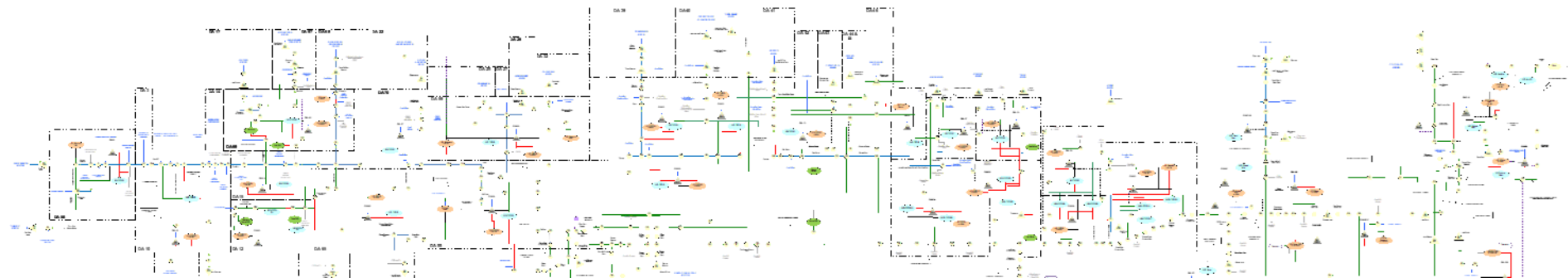
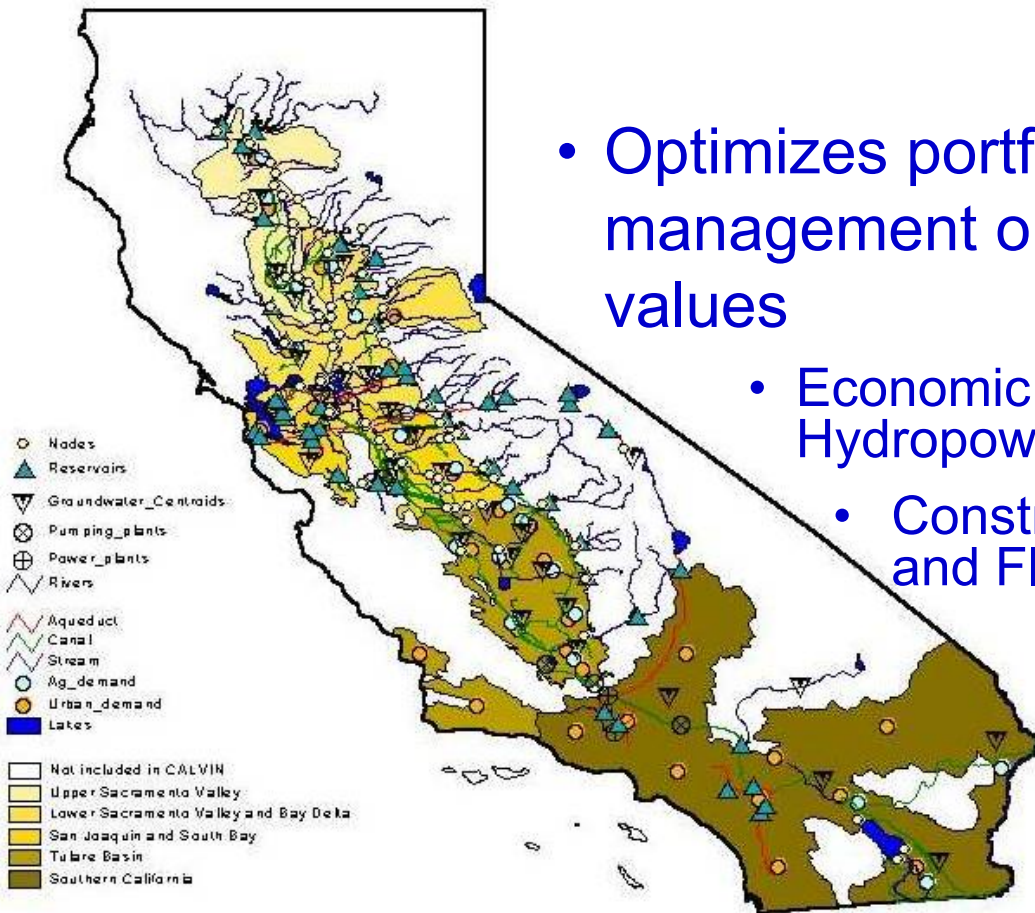


Yikes!

CALVIN - California Water Model

- Optimizes portfolio of supply and demand management options and economic values
- Economic values for Agricultural, Urban, & Hydropower Uses, and operating costs
- Constraints for Environmental Uses and Flows

Forces quantitative understanding of integrated water and economic system



Real work done by

Learning from hundreds of students!

Dr. Mimi Jenkins

Dr. Kenneth W. Kirby

Dr. Stacy K. Tanaka

Prof. Manuel Pulido

Dr. Siwa M. Msangi

Prof. Mustafa Dogan

Brad D. Newlin

Melanie Taubert

Prof. Tingju Zhu

Kristen B. Ward

Dr. Inês Ferreira

Wyatt Arnold

Matthew D. Davis

Christina Buck

Professor Richard Howitt

Dr. Andrew J. Draper

Prof. Josue Medellin-Azuara

Prof. Julien Harou

Prof. Sarah Null

Karandev Singh

Prof. Guilherme Marques

Dr. Arnaud Reynaud

Brian J. Van Lienden

Pia M. Grimes

Prof. Marcelo Olivares

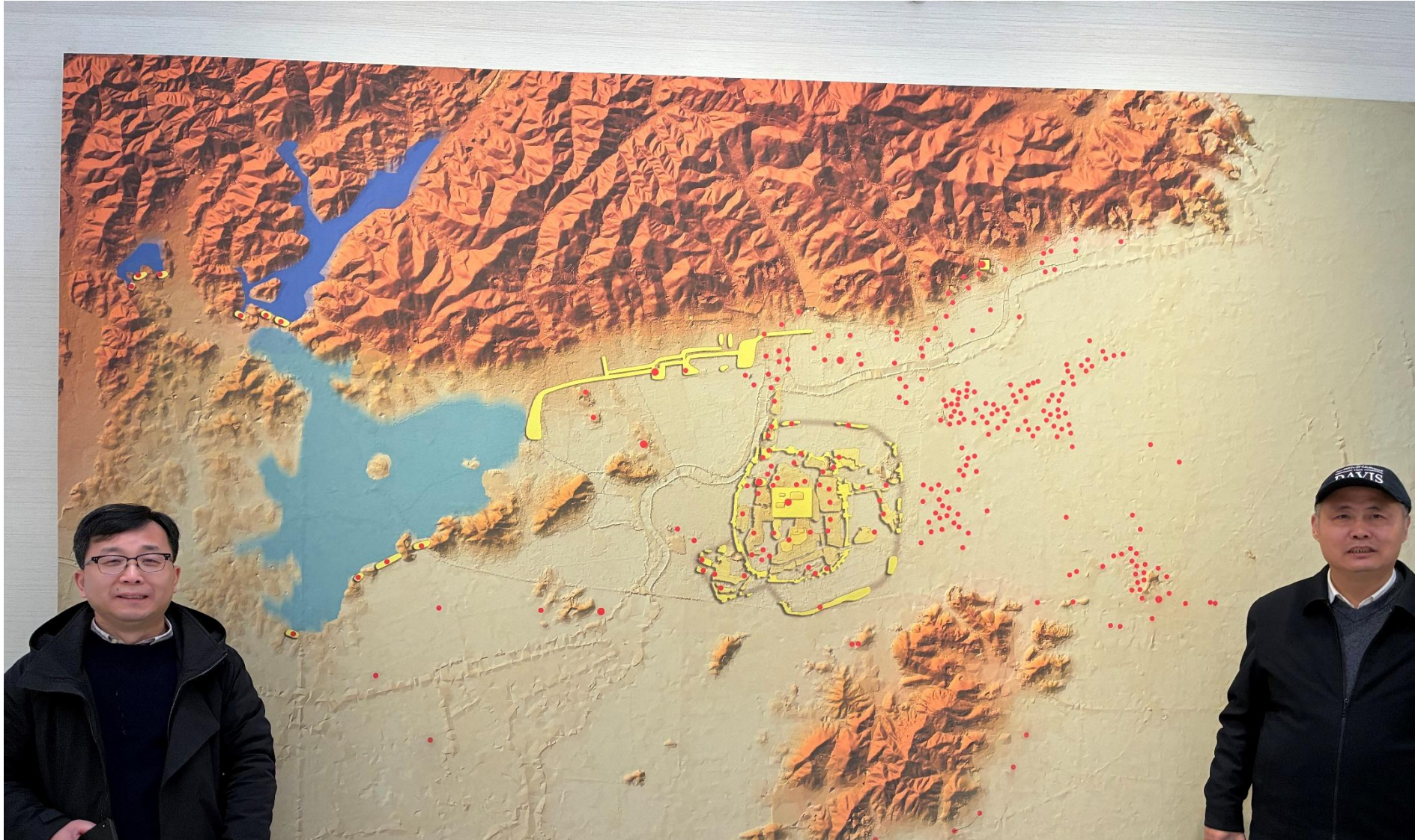
Rachel Hersh-Burdick

Prof. Kaveh Madani

Prof. Leopoldo Mendoza



5,100 years of River basin management! Liangzhu civilization



University Roles?

- Understand complex system
- Educate students
- Say controversial things in useful ways
- Find problems, assess solutions
- Explore novel solutions
- Mythbusting ...
- Academics heard when agencies silent



Universities should be better engaged

Some tips for Professors

- Your students are better than you, so make good use of their talents.
- If your students are worse than you, whose fault is that?
- Main advantages of students is they don't know what can't be done, and they will be around longer.
- You (and your students) will be around longer than any agency or political leader.
- Say controversial things in useful ways

Mencius (c. 300 BC)



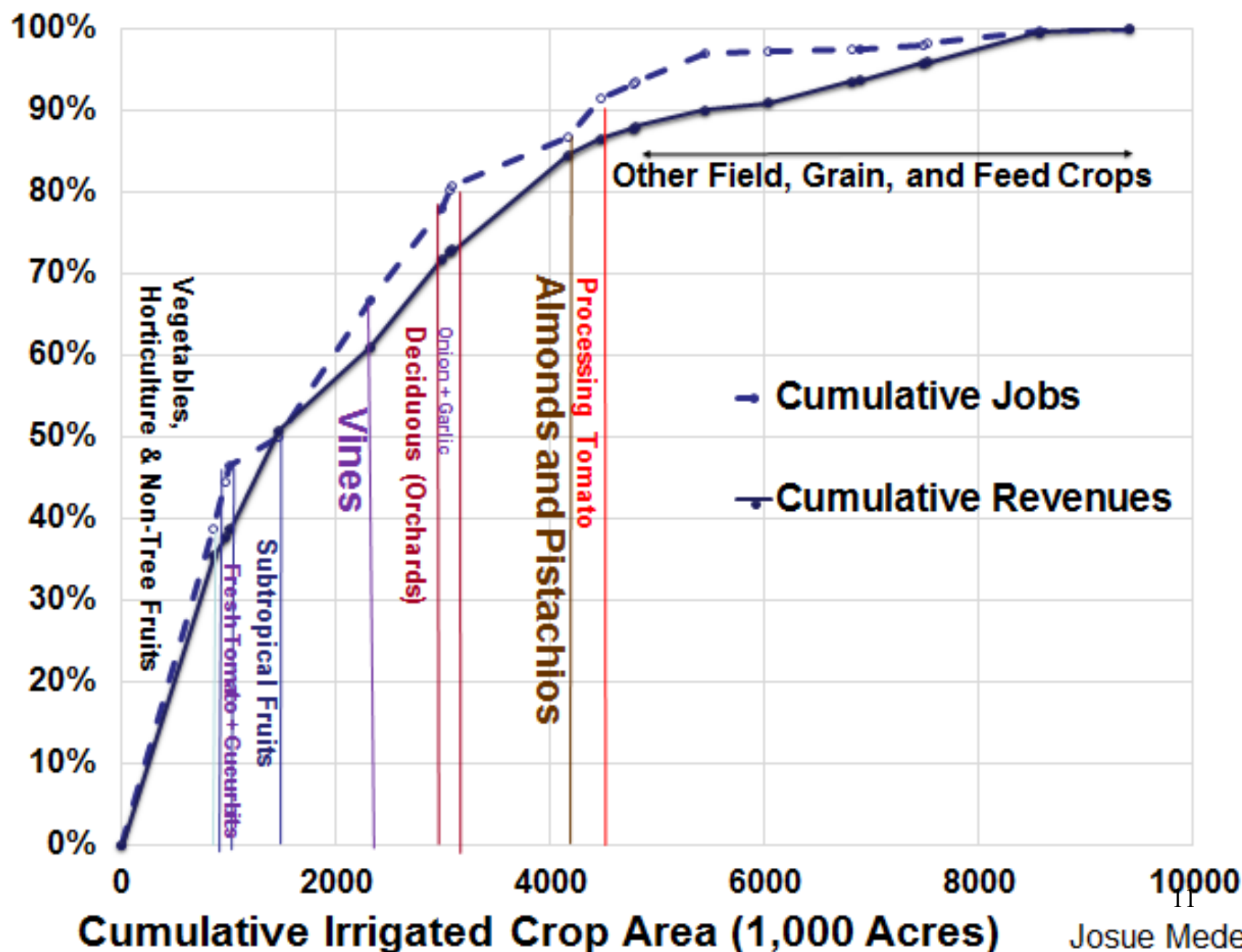
“A scholar delights in three things, and being ruler over the empire is not amongst them. His parents are alive and his brothers are well. This is the first delight. Above, he is not ashamed to face Heaven; below, he is not ashamed to face man. This is the second delight. He has the good fortune of having the most talented pupils in the Empire. This is the third delight. A scholar delights in three things and being ruler over the empire is not amongst them.”

WELCOME TO SCIENCE HELL, PROFESSOR.
THIS IS TONY, HE ONCE SAW SOMETHING
ON THE INTERNET ABOUT CALIFORNIA
WATER AND IS GOING TO SPEND
ETERNITY LECTURING YOU ON IT.

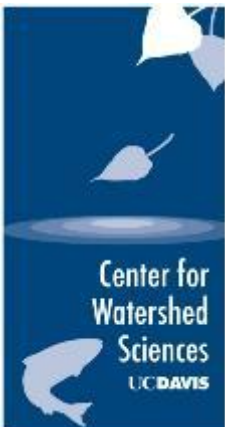
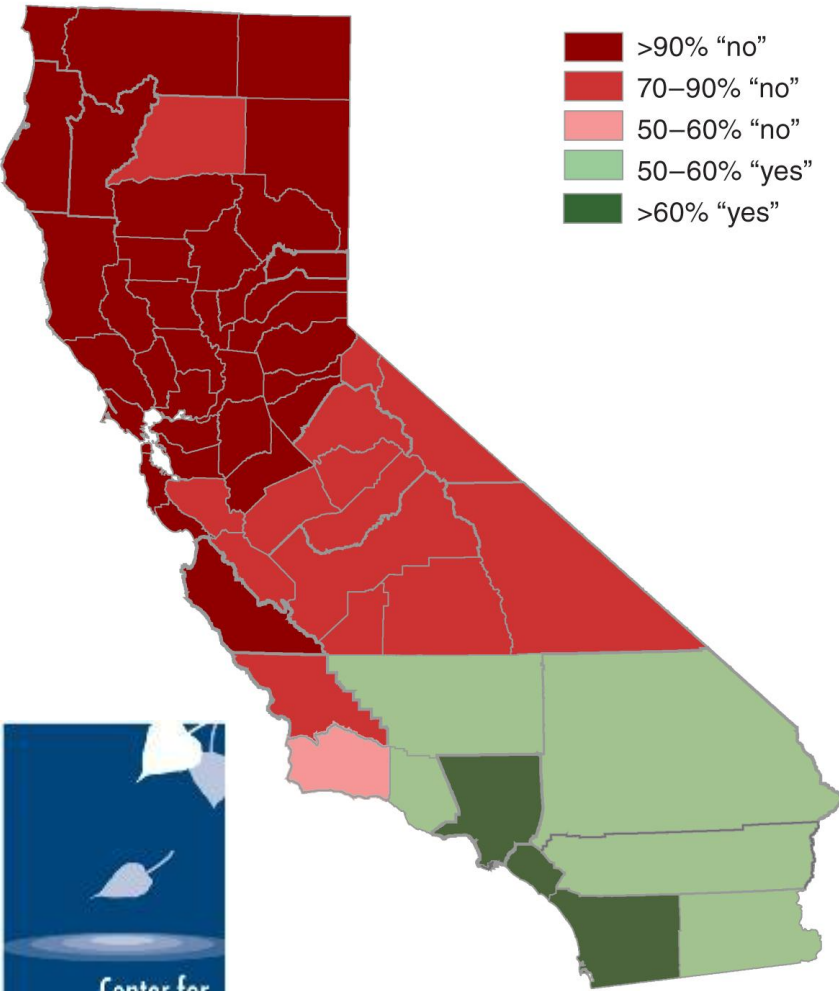
Jay's
fate



Cumulative Jobs and Revenues



Suggested Readings



Arax, M. (2019) *The Dreamt Land*, Vintage Press

Hanak et al. (2011) *Managing California's Water*, PPIC.org

Hanak et al. (2010) *Myths of California Water*, PPIC.org

Hundley (1992), *The Great Thirst*, UC Press

Kahrl, W. (1986), *Water & Power*, UC Press

Kelley (1989), *Battling the Inland Sea*, UC Press.

Lund et al. (2010) *Comparing Futures for the Sacramento San Joaquin Delta*, UC Press

Lund et al. (2018) "Lessons from California's 2012–2016 Drought" *JWRPM*, ASCE

Pinter, et al (2019), "The California Water Model: Resilience through Failure," *Hydrological Processes*.

Pisani (1983), *From Family Farms to Agribusiness*, UC Press

MavensNotebook.com

CaliforniaWaterBlog.com

Resistance is Futile



- 1) Flooding in parts of the Delta
- 2) Reduced Delta diversions
- 3) Less irrigated land in the southern Central Valley
- 4) Less urban water use, more reuse & storm capture
- 5) Some native species unsustainable in the wild
- 6) Funding solutions mostly local and regional
- 7) State's leverage is mostly regulatory, not funding
- 8) Nitrate groundwater contamination is inevitable
- 9) Groundwater will be managed more tightly
- 10) The Salton Sink will be largely restored

We cannot drought-proof, but we can manage better.