

GROWING SOLUTIONS: CLIMATE CHANGE AND AGRICULTURE RECOMMENDATIONS TO THE CALIFORNIA GOVERNOR



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About CalCAN

The California Climate and Agriculture Network (CalCAN) is a coalition of the state's leading sustainable agriculture organizations and farmer allies. We came together out of concerns for climate change impacts on California agriculture and to advance sustainable agricultural solutions to a changing climate. Since 2009, we have cultivated farmer leadership to face the challenges of climate change and to serve as the sustainable agriculture voice on climate change policy in California.

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EXECUTIVE SUMMARY



The State of California cannot meet its ambitious climate change goals of reducing greenhouse gas emissions (GHGs), nor can it adapt to changing weather patterns without seeking solutions in agriculture. California's farms and ranches, which make up the largest agricultural sector in the country and cover a quarter of the state's landmass, offer substantial and unique opportunities to reduce GHG emissions and adapt to a changing climate.

In our report, *Growing Solutions: Climate Change and Agriculture Recommendations to the California Governor*, we review the past four years of Governor Jerry Brown's leadership on issues of climate change and agriculture. We also advance a set of comprehensive recommendations to the Governor and his administration for the next four years.

The recommendations in the report are informed by some of the state's leading scientists, farmers and advocates who are experts on climate change and agriculture issues (see the Acknowledgements section).

California agriculture must lead the way in developing innovative responses to climate change. Our farms and ranches must become net carbon sinks, producers of renewable energy and home to diversified operations that can adapt to increasingly variable and unpredictable weather patterns.

Progress Made, More Ground to Cover

As California began to implement the Global Warming Solutions Act (AB 32) in 2010, little attention was paid to climate change and agriculture issues. Yet no other sector of our economy offers the diversity of climate change solutions that agriculture can deliver.

The state's farmers and ranchers can produce renewable energy, manage their operations to capture and store carbon in soils, trees and other woody plants, reduce potent methane and nitrous oxide emissions through livestock and soil management, and protect farmland from urban development, thus avoiding some of the largest sources of GHG emissions.

To address this gap in climate change policy, in 2010 the California Climate and Agriculture Network (CalCAN) forwarded its first set of recommendations to the Governor. Our recommendations focused on sustainable agricultural solutions to climate change, and were aimed at supporting a vibrant California agriculture and food system for years to come.

We are pleased to report that under Governor Brown's leadership, California climate change and agriculture issues are no longer sidelined. In the Governor's third term, new initiatives to advance agricultural solutions to climate change got underway:

California is currently developing the country's first climate change and farmland conservation program. This new effort will support smart growth development and prevent urban sprawl into neighboring farmland, thus significantly reducing GHG emissions associated with transportation and urban development. The program is possible through the public investment of cap-and-trade auction proceeds first made available during Governor Brown's third term.

A new program incentivizes actions that reduce water and energy use on farms, along with related GHG emissions; additional programs support small-scale bioenergy production in agriculture.

The Governor's support for distributed renewable energy is also paying off. California farmers and ranchers report a *tripling* of their production from 2009 to 2012 with 5,845 on-farm renewable energy systems installed—more farm-based renewable energy production than any other state.

The Governor and his administration have also brought needed attention to the agriculture sector's unique vulnerabilities to climate change impacts, including extreme weather events, rising heat stress, and new pest and disease threats.

However, much more is needed to bring on-the-ground climate change solutions to California's 78,000 farms and ranches in ways that benefit the entire state.

Why Sustainable Agriculture Solutions to Climate Change?

Our recommendations focus on sustainable agricultural solutions to climate change. By relying on biologically based, low-input approaches to pest, soil and natural resource management, including

organic farming practices, sustainable farming methods offer some of the best techniques for reducing agriculture's carbon footprint and lowering emissions of the potent GHGs nitrous oxide and methane.

Importantly, sustainable agricultural practices can also store (or sequester) carbon in soils and woody biomass like trees and shrubs, keeping carbon dioxide out of the atmosphere. Long-term studies show that using these practices can increase carbon sequestration by up to 36% over conventional farming systems.¹

These practices can assist with climate change adaptation by increasing biological diversity and conserving natural resources, making agriculture more resilient in the face of a changing climate.² Many sustainable management practices are also used by conventional operations and can be widely applied throughout California agriculture. Furthermore, many of the sustainable agricultural solutions to climate change offer multiple benefits to our communities in the form of cleaner air and water, greater biodiversity and economic benefits to farmers and their communities.



Photo credit: USDA-NRCS

1 Horwath, W., et al. 2002. Soil carbon sequestration management effects on nitrogen cycling and availability. *Agricultural Practices and Policies for Carbon Sequestration in Soil* 155–164.
2 Wall, E. and B. Smit. 2005. Climate Change Adaptation in Light of Sustainable Agriculture. *Journal of Sustainable Agriculture* 27(1): 113–123.

Recommendations

Farm Management Strategies for Mitigating Climate Change

- Invest cap-and-trade auction proceeds in agricultural research, technical assistance and financial incentives for on-farm practices and farming systems that meet AB 32 objectives. Integrate these efforts into a new California Program on Agriculture and Climate to achieve GHG emissions reductions and increased carbon sequestration in agriculture while providing multiple co-benefits.
- Include low-input, biological and organic farming practices and systems in state climate change and agriculture research initiatives and programs to reduce GHG emissions, increase carbon sequestration and achieve multiple health, environmental and economic co-benefits.

On-Farm Renewable Energy

- Encourage the California Public Utilities Commission (CPUC) to preserve and enhance affordable, simplified interconnection and billing processes for distributed renewable energy projects as it designs the next Net Energy Metering (NEM) program. CPUC actions should support the ongoing growth of on-farm renewable energy generation, particularly by preserving and enhancing meter aggregation under the NEM program.
- Direct the Bioenergy Interagency Working Group to develop standards and guidelines for the use of sustainable agricultural feedstocks in bioenergy production.

Agricultural Water Stewardship

- Direct the appropriate agencies to expand the vision for water efficiency to include on-farm practices such as soil management systems that improve water-holding capacity and build soil health, and techniques like on-farm water ponds that improve overall water savings.
- Simplify permitting for on-farm groundwater recharge and pond building projects that demonstrably produce environmental, conservation, and resilience benefits.
- Support the Department of Water Resources (DWR) and other agencies involved in agricultural water use efficiency in ongoing professional development of agency staff to improve their understanding of agricultural perspectives on water issues, particularly for water management in biological systems.

On-Farm Energy & Water Efficiency

- Include a diversity of water use efficiency measures, including soil management practices, incentives programs aimed at reducing water and energy-related GHG emissions in agriculture.
- Direct the California Public Utilities Commission to ensure that the energy efficiency programs of Investor-Owned Utilities are adequately reaching California’s diverse agricultural customers and achieving the best possible outcomes.

Compost Benefits in Agriculture

- Conduct an analysis of compost production and market demand in agriculture, including regional analyses, in order to inform the development of incentives that promote the wider use of compost for on-farm fertility, water use reductions, GHG emissions reductions/sequestration, and improved water quality.
- Create a pilot program to incentivize compost use on farms and ranches, aimed at improving soil health, reducing GHG emissions and lowering input expenses for growers.

Agricultural Land Conservation

- Convene a Governor’s task force to develop a set of recommendations on Williamson Act reforms and state agricultural land conservation policies that go beyond the Williamson Act. The task force should be charged with considering Williamson Act reforms and farmland conservation policies, as a whole, that address a variety of state priorities. The task force should include a diversity of stakeholders with relevant expertise.
- In the updated General Plan guidelines under development by the Office of Planning and Research, include farmland conservation policy tools and model ordinances—especially farmland mitigation policies—that are available to local governments. Highlight recent court cases that clarify the CEQA requirements to mitigate for the loss of farmland from development projects.
- Increase funding for the new Sustainable Agricultural Lands Conservation Program (SALCP) funded by cap-and-trade revenue. A minimum of ten percent of Sustainable Communities Strategies funding should be allocated annually to SALCP.
- Following the recommendations of the task force, described above, the Governor should re-invest in subvention payments that advance a reformed Williamson Act program to meet the needs of the state’s producers and the greater goals of the state.

Climate Resilient Agriculture

- Create a state clearinghouse of information and resources for climate change adaptation, including resources relevant to agricultural professionals.
- Prioritize activities that bring together climate change mitigation and adaptation strategies in biological systems like agriculture.

Research, Technical Assistance and Planning

- Implement the California Climate Change Research Plan, led by the Natural Resources Agency and the California Energy Commission, by prioritizing the multi-year climate change/agriculture research scope with stakeholder input and developing a funding mechanism.
 - Review the status and needs for grower public technical assistance and on-farm demonstration and research, focused on Cooperative Extension and Resource Conservation Districts.
 - Increase diversity of expertise, including those familiar with climate change and organic and sustainable agriculture, on the advisory board and committees of CDFA's Fertilizer Research and Education Program (FREP).
 - Improve communication between agencies and departments on climate change and agriculture by holding interagency and stakeholder meetings of the Agriculture Climate Change Action Team (AgCAT).
 - Develop and implement a funding plan to restore funding to the University of California Cooperative Extension to 1990 levels.
 - Stabilize funding for the Resource Conservation Districts through an ongoing appropriation.
-

California Farmworkers

- When implementing climate change policies, such as the Sustainable Communities Implementation Program administered by the Strategic Growth Council, ensure that rural communities with limited access to transit infrastructure are adequately served.
 - Ensure that migrant family housing centers and other farmworker housing have access to adequate HVAC systems to better protect farmworkers and their families from weather extremes.
 - Develop a plan to extend services (e.g., health care, education etc.) to those individuals and families in California who are given administrative relief under President Obama's November 2014 Immigration Accountability Executive Action. Support California farmworkers and their families in seeking relief status under President Obama's executive action.
 - Improve funding for migrant family housing centers and provide adequate funding (e.g., through the Joe Serna Farmworker Program) for financing new construction, rehabilitation and purchase of farmworker rental housing.
 - Improve access and funding to disaster services for farmworker families during times of crop failures, droughts and other extreme events and keep pace with the predicted need for assistance as weather extremes become more frequent in the state.
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Photo credit: USDA

INTRODUCTION



Photo credit: USDA-ARS

The State of California cannot meet its ambitious climate change goals of reducing greenhouse gas emissions (GHGs), nor can it adapt to changing weather patterns without seeking solutions in agriculture. California's farms and ranches, which make up the largest agricultural sector in the country and cover one quarter of the state's landmass, offer substantial and unique opportunities to reduce GHG emissions and adapt to a changing climate (box on page 9).

The stakes are high. Crop losses caused by water scarcity, extreme and unpredictable weather, shifting pests and diseases, and decreased winter chill hours threaten to increase food insecurity and food costs across the country. Farming jobs and rural economies are vulnerable. The current drought has only begun to highlight the risks to come if aggressive action is not taken to accelerate implementation of agriculture's climate solutions.

In this report, *Growing Solutions: Climate Change and Agriculture Recommendations to the California Governor*, we review the past four years of Governor Jerry Brown's leadership on issues of climate change and agriculture. We also forward a set of comprehensive recommendations to the Governor and his administration for the next four years. By building upon previous accomplishments, California can achieve tangible climate benefits in agriculture while improving the nation's food security, the state's agricultural economy, the health of our communities, and the well being of our environment.

The recommendations in this report are informed by some of the state's leading scientists, farmers and advocates who are experts on climate change and agriculture issues (for a complete list of advisors, see the Acknowledgements section).

Governor Brown enters into his fourth and final term at a tipping point in the global debate about potential responses to climate change. The recent U.S.-China Joint Announcement on Climate Change gives us some hope that an international breakthrough may yet be achieved, as countries prepare for the crucial United Nations climate change conference at the end of 2015.

This agreement, a joint effort with China, the world's largest GHG emitter, was made possible in part by Governor Brown's leadership. He led the way, as California became the first state to formally engage China in collaborative efforts on emissions reduction strategies.

Meanwhile, recent reports from the Intergovernmental Panel on Climate Change (IPCC) highlight the dire need for action. Temperatures are steadily rising as atmospheric carbon and other GHGs surge to unprecedented levels. At the same time, the planet is experiencing increases in extreme and unpredictable weather events that put human health and our environment at severe risk. In California, the most severe drought in decades makes these threats tangible.

The IPCC reports also point a path forward to climate change solutions. Among them, the IPCC finds that agriculture globally can reduce GHG emissions by 0.3 to 4.6 GtCO₂eq annually by 2030.³ In the United States and Canada alone, agriculture can reduce GHG emissions by 374 MtCO₂-eq/year by 2030.⁴ Such a reduction is the equivalent of taking nearly 80 million cars off the roads every year.⁵

California agriculture must lead the way in developing innovative responses to climate change. Our farms and ranches must become net carbon sinks, producers of renewable energy and home to diversified operations that can adapt to increasingly variable and unpredictable weather patterns.

Progress Made, More Ground to Cover

As the state of California began to implement the Global Warming Solutions Act (AB 32) in 2010, little attention was paid to climate change and agriculture issues. Yet no other sector of our economy offers the diversity of climate change solutions that agriculture can deliver.

Agriculture's Climate Solutions

The state's farmers and ranchers can:

- Produce renewable energy
- Manage their operations to capture and store carbon in soils, trees and other woody plants
- Reduce potent methane and nitrous oxide emissions through livestock and soil management
- Protect farmland from urban development, thereby avoiding some of the biggest sources of greenhouse gas emissions

For a summary of the most promising climate benefits agriculture can provide, see: <http://calclimateag.org/our-work/calcan-fact-sheets/>.

To address this gap in climate change policy, in 2010 the California Climate and Agriculture Network (CalCAN) forwarded its first set of recommendations to the Governor. Our recommendations focused on sustainable agricultural solutions to climate change, and were aimed at supporting a vibrant California agriculture and food system for years to come.

We are pleased to report that under Governor Brown's leadership, California climate change and agriculture issues are no longer sidelined. In the Governor's third term, new initiatives to advance agricultural solutions to climate change got underway:

- California is currently developing the country's first climate change and farmland conservation program. This new effort will support smart growth development and prevent urban sprawl into neighboring farmland, thus significantly reducing GHG emissions associated

3 GtCO₂eq refers to gigatons of carbon dioxide equivalent emissions. One gigaton is equivalent to 1,000 megatons. See: http://report.mitigation2014.org/drafts/final-draft-postplenary/ipcc_wg3_ar5_final-draft_postplenary_chapter11.pdf

4 http://www.ipcc.ch/publications_and_data/ar4/wg3/en/ch8s8-4-3.html

5 To calculate this, we used the EPA online tool. See: <http://www.epa.gov/cleanenergy/energy-resources/calculator.html#results>

with transportation and urban development. The program is possible through the public investment of cap-and-trade auction proceeds first made available during Governor Brown's third term.

- A new program incentivizes actions that reduce water and energy use on farms, along with related GHG emissions; additional programs support small-scale bioenergy production in agriculture.
- The Governor's support for distributed renewable energy is also paying off. California farmers and ranchers report a *tripling* of their production from 2009 to 2012 with 5,845 on-farm renewable energy systems installed—more farm-based renewable energy production than any other state.
- The Governor and his administration have also brought needed attention to the agriculture sector's unique vulnerabilities to climate change impacts, including extreme weather events, rising heat stress for humans, livestock and crops, and new pest and disease threats.

However, the necessary work to advance sustainable agricultural solutions for climate change mitigation and adaptation is only beginning. Much more is needed to bring on-the-ground climate change solutions to California's 78,000 farms and ranches in ways that benefit the entire state.

Why Sustainable Agriculture Solutions to Climate Change?

Our recommendations focus on sustainable agricultural solutions to climate change. By relying on biologically based, low-input approaches to pest, soil and natural resource management, including organic farming practices, sustainable farming methods offer some of the best techniques for reducing agriculture's carbon footprint and lowering emissions of the potent GHGs nitrous oxide and methane. Importantly, sustainable agricultural practices can also store (or sequester) carbon in soils and woody biomass like trees and shrubs, keeping carbon dioxide out of the atmosphere. Long-term studies show that using these practices can increase carbon sequestration by up to 36% over conventional farming systems.⁶

Finally, these practices can assist with climate change adaptation by increasing biological diversity and conserving natural resources, making agriculture more resilient in the face of a changing climate.⁷

Many sustainable management practices are also used by conventional operations and can be widely applied throughout California agriculture. Specific practices include compost applications, cover cropping (i.e., green manures), crop rotation, managed grazing of livestock, hedgerows, riparian plantings, biological pest control, renewable energy production, and energy and water use efficiency measures.

Many of the sustainable agricultural solutions to climate change offer multiple benefits to our communities in the form of cleaner air and water, greater biodiversity and economic benefits to farmers and their communities.

6 Horwath, W., et al. 2002. Soil carbon sequestration management effects on nitrogen cycling and availability. *Agricultural Practices and Policies for Carbon Sequestration in Soil* 155–164.

7 Wall, E. and B. Smit. 2005. Climate Change Adaptation in Light of Sustainable Agriculture. *Journal of Sustainable Agriculture* 27(1): 113-123.

A. FARM MANAGEMENT STRATEGIES FOR MITIGATING CLIMATE CHANGE



Photo credit: USDA-NRCS

We recommend that Governor Brown and his administration create a California Program on Agriculture and Climate (CPAC).⁸ This program should integrate the state's agricultural climate change initiatives and bring meaningful resources to farmers and ranchers. Such a program would implement a holistic, systemic approach by investing cap-and-trade proceeds in agricultural research, alongside grower technical assistance and financial incentives. The new program can support agricultural efforts to reduce potent methane and nitrous oxide emissions, increase carbon sequestration in soils and woody plants, and reduce GHG emissions associated with water, energy, and other inputs.

Such efforts must include low-input, biologically based and organic farming systems. These farming systems reduce reliance on fossil fuels, work within ecosystems to produce our food and fiber, and support natural resource conservation. Many of these farming systems also provide multiple health and environmental benefits to our communities, advancing the goals of AB 32's companion legislation, SB 535 and AB 1532.⁹ It is important to note that these strategies are not limited to organic producers, but many conventional farmers also employ these diverse farm management practices.

Progress to Date

In the Governor's third term, the administration made progress in developing a conceptual framework for addressing climate change and agriculture issues, and made important initial investments in research and program development to support GHG emission reductions in agriculture.

The next four years will be a critical time to go beyond planning and initial investments. For this to work, farmers and ranchers must experience the benefits of these investments through reduced input costs, savings on energy and water expenses, and greater resilience to drought and weather extremes. At the same time, our communities must benefit through improved air and water quality, improved wildlife habitat and a more economically robust agriculture sector.

In 2014, the California Air Resources Board (CARB) released an update to the AB 32 Scoping Plan, which outlines recommendations for how the state can reduce GHG emissions to 1990 levels by

⁸ For more on our vision for a California Program on Agriculture and Climate Change, visit: <http://www.calclimateag.org>

⁹ SB 535 requires that 25 percent of cap-and-trade proceeds investments benefit socially disadvantaged communities. AB 1532 requires that the Governor's administration develops, with public input, a cap-and-trade investment plan every three years. AB 1532 outlines eligible funding areas, including sustainable agriculture.

2020 and beyond.¹⁰ Significantly, the 2014 Scoping Plan update includes a robust discussion of how to achieve GHG emissions reductions in agriculture.

The Scoping Plan Update recommends research, technical assistance and financial incentives to develop agricultural “carbon plans” and implement GHG emissions reduction practices in agriculture. The Update also recommends the creation of interagency and stakeholder groups to develop initiatives related to climate change and agriculture, including developing targets for agricultural GHG emissions reductions, a methane capture standard, natural and working lands investment strategies, and local land use efforts that include farmland conservation.

The 2014 Scoping Plan Update represents a significant advancement in the administration’s conceptual framework on agricultural climate change solutions. Also in 2014, the state of California made its first cap-and-trade related investments in climate change mitigation activities, starting with an emergency drought relief package and continuing with the state’s FY 2014-15 budget.

These investments follow the completion of the state’s first three-year Cap-and-Trade Auction Proceeds Investment Plan,¹¹ which outlines eligible areas of investment to achieve GHG emissions reductions including competitive grants for agricultural/GHG emission reduction strategies.

The FY 2014-15 agriculture-related cap-and-trade investments and the implementing agencies include:

- \$12 million for dairy digester equipment and research (California Department of Food and Agriculture, CDFA)
- \$10 million in cost-share for irrigation efficiencies and evaluation (CDFA)
- \$5 million for farmland conservation under the Sustainable Communities Strategies initiative (Strategic Growth Council/Natural Resources Agency)
- \$3 million to develop biofuels standards from agricultural products (CDFA)

The administration has also funded research on climate change mitigation strategies, including an interagency group made up of CARB, CDFA, the California Energy Commission, and CalRecycle that funded researchers from UC Davis and Fresno State to develop baseline nitrous oxide (N₂O) emissions data and research on mitigation strategies to reduce N₂O emissions from agriculture. Some aspects of the administration’s approach in taking on these interagency research efforts are cause for concern.

The mitigation studies—which are to be completed in 2014-15—are focused overwhelmingly on conventional agricultural farming systems and strategies. Only one organic tomato system is included among the four multi-site studies.¹² This focus comes despite growing evidence that farming systems using biologically based approaches to soil, water and pest management can reduce reliance on fossil fuel inputs compared to conventional systems, thereby lowering their carbon footprint and delivering multiple co-benefits.¹³ Some organic systems, for example, have been shown to use inputs with up to 30 percent less embedded energy than comparable conventionally managed systems.¹⁴

10 In the Scoping Plan Update CARB considers GHG emission reductions beyond the 2020 timeframe. The Air Resources Board reiterated support for moving beyond 2020 timeline as prescribed in recent Governor Executive Orders. See: http://www.arb.ca.gov/cc/scopingplan/resolution_14-16.pdf

11 See: http://www.arb.ca.gov/cc/capandtrade/auctionproceeds/final_investment_plan.pdf

12 For a list of the N₂O emission studies for developing baseline emissions and mitigation strategies, see: <http://arb.ca.gov/ag/fertilizer/meetings/meetings.htm>

13 For a recent literature review on these issues see: <http://calclimateag.org/our-work/calcan-fact-sheets/>

14 Pimentel, D., et al. 2005. Environmental, energetic, and economic comparisons of organic and conventional farming systems. *BioScience* 55, 107-124.

Climate Benefits of Organic Farming

The health of the soil at Fetzer Vineyards in Mendocino County is maintained by adding compost produced from leftover grape skins, stems, and seeds. Cover crops planted between the vine rows protect against soil erosion and attract beneficial insects to manage pests. The cover crops also eliminate the need for fossil fuel based synthetic chemicals, helping to reduce the overall carbon footprint of the operation. On some of their property, they use sheep grazing and chickens in the vineyards for weed control and soil fertility.

Combined these management practices improve soil quality and carbon sequestration.

The land management practices at Fetzer provide additional climate benefits. Fetzer protects and maintains the natural oak woodlands and riparian habitat on about 45 percent of its property. They plant habitat corridors with dozens of species of perennial shrub, grasses and trees to protect riparian zones and harbor beneficial insects and native birds that help with pest control. Not only do these practices protect the natural resources upon which the vineyards depend, they also sequester carbon and build resilience to buffer against a changing climate.



photo credit: Fetzer/Bonterra

While we are pleased that the Scoping Plan Update takes a much more comprehensive approach to agriculture than the original 2008 Scoping Plan, in the next four years more needs to be done to invest in strategies that reduce GHG emissions in agriculture while also providing myriad health, environmental and economic benefits.

Recommendations

Budget/Legislative Action:

Invest cap-and trade auction proceeds in agricultural research, technical assistance and financial incentives for on-farm practices and farming systems that meet AB 32 objectives. Integrate these efforts into a new California Program on Agriculture and Climate to achieve GHG emissions reductions and increased carbon sequestration in agriculture, while providing multiple co-benefits.

Administrative Action:

Include low-input, biological and organic farming practices and systems in state climate change and agriculture research initiatives and programs to reduce GHG emissions, increase carbon sequestration and achieve multiple health, environmental and economic co-benefits.

B. ON-FARM RENEWABLE ENERGY



The explosive adoption of on-farm solar PV systems has been facilitated by forward-thinking state policies, particularly the Net Energy Metering (NEM) program. As discussions on the future of distributed renewable energy in the state proceed, we must preserve and enhance the strengths of NEM, such as its simple grid interconnection and billing process, while bolstering the role that on-farm renewable energy can play in decarbonizing our energy supply and diversifying California's renewables mix.

Another important emerging area of on-farm renewables is bioenergy. To unleash the potential of agricultural bioenergy without creating adverse environmental impacts, the state must clarify its vision for the use of sustainable feedstocks. For example, agricultural residues may be put to better use for soil amendments and nutrient recycling in some cases. By recognizing the full costs and benefits of using particular bioenergy inputs and processes, the state can better incentivize the development of these nascent energy sources.

Progress to Date

During the Governor's third term, growers enthusiastically embraced on-farm renewable energy production. By 2012 almost eight percent of the state's farms and ranches produced renewable energy and reported significant utility bill savings. This represents a tripling of farm-based renewable energy production from 2009 to 2012, to nearly 6,000 on-farm systems across California.¹⁵ This significant adoption of on-farm renewable energy was spurred in large part by distributed renewable energy policies, such as the NEM program, that facilitate simple and affordable access to the grid.

¹⁵ USDA National Agricultural Statistics Service. 2014. 2012 Census of Agriculture State Data: California, Table 52: Energy.

During Governor Brown's third term, the NEM program was significantly improved and its popularity with farmers and ranchers increased. In 2011, Governor Brown signed into law the Renewable Energy Equity Act (SB 489),¹⁶ authored by Senator Lois Wolk and sponsored by CalCAN. That bill expanded the NEM program to include all available types of renewable energy generation, including bioenergy. Following the passage of SB 489, Dixon Ridge Farms—a pioneer in on-farm bioenergy—connected their walnut shell-fueled bioenergy generator to the grid for the first time. Other bioenergy projects followed suit and have been able to use the streamlined NEM application process to get their projects connected to the grid.

A related improvement to the NEM program is SB 594 (Wolk), signed by the Governor in 2012. It supports the ongoing development of distributed renewable energy generation in the state by allowing for aggregation of multiple meters under NEM. Most agricultural operations have multiple energy meters and may produce excess renewable energy on any one meter. SB 594 offers an important incentive for agricultural and commercial operations to develop distributed renewable energy generation by allowing them to count excess renewable energy produced on a NEM account towards their other meters. In 2014, the California Public Utilities Commission (CPUC) finalized the NEMA rules, making meter aggregation under NEM available for the first time.

But the current NEM program may be significantly altered by the CPUC under a proceeding initiated by AB 327 (2013)¹⁷ that seeks to overhaul the program. In the process, it is critical that the momentum towards widespread adoption of diversified on-farm renewable energy projects is not impeded, but rather is encouraged. If we are to maintain gains in distributed renewable energy, then simple inexpensive interconnections to the grid must be preserved, along with appropriate compensation for all benefits provided by producers of distributed renewable energy.

At the same time, farmers producing renewable energy—particularly those producing energy through dispatchable (time-flexible) technologies, such as bioenergy—should be more strongly incentivized to help achieve California's renewable energy goals.

To build investments in technologies that are capable of converting other agricultural feedstocks at smaller scales (e.g., olive pits and nut shells), the state should develop clearer guidelines and standards on the lifecycle costs and benefits of sustainable feedstocks. These guidelines should also consider the costs and benefits of alternative uses for agricultural feedstocks, such as soil amendments. This will ensure that growers and processors are encouraged to use feedstocks in ways that provide the greatest benefits, recognizing that in some cases the best use may not be as an energy input.

¹⁶ See: <http://calclimateag.org/sb-489-bioenergy/>

¹⁷ CPUC Proceeding R.14-07-002

Recommendations

Administrative Action:

- Encourage the California Public Utilities Commission (CPUC) to preserve and enhance affordable, simplified interconnection and billing processes for distributed renewable energy projects as the Commission designs the next Net Energy Metering (NEM) program. CPUC actions should support the ongoing growth of on-farm renewable energy generation, particularly by preserving and enhancing meter aggregation under the NEM program.
- Direct the Bioenergy Interagency Working Group to develop standards and guidelines for the use of sustainable agricultural feedstocks in bioenergy production.

Walnuts to Watts

Dixon Ridge Farms is an organic walnut farm and processor in Yolo and Solano Counties. Owner Russ Lester became an innovator in on-farm renewable energy when, with a grant from the California



Energy Commission in 2007, he installed a 50-kilowatt biomass powered generator that converts his major waste product—walnut shells—into heat and gas to dry their walnuts and electricity to power processing equipment and large freezers. In addition to reduced GHG emission, the bioenergy facility provides significant savings in electricity and propane costs. In 2012, Dixon Ridge doubled the size of their system and increased their capacity again in 2014. Combined with their solar arrays, they now generate enough energy to power all of their walnut processing facility, hulling, drying, shop, office, house and one of their farm wells.

C. AGRICULTURAL WATER STEWARDSHIP



Photo credit: USDA-NRCS

Water scarcity will likely be the greatest threat to California agriculture under a changing climate, a fact highlighted by the ongoing severe drought in the state. As the Governor's administration and the legislature work together to prepare California's water system for the 21st century, on-farm water use efficiency must continue to be a top priority.

The Governor's third term has set the stage for support of agricultural water use efficiency. The Governor included conservation elements in his Water Action Plan and related programs. He made \$10 million in cap-and-trade funds available early in 2014 for agricultural irrigation efficiency improvements in response to the drought. The newly passed water bond will fund innovative on-farm water use efficiency measures to support a resilient farming system in the state. And the new groundwater law presents an opportunity to end the "Wild West" of groundwater withdrawals, replacing it with more measured and sustainable management of this precious resource.

Progress to Date

In 2014, Governor Brown released the final California Water Action Plan¹⁸ and the California Water Plan Update 2013.¹⁹ The Water Action Plan has a focus on water conservation in both urban and agricultural contexts, aiming to both raise current efficiency targets and provide funding for efficiency efforts and research. The Update 2013 includes more than 50 specific recommendations for agricultural water stewardship, including measures to improve on-farm efficiencies.

Proposition 1, the \$7.12 billion water bond approved by the voters in 2014 will make possible the implementation of the Water Action Plan. Significantly, it includes \$100 million for agricultural and urban water use efficiency projects.

Also in 2014, the legislature and the Governor passed an historic package of groundwater regulations (SB 1168, SB 1319 and AB 1739). This sensible package of groundwater bills will require local governments to monitor and regulate groundwater usage, a crucial step as California faces increasing water scarcity under climate change.

¹⁸ Available at: http://resources.ca.gov/docs/california_water_action_plan/Final_California_Water_Action_Plan.pdf

¹⁹ Available at: <http://www.waterplan.water.ca.gov/cwpu2013/final/>

Additionally, emergency drought legislation (SB 103) passed in 2014 allocated \$10 million in cap-and-trade revenues for grower financial assistance to implement efficiency measures that reduce water, energy and related GHG emissions. CDFA is administering these funds through its new State Water Efficiency and Enhancement Program (SWEEP).

As the state invests water bond and cap-and-trade funds in on-farm water use efficiency, it is important to expand the range of eligible practices. Additional practices that employ soil management techniques to retain soil moisture, increase water infiltration, and reduce water use should be incentivized. For example, cover crops, conservation tillage, mulching, and other practices that increase soil organic matter can also boost available water capacity in soils.²⁰ When combined with monitoring efforts and appropriate changes in irrigation use and scheduling, these practices can achieve real water use reductions, along with related energy use and GHG emissions reductions.

The USDA Natural Resources Conservation Service (NRCS) recognizes a suite of on-farm best management practices, such as cover cropping and mulching, that increase water-holding capacity of soils while providing other co-benefits. State programs should do the same by including these NRCS practice standards in their list of fundable practices.



It is important to note that effective deployment of these practices will not be possible without a concurrent reinvestment in technical assistance for California’s agricultural growers, which we address in a subsequent section.

Finally, the administration can improve the effectiveness of the Department of Water Resources (DWR) agricultural water programs by providing ongoing professional development for staff. Most DWR staff are trained as engineers or hydrologists, and their expertise in infrastructure and planning may not necessarily encompass the breadth of on-farm water management approaches taken by farmers and ranchers. Growers work within biological systems, and their water management decision-making may include considerations with which DWR staff are unfamiliar, such as soil management, crop rotation, livestock management, etc.

By expanding DWR staff knowledge of agricultural management and its relationship to water use efficiency, the agency can improve results and diminish conflict. This will be particularly valuable as DWR administers water bond funding and implements new regulations. To accomplish the necessary staff training, we recommend ongoing professional development for DWR staff that includes farm visits, facilitated dialogues with agricultural stakeholders, and regular information sharing with agronomists and other agricultural professionals.²¹

20 Hudson, B. D. (1994). Soil organic matter and available water capacity. *Journal of Soil and Water Conservation*, 49(2), 189-194; Tom G. Huntington, "Available Water Capacity and Soil Organic Matter," Rattan Lal, ed., *Encyclopedia of Soil Science*, 2006; Steenwerth, K. and K. Belina. 2008. Cover crops enhance soil organic matter, carbon dynamics, and microbiological function in a vineyard agroecosystem. *Applied Soil Ecology*, 40, 359-369; Paustian, K., H. Collins, and E. Paul. 1997. Management controls on soil carbon. In E. Paul, et al (Eds.), *Soil Organic Matter in Temperate Agroecosystems*. Ed. E.A. Paul et al. Boca Raton, Florida: CRC Press.

21 A multi-stakeholder process initiated by Ag Innovations Network (AIN) resulted in a report that includes a similar recommendation to ours here. In their report, "Regulating for Agricultural and Public Outcomes: Perspectives and Recommendations" (January 2014), AIN recommends that "agricultural literacy is consistently represented among the staff devoted to resolving interagency conflict to augment efforts already underway to train staff and improve regulatory processes" (p. 23).

Recommendations

Administrative Action:

- Direct the appropriate agencies to expand the vision for water efficiency to include on-farm practices such as soil management systems that improve water-holding capacity and build soil health, and techniques like on-farm water ponds that improve overall water savings.
- Simplify permitting for on-farm groundwater recharge and pond building projects that demonstrably produce environmental, conservation, and resilience benefits.
- Support the Department of Water Resources (DWR) and other agencies involved in agricultural water use efficiency in ongoing professional development of agency staff to improve their understanding of agricultural perspectives on water issues, particularly for water management in biological systems.

Pioneering water conservation in the San Joaquin Valley

Red Rock Ranch, near Fresno in the water-scarce Westlands District, produces 4,000 acres of fruit and vegetable crops. Owner John Diener is a leader in water conservation. He employs water-saving practices that lower water use, decrease the energy needed for pumping water, reduce GHG emissions and save time and money. Some examples include:

- An integrated irrigation management program, including soil moisture monitoring
- Highly efficient drip irrigation in almond orchards and vineyards
- State-of-the-art center pivot sprinklers with precise computer-controlled irrigation scheduling that minimize losses to evaporation, using 65 percent less energy and 10-15 percent less water
- Low-till and cover cropping methods that improve water penetration into the soil, reduce irrigation demand, reduce tractor fuel use and increase soil carbon levels



Photo credit: Jeff Mitchell

D. ON-FARM ENERGY & WATER EFFICIENCY



Photo credit: Full Belly Farm

As severe drought has gripped California, the Governor and his administration have addressed the relationship between water and energy use and GHG emissions. Water-related energy use consumes approximately 20 percent of California's electricity, and is an obvious target for achieving GHG reductions.²² The agriculture sector consumes about seven percent of California's total electricity, primarily through a broad mix of diverse and smaller accounts.

Opportunities for reducing energy usage in agriculture are available by seeking efficiencies and implementing conservation practices in both water and energy use. The CPUC is currently evaluating possibilities for an expanded focus on combined water and energy efficiencies.²³ CDFA, DWR, Department of Conservation (DOC), and other agencies have all administered programs designed to reduce agricultural energy use, water use, or both. But all of these efforts have focused solely on technological efficiencies (e.g., pumps and irrigation systems). More can be done to expand the reach and impact of these programs to include a diversity of on-farm practices that improve water-energy use while providing other environmental benefits.

Progress to Date

As mentioned above, CDFA's SWEEP program is administering \$10 million from cap-and-trade auction proceeds for agricultural water use efficiency grants. Tying water efficiency and GHG reductions together with SWEEP is a very important step towards addressing agriculture's potential for climate solutions. Similar efforts should continue to be funded by cap-and-trade investments in the future.

To date, SWEEP program guidelines have provided financial assistance primarily for the installation of irrigation systems and related technologies. This has meant that other on-farm water use efficiency measures (such as changes in tillage practices, cover cropping, mulching, and compost

²² California Energy Commission. October 2008. *Managing an Uncertain Future: Climate Change Adaptation Strategies for California's Water*. Available at: <http://www.water.ca.gov/climatechange/docs/ClimateChangeWhitePaper.pdf>

²³ As part of CPUC Rulemaking 13-12-011.

amendments), while eligible under the second round of SWEEP funding, did not receive much attention as possible activities for funding. Nor are these practices recognized through the state’s ratepayer-funded energy efficiency programs, which are administered through the Investor-Owned Utilities (IOUs) and supervised by the CPUC.

Overall, there is a perceived lack of data on the water-saving benefits of these practices, as well as on the accompanying energy and/or GHG reductions. Collaboration and data sharing between federal agencies like NRCS and state agencies such as CDFA, DWR and CPUC could result in standardized accounting of the energy and water use savings available through farm-level efficiency measures. With proper accounting, these practices can be adequately incentivized for the multiple co-benefits they provide.

Agency and IOU programs must be designed to address the water-energy nexus for California growers across a diversity of regions, scales, management systems, and crop and livestock types. Doing so will ensure that all growers are able to pursue innovative water and energy efficiencies on their operations, allowing widespread access to cost savings for growers, alongside more substantial energy use and GHG reductions for the state.

Recommendations

Administrative Action:

- Include a diversity of water use efficiency measures, including soil management practices, in incentives programs aimed at reducing water and energy-related GHG emissions in agriculture.

Legislative Action:

- Direct the California Public Utilities Commission to ensure that the energy efficiency programs of Investor-Owned Utilities are adequately reaching California’s diverse agricultural customers and achieving the best possible outcomes.
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E. COMPOST BENEFITS IN AGRICULTURE



Organic wastes, such as food and yard trimmings, that are decomposing in landfills are the state's greatest source of fugitive methane emissions.²⁴ Legislation signed by the Governor in 2014 will require the diversion of organic wastes from landfills and put them to productive purposes, including the creation of compost. This is expected to increase the availability of compost, which, when applied to farm and rangeland, is a valuable source of fertility and can increase carbon sequestration in soils.²⁵

Reducing or replacing synthetic fertilizer with compost can simultaneously reduce GHG emissions and lower nitrate contamination in groundwater.²⁶ Agricultural compost application can also save water and reduce energy consumption, as discussed in the above sections. Using compost to increase soil organic matter can enhance the penetration of water on farms, reducing soil erosion and helping to manage flooding.²⁷ Organic and conventional growers alike use compost for its multiple benefits, but more can be done to increase the use of compost in California agriculture.

Progress to Date

Two bills signed by Governor Brown in 2014 will drive organic waste recycling efforts statewide and may significantly increase the production of compost. AB 1826 (Chesbro) requires commercial waste generators to recycle organic waste through compost production or anaerobic digestion. AB 1594 (Williams) eliminates a loophole that has allowed some yard trimmings and prunings to be used as landfill cover instead of being recycled.

²⁴ California Air Resources Board. 2014 Update to the California Climate Change Scoping Plan, p. ES8. Available at: <http://www.arb.ca.gov/cc/scopingplan/document/updatedscopingplan2013.htm>

²⁵ Bowles, T., et al. 2014. Soil enzyme activities, microbial communities, and carbon and nitrogen availability in organic agroecosystems across an intensively-managed agricultural landscape. *Soil Biology & Chemistry*, 68, 252-262; Suddick, E., et al. 2010. The Potential for California Agricultural Crop Soils to Reduce Greenhouse Gas Emissions: A Holistic Evaluation. *Advances in Agronomy* 107.

²⁶ Jackson, L., et al. 2003. Scientists, growers assess trade-offs in use of tillage, cover crops and compost. *California Agriculture*, 57(2), 48-54.

²⁷ De Gryze, S., R. Catala, R.E. Howitt, and J. Six. 2008. Assessment of Greenhouse Gas Mitigation in California Agricultural Soils. California Energy Commission, PIER Energy Related Environmental Research. CEC 500 2008 039.

CARB's 2014 update to the Climate Change Scoping Plan prioritizes the diversion of organic wastes from landfills, highlighting the need to use these wastes as feedstock for "critically needed alternatives to agricultural amendments."²⁸ However, we still lack a full understanding of how the compost market functions in California—an obvious gap that needs to be filled for the state to meet its goals.

In 2010, CalRecycle released its *Third Assessment of California's Compost- and Mulch-Producing Infrastructure – Management Practices and Market Conditions*, which draws on the results of a 2008 survey of compost and mulch producers. The report highlights the need for more detailed information about the agricultural market for compost consumption, which the authors call "key to the sustainability of the composting industry in California."²⁹

A comprehensive analysis of both supply and demand for compost in the agricultural market segment will improve understanding of market potential for this important by-product. It can also inform a pilot program to incentivize the use of compost by a greater number of agricultural producers in the state.

Important areas for data collection and analysis will be:

- **Regional Differences:** Some facilities currently produce more compost than they can sell, while others may lack local supply. Supply and demand of compost should be evaluated by region in order to craft policies and programs that address local disparities. Factors that help create these disparities (i.e., economic, regulatory, technical) should be uncovered and examined.
- **Crops:** The 2010 CalRecycle study suggests that we need a better understanding of the motivations for purchasing compost to be used in various cropping systems. This will help to identify potential end users and to craft effective incentives and policies.
- **Quantifying Benefits:** Data collected through the pilot program and study could be used to quantify the overall benefits of compost applications for water use reductions, lowering GHG emissions, sequestering carbon, and more.

Recommendations

Administrative Action:

- Conduct an analysis of compost production and market demand in agriculture, including regional analyses, in order to inform the development of incentives that promote the wider use of compost for on-farm fertility, water use reductions, GHG reductions/sequestration, and improved water quality.
- Create a pilot program to incentivize compost use on farms and ranches, aimed at improving soil health, reducing GHG emissions and lowering input expenses for growers.

28 California Air Resources Board. 2014 Update to the California Climate Change Scoping Plan, p. ES8. Available at: <http://www.arb.ca.gov/cc/scopingplan/document/updatedscopingplan2013.htm>

29 CalRecycle. August 2010. *Third Assessment of California's Compost- and Mulch-Producing Infrastructure – Management Practices and Market Conditions*. Publication # DRRR – 2010 – 007. Available at: <http://www.calrecycle.ca.gov/publications/Documents/Organics%5C2010007.pdf>

F. AGRICULTURAL LAND CONSERVATION



The conversion of agricultural land in California to non-agricultural uses continues at an alarming rate. An average of 50,000 acres are lost annually.³⁰ By 2050, California could lose two million acres of agricultural land if aggressive action is not taken to slow the loss of productive farmland.³¹

By paving over agricultural land, we not only reduce the ability of the state to produce much-needed food and fiber, but we also face increased GHG emissions associated with land conversion. When agricultural land is developed, the carbon sequestered in agricultural soils and woody plants is released, and GHG emissions are increased from urban uses and transportation related to urban development.

Researchers at UC Davis found that an acre of urban land produced 70 times more GHG emissions than an acre of irrigated cropland in Yolo County. That number increases to 100 times more emissions from the urban acreage when rangeland is included.³²

The administration has taken an initial step to put forward a new vision for agricultural land conservation through the development of the country's first climate change and farmland conservation program. Despite this, the majority of the state's farmland conservation programs limp along with little to no funding. More is needed to address the gaps in our state land use policies and programs to protect the millions of farmland acres in the state threatened with conversion.

Progress to Date

The administration has created the country's first climate change and farmland conservation program. For the first time, the 2014-15 budget makes a modest \$5 million investment in agricultural land conservation. The new program, the Sustainable Agricultural Lands Conservation Program (SALCP), seeks to reduce GHG emissions associated with sprawl development by protecting agricultural lands on the urban/suburban edge. We commend the creation of SALCP as an important, though very modest, start to addressing the climate change nexus with agricultural land conservation.

30 See the Department of Conservation's Farmland Mapping and Monitoring data:
<http://www.conservation.ca.gov/dlrp/fmmp/trends/Pages/FastFacts.aspx>

31 See American Farmland Trust's report, Paving Paradise:
<http://www.farmland.org/programs/states/ca/Feature%20Stories/PavingParadise.asp>

32 See: <http://www.energy.ca.gov/2012publications/CEC-500-2012-032/CEC-500-2012-032.pdf>

SALCP is part of the larger Sustainable Communities Strategies (SCS) program, which supports urban in-fill projects featuring affordable housing and transit-oriented development. It will be critical to integrate the objectives and the evaluation of both SALCP and SCS grant proposals to mutually support the goals and complementarity of both farmland conservation and smart growth urban planning.

However, the minor investments in SALCP, while important, cannot replace the once robust funding for the Williamson Act subvention payments, the California Farmland Conservancy Program, and the Farmland Mapping and Monitoring Program—all of which are either de-funded or staggering along with limited budgets.³³

California needs a new vision for smart growth development that encompasses protecting our finite agricultural land base. The SALCP is a good conceptual start, but the administration can do much more to advance a vision for a reformed Williamson Act and new farmland conservation efforts that embrace multiple state and local land use planning objectives, including the long-term viability of our agricultural industry.

Recommendations

Administrative Action:

- Convene a Governor’s task force to develop a set of recommendations on Williamson Act reforms and state agricultural land conservation policies that go beyond the Williamson Act. The task force should be charged with considering Williamson Act reforms and farmland conservation policies, as a whole, that address a variety of state priorities. The task force should include a diversity of stakeholders with relevant expertise.
- In the updated General Plan guidelines under development by the Office of Planning and Research, include farmland conservation policy tools and model ordinances—especially farmland mitigation policies—that are available to local governments. Highlight recent court cases that clarify the CEQA requirements to mitigate for the loss of farmland from development projects.

Budget Action:

- Increase funding for the new Sustainable Agricultural Lands Conservation Program (SALCP) funded by cap-and-trade revenue. A minimum of ten percent of Sustainable Communities Strategies funding should be allocated annually to SALCP.
- Following the recommendations of the task force described above, the Governor should reinvest in subvention payments that advance a reformed Williamson Act program to meet the needs of the state’s producers and the greater goals of the state.

33 The California Farmland Conservancy Program will receive mitigation funds from the High Speed Rail Project, which will provide funding for conservation easement along the rail corridor. While a critical investment, this does not replace the once robust statewide program, which relied on bond funding that is no longer available.

G. CLIMATE RESILIENT AGRICULTURE



The Governor and his administration have done considerable work to raise awareness among Californians about the threats of climate change and the need to adapt to its impacts. In 2010, when CalCAN released our first set of recommendations on this issue, adaptation was a relatively new area of state policy work. Much has been done since then to make climate change impact and resilience strategies more tangible and relevant to our communities, as well as to the many sectors of the state's economy, including agriculture.

As we move forward, the state must turn planning and assessment into on-the-ground action by providing resources needed by farmers and ranchers to improve their resilience to the impacts of climate change. Foremost among these impacts are constrained water resources, loss of winter chill hours and greater weather extremes.

We can no longer afford to advance climate change mitigation strategies without considering how they impact agriculture's ability to adapt to climate change. As much as possible, we must bring together our climate change mitigation and adaptation efforts so we can implement solutions that support a more resilient and sustainable agriculture.

Progress to Date

The administration has dedicated staff and resources to climate change adaptation planning and research. In December 2011, Governor Brown hosted a state conference, Extreme Climate Risks and California's Future, followed by regional conferences to discuss climate impacts and resiliency strategies. In July 2014, the Natural Resources Agency released its update of the 2009 climate change adaptation report, *Safeguarding California: Reducing Climate Risk*.³⁴

The *Safeguarding* report builds upon a CDFA initiative, the Climate Change Consortium for Specialty Crops.³⁵ In 2013, CDFA brought together agricultural trade group representatives with climate researchers and technical experts to develop a set of recommendations that enhance California agriculture's viability and resilience in the face of a changing climate. This was pioneering work that made an often-observed topic—climate change and its impacts—tangible to the region and the industry.

³⁴ See: <http://resources.ca.gov/climate/safeguarding/>

³⁵ See: <http://www.cdca.ca.gov/environmentalstewardship/ClimateChangeAdaptConsortium.html>

Building on this work, the administration is launching California's Fourth Climate Change Assessment, which will include agriculture-related research on adaptation and mitigation issues.³⁶

Despite these efforts, California still lacks the necessary resources to tackle climate change adaptation on the ground.

A July 2014 study of state efforts to address climate change adaptation by the Little Hoover Commission found that, "California's lack so far of a unified strategy for climate adaptation stands in sharp contrast to its targeted efforts to reduce GHG emissions."³⁷ The Commission calls for a new state entity, or enhancement of the capacity of an existing state organization, to "share the best-available state science and risk assessment procedures for anticipated climate impacts."³⁸

Following up on our 2010 recommendation, we agree with the Commission that state resources are needed to move adaptation planning to action. The CDFA also recognized this need in their 2013 report, *Climate Change Consortium for Specialty Crops: Impacts and Strategies for Resilience*.

We recommend a clearinghouse for information and relevant resources—not just for local government, but also for important economic sectors like agriculture. Relevant adaptation science and information resources for agricultural professionals, along with funding to support implementation of adaptation projects, will help farmers and ranchers move toward greater resilience and improved food security for us all.

As much as possible, we must also bring together climate change adaptation and mitigation efforts in agriculture. California climate change policy has kept climate change mitigation and adaptation efforts unconnected for too long.

As mitigation efforts move forward in the form of new cap-and-trade investments, we must consider strategies that meet the collective aims of reducing GHG emissions while increasing resilience to greater weather extremes. In biological systems like agriculture, there is often the opportunity to both reduce emissions *and* improve resilience to climate change impacts. For example, through enhanced water use efficiency, we can reduce the energy used to move water, thus lowering GHG emissions and improving water conservation.

Where there are trade-offs, we must acknowledge them, and determine the costs and benefits of our actions. Otherwise, we risk making costly investments that fail to meet the urgent needs of our communities as we take on the challenges of greater weather extremes.

Recommendations

Administrative Action:

- Create a state clearinghouse of information and resources for climate change adaptation, including resources relevant to agricultural professionals.
- Prioritize activities that bring together climate change mitigation and adaptation strategies in biological systems like agriculture.

36 See: <http://resources.ca.gov/climate/fourth/>

37 Page v. July 2014. *Governing California Through Climate Change*. Little Hoover Commission. <http://www.lhc.ca.gov/studies/221/Report221.pdf>

38 Cover letter. *Ibid.*

H. RESEARCH, TECHNICAL ASSISTANCE AND PLANNING



Public funding for agricultural research, extension and technical assistance has been on a steady decline since the 1990s. The once robust University of California Cooperative Extension system has diminished to fewer than 300 farm advisors and specialists, compared to more than 500 staff in 1990.³⁹ The Resource Conservation Districts (RCD), which also provide technical support for growers wanting to address water, land, energy, and air conservation issues, have not recovered from state budget cuts that eliminated their core state funding.

As a consequence of declining public investment in agricultural extension and technical assistance, we enter into the age of greater climate change impacts on California agriculture and its related complexities, without the scientific and technical expertise once available to the state's nearly 78,000 agricultural producers.

Some may argue that the private sector can fill the gaps left by government budget cuts and shifting priorities. While there is undoubtedly a role for the private sector in providing climate change solutions for agriculture, there is also a need for public sector research and technical assistance for agriculture that is driven by a public interest mandate and mission. The challenges of climate change also require agricultural solutions that are based in science and take a whole-farm systems approach that often goes beyond the training and scope of most private farm consultants.

Here we offer a diversity of recommendations to re-imagine and improve funding for public research and technical assistance to support California's farmers and ranchers in meeting the challenges of a changing climate.

³⁹ Email correspondence with UC Cooperative Extension on latest numbers of Cooperative Extension specialists and farm advisors. November 2014.

Progress to Date

The Governor and his administration are in the process of finalizing a California Climate Change Research Plan. The Plan will help inform the initial work for the Fourth Climate Change Assessment, which evaluates regional and state climate change impacts. Requests for proposals to fund \$5 million in Research Plan priorities will be released in 2015, and among them will be key research topics addressing the connection between rangeland management and climate change mitigation, as well as water, compost and other agriculture-related climate change issues.

However, this effort does not make up for the loss of support from the state's Public Interest Energy Research (PIER) program, which once provided millions of dollars for climate change and agriculture research.⁴⁰ It is not clear how ongoing Climate Change Research Plan priorities will be funded. To address the climate change research agenda for agriculture, the administration will need to engage stakeholders and continue to find ways to develop and fund research efforts.

Furthermore, the research alone is not sufficient. Research findings must be translated into on-the-ground, practical assistance for farmers and ranchers. As noted above, the once robust

Cooperative Extension and RCDs have seen steady and profound state budget cuts that constrain their ability to translate research for the state's farmers on urgent issues like climate change.

We must re-imagine and re-invest in our public agricultural resources like Cooperative Extension and the Resource Conservation Districts. Their importance in meeting the state's climate change priorities cannot be overstated, but the administration has paid little attention to the status of these public bodies and their role in strengthening the state's climate change actions.

Another area of work needed within the administration in order to sustain public research and technical assistance for farmers is the Fertilizer Research and Education Program (FREP). Funded

through an assessment on fertilizers, FREP supports competitive research and technical assistance grants to address environmental and agronomic concerns with synthetic and organic fertilizers. CDFA Secretary Karen Ross has greatly improved access to grant research findings and has broadened the reach of the program so that it is relevant to growers. But more can be done to diversify the membership of the advisory board and the technical advisory committee. Statutory changes may be needed to bring in soil management experts who are not directly tied to the fertilizer industry.



Photo credit: USDA-NRCS

⁴⁰ PIER funding for climate change and agriculture research ended when the original public goods charge on utility bills was not renewed by the legislature in 2011. The charge was replaced by the Electric Program Investment Charge (EPIC) under CPUC authority in 2012, but was more narrowly defined and no longer funds public research on climate change issues.

Finally, more can be done to support greater transparency and communication across agencies and stakeholders working on climate change and agriculture issues. To date, CDFA and the Resources Agency, with CARB, are the leads on climate change and agriculture issues—both mitigation and adaptation. With increased water bond dollars, DWR will likely also engage more in agriculture/climate/water issues. To better facilitate interagency collaboration and stakeholder involvement, and to avoid working at cross purposes, the Agriculture Climate Change Action Team (Ag CAT) should be reconstituted once again, as it was under Governor Schwarzenegger, as a body that meets publicly and at the agency level.

Recommendations



Administrative:

- Implement the California Climate Change Research Plan, led by the Natural Resources Agency and the California Energy Commission, by prioritizing the multi-year climate change/agriculture research scope with stakeholder input and developing a funding mechanism.
- Review the status and needs for grower public technical assistance and on-farm demonstration and research, focused on Cooperative Extension and Resource Conservation Districts.
- Increase diversity of expertise, including those familiar with climate change and organic and sustainable agriculture, on the advisory board and committees of CDFA's Fertilizer Research and Education Program (FREP).
- Improve communication between agencies and departments on climate change and agriculture by holding interagency and stakeholder meetings of the Agriculture Climate Change Action Team (AgCAT).



Budget Action:

- Develop and implement a funding plan to restore funding to the University of California Cooperative Extension to 1990 levels.
- Stabilize funding for the Resource Conservation Districts through an ongoing appropriation.



I. CALIFORNIA FARMWORKERS



Farm labor is critical to the long-term viability of California agriculture. Without adequate labor, the state’s farmers and ranchers cannot produce the food and fiber upon which we depend. And just as the livelihoods of farmers and ranchers are vulnerable to the extremes of climate change, so too are the livelihoods of farmworkers and their families. The recent drought highlights these vulnerabilities. A UC Davis study finds that the current drought will lead to the loss of 17,000 agriculture-related jobs in the Central Valley, many of which are farmworker jobs.⁴¹

Because many of California’s farmworkers are undocumented, comprehensive federal immigration reform is needed to ensure a stable and healthy agricultural workforce. Such reforms should avoid repeating the mistakes of the past such as guest worker programs that essentially create indentured workers separated from their families and with essentially no choice of employers. Instead, comprehensive federal reforms should create a path for farmworkers to legally and freely work in California and throughout the country.

Governor Brown can act now to continue to improve the lives of California farmworkers and their families, better equipping them to face the challenges of climate change, rather than waiting for Congressional action. For example, he can extend basic human services like health care and education to those individuals and families who are given administrative relief under the Immigration Accountability Executive Action announced by President Obama in November 2014.⁴² Under President Obama’s action, five million undocumented workers, many of whom make their homes in California, will have deportation relief.

41 Howitt, R.E., J. Medellin-Azuara, E. MacEwan, J.R. Lund and D.A. Sumner (2014). Economic Analysis of the 2014 Drought for California Agriculture. Center for Watershed Sciences, University of California, Davis, California. 20p. Available at <http://watershed.ucdavis.edu>.

42 See: <http://www.whitehouse.gov/the-press-office/2014/11/20/fact-sheet-immigration-accountability-executive-action>

Governor Brown can also improve existing state programs that support farmworker housing and provide disaster relief and job retraining services during times of the crop losses predicted to worsen with climate change. Such efforts will enhance the lives of farmworkers, ensure a more stable agricultural workforce in California, and improve the economic development of our rural communities, especially in the Central Valley.

Progress to Date

During his third term, Governor Brown made progress on addressing some of the concerns of undocumented workers. Governor Brown signed AB 60 (Alejo) and AB 353 (Cedillo). AB 60 allows undocumented immigrants in California to obtain drivers' licenses. AB 353 states that vehicles can no longer be impounded if drivers do not have a valid driver's license. These are important steps in the right direction to improve the lives of undocumented workers, but implementation is always the key to such efforts. Governor Brown and his administration should ensure effective implementation through outreach and education to local law enforcement on the new rules.

In terms of climate change-related issues for farmworkers, Governor Brown's efforts have aimed at reducing heat and drought-related stresses for farmworker communities. Governor Brown signed SB 1360 (Padilla) into law, to clarify that "recovery periods" related to heat stress are like other rest periods and employees must be paid for the time. In September 2014, \$1 million was allocated to a new two-year program⁴³ that provides job training in regions hit hardest by the drought. While very modest in funding, such a program can be built upon during Governor Brown's final term.

Governor Brown also issued an executive order (#B-26-14) to make funding available through the California Disaster Assistance Act to provide water for drinking and sanitation to households currently without running water—many of which are located in farmworker communities. The executive order also extends the state's prohibition on price gouging during emergencies to the current drought, and it directs the State Water Resources Control Board, the Department of Water Resources and the Governor's Offices of Emergency Services and Planning and Research to work together to identify acute drinking water shortages in domestic supplies, and to work with counties and local agencies to implement solutions for those water shortages.

Governor Brown and the legislature have begun allocating cap-and-trade funds to the Strategic Growth Council for GHG reductions associated with in-fill housing developments and improved public transportation. Fifty percent of these funds are dedicated to disadvantaged communities, many of which are in the Central Valley. As these programs are developed, it will be crucial that funding be made available for improved housing and transportation access in rural communities where transit infrastructure can be limited.



Photo credit: Full Belly Farm

⁴³ The agencies involved in the job training initiative are the California Community Colleges Chancellor's Office, the California Labor and Workforce Development Agency and the Employment Training Panel.

California has a patchwork of programs and funding sources that can support farmworker families with job training, disaster assistance, and housing, energy and water subsidies. But these programs are not necessarily well coordinated, are sometimes hard to access, and are often insufficiently funded. As the stresses on farmworker communities increase with climate change, it is important that funding keeps pace with demand and that the programs are accessible and structured to serve the changing needs of California farmworkers and their families.

Recommendations

Administrative Action:

- When implementing climate change policies, such as the Sustainable Communities Implementation Program administered by the Strategic Growth Council, ensure that rural communities with limited access to transit infrastructure are adequately served.
- Ensure that migrant family housing centers and other farmworker housing have access to adequate HVAC systems to better protect farmworkers and their families from weather extremes.
- Develop a plan to extend services (e.g., health care, education, etc.) to those individuals and families in California who are given administrative relief under President Obama's November 2014 Immigration Accountability Executive Action. Support California farmworkers and their families in seeking relief status under President Obama's executive action.

Budget Action:

- Improve funding for migrant family housing centers and provide adequate funding (e.g., through the Joe Serna Farmworker Program) for financing new construction, rehabilitation and purchase of farmworker rental housing.
 - Improve access and funding to disaster services for farmworker families during times of crop failures, droughts and other extreme events, and keep pace with the predicted need for assistance as weather extremes become more frequent in the state.
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