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Building climate change resilience in California through UC Cooperative Extension

A survey of UC ANR academics found opportunities for expanding the role of climate change in extension work.

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Climate change is a global challenge. Yet, the impacts are local and already being felt in California. Rising summer temperatures and extreme events — including the recent swing from a 5-year drought to one of the wettest winters on record — are indicative of a warmer, more variable climate future. The changing climate has already begun to stress our social, economic and ecological systems. It is threatening crops, increasing catastrophic wildfires, harming fish and wildlife, limiting water supplies while also increasing flood risk, and ultimately impacting the health and quality of life for Californians.

The University of California's Division of Agriculture and Natural Resources (UC ANR) has worked with Californians for more than 100 years through its statewide network — which includes UC Cooperative Extension and the Agricultural Experiment Station campuses — to solve problems in agriculture, natural resources and food systems. Climate change compounds these problems, making it more difficult for UC ANR to achieve its vision for "a thriving California in 2025 where healthy people and communities, healthy food systems, and healthy environments are strengthened through partnerships between UC and the people of the state."

UC ANR academics and staff are mobilizing to address the threat of climate change. In November 2013, UC President Janet Napolitano announced the Carbon Neutrality Initiative (CNI). The initiative committed UC to emitting net zero greenhouse gases from its buildings and vehicle fleet by 2025, the first commitment of its kind by any major university. Within UC ANR, the CNI provided small financial incentives for academics to develop climate change–related projects across many program areas, including agriculture, natural resources, nutrition and youth development.



Snowmelt fills the South Yuba River near Emigrant Gap in March 2016. Climate change is expected to reduce the Sierra snowpack, resulting in major shifts in the timing and magnitude of flows in rivers fed by snowmelt.

Kelly M. Grow/California Department of Water Resources

UC ANR leadership also supported the establishment of a climate change program team in 2015, with the primary goal of building capacity within UC Cooperative Extension to better serve the public in addressing climate change impacts and adaptation challenges. As members of the program team, we decided an important first step to support this goal was to assess the scope of current climate science research and extension within UC ANR. We designed and distributed an online survey in early 2017, reaching out to approximately 1,000 UC ANR faculty, specialists, advisors and staff to evaluate interests and experiences in incorporating climate change science into research and extension programs. We received feedback from 144 respondents (fig. 1).

We found that there was overwhelming agreement on the importance of addressing climate change (fig. 1). Nearly all respondents (88%) believe it is important to incorporate information about climate change impacts, adaptation approaches, and mitigation strategies into extension programs. At the same time, fewer than half of the respondents (43%) currently incorporate climate change in their extension programming in some way. Because responses were voluntary and probably overrepresented those interested in climate change, the actual percentage of ANR

Fig. 1. Results from the UC ANR climate science, outreach, and needs survey.

UC Agriculture and Natural Resources

Climate science, outreach, and needs survey

In 2017, the authors surveyed UC ANR scientists and outreach professionals. The 144 responses highlight the broad range of efforts by UC Cooperative Extension and the Agricultural Experiment Station in building climate change resilience across California, as well as opportunities to further grow capacity in these areas.



Respondents

County advisors
46

Community education specialists
38

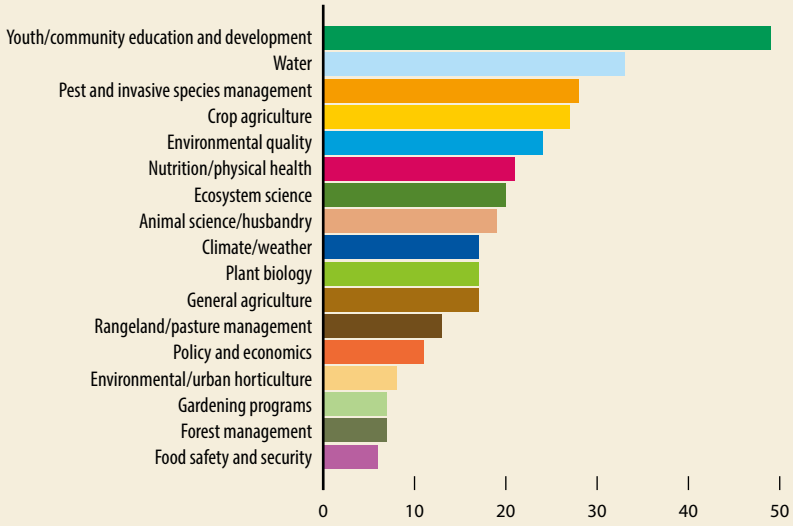
Cooperative Extension specialists
23

Campus faculty (Agricultural Experiment Station)
22

Academic coordinators and support personnel
15

Area of expertise

(324 unique responses; respondents could choose more than one area)



Primary clientele

Agriculture
47%

Natural resources
22%

Youth development
17%

Family and consumer science
14%

academics and staff directly engaging with climate change is likely lower.

Many respondents had a low level of confidence in their current ability to incorporate climate change in their extension programming. Perceived barriers included lack of access to climate information relevant to their extension programs and clientele, limited familiarity with climate science fundamentals, and fear of alienating clientele by talking about a contentious topic.

In addition, 25% of the respondents who currently incorporate climate change in their programming felt that they did not have adequate support from UC ANR to work on climate change issues. Respondents expressed interest in professional development opportunities, including education on technical tools and information resources, as well as training in climate science communication.

In summary, the survey revealed that UC ANR personnel recognize the importance of addressing climate change and that additional training and institutional support are critical for building capacity to incorporate climate change within extension programs. In response, the climate change program team is working to develop a series of workshops to address these barriers and to identify the tools, resources and information

Concerns expressed by respondents who currently incorporate climate change into their extension programming

1. No concerns
35%

2. Unsure about presenting complex climate data accurately
32%

3. Don't feel they have adequate support from UC ANR to work on issue
25%

4. Concerned about the reaction of clientele to climate change information
22%

Concerns expressed by respondents who do not currently incorporate climate change into their extension programming

1. No access to curriculum specific to field
51%

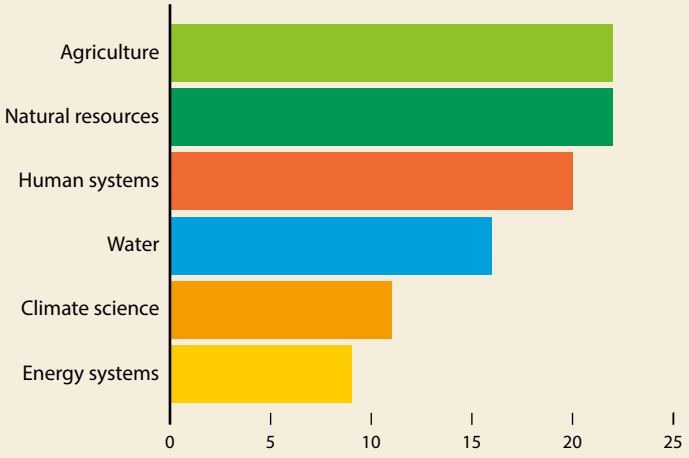
2. Unsure about presenting complex climate data accurately
32%

3. Don't have good source of climate change information to share
30%

4. Concerned about the reaction of clientele to climate change information
24%

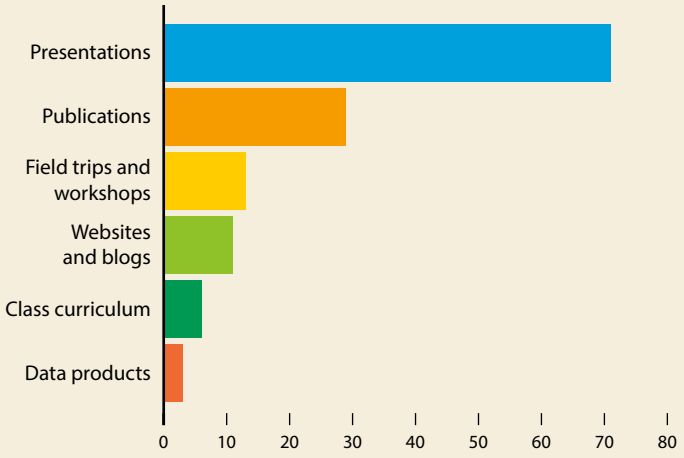
Topics covered currently by respondents who are incorporating climate change into their extension programming

(101 unique responses; respondents could select more than one topic)



Strategies used currently by respondents who are incorporating climate change into their extension programming

(133 unique responses; respondents could select more than one strategy)



that UC ANR extension personnel need to more effectively engage with climate change.

There are several existing programs that provide models for those seeking to incorporate climate change in their extension work. These include extension publications to help forest managers adapt to climate change and rancher outreach programs focused on enhancing the resilience of rangelands to climate stresses. The extreme drought that gripped the state from 2012 to 2016 offered a glimpse into California's climate future, and UC ANR was actively involved in developing fact sheets and workshops to assist growers and ranchers in coping with water scarcity. UC ANR academics have contributed to the development of the Cal-Adapt.org website to allow for easy access to climate change data and have been active in the state capitol, providing testimony on climate change adaptation and resilience efforts by Cooperative Extension. Finally, the Master Gardener Program has long taught "climate-smart" approaches to gardening, landscaping and irrigation. Through diverse extension approaches, UC ANR is already taking an active role in addressing climate change impacts in California.



This photo from a 2016 aerial detection survey of the Sierra and Sequoia national forests shows a high concentration of dead and dying trees. Climate change is expected to lead to longer droughts and higher temperatures, stressing trees and making them more vulnerable to pests and diseases.

To further increase the capacity of UC ANR staff to support the needs of their clientele and the broader public, professional development around climate science fundamentals, communication, and adaptation strategies is critical. In particular, discussing climate change with our stakeholders can feel challenging to both the new and well-worn relationships that are fundamental to the success of our work. UC ANR personnel work hard to build and maintain trusting relationships and are understandably reluctant to address difficult, politicized issues such as climate change. Workshops that address the challenges of communicating climate science information to clientele and future professional development opportunities that enable UC ANR personnel to feel more comfortable working with difficult and controversial topics would be valuable. In addition, UC ANR staff would benefit from tailored trainings on climate change information resources that are most relevant to their stakeholders.

Beyond professional development opportunities, UC ANR can do more to increase the visibility of its climate change research and extension programs in its media campaigns, government relations, and strategic planning efforts. Expanding the CNI's program to provide seed funding for projects would spur creative activity and foster new collaborations around climate change extension. The statewide California Naturalist Program provides a network of partnering organizations who are well-positioned to improve climate-change literacy and advance local adaptation efforts through science-based education and service opportunities. Efforts to expand this growing network and provide a community of practice for climate education and stewardship should be supported.

As federal efforts to combat climate change stall, California has embraced an ambitious climate change strategy — increasing renewable energy, investing in research, and reducing greenhouse gas emissions. Yet, the public is still uncertain about how climate change will affect their lives and how they should respond. According to a recent climate opinion study, most Californians (79%) recognize that climate change is happening, but fewer believe it will harm their communities (56%), families (54%), or themselves personally (44%). UC ANR's representation across the state and engagement with the state's diverse communities makes us uniquely positioned to understand and communicate the consequences of climate change to the public, and to identify strategies to mitigate negative outcomes for local economies, the environment and public health. Looking to the future, UC ANR can become a powerful catalyst for climate adaptation and we should embrace a leadership role in advancing the knowledge and tools needed for a climate-resilient California. CA

For more information on UC ANR's ongoing and planned research and extension activities relating to climate change, please contact climate change program team co-leaders Ted Grantham, Susie Kocher and Tapan Pathak.