

Regents of University of California Combined Research and Extension Plan of Work 2021-2025

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I. Plan Overview

1. Executive Summary

The Division of Agriculture and Natural Resources (UC ANR) is the land-grant arm for the University of California. The Agricultural Experiment Station (AES) at three UC campus locations is integrated with Cooperative Extension (CE) across the state. UC ANR has programs in every county in California, academics on six campuses, nine Research and Extension Centers (RECs), ten Statewide Programs and now three UC systemwide Institutes.

The UC system's first-ever institute for organic research and education was announced in 2020. It was established in UC ANR with a \$500,000 endowment gift from Clif Bar & Company and \$500,000 in matching funds from UC President Napolitano. The new California Organic Institute will accelerate the development and adoption of effective tools and practices for organic farmers and those transitioning to organic by building on the capabilities of UC ANR's Cooperative Extension and its statewide program the Sustainable Agriculture Research and Education Program. Although organic is the fastest growing sector of the food economy, funding for research has lagged far behind support for conventional agriculture. Farmers interested in transitioning to organic or improving performance of their organic systems often lack the guidance they need to succeed.

The UC ANR network engages academics across the entire UC system to encourage integrated teams to work on complex issues that require multidisciplinary approaches to find solutions. The UC ANR connections also include faculty from the State University system, private colleges and universities, and stakeholders representing federal and state governmental agencies, organizations representing agricultural and natural resource production, non-governmental organizations (NGO's), and other interest areas including the environment, youth, and nutrition.

Strategic Vision 2025

UC ANR has the vision of making a positive difference in the lives of every Californian. UC ANR envisions a thriving California where healthy people and communities, healthy food systems, and healthy environments are strengthened by a close partnership between the University of California and its research and extension programs and the people of the state. The University remains connected and committed to the people of California, who enjoy a high quality of life, a healthy environment, and economic success in a global economy.

UC ANR's mission is to engage UC with the people of California to achieve innovation in fundamental and applied research and education that supports:

- sustainable, safe, nutritious food production and delivery
- economic success in a global economy
- a sustainable, healthy, productive environment
- science literacy and youth development programs

California's Future Challenges and UC ANR's Response

The challenges facing California are numerous and require multiple strategies to ensure UC's vision for California becomes reality. UC and its partners will strategically focus UC ANR's efforts on the following challenges.

Increasing global and domestic populations require increased, safe and sustainable, food production:

The state's increasing population will result in an expanding urban footprint and a decrease in some of the most fertile lands available for agricultural production. This will create an even greater need for increasing crop production per unit area, requiring research and educational programs to address such issues as crop improvement, nutrient management, sustainable management systems, and pest and disease management strategies. Not only must food supplies increase, they must be safe. With increasingly more food and food ingredients being imported from countries with different production practices, we can anticipate more food recalls and food allergies.

The UC ANR network and its unique research and education programs offers the opportunity to respond to local needs for increased food products and value, as well as the opportunity to test varieties which will respond to global food and marketing needs. The REC system offers opportunities for testing and evaluation of plant and animal varieties as well as systems of production. Opportunities abound for field-testing of biotechnology developed in campus labs, and for the evaluation of methods to reduce the impact of invasive species through the continuum of county and campus-based academics. Industry needs and requirements can be discussed, applied and tested in soil, water, and weather conditions throughout the state.

Increased population leads to intensified competition for water resources among urban, environmental and agricultural uses:

The state's expanding population and increased water allocations for environmental purposes will result in a decrease in water available for agricultural production. Urban development on prime agricultural land pushes production to more marginal land which requires more water to produce the same quantity of product. Together these trends create a need for production processes that utilize less water and lower quality water.

The UC ANR network works with a broad spectrum of stakeholders to identify local and regional water policy issues and can be the catalyst for initiating research and educational programs that develop solutions. Many of UC ANR's RECs and campus field stations have the infrastructure to investigate approaches to water conservation. For example, many have sophisticated irrigation systems that allow for precise water applications. These systems enable research in water use efficiency, deficit irrigation, and management strategies to reduce water needs. They also have the capacity to support alternative crops research that may identify new varieties or crops that require less water.

California faces diminishing and more costly energy supplies:

The demand and cost for energy continues to rise as a result of population growth, urban development, and global competition. Innovative strategies for management and use of the state's natural and agricultural resources will help create a more sustainable energy future.

In particular, UC ANR's research and extension network can provide California agriculture with new production technologies and practices which minimize energy consumption and utilize renewable energy sources. UC ANR's innovations with partners can provide technology, marketing and policy advancements to enable expanded use of forest, range, and agricultural resources for renewable energy production.

Environmental constraints will continue to increase in California:

California's environmental regulations, arguably the most intense in the country, will affect agriculture and natural resource production.

UC ANR's research, extension, and education programs offer the potential for multiple stakeholders to compare the impacts of regulatory programs, and recommend new and creative methods for protecting the environment, while simultaneously producing goods and services. Links between campus and county programs allow for collaboration in both research and outreach programs.

The mixture of regional crops and animal products grown in California will change:

A combination of factors, including climate change, population growth, water availability, technological change, and global demand, will accelerate changes in the type and distribution of crops grown in California. Projected changes in temperature, rainfall and snowpack will result in geographical shifts in crop locations. Population growth will continue to occupy what is currently prime agricultural land forcing production onto other more marginal lands. Associated with population growth is the increasing municipal demand for water which will change water allocation in many areas, resulting in inadequate supplies available for current crop production and requiring relocation of agricultural operations. Global demand for products will also have a significant influence on the types and amounts of crops grown throughout the state.

UC ANR is uniquely positioned to address the shifts in crop production that will have to occur, and has the capacity to investigate the suitability of areas for growing crops not previously produced in similar climates and to alter or develop production systems to create sustainable systems in these new environments. Both short and long-term research can be conducted under controlled situations not available when utilizing cooperators' operations.

The capacity to use nutrition to positively impact human health will be a reality:

Obesity, diabetes, heart disease, stroke, hypertension, cancer and bone diseases are just some of the human health threats related to poor nutrition and lifestyle choices.

UC ANR discoveries and educational outreach will help understand, evolve solutions, and inform the public about diseases associated with nutrient deficits, excesses, and imbalances and food sensitivities. Current and future technologies based on genetics, genomics, proteonomics and other methods will contribute to the creation of designer foods to enhance nutrition and reduce health risk.

California's youth will need more complementary education programs:

A challenge for California is to engage the state's youth to become empowered citizens.

UC ANR's system of research-based non-formal education can be used to develop new approaches to science literacy and school readiness (pre-K) especially among low income and under-represented populations. UC ANR can provide, through its 4-H Youth Development programs, alternative academic pathways and promote leadership development and citizenship opportunities that keep youth engaged in their educational pursuits and development. With other internal UC and external partners, UC ANR programs will complement the K-12 school system and reinforce development of skill sets to prepare youth for higher education, future career opportunities and informed participation in civic affairs and public policy.

UC ANR Strategic Initiatives Critical Issue Areas

To meet the state's most pressing challenges, members of the UC ANR network position cutting-edge science and education programs that focus on the five UC ANR Strategic Initiatives, which are UC's federal Critical Issues for reporting purposes. These are the best opportunities for the Division's considerable infrastructure and talent to find solutions to these critical issues facing California.

Sustainable Food Systems

Sustainable Natural Ecosystems

Healthy Families and Communities

Endemic and Invasive Pests and Diseases

Water Quality, Quantity, and Security

UC ANR Strategic Plan and Public Value

In 2020 UC ANR refreshes its Divisionwide strategic plan for 2021-2025. The plan enables the Division to operationalize the Strategic Vision 2025. The plan defines goals to enhance UC ANR's research and extension mission, support employees and volunteers, address financial stability and administrative excellence, and increase awareness of UC ANR's value.

UC ANR will continue its efforts to contribute to its seven broad public values and the respective 24 more discrete condition changes. Every year UCCE academics allocate the time they work toward these significant social/health, environmental, and economic benefits. In the annual report the UC ANR outcomes and impact stories are framed in terms of the condition changes below, and aligned with relevant Critical Issues/Strategic Initiatives.

UC ANR: Promoting economic prosperity in California

- Improved individual and household financial stability
- Enhanced community economic development
- Improved animal management, productivity and efficiency
- Increased agriculture and forestry efficiency and profitability
- Increased emerging food economies and markets

UC ANR: Safeguarding sufficient, safe, and healthy food for all Californians

- Improved food security
- Improved food safety

UC ANR: Protecting California's natural resources

- Improved management and use of land

Improved air quality
 Protected and conserved soil quality
 Increased ecological sustainability of agriculture, landscapes, and forestry
 Improved water quality
 Improved water-use efficiency
 Improved water-supply security

UC ANR: Promoting healthy people and communities

Improved health for all
 Improved community health and wellness
 Improved access to positive built and natural environments

UC ANR: Developing a qualified workforce for California

Increased workforce retention and competency
 Increased effective public leaders
 Improved college readiness and access
 Increased civic engagement

UC ANR: Building climate-resilient communities and ecosystems

Increased preparedness and resilience to extreme weather and climate change

UC ANR: Developing an inclusive and equitable society

Improved living and working conditions for California's food system and farm workers
 Increased diversity, inclusiveness, and cultural competency in California's workplaces

2. FTE Estimates

Year	1862 Extension	1862 Research
2021	302.0	356.0
2022	302.0	356.0
2023	302.0	356.0

2024	302.0	356.0
2025	302.0	356.0

II. Merit / Peer Review Process

Scientific Peer Review

Each Agricultural Experiment Station project in the federal REEport system is peer reviewed at the department level in the colleges/school at UC Berkeley, UC Davis, and UC Riverside. A peer review committee is appointed by the department chair. The committee evaluates the relevance, quality, and scientific value of the proposed research. Upon completion of the peer review, the project is also reviewed at the dean's office for USDA compliance and forwarded to the Vice President's office for final review and submission to NIFA.

Merit Review

UC ANR's organizational structure emphasizes that resource allocation decisions will be driven by programmatic considerations and developed through a broad participatory process. This process includes review of ability to address critical needs, stakeholder engagement, and likelihood of making a significant impact, in order to realize the Division's strategic vision. At the statewide level, the UC ANR Program Council meets almost monthly to coordinate Division wide planning and program delivery and develop resource allocation recommendations for the programmatic units. The programmatic leadership group is chaired by the Associate Vice President of Programs, and includes the four AES college/school Executive Associate Deans, the five strategic initiative leaders, Vice Provost of Strategic Initiatives and Statewide Programs, Vice Provost of Research and Extension, a representative from the Academic Assembly Council, as well as at large members and other ex-officio administrative members.

The Strategic Initiatives, Program Teams, and Workgroups are mechanisms that engage academics to identify programmatic priorities and multidisciplinary solutions. The Strategic Initiatives are the umbrella structure to unify, communicate, and advocate. The strategic initiative leaders and advisory panels identify programmatic focal areas. The Program Teams provide the opportunity for academics across the Division to network, share, and learn. They are active contributors to the CE Position Call process, reviewing other groups' proposals and developing their own if they see significant gaps given their programmatic expertise and statewide perspective. The Program Team meetings provide the structure for the Division's many Workgroups to meet and foster multidisciplinary approaches to solve the critical issues facing the state. In this way they carry out their essential leadership functions and enhance inter-Workgroup communication and collaboration. The Workgroups operate as Communities of Practice where people plan and implement research, outreach, and education efforts. The Workgroups involve external stakeholders in their program planning process, activities, and projects. The involvement of external stakeholders in the Workgroups ensures that real world needs are brought to the attention of the Division as programs are planned and implemented. External stakeholders on the Workgroups include individual producers, representatives from local community groups, state and federal agencies, industry groups, consumer groups, and colleagues from other higher education institutions.

III. Stakeholder Input

1. Actions to Seek

CE advisors delivering programs in 58 counties receive input on local needs from clientele daily and conduct regular needs assessments.

UC ANR actively engages stakeholders in the CE Position Call, to determine the highest priority CE academic positions. The process includes consultation and discussions with internal stakeholders and strongly encourages engaging external stakeholders in the development of the position proposals. The proposals, along with information regarding current staffing and retirement projections, are considered by UC ANR Program Council in their deliberations to provide recommendations to the Vice President, who makes the final decision.

UC ANR's Research and Extension Center (REC) system will begin implementation of a new strategic framework with integrated priorities systemwide, which will be developed with stakeholder input through the committee and additional consultation. The strategic framework takes into consideration the recommendations provided by current users as well as a Blue Ribbon Panel comprised of leadership from other land-grant institutions, a UC Department Chair, and an external researcher. Each of the nine UC ANR RECs will continue to implement their respective strategic plan developed with critical stakeholder guidance.

UC ANR's statewide programs/institutes each undergo routine program planning and review that solicits and incorporates significant stakeholder input. These processes have committees with representatives of diverse stakeholder interests from across UC and external groups. In the strategic planning processes committee members also outreach to additional stakeholders to provide input on the strengths, weaknesses, opportunities, and threats, and later on the draft strategic plan. In the program review process the ad hoc committees solicit input from additional stakeholders through interviews and web-based surveys to assess past performance and the forward-thinking strategic plan. The statewide programs/institutes also have advisory groups which meet regularly to provide feedback and offer recommendations for future program direction.

The President's Advisory Commission on Agriculture and Natural Resources advises the UC President on issues of importance to California, and assists UC in identifying needs in the agricultural, natural resources and related human resources sectors and ways to meet them through research, outreach, and education. The members represent close to 30 different California business, consumer, youth and government leaders. The UC ANR Vice President brings the Commission's advice to the UC ANR Deans' Council, which includes the four Deans from UC's AES college/school locations. The Deans' Council advises on UC ANR programmatic directions, resource allocation, and policies. The AES colleges/school have external stakeholder advisory councils that provide feedback on their research, extension, and teaching programs.

The UC ANR Governing Council was created in 2019 to support UC Presidential oversight and promote greater understanding of and participation in UC ANR's mission across the University. The 15 member council includes high-level internal and external stakeholders, including the Secretary of the California Department of Food and Agriculture. They meet quarterly to provide recommendations to the UC ANR Vice President, UC President, and Executive Budget Committee on UC ANR's budget and funding models, and scope, policies, and procedures.

Members of commodity organizations/marketing order boards provide input on research and extension needs for their commodities to UC ANR members through regular meetings and discussions on funding for research projects.

2. Methods to Identify

UC ANR uses a variety of methods to ensure California's diverse stakeholders are engaged in providing input, such as the following.

Advisory Committees
Needs assessments

Relationships with clientele and partners

3. Methods to Collect

Meeting with traditional stakeholder groups and individuals
Survey of traditional stakeholder groups and individuals
Events open to the general public
Meeting and survey specifically with non-traditional groups and individuals
Meeting with invited selected groups and individuals

4. How Considered

To identify emerging issues
To set priorities
In the action plans
In resource allocation decision-making
To redirect extension programs
To redirect research programs

IV. Critical Issues

1 Sustainable Food Systems

Description:

The Sustainable Food Systems federal Critical Issue is one of the UC ANR Strategic Initiatives. It focuses on the following program areas and respective grand challenges.

Sustainable production – addressing labor scarcity; regulatory requirements; water quantity and quality; farm prices; climate change; and emerging pests

Safe processing – addressing food safety and food preservation

Enhanced access – addressing food deserts and cost; changing food preferences; food access and security for aging seniors

The Sustainable Food Systems Strategic Initiative helps the state economy, protects the natural resources, builds capacity of people and communities, and helps ensure safe food.

Term: Long

Science Emphasis Areas

Agroclimate Science
Bioeconomy, Bioenergy, and Bioproducts
Education and Multicultural Alliances
Environmental Systems
Food Safety
Sustainable Agricultural Production Systems

2 Endemic and Invasive Pests and Diseases

Description:

The Endemic and Invasive Pests and Diseases federal Critical Issue is one of the UC ANR Strategic Initiatives. It focuses on the following bulleted program areas that address the grand challenges of emerging pests, the public's understanding of the role of science in safe and effective pest management, and pursuing new technologies for existing pests.

Keeping invasive pests and pathogens out of California
New problems with existing pests and diseases
Integrated Management

The Endemic and Invasive Pests and Diseases Strategic Initiative helps the state economy, protects natural resources, builds capacity of our people and communities, and helps ensure safe food and drinking water.

Term: Long

Science Emphasis Areas

Agroclimate Science
Education and Multicultural Alliances
Environmental Systems
Food Safety
Sustainable Agricultural Production Systems

3 Sustainable Natural Ecosystems

Description:

The Sustainable Natural Ecosystems federal Critical Issue is one of the UC ANR Strategic Initiatives. It focuses on the following program areas to address the grand challenges of fire, land use policy, water supply, and climate change.

Healthy rangelands, forests, and working landscapes
Fighting fire - resilient forests and fire-safe urban areas
Healthy landscapes and urban forests
Enhancing and protecting water supplies (quality and quantity)
Land use policy
Climate change

The Sustainable Natural Ecosystems Strategic Initiative helps the state economy, protects natural resources, and builds capacity of our people and communities.

Term: Long

Science Emphasis Areas

Agroclimate Science
Education and Multicultural Alliances
Environmental Systems

4 Water Quantity, Quality and Security

Description:

The Water Quality, Quantity, and Security federal Critical Issue is one of the UC ANR Strategic Initiatives. It focuses on the following bulleted key critical issue areas. This critical issue works on: 1) conservation and enhancement strategies to bolster water resources and meet increasing agricultural, urban, and ecosystem water demands; 2) sustainable farm, urban, and natural resource management practices to protect soil and water quality from salinity, sediment, pathogens, excess nutrients, trace elements, and other contaminant; 3) quantifying the impacts of climate change on California's precious water resources and consequent impacts on agriculture, urban, and ecosystems, while seeking ways to make these sectors more resilient to climate related

risks.

Safe and secure drinking water
Safe and secure surface water
Safe and sustainable groundwater
Holistic water management

The Water Strategic Initiative helps the state economy, protects natural resources, builds capacity of people and communities, and helps ensure safe food and drinking water.

Term: Long

Science Emphasis Areas

Agroclimate Science
Education and Multicultural Alliances
Environmental Systems
Food Safety
Sustainable Agricultural Production Systems

5 Healthy Families and Communities

Description:

The Healthy Families and Communities federal Critical Issue is one of the UC ANR Strategic Initiatives. It focuses on the following program areas and grand challenges.

Food literacy and healthy lifestyles to address chronic disease and food insecurity across the lifespan of all Californians
Scientific literacy (youth and adult) to foster access to science education and professional learning opportunities
Positive Youth Development programming to deliver of high-quality positive youth development in all communities
Community development and public policy to address rising social, economic and health inequality

The Healthy Families and Communities Strategic Initiative helps build the state economy and the capacity and health of the people and communities.

Term: Long

Science Emphasis Areas

Education and Multicultural Alliances
Family & Consumer Sciences
Food Safety
Human Nutrition
Youth Development