

Strategic Plan for Sustainable Food Systems Initiative

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Goals

Our overall goal is to justify, define, prioritize, and recommend for implementation the portions of the ANR Strategic Vision related to Sustainable Food System using a five-year planning horizon. The overarching criteria used to determine the key areas of inquiry include 1) consistency with ANR Strategic Vision, 2) current expertise within the ANR continuum (AES, CE Specialists, and Advisors) that integrates research and extension, 3) ability to attract or leverage for additional outside funding, and 4) a high potential to support science-based impacts on public policy or behavioral change. It is important to note that the process is an iterative one, requiring flexibility depending upon issues and opportunities that arise within the five-year planning horizon.

Background and Introduction

As a basis for determining the primary areas of inquiry, we used the ANR *Strategic Vision 2025* (UC ANR 2009) and the supporting document entitled *The Evolution of California Agriculture: An Outlook for 2029* (Alston et al. 2008). Five teams contributed to development of *Strategic Vision 2025* by focusing on the future for: 1) demographics and infrastructure of California; 2) agriculture and food production; 3) natural resources; 4) health and nutrition; and 5) human development. Within the ANR Strategic Vision, nine initiatives were identified including:

- Improve Water Quality, Quantity, and Security
- Enhance Competitive, Sustainable Food Systems
- Increase Science Literacy in Natural Resources, Agriculture, and Nutrition
- Sustainable Natural Ecosystems
- Enhance the Health of Californians and California's Agricultural Economy
- Healthy Families and Communities
- Ensure Safe and Secure Food Supplies
- Managing Endemic and Invasive Pests and Diseases
- Improve Energy Security and Green Technologies through Innovative Science Linking Engineering, Agricultural, Biological, and Environmental Sciences

Among these nine initiatives, four are the current focus of the ANR Initiative Advisory Panels. These are Sustainable Food Systems, Sustainable Natural Ecosystems, Healthy Families and Communities, and Managing Endemic and Invasive Pests and Diseases.

The initiative to Enhance Competitive, Sustainable Food Systems states that “California agriculture’s competitiveness will critically depend on adopting new scientific and technological innovations derived from new knowledge in agriculture and nutrition.” In addition, it notes that “Future research and educational efforts must enhance the opportunities for markets and new products.” While the Sustainable Food Systems represents one of the nine overall initiatives, it clearly cross-cuts with several of the other ANR Strategic Vision initiatives. For example, sustainable food systems can also depend upon 1) improving water quality, quantity, and security, 2) increasing science literacy in agriculture and nutrition, 3) enhancing California’s agricultural economy, 4) ensuring safe and secure food supplies, and to some degree, 5) managing pests and diseases, and to some degree, and 6) improving energy security and green technologies through innovative science linking agricultural science. Thus, the Sustainable Food Systems initiative is very broad and includes many of the areas outlined in the Strategic Vision.

The Sustainable Food Systems Initiative Strategic Plan provides a brief background, justification and objectives of four areas of inquiry focused on water, food safety, improving the competitiveness and productivity of agriculture, and supporting the sustainability of small farms. In addition, several components of the initiative program are discussed, including cross-cutting among initiatives, internal funding opportunities, leveraging outside funds, academic position, outreach and communications, interactions with other programs and agencies, interaction with working groups, and the annual SFS Initiative conference.

Areas of Inquiry

A panel of seven members with a broad range of expertise related to sustainable food systems has identified four key areas of inquiry. These areas are consistent with the ANR Strategic Visions and were also identified as critical areas of research and policy needs in *The Evolution of California Agriculture: An Outlook for 2029* (Alston et al. 2008).

Water

The future of California partly depends on addressing a range of critical issues regarding water supply and delivery systems, including availability, reliability, price and adequate protection from floods. While improving water quality, quantity and security is identified as one of the nine ANR Strategic Vision initiatives, implicitly or in some cases explicitly, water issues also cut across all of the initiatives. Certainly, addressing California’s water challenges is fundamental to achieving a sustainable food system.

UC research and extension programs have and must continue to contribute to improvements in water use efficiency, quality, and conservation across multiple uses - urban, and both plant and animal production systems. Enhancing these efforts with scarce resources requires thinking strategically about developing water expertise that cuts across programs and disciplines as well as extension delivery systems, including considering adding resources at the multi-county advisor level. Climate change is

expected to play an increasing role in water availability and agricultural production systems, adding further complexity and demand for research, as well as for economic and policy analysis.

Robust multi-disciplinary research and statewide and county extension programs can make essential contributions to technological development and adoption at the farm, firm, and consumer levels. For example, research on new crop varieties which are better able to tolerate periods of drought and other water-related stresses will contribute not only to a reduction in water demand but to enhanced food security and benefits for the environment. Research on water use efficiency and quality, including salinity and nitrate management, may lengthen the time that farmland is productive. Research and extension programs on water use efficiency and quality in urban contexts are equally important and should generate benefits to several of the ANR Strategic Vision initiatives, most notably to healthy families and communities. Including an economic component to many research projects can strengthen understanding of the net benefits of new technologies or practices and help firms to evaluate alternative management practices and decisions.

However, addressing California's water challenges goes far beyond influencing decision-making at the individual level, it involves public policy formulation by diverse stakeholders at many jurisdictional levels. Water policy debates are frequently based on myths and misperceptions rather than on facts and science, impeding progress. Going forward, if California is to meet the often competing agricultural, environmental, and urban demands for water supply and quality, better technical and scientific information, analysis, and synthesis are an essential support to better policy. For example, expanded data collection at the water district, state and other pertinent levels is needed and should improve analysis, thereby contributing to improvements in ecosystem management and integrated water management portfolios, as well as in other areas. Broadly speaking, it is important to develop more actionable information and a better understanding of trade-offs, costs, benefits and outcomes among key stakeholders. UC personnel can make vital contributions in the field of water policy research and resource economists are among those with a key role to play, helping to clarify the policy choices California faces. The future of California depends on those choices.

Food safety

Plants

Food safety issues about plant commodities and products are not new and have been concerns in California for many years. However, the *E. coli* O157:H7 contamination of California spinach in 2006 changed the food safety landscape for plant commodities and greatly heightened the urgency about such issues. Contamination of commodities, health implications, and quality and profitability of many of our state's crops are significantly influenced by the food safety debate.

Despite this great concern, there is a decided lack of information on the etiology, epidemiology, ecology, and biology of foodborne pathogens (such as Shiga toxin-producing *E. coli* (STEC) and *Salmonella* spp.) as they interact with crops in the field. For example, the precise source of pathogens, means of movement from source to crop, persistence in field conditions, role of wild animals, and other questions remain unanswered.

Research is therefore needed on how foodborne pathogens and crops interact under California growing conditions. ANR has the opportunity to provide research-based information that can improve industry metrics used to guide growers in the production of safe produce. ANR can also generate information to improve and support regulatory decisions that will impact California growers, while increasing food safety to the consumer.

Animals/Livestock

Reduction and prevention of foodborne illnesses associated with foods of animal origin continue to be an important priority for consumers. Research is needed for developing improved animal production systems that will enhance the overall health and well-being of livestock raised for food. It is well recognized that healthier animals are associated with reduced pathogen loads resulting in reduced risks for foodborne illness. Additionally, targeted research is needed that is related to specific pathogens such as *Salmonella* spp. or Shiga toxin-producing *E. coli* (STEC). Infections with these types of organisms are not always associated with signs of illness in the animal host. Because pathogen transmission and exposure can occur at various stages along the continuum from “farm to fork”, a comprehensive research plan and strategy is required to successfully reduce these health threats.

Chemicals or other products

While pesticides, fertilizers, and other agricultural chemicals remain an important component of integrated pest management programs, there are a number of opportunities to improve the economic and environmental sustainability of plant agricultural systems through more judicious use of agrichemicals, through the development and use of safer yet effective pesticides, or by exploring novel means of controlling pests that do not rely on pesticides. Successful development and implementation of such new technologies would further reduce chemical inputs in plant production.

Tools to improve the relative competitiveness and productivity of California agriculture today and with projected climate changes

The burgeoning population of California and the world will require the sustainable intensification of agricultural production systems. At the same time, limits on available options to pursue will likely be imposed by resource limitations associated with competition from municipal and industrial users, projected climate change impacts on resource availability and growing conditions, availability and costs of farmland, water and other inputs, and concerns regarding impacts of plant and animal production systems on other components of the environment. The continued competitiveness of California agriculture will depend upon the development of new technologies and the use of the best ecological management practices to optimize food production per unit of inputs. This will be particularly

important in mitigating or adapting cropping systems strategies and practices to the challenges associated with climate change. The generation of new knowledge in the basic sciences, coupled with translational research and outreach is critical to move California agriculture towards efficient production systems that integrate a sustainable balance of economic, environmental and social goals.

Research in these areas should address basic and applied approaches to the development of improved technologies to optimize the efficiency of plant and/or animal production systems or to improve the quality and value of agricultural products. Approaches could include improvements in the quality and value of food products, development of value-added agricultural products, technologies to improve production efficiency and resource use efficiency (water, feed, nutrients, fuel, labor) while addressing pest and disease management and ecological concerns, identification of new crops or animal production systems suited to natural resource limits, and techniques to produce new germplasm or varieties for plant or animal agriculture better-adapted to current and projected situations in California agriculture. Advances within these areas should greatly impact production practices and significantly increase the competitive ability of California livestock and plant food producers.

Small Farms

California agriculture has long featured relatively few big farms that account for most farm output together with large numbers of small and mid-scale operators who also contribute economic, social, and cultural benefits to California's communities and our food system. These contributions of small and mid-scale operations include small-business opportunities in rural and peri-urban communities, increased consumer awareness of agriculture, and youth leadership development. Commitment to serving the needs of small and medium-sized farms and ranches is rooted in the public land grant university heritage and public interest in these issues is high. (In a recent on-line consultation with 650 California leaders, "locally and regionally based food systems" ranked third and "viability of small and mid-size farms" ranked fifth of 29 agricultural sustainability issues considered).

California's large farms certainly have benefitted from UC research and extension, and will continue to do so. Since small or mid-scale farms are not simply scale models of large farms, their needs and the impacts of their activities differ significantly from the large-scale sector. In this structural context, the decline of mid-scale farms in California (and nationally) may be of particular concern as it affects market structure and competition, rural society, and political economy. Since support for "large" versus "small" farms is a perpetually polarizing issue, perhaps a more productive approach is to consider how the distribution of farms by size (called agrarian structure) matters for specific public policy objectives and the scope for UC to most effectively influence the vitality of the small and mid-scale farm sector, while balancing a host of competing priorities for public resources.

Locally and regionally based food systems: what are we trying to achieve?

While there is no intrinsic link between agrarian structure and local or regional food systems – in theory one large “local” farm could supply local food needs – there is considerable overlap between public interest in local and regional food supply and that for small and mid-scale farms and ranches. Clarifying the relationships and potential tradeoffs between structural and spatial aspects of our food system and major public policy objectives (including economic, public health and environmental goals) is an important first step. Surprisingly little credible scientific evidence exists to support (or refute) radically different conceptions of the structural and spatial attributes of a “sustainable food system.” In the broadest sense, a key food systems question is what level of local and regional food production optimizes human well-being at what spatial scale (local, regional, national)? Similarly, what implications do these differences in food systems have for agrarian structure in California? These researchable questions can produce noteworthy scientific results that hold major policy implications and would be of great public interest.

Another important issue concerns the structure (industrial organization) of our food system and how it affects vulnerability to natural disasters or to human caused catastrophes. Moreover, it is critical to know how the scale of operation interacts with food safety, and how food safety (or other regulations) affects farms differentially by size. Are different approaches needed depending on farm size or does “one-size-fit-all”?

There is mounting evidence of growing concentration in agricultural processing, distribution and marketing in some areas. In addition, there is growing coverage of this issue in the media, and some emerging interest by federal regulators. It is yet unknown how this concentration in processing and marketing affects the sustainability of different sized farms and ranches, or investments in food system infrastructure?

Viability of small and mid-size farming and ranching operations: what can we really do?

Small and medium sized farms and ranches have very distinctive needs, opportunities and challenges compared with large-scale operations and the public policy objectives addressed above can strengthen the justification for specific UC attention to the needs of this sector. It is important to evaluate appropriate models for provision of services and cost recovery (for large or small and medium size farms) in pursuit of public policy objectives that maintain the viability of small and mid-sized farms and ranches.

Related to these issues, there are a wide range of practical, applied science questions regarding implementation of food system interventions that involve small and mid-sized farms (farm to school programs, farm to institution programs, urban agriculture programs, youth development around sustainable food systems, for example) and their cost effectiveness in addressing major public policy concerns (child nutrition, obesity, etc.). These issues are closely aligned with the goals of the Healthy Families and Communities Initiative and involve high stakes for our society. They require comprehensive monitoring, evaluation and impact assessment to provide a sound basis for public policy and program design.

Program Components

Cross-cutting among initiatives

While the four initiatives that are currently emphasized consist of independent panels and leaders, there are clearly areas of inquiry within each initiative that cross-cut areas of inquiry of the other initiatives. For example, water issues can be critical to the Healthy Families and Communities and Sustainable Natural Resources Initiatives, topics related to small farms are also very relevant to the Healthy Families and Communities Initiative, and food safety issues can cross-cut both the Healthy Families and Communities and the Endemic and Invasive Pests and Diseases Initiatives. Science literacy is an element that is key to the success of all four initiatives and to nearly all areas of inquiry. Those submitting proposals for support through the initiatives are encouraged to consider how their projects cross-cut with other initiatives and make the necessary linkages that lead to a more robust proposal with higher potential for significant policy or behavioral impacts.

Internal funding opportunities

While there are several important areas of research and extension being conducted by ANR academics, internal ANR funding opportunities will focus on the primary areas of inquiry within the four initiatives. The final model for ANR funding is still under discussion, but it is likely that the key elements will include the following areas:

- Funding activities that synthesize large datasets with the goal of supporting science-based management decisions, policy-relevant impacts, or effective science education programs directed at the general public of an important stakeholder group. The resulting product could include synthesis white papers, commentaries, or issue papers that provide unbiased policy relevant information to legislators on issues critical to California.
- Funding to expand extension activities in existing grants or new proposals to achieve broader statewide impacts in one of the areas of inquiry. This can include recommendations for temporary or term appointments in outreach or extension activities.
- Funding for new initiatives in research, education, and/or extension- particularly for efforts that need initial support to leverage outside funding including: initial data gathering, planning grants, matching funds, stakeholder group meetings to prioritize needs, initiation of integrated projects.
- Synthesis and expansion of outreach and extension activities across program areas (sustainable food systems, sustainable natural ecosystems, healthy families and communities, endemic and invasive pests and diseases).

Leveraging outside funding

With a limited level of support, it is critical that ANR funding be used to leverage for additional outside support through private, non-profit, state, or federal sources. The primary goal of ANR funding should be to enhance the research, extension, and education programs of proposals that address critical problems within the ANR strategic vision. This is particularly important in areas where leadership and

expertise exists within all phases of the continuum to integrate research, management, and extension. Although the USDA-AFRI program has been a major opportunity for large multi-state grants, there are also several other programs whose emphasis can align with those of the initiatives.

Recommendations for AES, CE Specialists and Advisor Academic positions

Understanding the complexity of sustainable food systems and how they affect producers, labor workers, as well as solve problems that benefit all Californians requires diverse, adaptable, well-trained, and dedicated academics. Within ANR, the need for Cooperative Extension Specialists and Advisor in core areas critical to family and community development, environmental sciences, agriculture, and livestock production have not been matched by recent hiring of academic personnel. With the age demographics of the current academic workforce and the projected rate of retirements in the next several years, it is expected that many new hires will be needed to maintain ANR's excellence in core programs and to address critical issues outlined in the strategic vision.

The tradition method of replacing retired academics is no longer possible in most cases. While many core areas of expertise will need to be replaced, other future hires will require more strategic approaches that anticipate new or future issues considered in the strategic vision related to sustainable food systems. With this consideration, future academic positions may require a more diverse set of research skills and disciplines, as well as educational capabilities. While recommendation for hiring new Cooperative Extension Specialists and Advisors position will be through several sources, including campus colleges, counties or county clusters, and working groups, the four initiatives will also provide an avenue for filling critical needs within the context of the strategic vision. These positions can be recommended by members of the panel with expertise in the various disciplines or identified by proposals seeking support within the areas of inquiry.

Outreach and communications

The long-term success of the initiatives, as well as ANR, depends upon a strong campus-county continuum and an effective outreach effort. In addition, campus and county-based Cooperative Extension programs throughout the state have a long tradition of effective collaboration with a wide array of stakeholders and clientele groups, who often provide resources and help to identify research priorities. ANR has historically been effective in extending important and relevant information to appropriate audiences through traditional methods, such as meetings, workshops, field or short courses, symposia, demonstrations, and a variety of print publications. ANR has also historically been effective in reaching out to the ethnically, racially, and culturally diverse California demographic. In the future, however, it will be necessary to reach more diverse peoples and groups, including policy or decision-makers and a broader and more technically savvy audience that comprises California's population. This can be achieved through other emerging technologies, including web or software-based sources, social media (e.g., radio, television, magazines, newspapers), or other innovative distance-learning electronic

media (i.e., films, videos, youtube.com educational clips, iPhone apps for accessing website information, website interactive tools).

ANR Communication Services offers many resources that enable our division to learn and use new methods of media outreach in addition to our traditional forms of communication. These new and emerging resources, and the corresponding training or support staff, should be increasingly available to ANR academics and staff to expand our ability to reach a wider more diverse audience.

Interaction with other programs and agencies

A fundamental criterion for the success of the initiatives beyond the five-year planning phase is the ultimate impact on public policy or behavioral change, and how these efforts solve the key problems they address in California. This can only be achieved through high quality research coupled with strong and effective outreach efforts directed to those that either influence policy or have the ability to alter or modify their management practices or behavior.

While it is important to use information and structures in other states as examples to build on, California has many unique ecological, economic and social issues that need to be incorporated into policies and management. ANR should work closely with state agencies to define the topic areas that we understand, identify those where knowledge and techniques are lacking, and balance and improve the links between basic and applied research needs. ANR leaders need to work closely with state agencies to direct funding towards those needs and pursue research and outreach through focused funding.

The priority issues identified in the ANR Strategic Vision are socially, agriculturally, ecologically and environmentally complex and require integrated approaches that ANR academics are well equipped to handle. Although ANR programs are now divided between the strategic initiatives, collaboration between programs and stakeholders will be necessary to our future success. Sustainable Food Systems priorities are intrinsically linked to those in other Initiatives, which offers numerous collaborative opportunities to effectively address the complex issues facing California.

Working Groups and conferences

ANR workgroups have been, and are expected to continue to be, integral in organizing academics around specific research topics, many of which are essential to the success of the Initiatives.

Workgroups ideally provide internal communication and networking, in-service training, identification of key emerging issues, and research and extension program planning. However, in its current form, the narrow focus of many workgroups has sometimes resulted in reduced effectiveness and sustainability, particularly considering the limited number of meeting times (Initiative Conferences) and the overlapping membership in related workgroups. Thus, it will be necessary for significant restructuring of existing workgroups into broader topic areas related to a particular discipline or to fit with programmatic priorities outlined in the ANR Strategic Vision. Subgroups that focus on more specific

issues or topics can be partitioned within these larger workgroups. Some current workgroups already function in this manner.

While the function of the restructured workgroups will include many of the functions of the previous workgroup model, it will be expected that the most important functions will be related to program planning, developing a needs assessment, identifying emerging issues critical to the workgroup, planning collective research and extension activities and products, determining extramural funding opportunities, and recommending key academic position needs within the workgroup discipline. Other activities of the workgroup include communication and networking, providing subject matter for in-service training, and reporting and discussing individual or collaborative research findings. Although time may be limited to accomplish all of these objectives, workgroups should be encouraged to use available communication technologies, including interactive web-based meetings and video conferencing when additional in-person meetings are not practical or economically feasible.

In most cases, workgroups will meet after the annual Initiative Conference in which they most closely align. The function of the Initiative Conference will be to discuss issues related to the workgroups and areas of inquiry, provide an opportunity for networking among the workgroups, give updates on programmatic changes in ANR, and strategize on key academic position needs within ANR.

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