CARBON NEUTRAL AGRICULTURE IN CALIFORNIA BY 2030: A PATHWAY TO ECONOMIC, ECOLOGICAL, AND SOCIAL RESILIENCE

Recommendations to Governor Newsom's Administration

GOAL: By 2030, California agriculture will achieve carbon neutrality, moving from a net source of greenhouse gases to a net sink through an integrated approach that simultaneously builds climate resilience and garners economic, environmental, and social benefits.

INTRODUCTION

As outlined in the recent IPCC report,[1] we must act immediately to avoid temperature increases beyond 1.5 degrees Celsius and avoid the worst impacts of climate change. California has a goal of reducing greenhouse gas (GHG) emissions to 40 percent below 1990 levels by 2030 and achieve carbon neutrality as a state by 2045. The opportunity to sequester significant quantities of atmospheric carbon dioxide (CO_2) as soil organic carbon and perennial vegetation in the agricultural and working lands of the state must be realized *now* if California is to meet its GHG reduction goals.

If immediate action is taken, our analysis indicates that California agriculture could achieve net carbon neutrality by 2030 and become a significant carbon sink in perpetuity. California's agricultural sector is responsible for 8 percent of the state's GHG emissions,[2] and we encourage the agricultural sector to adopt a variety of strategies to reduce those emissions. One critical way to offset those emissions is through carbon sequestration via the soil, which is the focus of this vision. Focusing on this "healthy soils" strategy can help California simultaneously achieve a wide

range of important public health and environmental benefits and cost savings, including improved crop yields, enhanced management of increasingly limited water resources, flood and fire mitigation, enhanced water quality (including drinking water), improved air quality, better and more equitable economic outcomes for farmers and ranchers, and more resilient food production systems. We believe that complex and interconnected climate and other environmental challenges require similarly interconnected and cost-effective solutions.

Here, we offer our recommendations for how to utilize our agricultural soils as a strategy for reaching carbon neutrality in California agriculture by 2030. As a group representing diverse public interests, including production agriculture, rural economic development, public health and safety, farmworker wellbeing, rural communities, land conservation, drinking water safety, and environmental stewardship, these recommendations represent an unprecedented consensus on a robust and achievable pathway to a resilient future for all Californians.

PATH TO ACHIEVING CARBON NEUTRALITY IN AGRICULTURE

The sector must offset its current emissions of 34 Million Metric Tons (MMT) of Carbon Dioxide Equivalent per year (CO_2e /year) to achieve carbon neutrality on California's agricultural lands.[3] The offset can be realized by 2030 and can contribute to the state's overall 2045 carbon neutrality goal by immediately implementing a comprehensive statewide strategy that addresses emissions reduction and carbon sequestration on the state's working lands and deploys working land carbon dioxide removal (CDR) practices at scale.

Table 1 illustrates ***one of many*** possible CDR scenarios deployed on a subset of the state's working lands by 2030. It employs a set of management practices that derive almost half their carbon sequestration benefits from compost applications on the state's arable lands and 30 percent from agroforestry practices. The remaining carbon sequestration benefits come from increased photosynthetic carbon capture by deploying, at scale, well-established soil and vegetation management conservation strategies in use since the Dust Bowl era. In addition to the practices below, organic and agroecological farming practices offer further opportunities for carbon sequestration.[4]

Table 1. One potential CDR scenario for a subset of California working lands from 2020 through 2030

Practice	Annual Acreage (new)	Annual MMT CO2e (new acres)	2030 Acreage	2030 MMT CDR[5]
Rangeland compost*	110,000	0.16	1,210,000	10.8
Pasture compost[6]	192,500	0.866	2,117,000	10.4
Cropland compost	200,000	0.9	2,200,000	9.9
Agroforestry	190,000	0.19	2,090,000	12.54
Riparian restoration	8,500	0.009	93,500	0.56
Prescribed grazing**	218,000	0.01	2,398,000	0.72

Avoided N fertilizer cropland	200,000	0. 19***	2,200,000	2.1
Cover Crops	200,000****	0.05****	2,200,000****	0.55
Total	916,500	2.05	10,081,500*****	47.57

*See Ryals and Silver 2013 for discussion on rangeland compost CDR metrics.
** Assumes grazing on private land.
***Assumes 1.5% N in compost and 15.6 Mg CO_2e /MT of N (Foucherot and Bellassen 2011). Because COMET-Planner assumes a 15% reduction in synthetic N use with compost application, a factor of 0.85 is used to estimate remaining volume of synthetic N reduced: 200,000 acres/year x 5.3 short tons compost x 0.909 = 963,540 MT compost x 0.015 %N x 15.6 MT CO_2e x 0.85 = 191,648 MT CO_2e.
****assumes practice occurs on same acreage as cropland compost at annual sequestration rate of 0.25 Mg/acre/year (COMET-Planner), and no cumulative benefit.
*****Practices are not applied on unique acreages; some acres may receive more than one practice, hence total acres treated may be less than total acres on a practice by practice basis.

The following vision is presented here in three components—a description of our guiding principles, a discussion of our goals, and specific policy recommendations. We offer this work as a roadmap to achieving transformational change on the scale that the climate crisis requires.

Guiding Principles

Our recommended actions adhere to the following principles to maximize benefits and mitigate unintended consequences. We recommend that any state-led agricultural climate strategy be designed with these principles in mind.

- ***Enhance climate resiliency***: Help agricultural operations and rural communities better respond to climate-related changes such as drought, flooding, and wildfire.
- ***Enhance the long-term viability of agricultural operations across scale and operation type***: Support the long-term economic health of agricultural businesses and foster stable land tenancy and market opportunities, taking explicit measures to be inclusive of our state's most vulnerable farmers, including socially disadvantaged farmers and small-to mid-scale operations.
- ***Include all voices in decision making***: Enable full participation and representation of communities, particularly vulnerable and marginalized communities, in decision-making.
- ***Advance environmental justice:*** Eliminate the disproportionate burden of negative environmental impacts from climate change and agriculture borne by low-income and communities of color.
- ***Promote collaboration:*** Enhance meaningful collaboration and partnerships among a multiplicity and diversity of stakeholders.
- ***Promote environmental health***: Improve water quality in surface and groundwater, reduce agriculture's negative impact on human health and the environment, reduce nutrient runoff, and reduce the use of synthetic inputs.

- ***Build capacity to implement best practices for soil health***: Facilitate opportunities for land managers to learn about and adopt soil building practices that build soil organic matter.
- ***Support equitable rural community economic development***: Support diversified and equitable rural economies.
- ***Advance research for public interests:*** Ensure public funding for agricultural research and development is used for research that serves the public interest rather than private interests.

Pillars of a Healthy Soils Strategy

The following pillars are needed to accelerate carbon neutrality in California agriculture:

- Leverage the amplifying power of compost to accelerate soil carbon sequestration.
- Facilitate alternatives to synthetic fertilizers and pesticides for climate, environmental, human, and economic health.
- Prioritize farmland conservation and land access, particularly for people of color and other historically underserved populations.
- Implement holistic water policies and incentives programs.
- Provide funding and technical assistance to land managers for planning, implementing, and monitoring whole farm approaches to carbon sequestration.

LEVERAGE THE AMPLIFYING POWER OF COMPOST TO ACCELERATE SOIL CARBON SEQUESTRATION

GOAL: Utilize all appropriate organic waste materials for environmentally compliant compost production, and build new market opportunities focused on economic and environmental justice.

Proper compost production and application can play a pivotal role in the carbon, water, and nutrient cycles that support our agricultural and climate systems. Compost offers the most rapid means of directly increasing soil organic carbon in both rangeland and row crop systems. Directly adding nutrient stable organic matter enables the rapid elevation of soil organic carbon to levels that may take several years to achieve without it.[7]

Compost application on cropland and rangeland triggers soil carbon sequestration.

- A one-time, ¼ inch deep application of compost on grazed rangelands can stimulate carbon sequestration rates of one to three tons CO_2e per acre per year while simultaneously increasing the production of forage by 15 to 50 percent even during times of drought.[8]

Compost helps replace synthetic fertilizers, creating water quality and GHG emission reduction benefits.

- Compost supports the reduction of synthetic fertilizer use, and thus reduces emissions from both the manufacture and use of synthetic fertilizers, while directly increasing soil carbon.

Large emissions reductions are possible by diverting organic waste from landfills to compost.

- In 2016, California disposed roughly 35 MMT of waste in landfills, more than 60 percent of which was organic material that could have been source reduced, recycled, composted, used as mulch, or processed in anaerobic digesters and then composted.[9]
- Composting materials such as food scraps, yard trimmings, animal manure, orchard waste, and wood debris (instead of landfilling, lagoon storage, or open burning) is an effective strategy for mitigating highly potent and short-lived methane, nitrous oxide, and black carbon.
- Directing suitable organic waste materials to composting is consistent with recent state statutory requirements to:
    a. Annually divert millions of tons of organics from landfills; and
    b. Reduce short lived climate pollutants from food waste, livestock manures, orchard waste, and fire fuel reduction biomass.

Scaling up compost production and application can create jobs and allows for community participation.

- To meet S.B. 1383 targets,[10] CalRecycle estimates the need for dozens to hundreds of new and expanded composting facilities and transport infrastructure. Community participation in the design and development of compost projects will enable disenfranchised populations and people most affected by the location of waste management facilities to participate in the new soil building economy.

FACILITATE ALTERNATIVES TO SYNTHETIC INPUTS FOR CLIMATE, ENVIRONMENTAL, HUMAN, AND ECONOMIC HEALTH

GOAL: Reduce synthetic pesticide[11] and other agri-chemical use and reinvest in alternatives to conventional pesticides (e.g. compost products) in both rural and urban land management. Alternatives should improve the health, function, and diversity of the soil microbiome, increase soil organic matter accumulation and nutrient cycling, increase crops' resilience to pests and disease, improve nutritional density in food, improve water quality, reduce exposure for agricultural workers and communities, and bolster rural economies.

Alternatives to synthetic inputs enhance soil carbon sequestration.

- Over-application of synthetic fertilizer can have a negative impact on soil health.[12] The higher nitrogen, phosphorus, and potassium levels in synthetic fertilizer inhibit soil carbon sequestration and significantly reduce soil organic matter.[13]
- Pesticides can undercut carbon sequestration goals by damaging the soil microbiome and altering critical biochemical processes.[14]
- Organic farming can result in higher stable soil organic matter compared to conventional, even continuous no-till, conventional farming.[15]

Reductions in chemical use help achieve GHG emissions reduction targets.

- N_2O, a greenhouse gas, is nearly 300 times more potent than carbon dioxide. Approximately 20 million pounds of just three fumigants are applied in California every year,[16] and the application of these fumigants are associated with a seven to 100-fold increase in N_2O emissions.[17]
- Producing synthetic fertilizers[18] and pesticides[19] are energy-intensive processes. Roughly 17 percent of California's agricultural pesticide use comes from fumigants, and fumigant production alone uses approximately 500,000 gigajoules of energy per year.[20]

Over application of synthetic chemicals exacerbate climate impacts, waste farmers' money, and undermine ecological and human health.

- In California, 204.7 million pounds of pesticide active ingredients were applied on agricultural lands in 2017 alone.[21] Those ingredients are linked to both acute and chronic disease in workers, rural community members, and to impacts on the soil microbiome.[22]
- The over-application of synthetic fertilizer contributes to the health and climate crises; leaches into drinking water sources, resulting in unsafe drinking water for hundreds of thousands of Californians in agricultural regions that tend to be low income communities of color; and contributes to N_2O emissions and ground level ozone formation.[23],[24]

PRIORITIZE FARMLAND CONSERVATION AND LAND ACCESS, PARTICULARLY FOR PEOPLE OF COLOR AND OTHER HISTORICALLY UNDERSERVED POPULATIONS

GOAL: Protect our finite agricultural lands from sprawl development, improve access to agricultural land for future generations of farmers and ranchers, and scale up adoption of healthy soils practices on protected lands.

Agricultural land has a smaller climate footprint than its urban neighbors.

- A 2012 UC Davis study found that one acre of urban land in Yolo County emits 70 times more GHG emissions than one acre of irrigated cropland.[25]

Preventing farmland conversion from urban sprawl development puts California on a pathway towards sequestering more carbon and reducing GHGs associated with vehicle miles travelled.

- California loses an average of almost 40,000 acres of farmland to urban sprawl every year.[26]
- 90,000 acres of at-risk agricultural land have been protected since 2014 through permanent conservation easements funded by the Sustainable Agricultural Lands Conservation Program (SALCP). Through SALCP, those 90,000 acres of protected farmland will prevent nearly 47 MMT of carbon dioxide from being emitted over 30 years.[27]
- California should support farmland conservation that helps small, diversified, and historically disenfranchised farmers secure their livelihoods.
- Combined with smart urban growth, farmland conservation on the urban/suburban edge can create more livable, transit-oriented communities with lower carbon footprints.

IMPLEMENT HOLISTIC WATER POLICIES AND INCENTIVES PROGRAMS

GOAL: Knowing climate change will cause uncertainty in future water supplies, decision-makers should include soil health enhancement as a strategy when considering water policies (e.g. as a strategy for reducing agricultural water use). Include healthy soils outcomes in water policies and programs as a strategy for GHG reduction, water conservation and management, water quality improvement requirements, and agricultural water use efficiency.

Healthy soils best practices improve water quality.

- Management practices that build soil health like cover cropping can reduce nitrate leaching.[28]
- Soils with high soil organic matter in organically managed systems cycle nitrogen more effectively, increasing nitrogen retention on farms.[29]

Healthy soils practices can help build water holding capacity. This allows farmers to retain more water on their land, helping mitigate both drought and flooding.

- A statewide average increase in soil organic matter of *just* one percent on all of California's 26 million acres of working lands would increase soil water holding capacity by 1.5 million acre-feet per year, and includes a water supply benefit of approximately 283,000 acre-feet per year.[30] With a more ambitious but technically feasible three percent increase, soil water storage capacity in the state's working lands would increase by 4.7 million acre-feet per year, and includes a water supply benefit of approximately 613,000 acre-feet per year.[31]
- Water that stays in the watershed can help preserve baseflows and riparian systems during low-flow periods.[32]

PROVIDE FUNDING AND TECHNICAL ASSISTANCE (TA) SUPPORT TO LAND MANAGERS FOR PLANNING, IMPLEMENTING, AND MONITORING WHOLE FARM APPROACHES TO CARBON SEQUESTRATION

GOAL: Significantly scale up education, incentives, demonstration projects, and other opportunities to support farmers, ranchers, and frontline communities in adopting soil carbon sequestration and GHG reduction best practices. Prioritize resources for small and mid-scale and socially disadvantaged farmers.

Technical assistance extends the reach and impact of transformative agricultural practices.

- Increase TA for farmers and ranchers. TA is a key indicator of market adoption in the agricultural sector and is most impactful when presented by trusted sources (e.g. Resource Conservation Districts, U.C. Cooperative Extension, USDA NRCS, trade associations, NGOs, and other farmers).
- TA should be provided in a way that recognizes and accounts for farmers' management objectives, existing management practices, unique location, crops/livestock raised, available resources, culture, knowledge, values, experiences, spoken language, and other aspects of their complex business operations and surrounding social and ecological systems.[33]
- Regional collaboration, outreach, and demonstration projects will accelerate adoption of best practices.
- Prioritizing outreach, education, TA, regulatory, and incentive program support for farmers of color and small and mid-scale diversified farms will help repair the legacy of racial injustice and economic consolidation in the agriculture sector.
- According to the 2017 Census of Agriculture, approximately one out of five farmers in California are farmers of color.[34]
- Taking these actions will assist the Newsom administration in implementing the Farmer Equity Act of 2017.[35]

POLICY RECOMMENDATIONS TO ACHIEVE CARBON NEUTRALITY IN CALIFORNIA'S AGRICULTURAL SECTOR BY 2030

Carbon neutrality in California agriculture by 2030 is achievable through coordinated action in five key areas:

1. Technical assistance, outreach and education in the agriculture sector;
2. Research priorities;
3. Financial incentives;
4. Infrastructure; and
5. Regulatory streamlining.

Agency Acronyms

CalEPA: California Environmental Protection Agency
CalRecycle: Department of Resources Recycling and Recovery
CARB: California Air Resources Board
CDFA: California Department of Food and Agriculture
CDTFA: California Department of Tax and Fee Administration
CNRA: CA Natural Resources Agency
DOC: Department of Conservation
DFW: Department of Fish and Wildlife
DPR: Department of Pesticide Regulation
DWR: Department of Water Resources
GO: Governor's Office
GoBiz: Governor's Office of Business and Economic Development
HCD: Department of Housing and Community Development
NRCS: Natural Resources Conservation Service
OPR: Governor's Office of Planning and Research
RCD: Resource Conservation District
SGC: Strategic Growth Council
SWRCB: State Water Resources Control Board
UCANR: University of California Agriculture and Natural Resources
UCCE: University of California Cooperative Extension

TECHNICAL ASSISTANCE, SOCIALLY DISADVANTAGED COMMUNITIES, AND EDUCATION

Focus Area: Technical Assistance (TA)
Agencies: DOC, CDFA, and GO

- Assess existing capacity for a diversity of TA providers (e.g. RCDs, UCCE, UC Climate Smart Ag Team) to support whole farm conservation planning and implementation in every agricultural county in the state. (CDFA)
- Provide baseline funding for all RCDs. (GO)

- Support whole farm planning in all CA Climate Smart Programs by giving preference to applicants with whole farm plans and by providing funding for TA providers to create and implement plans. (CDFA)
- Provide funding for RCDs and other qualified TA providers to support robust whole farm planning assistance for producers that captures both state and NRCS funding programs and incentives. (CDFA)
- CDFA should work directly with TA providers, including RCDs and others, to coordinate and ensure comprehensive information on all available funding and TA opportunities are made available to producers for implementing CA Climate Smart Programs. (CDFA)
- Increase UCANR funding to restore the number of farm advisors and specialists to 1990 levels. (GO)
- Provide administrative and staff funding for the Small Farms Program. (GO)
- Provide ongoing support, staffing, and/or funds to manage the Farm Demonstration Network. (CDFA)
- Train and employ a robust conservation workforce to provide the necessary labor for conservation practice implementation. (DOC)
- The state should restore funding for the Sustainable Agriculture Research Education Program (SAREP) program. (GO)

Focus Area: Support for Socially Disadvantaged Farmers
Agencies: CDFA

- Prioritize farmers of color and small and mid-scale diversified family farms on all CDFA boards, committees, commissioners, and advisory panels. (CDFA)
- To support socially disadvantaged farmers and small and mid-scale, diversified family farmers, prioritize filling TA gaps in the San Joaquin Valley and Southern California. (CDFA)
- Implement the Farmer Equity Act of 2017 to maximize participation from socially disadvantaged farmers in healthy soils programs. (CDFA)

Focus Area: Education
Agencies: CDFA, UCANR, and DPR

- Develop a public online database of farming systems and practices that can be adopted to reduce use of synthetic pesticides and fertilizers for farmers, Pest Control Advisors (PCAs), and County Agricultural Commissioners. (DPR)
- Develop a system to ensure that TA providers, including Certified Crop Advisors (CCAs) and PCAs, have adequate expertise on organic, regenerative, ecological Integrated Pest Management (IPM), agroecological, and/or other healthy soils management practices, including their impacts on nutrient management and water holding capacity. Develop a list of approved degrees/certifications as well as training programs available to meet those requirements. (UCANR/DPR/CDFA)
- Research and support implementation of regional IPM programs. (DPR)
- Create a statewide pest and disease observation and alert system to reduce unnecessary pesticide application (e.g. Agroclimate's[36] real-time disease risk alert system for strawberry growers reduced fungicide applications by half and saved up to $400 per acre.). (DPR)

FINANCIAL INCENTIVES

Focus Area: Financial Assistance
Agencies: CDFA, GO

- Scale up funding for the Healthy Soils Program (HSP) to meet the goal of carbon neutral agriculture by 2030. (GO)
- Explore additional avenues for incentivizing healthy soils practices, in partnership with the USDA, through low-interest loans, credit, and crop insurance options. (CDFA)
- Provide down payments and interest payments to farmers utilizing carbon friendly practices. (CDFA)
- Better coordinate HSP with NRCS's Environmental Quality Incentives Program (EQIP) and Conservation Stewardship Program (CSP) incentives. (CDFA)
- Include organic transition as a practice eligible for payments through the HSP. (CDFA)
- Provide support to local governments and private initiatives to implement soil carbon programs; including procurement policies, Restore California, and other climate-friendly agricultural programs. (GO)

Focus Area: Pesticide Use Reduction and Organic Transition
Agency: CDTFA, CDFA

- Provide tax credits to landowners for organic transition and student loan forgiveness for young organic farmers. (CDTFA)
- Make information and funding for technical assistance available to support farmers for transitioning to organic. (CDFA)

Focus Area: Groundwater Management Program
Agency: DWR

- Pilot a groundwater sustainability rebate program for cover crops and other soil building practices and provide credits to farms for the increased infiltration and groundwater recharge that result from incorporating cover crops.

Focus Area: Land Access
Agencies: DOC, SGC, and OPR

- Provide state funding for land linking programs that connect next-generation farmers and ranchers to landowners. (DOC)
- Develop a loan support program. Provide state funds and support to lenders for credit enhancements, such as down-payment or interest assistance to help working farmers and ranchers, including socially-disadvantaged farmers and ranchers, buy farmland protected by easements. (SGC/OPR)
- Give additional scoring points for state-funded easement projects that have a qualifying succession plan in place, and where socially disadvantaged farmers and ranchers are party to the project. (DOC)
- Provide technical and legal support for land trusts to develop "Buy-Protect-Sell" programs that protect the most critical farms and ranches with easements and sell to working farmers and ranchers. (DOC)

- Prioritize or give additional incentives for state-funded affirmative easements that require land management practices that build healthy soils. (DOC)
- Create a fund to conserve farmland for socially disadvantaged farmers and give them access to financial resources (e.g. down-payment assistance, one-time investments in infrastructure improvements, etc.). (DOC)
- Develop a legal framework to adopt a tool similar to Vermont Land Trust's Option to Purchase at Agricultural Value program[37] to ensure easement-protected farmland remains affordable for purchase by farmers at agricultural production values. (OPR)

Focus Area: Planning
Agency: OPR

- Provide incentives for local governments to adjust their General Plans and Spheres of Influence to be consistent with high-density infill and related smart growth strategies that reduce and mitigate the urbanization of adjacent, productive farmland.

Focus Area: Land Reform
Agencies: SGC/DOC

- Develop the "third leg" of SALCP by incentivizing land management practices that reduce GHG emissions, increase carbon sinks, and improve air and water quality on permanently protected farmland.

RESEARCH

Focus Area: Climate and Agriculture Research
Agency: CNRA

- Fund research that analyzes the climate benefits of healthy soils practices in the Fifth Climate Assessment, including: animal management, increased nutrient cycling and carbon sequestration, reduced GHG emissions, and reduced nutrient runoff. Research should include the climate benefits of reduced synthetic pesticide and fertilizer production and use.

Focus Area: Research & Development
Agency: UCANR, CARB

- Fund the development of public seed varieties that perform best under organic systems. (UCANR)
- Fund cross-disciplinary research to quantify healthy soils' impacts on environmental sustainability, including: plant health, nutrient density, crop resilience to pests and disease, and food security. (UCANR)
- Fund a complete life cycle analysis of the costs of synthetic fertilizers and pesticides. (CARB)

Focus Area: Sustainable Groundwater Management Program
Agency: DWR

- Integrate into its Flood-Mar research program research into the efficacy of soil organic matter and healthy soils practices in improving water storage and infiltration, particularly in soils that may not be suitable for high-volume recharge.

Focus Area: Pesticide Use Reduction and Organic Transition
Agency: CDFA, DPR & CARB

- Increase funding for on-farm research and implementation programs, such as the Alliance Grants Program and Biologically Integrated Farming Systems/Biologically Integrated Orchard Systems (BIFS/BIOS), that support farmers' transition away from synthetic pesticides and fertilizers.

Focus Area: California Greenhouse Gas Emission Inventory Program
Agency: CARB

- Fund research that analyzes the GHG emission reduction potential and ecosystem benefits of removing or processing in place, dead and dying trees in woodlands and forest lands.

Focus Area: Irrigated Lands Regulatory Program (ILRP) & Management Practices Evaluation Program (MPEP)
Agencies: SWRCB, Regional Water Boards, CDFA, and CalRecycle

- Fund research that quantifies how soil building practices directly and indirectly impact water quality, water quantity, and irrigation demand. (State Water Board)
- The Regional Water Boards and CDFA should work together to ensure that healthy soil practices and soil health indicators are incorporated into agricultural coalitions' MPEPs. (Regional Water Boards/CDFA)
- The Regional Water Boards and CDFA should provide standardized soil health and correlated water quality and quantity data to agricultural coalitions. (Regional Water Boards/CDFA)
- CalRecycle and CDFA should work with the Central Valley Regional Water Resources Board and the agricultural coalitions tasked with implementing the ILRP to collect and disseminate data demonstrating the efficacy of soil organic matter reducing nitrate leaching below the root zone. (CalRecycle/CDFA)

Focus Area: Specialty Crop Block Grant
Agency: CDFA

- Elevate the importance of the five environmental stewardship program priorities (e.g. climate change adaptation and mitigation, organic production, and soil health) in proposal scoring to ensure all funded projects address these priorities. (CDFA)
- Shift from the current trend of supporting small tweaks in conventional research agendas to supporting bold, innovative practices implemented within a systems approach that addresses the complex plant-soil-ecosystem interactions fundamental to the creation of resilient cropping systems. (CDFA)

Focus Area: Pest Management Advisory Committee (PMAC)
Agency: DPR

- Elevate the importance of the stated PMAC priorities (based on UC's IPM "ecosystem-based strategy that focuses on long-term prevention of pests or their damage") in proposal scoring, as many of the supported projects fail to adequately address the stated priorities. (DPR)
- Shift towards supporting innovative practices with a systems approach that address the complex plant-soil-ecosystem interactions fundamental to the creation of crop resilience to pests and disease. (DPR)

INFRASTRUCTURE POLICY RECOMMENDATIONS

Focus Area: Infrastructure Investments for On-Farm Climate Practices
Agencies: CDFA, OPR

- Create infrastructure grants that support equipment and materials needed for the large-scale implementation of on-farm healthy soils projects, including new equipment for no-till operations, compost production, compost spreaders, greater availability of nursery stock for vegetative and woody plantings across the state (e.g. compost spreaders, EV trucks, etc.). (CDFA)
- Provide guidance, quantification tools, and monitoring resources for local governments to include healthy soils and working lands strategies in the development of their local climate action plans. (OPR)

Focus Area: Monitoring/Verification Infrastructure Investments
Agencies: CDFA, CalRecycle

- Improve farmers' and ranchers' access to affordable and reliable soil testing and analysis. (CDFA)
- In collaboration with UCCE and USDA, develop a coordinated network of soil labs with standard protocols. (CDFA)
- Improve farmers' and ranchers' access to compost (through on-farm composting development) or access to affordable, high-quality commercial compost. (CalRecycle)

Focus Area: Market Development and Supply Chain Infrastructure
Agencies: GoBiz, CDFA, DGS

- Develop new financing mechanisms, including low-interest revolving loans, tax incentives, and grant programs to support regional food and fiber processing infrastructure for products coming from farms and ranches implementing carbon farming and ecological agriculture practices. (GoBiz)
- Promote market development for sourcing and processing food and fiber products coming from farms and ranches implementing carbon farming and ecological agriculture practices. Emphasize regionally-based sourcing, processing, and use. (CDFA)

- Amend the state's "environmentally preferable purchasing" guidelines to specifically prioritize food and fiber products originating from farms and ranches implementing carbon farming and ecological agriculture practices. Encourage adoption of similar purchasing guidelines among regional and local governments and other partners. (DGS)

Focus Area: Compost Infrastructure Investments
Agencies: CalRecycle

- Provide funds for incentive payments that support compost infrastructure to meet the needs of S.B. 1383 implementation. (CalRecycle)
- Require new municipal or community compost facilities, which are producing more than 12,500 cubic yards of compost on site at a given time and are receiving state funding, to enter into a Good Neighbor Agreement with the public to demonstrate how proposed technologies or projects will benefit the community. (CalRecyle)

REGULATORY STREAMLINING

Focus Area: Compost Production Regulation and Policy Coordination
Agencies: CalRecycle, SWRCB, CDFA

- Align CalRecycle rules with SWRCB for on-farm compost producers to allow the sale of up to 5,000 cubic yards of on-farm compost annually. (CalRecycle, SWRCB)
- Provide directive to Local Enforcement Agencies (LEA) to pursue enforcement against direct land application of un-composted urban wastes on agricultural land. If LEAs fail to act, CalRecycle should use its existing authority to enforce the prohibition on the direct land application of urban waste on agricultural land. (CalRecycle)
- Designate compost facilities as "essential public services," if community agreements are put in place. (CalRecycle)
- Support the adoption of best available control technologies that match the scale of the proposed compost operation/site. (CalRecycle)
- Finish and publish the re-designation of the new parameters for on-farm composting in the Environmental Impact Review Compost Facilities General Order. (SWRCB)
- To optimize on-farm compost quantity, quality, and processing efficiency, create an official best management practice framework to allow for the free exchange of compostable materials among agricultural producers. This will enable balancing of C/N ratios, moisture content, bulk density, etc. (CalRecycle)
- CalRecycle and CDFA should work with SWRCB to create an outreach plan to farmers to educate them about best management practices for compost production and use through the ILRP. (CalRecycle, CDFA, SWRCB)
- Formalize a legal definition for community composting. Provide state grant funds to community compost projects, businesses, and non-profits. (CalRecycle)
- To support the creation of county, regional, and municipal compost education programs in concert with community composters and urban gardeners, host workshops for haulers and

community composters to help navigate subcontracting and partnership barriers. (CalRecycle)

- Promote and provide information to city and county governments regarding food recovery, waste prevention, community composting, managing organic waste on-site, regional organic materials brokering, and other means of recovering organic waste. (CalRecycle)

Focus Area: Fertilizer Research and Education Program (FREP)
Agencies: CDFA

- Implement A.B. 2174 (2012),[38] which directs FREP to fund improvements in TA, research, and education regarding the benefits of soil building practices for nutrient management. (CDFA)
- Increase the portion of FREP funds used to promote compost application and other soil building nutrient management strategies. (CDFA)

Focus Area: Farmland Conservation, Land Access, In-fill Development
Agencies: OPR, SGC, DOC, HCD

- Provide guidance to local governments on the creation of transfer development rights programs that allow for the transfer of development rights from farm and ranchlands to urban areas, including across jurisdictions. (OPR)
- Develop a regional strategy funding approach to the Affordable Housing and Sustainable Communities Program (AHSC) and the SALCP to improve and maximize in-fill development and farmland conservation outcomes. (SGC, HCD, DOC)
- Require the siting of new and expanded local and state infrastructure improvement projects to avoid the most productive, versatile, and resilient agricultural lands. (OPR)

Focus Area: Pesticide Use Reduction
Agencies: CARB, CalEPA

- Ensure that under A.B. 617,[39] Toxic Air Contaminant emission reduction plans in agricultural areas across the state include the reduction of emissions from pesticides. (CARB)
- Ensure that the DPR and County Agricultural Commissioners abide by California Environmental Quality Act requirements to assess cumulative exposures before approving pesticide registration and permits. Reject pesticide registrations and pesticide use permit requests if feasible alternatives exist. (CalEPA)
- Rename the “Department of Pesticide Regulation” to the “Department of Pest Management.” Develop a transition plan to reorient funding and staff to prioritize the “fostering reduced-risk pest management” component of DPR’s mission over “regulating pesticide sales and use.” (CalEPA)

LEGISLATIVE ACTIONS

- Require irrigation districts to include the promotion of on-farm practices that increase soil water holding capacity as a conservation strategy in their agricultural water management plans in order to be eligible for state grants.
- Diversify the membership of the FREP bodies to include more soil health, water quality, and climate change experts with an expertise in healthy soil management practices, compost production, water quality, and GHG mitigation in agriculture.
- Utilize funds from increased pesticide and fertilizer mill fees to expand and support BIOS/BIFS program and support additional peer-to-peer learning with farmers around pesticide reductions.
- Link state transportation dollars with development of farmland mitigation policies in General Plans. Require at least a 3-1 mitigation level.

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[5] Rates are derived from COMET-Planner, unless otherwise stated.

[6] Pasture is more intensively managed than rangeland using practices such as seeding, fertilization, mowing, and irrigation. Pasture may also include cropland that is seasonally or episodically grazed by livestock. Pasture is typically included in estimates of arable land in California, while rangeland is not.

[7] Soil organic matter can be built by a variety of practices over time. Compost application immediately increases organic matter because approximately half of compost's weight is organic matter. For example, 50 tons of organic matter will be added to the soil for every 100 tons of compost applied. Compost management affects how much organic matter remains on the soil.

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