ENVIRONMENTAL SCIENCES AND STEWARDSHIP

Ag Strategies for Climate Change

Local Strategies for Mitigating and Adapting to Climate Change in California: A Case Study from Yolo County.

IN CALIFORNIA, THERE IS A NEED FOR NEW EFFORTS within the state's government and agriculture sectors to assess risks, adapt production strategies, and mitigate greenhouse gas (GHG) emissions. Here we present interdisciplinary research which examines the risks associated with climate change as well as the opportunities for mitigation and adaptation in California's Central Valley, using Yolo County as a representative case study.

This study demonstrates the value of participatory research with local stakeholders aimed at developing region-specific tools that aid decision-making, incentivize GHG mitigation and enhance local adaptive capacity.

Farmer Views on Climate Change

The attitudes and perceptions of local farmers towards climate change risk, mitigation, and adaptation are being evaluated using interviews and quantitative surveys.

How important are climate change issues in your planning and investment decisions?

Response	Growers (n=27)	Ranchers (n=9)	All Respondents (n=36)
Very Important	18%	67%	31%
Somewhat Important	37%	33%	36%
Somewhat Unimportant	30%	0%	22%
Very Unimportant	15%	0%	11%

▲ Sample question from survey (Adapted from Jackson et al., 2009)

Agricultural GHG Emissions

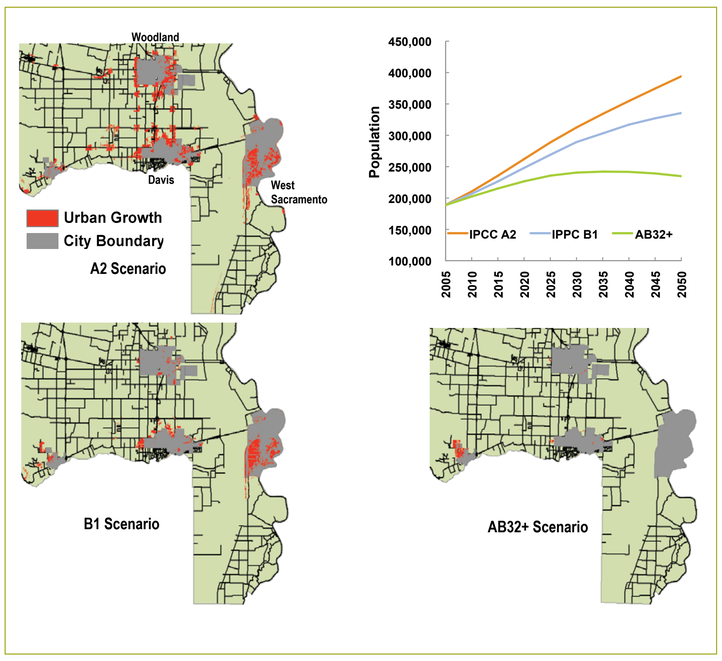
Scientists, growers and other rural stakeholders are working with local officials to carry out an inventory of Yolo County's GHG emissions as a part of a county-wide climate action plan that considers the role of agriculture in GHG mitigation and climate change adaptation.

Emissions Category	Gases	1990 Emissions		2008 Emissions		Change
Agricultural Soils		kt CO_2 E	%	kt CO_2 E	%	%
• Direct	N_2O	124.9	36.7	94	30.3	-24.7
• Indirect	N_2O	32.1	9.4	23.5	7.6	-26.8
• Rice Cultivation	CH_4	30.6	9.0	37.1	12.0	+21.2
• Lime	CO_2	4.3	1.3	2.3	0.7	-46.5
• Urea	CO_2	4.2	1.2	3.5	1.1	-16.7
Agricultural Fuel Use						
• Farm Equipment	CO_2, N_2O, CH_4	72.2	21.2	71.7	23.1	-0.7
• Irrigation Pumping	CO_2, N_2O, CH_4	39.2	11.5	39.2	12.7	0.0
Livestock	CH_4	31.6	9.3	37.9	12.2	+19.9
Residue Burning	N_2O, CH_4	0.9	0.3	0.6	0.2	-33.3
Total Ag. Emissions	CO_2, N_2O, CH_4	**340.0**		**309.8**		**-8.9**

▲ Inventory of agricultural GHG emissions for Yolo County in 1990 and 2008 using IPCC standard values (Haden et al., in prep.).

Land-Use Change

The GIS-based UPLAN software was used to assess the impact of 3 development scenarios: IPCC A2 (fossil-fuel intensive), IPCC B1 (green), and AB32+ (highly green) on land-use types of agroecological importance. (Wheeler et al., in prep.).



▲ Three Yolo County development scenarios for 2050 modeled using UPlan under A1, B2 and AB32 + scenarios.

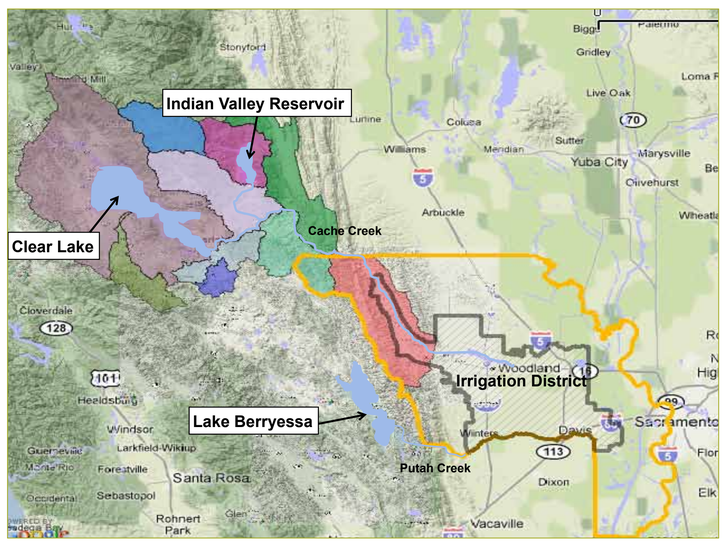
▼

Land-Use Types	New Acres Developed		
	A2	B1	AB32+
Floodplains	2170	227	0
Natural Diversity Areas	1114	150	0
Storie Class – Excellent Agricultural Soil	3166	225	0
Storie Class - Good Agricultural Soil	4867	1731	257
Vernal Pools	47	Mask	0
Wetlands	380	11	0
Williamson Act Lands	2110	0	0

▲ Urbanization of agriculture and natural ecosystem types under A1, B2, and AB32+ scenarios (Wheeler et al., in prep.).

Water Management Planning

Scientists and local water managers at the Yolo County Flood Control and Water Conservation District (YCFCWCD) are assessing the risks associated with climate change, water scarcity, and the occurrence of extreme weather events by linking an economic analysis of local trends in climate and agricultural production (e.g. crop acreage and value) to a scenario-driven water evaluation and planning (WEAP) model (Mehta et al., in prep.).



▲ Map of Cache Creek watershed and Yolo County (yellow boundary). Other colors represent sub-watersheds. Hatched area is the YCFCWCD irrigation district (Mehta et al., in prep.).

CREDITS:

L. Jackson, V.R. Haden, D. Purkey, V. Mehta, H. Lee, D. Sumner, S. Wheeler, M. Tomuta, A. Hollander, A. O'Geen, B. Orlove, M. Lubell, J. Perlman, M. Niles, M. Dempsey

CONTACT:

University of California
Dept. of Land, Air and Water Resources
lejackson@ucdavis.edu
vrhaden@ucdavis.edu

UC DAVIS
UNIVERSITY OF CALIFORNIA