

**College Visioning Committee
College of Agricultural and Environmental Sciences
University of California, Davis**

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Executive Summary

The College Visioning Committee (CVC) convened during winter quarter 2013 for the purpose of looking to the future and defining how the college may position itself to build on its position as the world leader among colleges of agricultural and environmental sciences. Our charge was to create a vision.

This vision has two key components. For the first component, we identified critical problems for society that transcended both disciplines and geographies to represent challenges that impact people on scales from local to global and for which solutions cross disciplinary boundaries. ***Our vision is that the College of Agricultural and Environmental Sciences at UC Davis be the world leader in addressing these critical societal challenges.***

The challenges we identified are:

- 1) Food Security and Safety
- 2) Healthy Diets, Healthy Living
- 3) Sustainable Agricultural Growth and Economies
- 4) Water Quality and Quantity
- 5) Balanced Land Use
- 6) Environmental Stewardship
- 7) Sustainable Energy
- 8) Scientific Literacy

The CVC feels that addressing these eight multidisciplinary opportunities represent a powerful means for the college to engage and serve our stakeholders, from the urban centers of California to the rural farmers of the developing world, as these represent the big problems that challenge humanity.

The second key component of our vision is that the college increase excellence in its core missions of research, teaching, and outreach to continue to lead the world in these areas.

These functions are the foundation of the college and the source of its current national and international standing. Continued excellence is imperative for receiving support from the campus and state.

Our committee next examined the resource needs that the college must address to achieve these aspirations. First, the committee felt that the trend of contraction in the size of the college should cease. In addition, other critical resources needed include faculty expertise in informatics and analysis of large data sets, microbial communities, sustainable coastal systems, decision making under uncertainty and cultural aspects of strategy implementation.

In the realm of faculty personnel, we also identified a need to hire at the mid-career level and suggest that integrative professorships and fellowships may aid in achieving our multidisciplinary goals. We identified a need to build industry / agency relations and outreach along with administrative support in award management.

The committee felt that there is still a strong need to improve college facilities. Considering the college financial position, the committee recommends analysis and communication with college units on possible ramifications of the new financial model as it relates to indirect cost recovery and the volume of reduced overhead grants our college carries.

Finally, the committee recommends developing college strategic plans for: new forms of pedagogy (e.g., online curriculum), endowments, encouraging entrepreneurship, investment in teaching (including teaching assistants), evaluation of college majors (not simply reviews of majors), the 2020 Initiative, industry relations and outreach, and redefining the college relationship with Cooperative Extension. ***A detailed list of recommended actions can be found in the last section of this report.***

We sought feedback from the faculty on our recommended focal areas. The faculty feedback gave strong support for the components of the two-part vision, and the important resource needs that are constraining our progress. Among our findings that we feel the college should pay particular attention to, based on this feedback, are: facilities, endowments teaching resources and the emerging ICR model. Faculty feedback is summarized within this report and detailed in an appendix.

We recommend that the College of Agricultural and Environmental Sciences view this report as a roadmap to frame CA&ES research, teaching, and outreach to resonate with the people of California and the world. This report is a living document that requires an updating process so that it can continue to guide the college to address the serious local, national, and global challenges that face humanity in the 21st century. Framing our departmental, center, and facilities needs in this language will allow us to better see interdisciplinary opportunities and synergisms as well as to communicate more effectively with our stakeholders.

Introduction

College Visioning Committee Charge

The College Visioning Committee (CVC) (Appendix 1) was charged by interim dean Mary Delany to complete three tasks during winter quarter 2013:

1. Identify the most important areas of emphasis for the future in which the College of Agricultural and Environmental Sciences (CA&ES) should engage.
2. Examine investments/reinvestments the college needs to make in order to remain the world's leading institution of its kind.
3. Identify core competencies that must be maintained or strengthened in order to advance the preeminence of the college.

Our committee met weekly during winter quarter and sought systematic feedback from department chairs, centers, the college Executive Committee, and faculty during the process of identifying critical new opportunities, core competencies and focal areas that the college can emphasize to maintain and further develop global leadership in agriculture and the environment. This feedback was sought in the form of solicitation of comments from faculty in the middle and near the completion of this process, along with an electronic survey of all faculty during the latter stages of the process.

Because past visioning exercises have extended over a considerably longer time frame, the committee feels that this report should be a living document on which the college continually builds using a formal process as the college continues to work with local and global partners toward solving critical world problems and strengthening the resources it has to accomplish its missions of teaching, research, and outreach/extension.

Previous Visioning Exercises

The current visioning exercise builds on previous efforts to focus the college mission (Appendix 2a). The vision from the 1999 Steering Committee for Academic and Strategic Planning (SCASP) through the 2007 College Academic Plan optimistically mapped a course for college growth. Since 2009, planning efforts have focused primarily on the expectation of a smaller college. In fact, the college has shrunk by 71 faculty FTE (17.8 percent) in the past decade (Appendix 2b). This contraction can no longer continue if we wish to maintain the quality and ranking of CA&ES. As discussed below, the committee recommends that maintaining the number and quality of faculty in CA&ES, with no further contraction, be a top priority of the new dean.

We expect that a wave of retirements over the next several years, along with opportunities associated with the 2020 Initiative, will generate the opportunity to reposition the college through new hires.

Previous strategic planning efforts have been instrumental in driving college actions—from hiring, to allocation of space and resources, to renovating facilities. Investment in upgrading facilities, reallocation of college space, a renewed focus on Agricultural Experiment Station (AES) outreach expectations, hiring of faculty, and reorganization of departments has been called for and conducted as either a direct consequence of these planning efforts, or a combined outcome of departmental plans incorporating the focus of college planning efforts.

It is clear from examining records such as faculty hiring, that the 1999 SCASP effort that coincided with the hiring of the previous dean of CA&ES guided the actions of the new dean, especially in the first few years after hiring. It is our intent that the current effort will have a similar impact by driving the vision of the college, in concert with departmental plans, and providing strong motivation for action based on college-wide needs. This effort, however, needs to be an evolving exercise in order to remain current and guide the college toward a future of sustained California and global leadership in the agricultural and environmental sciences.

Assessing the Core Strengths of the College of Agricultural and Environmental Sciences

The College of Agricultural and Environmental Sciences is currently composed of 334 faculty across 15 departments. It addresses critical issues related to agriculture, food systems, the environment, and human and social sciences through cutting-edge research, top-ranked undergraduate and graduate education, and internationally recognized outreach programs.

The CA&ES is the leading college of its kind in the nation and the world. UC Davis is the most published and cited research university in the U.S. in agricultural sciences, plant and animal sciences, environment/ecology, food science and nutrition, and soil sciences. CA&ES was recently ranked No. 1 in the world for agriculture and forestry by QS World University Rankings. Ten programs in the college are ranked No. 1 or No. 2 in the nation in research productivity (Appendix 3).

UC Davis is ranked No. 2 in plant and animal sciences, No. 3 in ecology/ environmental sciences and No. 5 in agricultural and food sciences in terms of most-cited international institutions (ISI Essential Science Indicators), in many cases ranked only behind national and international governmental organizations such as the U.S. Department of Agriculture (USDA) or National Institute for Agricultural Research (INRA) in France that are considerably larger in size, scope, and budget.

College researchers garner over \$140 million in annual funding (20 percent of the campus total), second only to the School of Medicine. UC Davis is also the No. 1 institution in the U.S. for awarding degrees to undergraduate minority students in agricultural sciences. Clearly, CA&ES has exceptional strength and depth in its core programs to continue to lead the nation and the world in agricultural, environmental and human sciences.

The college educates 22.8 percent of the undergraduates and 23.5 percent of the graduate students at UC Davis. The college also provides several unique learning opportunities not represented on any other campus within the entire UC system, including programs offered in the departments of Viticulture and Enology; Wildlife, Fish and Conservation Biology; Biological and Agricultural Engineering; Food Science and Technology; and Animal Science. Nowhere else within the UC system is there the breadth and depth of resources in agriculture and the environmental sciences. The reputation that CA&ES has for a high-quality education is renowned throughout the state as well as the world, and, for this reason, attracts students from around the globe.

The Vision

Our broad vision is for the college to maintain its status as the top university-based research institution in the world that specializes in agriculture, food, the environment, and related sciences. Achieving this goal requires a two-part vision:

- Provide leadership in addressing the most pressing challenges facing the state, the nation, and the world related to agriculture, food, and the environment. The college has the capacity and opportunity to contribute valuable research to meet these challenges.
- Increase excellence in research, teaching, and outreach. These functions are the foundation of the college and the source of its current national and international standing. Continued excellence is imperative for receiving support from the campus and state.

These two parts of the vision are discussed in the following sections.

Leading into the Future: Multidisciplinary Opportunities to Address Critical Global Problems

We identified eight key opportunities for the college to address global challenges related to agriculture, food, and the environment. Each of these challenges provides an opportunity for a diverse group of researchers, departments, centers, and institutes across multiple disciplines in the college to contribute valuable knowledge and solutions. The accomplishments of the college will be enhanced by broad collaboration between researchers within and between departments and units, as well as partnerships with other colleges and outside institutions. Many of the most successful projects will likely be those that use the multidisciplinary approach that has long been the norm in our college.

None of these opportunities will have easy solutions, especially in the face of a changing economic, environmental, social, cultural, and political context, but leadership from college faculty will be critical to the solutions that are developed. Some of these opportunities will entail expanding into new areas, while the college already has a long history of innovating in many of them.

The expertise contained within the college represents a nexus to solve these problems. While the disciplines represented in the college are built on a strong foundation of fundamental sciences, engineering, and social sciences, it is only through the applied expertise and focus of each of the departments in the college that significant progress will be made on these key world problems. Therefore, it is imperative that the college contributes critical tools to

understand and address each opportunity, enabling a broad solution to the problems inherent in each opportunity.

At the same time, this work will allow us to train the next generation of leaders and problem solvers and translate our findings into technical innovations and innovations in policy that can strengthen the economy and protect the environment, thus integrating our core missions of teaching, research, and outreach.

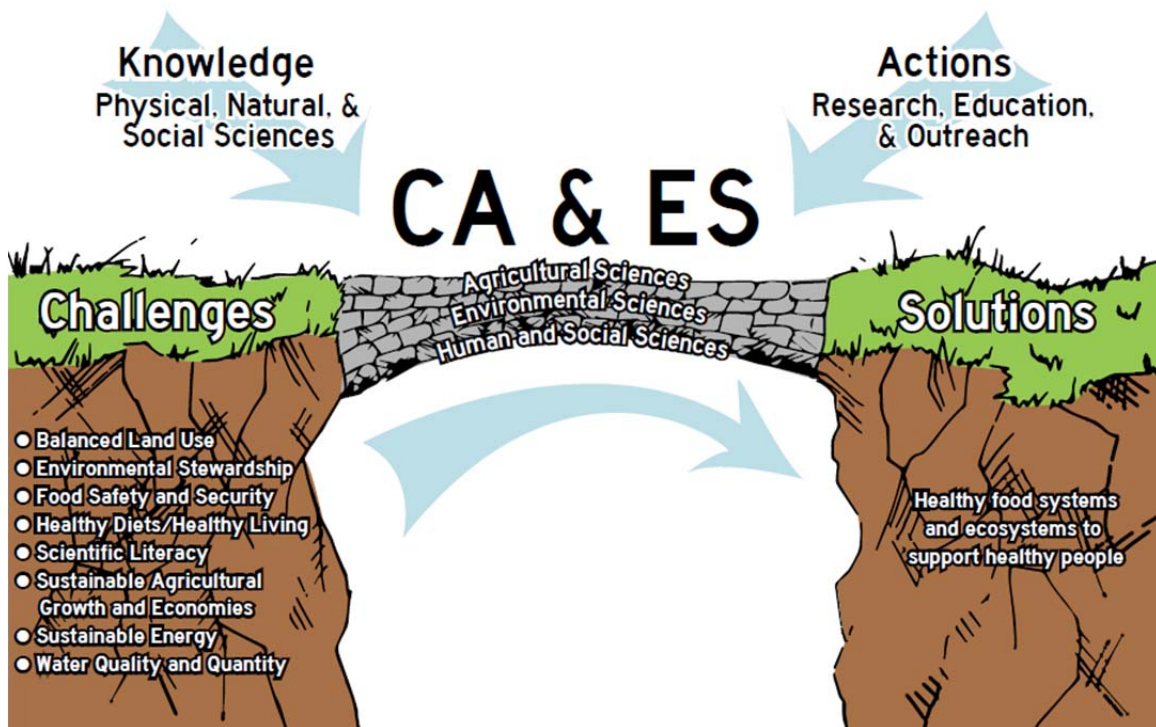


Figure 1. A conceptual diagram depicting the College of Agricultural and Environmental Sciences' role in integrating knowledge and action to find solutions to global problems.

The eight multidisciplinary opportunities are listed below, along with a short explanation of the scope and focus of each opportunity.

1) Food Security and Safety

Improved food security and food safety for all people

A growing world population, competition from biofuel production, changing diets, limited arable land, poverty, and climate change all threaten continuous access to sufficient, safe, and nutritious food for all people. In addition, food safety and supply vary across the world, as do wealth and connectivity to world markets. Meeting these challenges will demand substantial yield increases of staple food commodities while maintaining the quality and desirability of the resulting foods.

Developing technologies, practices, and policies to enhance food productivity—despite environmental fluctuations, pest invasion, and economic volatility—while minimizing environmental impacts, will be essential to provide a secure food supply. New agricultural technology and infrastructure, including improvements to preharvest production, postharvest handling, processing, transport, trade, and marketing will also be necessary to provide safe, reliable, healthful and desirable foods to all sectors of the population.

Combined, these areas present a challenge requiring innovation and cooperative efforts across both the foundational and applied sciences to effect change.

2) Healthy Diets, Healthy Living

Advance diets and actions that improve health and well-being

The growing crisis in adult and childhood obesity, diabetes, and malnutrition in the U.S. highlights the challenges associated with addressing the health and well-being of people through dietary improvement. Many forces affect diet simultaneously, including food availability, individual preferences, income, knowledge, land-use patterns, and policies.

In a situation with surplus food, a healthy diet is not enabled by the mere availability of adequate calories and nutrients, but by food choices that motivate and reward appropriate decisions. To achieve this challenging goal, we will study those motivations and supply consumers with tools to understand and address their individual needs and behaviors, as well as provide foods and diets to support those needs.

CA&ES is uniquely positioned to address these challenges because the solutions require a holistic and interdisciplinary approach. For example, we must optimize the safety and

nutritional value of food commodities, and work to develop new foods and agricultural products that improve human health and are desirable and affordable. In addition, we must develop and disseminate tools and information that help people choose health-promoting foods. These tools will include new and innovative devices for measuring personalized nutritional needs. This information can then be used by individuals to make health-promoting choices. These choices will also be facilitated by the design of our communities and built environment.

3) Sustainable Agricultural Growth and Economies

Enhance growth in California food and agriculture industries while promoting vibrant communities and a healthy environment

California is the leading agricultural and food-producing state in the U.S., but it faces significant challenges, as well as opportunities. Growing the food and agriculture sector of the economy while improving quality of life requires a number of advances in technology and innovation.

These include developing new technologies to improve productivity, solving problems that reduce product quality, creating high value, high quality food and agricultural products, promoting industry structures that enhance economic welfare of producers, customers, and workers, managing natural resources efficiently and sustainably, and improving education and health outcomes in migrant-worker communities.

CA&ES is uniquely placed to develop holistic solutions to these challenges. Moreover, through collaborative global partnerships, these solutions can generate flexible frameworks for agricultural and food-driven regional economic growth that can be tailored to local conditions across the globe.

4) Water Quality and Quantity

Provide strategies for safe, clean, affordable, and sufficient water supplies

The scarcity of clean and available water limits food production, human health, ecosystem functioning, and habitat for biological diversity in many parts of the world, including California. Problems associated with limited supplies of water will increase with population growth, human impacts to land use, and climate change. Already, close to half of the world's population is at risk because of limited water supplies. Sustainable watershed and groundwater management practices are needed to ensure a clean and sufficient water supply to meet urban and rural, agricultural, industrial, and environmental needs.

Development of technologies, practices, and policies is critical for enhanced watershed hydrologic function, water conservation, and water use efficiency. Development of social structures that foster the equitable use of limited clean water is also critical. UC Davis should continue to be a leader in developing efficient solutions for limited water supplies, and engineering the capacity to improve water quality.

5) Balanced Land Use

Develop innovative approaches to land use that enable a high quality of life

Competition for land use—for natural environments, living space, and food production—is intense and growing exponentially with population growth. Land-use decisions have profound impacts on the quality of life globally and in California. Anthropogenic impacts on the environment, including air quality, rising sea level, soil salinization, and climate change, demand careful allocation decisions to balance competing needs.

The world faces a challenge to better accommodate increasing populations in sustainable and appealing communities while minimizing negative effects on the environment and food production. Urban areas in the next century can be vibrant, efficient, culturally diverse, and healthy communities integrated with neighboring natural environments and rural communities.

Departments, centers, and institutions in CA&ES are uniquely situated to address the issue of analyzing costs and benefits of land-use choices from the urban, agricultural, and natural environment perspectives. With strong connections to policymakers from the local to the national levels, CA&ES has the opportunity to translate research ideas into application. We should be full participants in the co-design of new studies to meet tomorrow's land-use challenges, including sustainable urban living space, integrated

working landscapes, and healthy natural ecosystems.

6) Environmental Stewardship

Maintain high-quality natural environments in the face of global climate change

Numerous vectors of environmental change threaten the natural environments of California and the world. Invasive species displace and dominate native communities, pollution degrades the capacity to provide habitat to native species, and climate change drives undesirable changes to our natural heritage.

People threaten their well-being through degradation of natural ecosystems and the services they provide. Humanity and natural systems share the need for innovative approaches to maintaining natural systems to support earth's biological diversity while also fulfilling human needs.

UC Davis is well positioned to partner with stakeholders to develop and deliver science-based innovation to drive creative and broad-reaching stewardship practices and policies. Sustainable stewardship requires both adaptation and resilience in response to global change. Economic solutions for sustainable environments are needed for business, recreation, and natural systems. Forecasting change, monitoring impact, and managing sustainably at the systems level remain critical scientific challenges.

7) Sustainable Energy

Ensure sufficient and affordable energy sources that have minimal environmental impact

Petroleum-based fuels and chemicals have been the drivers of economic growth since the industrial revolution. However, as we have come to understand over the last hundred years, their use is not without costs to society in terms of pollution and carbon emissions. Furthermore, their production has been compromised by governmental regulations and wavering supplies. The challenges in the coming century include developing more environmentally friendly and secure energy sources that can continue to fuel economic prosperity.

To address these concerns, CA&ES researchers will continue to find and develop new sources of energy, along with the data and decision-making tools to quantify the economic, environmental, and social benefits and costs of existing and new energy resources. Technologies and effective policies enabling energy efficiency must also be developed, along with the tools to plan and design energy-efficient communities.

The future of energy is likely to be more decentralized and dependent on a broader diversity of energy sources than at any time in the past. Assessing optimal energy allocation and developing social structures that foster such energy production and consumption are central to the mission of several CA&ES research units.

8) Scientific Literacy

Advance public scientific literacy in agriculture, health, and the environment

Many challenges relating to food and agriculture, and natural and human resources, must be addressed by state, national, and international communities. However, low levels of scientific literacy among the general public are of great concern, threatening workforce preparedness, economic prosperity, future advances in science and technology, and public policy decisions.

Developing a population that has a fundamental understanding of scientific concepts and theories will help to address important societal challenges (e.g., climate change, food distribution), key public policy issues (e.g., energy resources, labor), and consumer choices (e.g., genetically modified food, humane food production, local food production).

While the college is actively engaged in research and extension activities focused on advancing scientific literacy, more can be done to improve public scientific literacy. The focus areas of the college in food and the environment are of keen interest to the public, especially in California, which creates an opportunity to draw the public into a better understanding of science and the scientific process. Further collaborations with the campus (e.g., School of Education, John Muir Institute of the Environment, Western Institute for Food Safety and Security) and state entities (e.g., California Science Teachers Association) and programs (e.g., California 4-H) will continue to expand and enhance these efforts.

The history of interdisciplinary work within the college has prepared us to provide leadership in the expanding field of science literacy. College facilities throughout the state make us uniquely positioned to expand programs in both formal and informal science education.

Excellence in Research, Teaching, and Outreach: Preserving and Enhancing Our Core Missions

Research

Our vision for the college is that it remain the leading college for agricultural and environmental sciences research in the world. CA&ES faculty conduct a broad range of research in food and agriculture, the environment, and human ecology. All of this research addresses critical issues important to stakeholders in California, as well as the world. While CA&ES has been shrinking in size and scope over recent years, the College Visioning Committee feels that it is critical, at this time, to maintain or grow (depending on the implementation of the 2020 Initiative) research strength in all relevant areas of expertise needed for supporting stakeholders, training students, and preserving the international standing of the college.

However, in order to further strengthen the college, it will be important to do more than just maintain or increase the size. The CVC supports the development of a plan by college faculty to energize core environmental faculty by coordinating centers, departments, and other entities, and building an overall identity for environmental research in the UC Davis College of Agricultural and Environmental Sciences. Many of the existing entities are focused on the entire campus at the expense of attention to the environmental core within the college, even though college faculty make up a critical part of the leadership and membership of these organizations.

Similarly, a plan should also be developed by college faculty to activate core food and agriculture faculty by coordinating efforts and building a core identity, as well. In this case, many of the centers and institutes in this area are college organizations. While each of these organizations addresses a different stakeholder base, they are likely not taking full advantage of the synergy that could exist had growth in this area been more highly planned and less organic.

Finally, a world-class faculty needs world-class research facilities. While college facilities have improved over recent years through a combination of new building and renovation, this improvement has not been uniform for all faculty. In addition to laboratories and studios, computing facilities in the college need to be updated and expanded. Many of the multidisciplinary opportunities and core mission research projects will necessarily generate large data sets in coming years. The college should plan to design and maintain the most advanced computing facilities possible for this type of research.

Teaching

CA&ES teaching encompasses both preparing students for careers in the public and private sectors and, for some, additional training towards professional degrees. CA&ES teaching is diverse, including informal community learning, continuing education for professionals, and world-class graduate education for tomorrow's research leaders.

The CVC vision for teaching within the college is to strengthen this diversity of teaching, even as we diversify both the means by which we teach as well as the students we teach. We must maintain strong, large majors that clearly resonate with student interest and needs, and provide students the support networks they require. We must also increase our student numbers, particularly among national and international students to leverage opportunities in the 2020 Initiative. As a consequence, we must align majors to resonate with global issues.

CA&ES must show national and international leadership in developing new teaching methods that take advantage of emerging technologies but that also leverage our classroom, field, and electronic facilities in delivering highly valued educational experiences in the agricultural and environmental sciences. CA&ES has a legacy of practical training through a variety of agricultural and environmental facilities both on and off campus. In times of tight budgets, small experiential classes are the most difficult to support. Yet, experiential learning has the highest value to our students, and often best prepares them for success in their careers.

The CVC calls for a vision to fully engage our students in education that is cost effective, yet maintains our commitment to hands-on experience as central to learning. This vision requires elevating the role of teaching within the spectrum of what our faculty do and recognizing the accomplishments of excellence and innovation in all the ways that we envision the future 'classroom.'

Outreach and Extension

Extension of research from the college has evolved over time, along with the number and focus of Cooperative Extension specialists and farm advisors. Despite the growing demand for applied research in California and globally, fewer CE specialists and diminishing resources have challenged our ability to connect with stakeholders and meet the needs of emerging clientele. Moreover, the way in which clientele groups access information is evolving from the traditional linear exchange of information via talks and publications to on-demand, web-based information delivery and exchange mechanisms.

Our vision for the future of CA&ES outreach and extension is that it is the model for extension globally. This includes the development and incorporation of cutting-edge

technology for communicating with stakeholders, introduction of staff members into the extension continuum who act as industry relations managers and outreach ambassadors, and better integration of the roles of core campus faculty, CE specialists, and farm advisors, along with institutes and centers on campus.

Resources

I. Resources to Achieve the College Research Vision

1. People

Faculty expertise. The faculty of the College of Agricultural and Environmental Sciences at UC Davis currently have the depth of expertise needed to advance research in most of the multidisciplinary opportunities (MOs). However, as multidisciplinary opportunities are prioritized by the dean and current faculty of the college, more faculty should be hired to strengthen the disciplines most closely aligned with these priorities—though this strengthening should not be at the expense of our core missions. The College Visioning Committee thinks this should be possible because of the demographics of the college faculty and the expected large degree of turnover from retirements over the next ten years, especially if the college follows the stated vision of avoiding further contraction.

The College Visioning Committee (CVC) did not attempt to develop a priority list of future hiring needs for the college. This will take further consultation and discussion with department and college leadership. However, the view of the CVC is that **all future hires should be considered in the context of the eight multidisciplinary opportunities** identified above, in addition to considering the general core missions of the college of research, teaching, and extension. Efforts should be made to hire faculty who can advance the college in each of these areas, and whenever possible, actively to integrate hires across the multidisciplinary opportunities and core missions.

To illustrate, and to seed future discussion, the CVC identified five areas of expertise that are likely to enhance acceleration on many of the multidisciplinary opportunities.

First, it is especially important for nearly all MOs that we recruit more faculty with the expertise to assemble, store, analyze, visualize, and interpret **large data sets**. Large data sets emerge not only from the realms of genomics, proteomics, and metabolomics, but also from multiple sources in the areas of economics, ecology, climate, and environmental sciences (e.g., data derived from the Internet, remote sensing, and wireless sensor networks). While some CA&ES faculty already have this expertise, more are needed across the spectrum of the college to be able to address the full range of multidisciplinary opportunities listed above, and to train our students in this important academic area.

A second area is that of **microbial communities** and microbial ecology. Diseases caused by pathogens in animal (including human) or plant host populations pose grave threats—including pandemics—in an increasingly global economy. Microbial communities can also have strongly beneficial uses in applications ranging from medicine (e.g., probiotics, bacteriophages) to environmental remediation (e.g., bioremediation of oil spills) to food

production (e.g., yeast-containing foods and beverages, nitrogen-fixing bacterial mutualists of crop plants). Understanding and controlling these microbial communities, both positive and negative, will be an integral part of nearly all of the MOs. With tools evolving rapidly for assessing these communities, new faculty will be important in this area.

A third area is **sustainable coastal systems**. Globally, 80 percent of humanity lives within 60 miles of the sea. In California, the 20 counties that border the Pacific Ocean and San Francisco Bay encompass 22 percent of California's land area, but are home to 68 percent of the state's population. This same region is an important biodiversity hotspot, home to 56 percent (1,200 species) of the state's rare plants. While expertise on inland, non-coastal systems is strongly represented in current faculty resources, creating a coordinated, strengthened identity in the area of coastal systems will ensure the college's ability to address the MOs successfully. The marine environment is a globally recognized critical system for sustaining the healthy natural ecosystems, healthy food systems, and healthy people that are the subject of nearly all of the multidisciplinary opportunities.

The fourth area is **decision making under uncertainty**. Whereas scientists often attempt to conduct observations and experimental manipulations under tightly controlled environmental conditions, in the real world where research is translated into practice, decision makers often must operate under substantial levels of uncertainty. In many cases, the uncertainty itself may exert major influences on optimal behavior. For example, risk avoidance may shape decisions in a wide range of arenas, from treatment decisions made by doctors working under a threat of malpractice lawsuits to pest management decisions made by farmers under a perceived risk of crop failure. Research in this area should enhance decision making by people and by computers, enhancing the ability to plan, respond to unexpected events, and evaluate the full range of potential options necessary to successfully address nearly all of the multidisciplinary opportunities. Recruitment of additional faculty with expertise in decision making under uncertainty will enhance the college's ability to make recommendations for stakeholders that reflect the uncertainties of the workplace.

Finally, successful implementation of innovations toward any of these MOs will necessarily need to consider the **cultural aspects** of the participating communities. More faculty that bridge the technical innovation disciplines and the cultural aspects of the use and adoption of the innovation will be critical to the effective translation of research advances into on-the-ground practice. Similarly, faculty who bridge the policy innovation and cultural aspects will be critical to effective and efficient adoption of policy and regulations leading to successful solutions to the MOs. This is a clear opportunity nationally and internationally as well.

Mid-career faculty hiring. Because of the demographics of college faculty, the college will experience a large degree of faculty turnover in the next five to 10 years. While a short-term plan exists for replacement of some of these faculty, the current gap in mid-career faculty will eventually lead to a gap in senior faculty. In order to protect the reputation and standing

of the college, which could be negatively affected by this gap, a directed effort should be made to recruit and attract mid-career faculty in affected departments in order to maintain leadership throughout this transition.

Integrative professorships. Many of the multidisciplinary opportunities and the problems of the future will be solved by faculty and groups of faculty with a wide variety of backgrounds. For this reason, the College Visioning Committee recommends establishment of a formal program of *Integrative Professorships*.

These professorships would entail split appointments across departments and colleges and could explore nontraditional split appointments between UC faculty and outside organizations such as federal laboratories (e.g., Dept. of Energy or U.S. Dept. of Agriculture) or even industry. These integrative professorships could be linked specifically to a priority MO, and the funding could come in the form of an endowed chair or a research endowment. We encourage the college to explore this idea with other colleges at UC Davis and to look to both internal and external funding sources for this program.

For these split appointments, teaching in multiple departments must come with reasonable expectations, but take advantage of unique interdisciplinary teaching capabilities associated with the professorship. We envision recruiting faculty into these positions from outside UC Davis, but current faculty could also be eligible for integrative professorships.

Integrative fellowships. To augment the permanent faculty hired to work on these multidisciplinary opportunities and our core missions, the CVC recommends initiation of a college- or campus-based program of *Integrative Fellowships*. These fellowships would bring prominent international scholars from academia, as well as industry, government, and NGOs, to campus as in-residence visiting scholars who interact with college faculty, staff, and students to work on specific MOs.

Complementary to this program would be another fellowship program to send UC Davis faculty to international institutions, including academic, governmental, NGOs, and industry, to implement our faculty findings to other locations and cultures, as well as to learn from these organizations.

Key Staff Support. In addition to new faculty, several types of staff positions will be critical to the success of our college in addressing the multidisciplinary opportunities. First, a new type of position is necessary in the form of **industry relations managers** or **outreach ambassadors/stewards**. The proposed duties of these positions are further described in the Outreach and Extension section below, but one component of their position would be directly related to research funding. One of their key responsibilities would be to listen to the critical needs of the stakeholders as it relates to both the MOs and the university, in general, and

facilitate coordination of industry, government, and university partnerships on research proposals and grants.

In addition, clustering of administrative services in CA&ES has brought about a large change in the way that these services are delivered to college faculty. Transition has brought a destabilizing effect in many cases. In order for research funding to increase, the administrative support provided to faculty in the areas of purchasing, human resources, pre- and post-award services, account management, and information technology needs to be stabilized and, wherever possible, improved.

More service in the area of **pre-award processing** and **grant preparation** is the highest priority here with a goal of faculty only having to focus on project narratives in order to submit a proposal.

2. Organizations

The College Visioning Committee thinks that many of the centers and other organizations needed to move forward on the MOs and our core research mission are already in place in the college or on campus. They are already playing a critical role coordinating research efforts and providing a public face to our stakeholders. However, the resources necessary to coordinate these efforts needs to be improved. For example, the college organizes numerous centers related to agriculture, but all of the environmental centers are campuswide with variable relationships to the college.

In addition, the CVC feels that more effort needs to be put into translating the college's research efforts into practice. Implementing an increased effort to have effective translation would include incubator space for new companies that are initiated via UC Davis research and the business, technical, and training expertise to facilitate this translation.

In addition to translating our technology into practice, it is clearly important to develop a similar organization to coordinate with governmental and regulatory agencies to translate our findings into policy generation.

3. Facilities

While facilities have generally improved in the college over the last 10 years, there are several types of facilities that still need to be established and others that are clearly in need of renovation to bring them to world-class standards. First, a larger effort needs to be placed on computing facilities and data storage for working with large datasets. In an age of large data sets, a world-class research organization needs to have world-class computing facilities.

There are also several of the MOs and core research areas that would benefit from new or renovated facilities to coalesce efforts in that area (an excellent example is a building or complex that coalesces environmental faculty).

Finally, especially for Multidisciplinary Opportunity No. 8 (Scientific Literacy), but in general as well, the college should create facilities for improved experiential learning for both internal instruction and education of stakeholders and the general public. For the latter purpose, ideas like a National Food Museum (maybe in conjunction with the Smithsonian Institution) on campus would help leverage the college to inform and educate the general California public about the relevance of what we do.

4. Funding/Incentives

Overhead and indirect cost recovery. The campus's new funding model represents a significant challenge for CA&ES. Indirect cost recovery rates are fixed by the campus or by state legislation and are out of the college's control. Nevertheless, the new campus financial model is based on funding units based on indirect cost recovery (ICR) and a tax for support of core university functions (e.g., UC Office of the President). This model favors full ICR grants (54 percent).

CA&ES, however, has historically had substantial funding through agency partners with reduced ICR agreements (0–25 percent). These agency partners are at the heart of much of the translational research undertaken within the college. At present, ICR is based on dollars returned, but taxation is based on expenditures. As a consequence, the college is strongly disincentivized from partnering with traditional research partners (e.g., commodity groups) because of the costs incurred to accept such an award, yet this is clearly part of our mission as a land-grant institution.

The new dean may face a substantial challenge in maintaining our connection to agency and commodity research under the current fiscal model. Alternatively, it will fall to the dean to spearhead the effort to change the practice of low overhead grants.

Endowments. The CVC feels that the establishment of more endowed chairs and research endowments is important to making progress on each multidisciplinary opportunity, especially because the visionary ideas represented by the MOs may initially precede federal or private funding sources and because federal and state funding for research is shrinking.

Seed funding for large group projects/training grants is an important strategy for increasing success given the reduced opportunities for government and private funding. We suggest that the college consider a program similar to the UC Davis RISE program to stimulate innovative research and grants. Funding for retreats and meetings to coordinate the existing

efforts and centers could be an effective way of leading to these larger funding opportunities as well.

Finally, initiating national or international prizes related to the MOs, through endowments, would act as incentives for accomplishments, as well as bring attention to the college and the university.

Encouraging operational and administrative entrepreneurship. In the present economic reality of state funding, the college should encourage departments to be entrepreneurial in the way they operate and raise funds in a manner consistent with their mission.

II. Resources to Achieve the College Teaching Vision

To strengthen the educational experience for both undergraduates and graduate students, it is imperative that the college addresses four specific, but related, issues. These are:

1. Allocation of teaching resources
2. Evaluation of evolving teaching pedagogy and the emergence of online teaching as it relates to our core mission.
3. Development of a strategic plan for increasing enrollment in response to the 2020 initiative.
4. Review of the current majors offered by the college and alignment with student and stakeholder needs.

Teaching resources. Teaching resources are in short supply. The new financial model for budgets to be driven by student credit hours poses a suite of challenges to the college by creating a financial incentive that pulls against many of our core teaching values of providing hands-on learning experiences. Student credit hours drive teaching assistantships (TAs) and there is a clear call by faculty to increase TA support to enhance teaching quality.

In addition, the means for allocation of resources must account for faculty contact hours, along with student contact hours, to compensate and reward departments for classes that meet our core mission to train students in agricultural and environmental sciences but are necessarily instructor-intensive such as field classes and other laboratory and experiential learning opportunities that are critical to our curricula. To accomplish this, an allocation method should be devised that differentially compensates lower and upper division classes to encourage appropriate class sizes.

Finally, where not already available, state-of-the-art production facilities and laboratories should be built to best train the next generation of leaders and problem solvers.

New forms of pedagogy. With the rapid emergence of new modes of learning among our students and stakeholders, faculty should be trained on current effective pedagogy and have the opportunity to modernize their teaching skills. This applies to programs for our undergraduate and graduate students pursuing degrees here at UC Davis, as well as for external stakeholders interested in furthering their knowledge through non-degree programs.

For our students pursuing degrees, the college should examine the current best practices for online instruction and develop a plan for continually integrating the newest electronic education methods into existing curricula. The college faculty require a clear understanding of where to access resources (department, college, campus, university programs). This could include existing online products to teach and extend knowledge in agricultural and environmental science in a way that enhances the core mission of the college or new ideas developed at UC Davis or elsewhere that leverage our existing teaching methods and facilities.

For our external stakeholders, universities throughout the world are working on the issue of online education for non-students. Many are developing Massive Open Online Courses (MOOCs). This could be an opportunity for UC Davis and the college, as well, as the agricultural and environmental MOOC space remains relatively uncrowded. This direction needs to be further explored by college faculty.

Tied to both of these priorities is the possibility of funding a Center for Online Instruction in Agriculture and the Environment with the goal of being the top online instruction site for our core areas. Campus departments and programs that are already strong in these areas could contribute ideas and guide achieving this goal. Partnering with University Extension seems to hold obvious benefits in this effort.

Finally, the CVC feels that new areas of instruction would also benefit our students. One specific suggestion is for the college to develop the capacity for instruction on entrepreneurship as a component of both graduate and undergraduate education. Such a program would promote the translation of research innovation into practical application, and help build the state and global economies.

Increasing enrollment as part of the 2020 Initiative. The college is well-positioned to serve the needs of the international and national students, which is promoted in the 2020 Initiative. The global relevance of the college's research enterprise in the areas of food, agriculture, environment, and policy, coupled with the renowned faculty teaching courses on those topics, serves to draw this population of students. The expanding student body will create opportunities for additional faculty who can then build and further enhance the college's stature.

The college is the world leader in agricultural and environmental sciences. With smart planning and marketing by the college, there is scope to bring significantly more international students to UC Davis to study in CA&ES. Developing a strategic plan for departments and majors to promote their strengths to an international community of students would help the college create a cohesive vision for attracting students under the 2020 Initiative. Such an initiative may require investment in academic and cultural advising services as well as marketing.

Review of majors. Finally, another important step the college can take is to foster and facilitate an Academic Senate reexamination of the set of majors offered and the overlaps between them. If majors can be combined and/or streamlined, then teaching resources will be employed more efficiently, and students will be clearer on what the college offers.

Summary. We recommend that the college form two committees. The first committee would be charged with examining enrollment growth, how college majors and college advising foster growth, and a college strategy for the 2020 Initiative. The second committee, or task force, would focus on examining the use of technology and the Internet in teaching and extension, and developing a comprehensive teaching strategy that supports the breadth of the college teaching mission, both on campus as well as globally.

III. Resources to Achieve the College Outreach/Extension Vision

Extension of research from the college has evolved over time, along with the number and focus of Cooperative Extension specialists and farm advisors. Despite the growing demand for applied research in California and globally, fewer CE specialists and diminishing resources have challenged our ability to connect with stakeholders and meet the needs of emerging clientele. Moreover, the way in which clientele groups access information is evolving from the traditional linear exchange of information via talks and publications to on-demand, web-based information delivery and exchange mechanisms.

In order to fill this outreach demand the college should take three steps:

1. As described earlier, the college should consider deploying a team of department-based stakeholder-relations managers to increase communication and coordinate research with stakeholders (e.g., industry, agencies, and public interest groups).
2. The college needs to develop world-class expertise in the use of electronic communication to extend knowledge.
3. Incentives are needed to integrate graduate and undergraduate education with outreach activities.

Industry relations and outreach. In addition to CE specialist and farm advisor positions, a new type of position is necessary in the form of industry relations managers or outreach ambassadors/stewards. The responsibilities of these staff members would be to interact with stakeholders across the state, in concert with CE specialists and farm advisors, to explain what the university is doing to address the MOs and strengthen the state of California. It would also be the responsibility of these staff members to listen to the critical needs of the stakeholders as it relates to both the MOs and the university, in general, to assure the relevance of our work. These staff members could also work with CE specialists to coordinate industry, government, and university partnerships on specific issues, including toward preparation of collaborative research proposals.

While some of this work had previously been the purview of Cooperative Extension specialists, the increasing and necessary research role of CE specialists now precludes sufficient contact with growing groups of stakeholders across the state, resulting in a perceived disconnect that jeopardizes our mission, and our stakeholder-based and state funding sources. In addition, it will be important to have more staff who interact directly with local, state and federal governments and policy makers to inform legislation that addresses the MOs and strengthens California.

Innovation in developing and delivering knowledge. The college needs to be innovative in creating material for stakeholders and in training outreach professionals for the future. To do this, the college should develop department-accessible in-house expertise in electronic communication and interactive data delivery. In addition to developing the technology side, a team representing the extension continuum (including CE specialists, farm advisors, and senate faculty) should be formed to continually develop best practices for use of electronic communication in extension and outreach.

Finally, another way to foster and achieve innovation is by creating fellowships for students, for one academic quarter near completion of their graduate degrees, with the intent that they work with a Cooperative Extension professional and package their results into creative outreach products. This program could be expanded to involve collaborations with industry/stakeholder-relations managers and electronic communications experts (as discussed above).

Redefining Cooperative Extension. In light of the ever-growing demand for science-based information, and the uncertainty associated with Agricultural Experiment Station funding, the Academic Senate and Cooperative Extension faculty in the college need to continue to define the differences and similarities between their positions in order to create the correct expectations for merits and promotions for both types of positions.

One such opportunity is to support CE specialists who are interested in classroom teaching with partial I&R appointments, with the specific intent of involving students in the outreach process.

Summary of Faculty Input

After working through a deliberative and consultative process of identifying priorities, the CVC offered an opportunity for all faculty to express their opinion on the committee's work through a survey which included three types of questions: (a) an allocation portion where each person would allocate 100 units across the suite of multidisciplinary opportunities; (b) a ranking portion, where faculty would rate a suite of resource needs into categories from high to low priority; and (c) an open response portion that allowed individuals to express their opinion.

The purpose of this survey was to characterize faculty sentiment regarding the multidisciplinary opportunities and resource needs identified by the CVC. Fifty-nine percent of the faculty responded. The survey results show that our faculty are currently well distributed across our eight multidisciplinary opportunities and that faculty see a need to remain well-balanced across these eight areas. Secondly, these results suggest that faculty sentiment remains supportive of the idea that water and energy are high priority research areas that span the college. In terms of faculty assessment of resource needs, once again, the responses were positive with respect to the 20 areas we identified, but that improving facilities and working to build endowments were the most strongly endorsed needs.

A more detailed analysis of the results of the survey can be found in Appendix 4.

Recommended Actions

The following are recommended actions for the dean and faculty of the college:

- (1) Maintain or increase the number of the faculty within the college.
- (2) The college should establish or maintain leadership in the eight multidisciplinary opportunities identified by the CVC. Future faculty hires should be considered in the context of the eight multidisciplinary opportunities—or at least a subset of these MOs chosen as a focus by the dean and faculty of the college.
- (3) Invest in faculty positions in academic areas that will contribute to multiple MOs such as ones focusing on informatics and “big data.”
- (4) Work with departments to hire mid-career faculty to fill large demographic gaps between junior and senior faculty to avoid future gaps in leadership.
- (5) Establish a formal Integrative Professorship program that hires and supports faculty that span multiple disciplines and/or colleges.
- (6) Increase pre-award grant management to facilitate proposal preparation for federal, state, and private agencies.
- (7) Update aging research and teaching/production facilities and develop world-class IT infrastructure for research.
- (8) Create college resources for coordinating large multidisciplinary efforts in agriculture and the environment and for translating cutting edge research to practice and policy.
- (9) Create a development focus on establishing research endowments and endowed chairs.
- (10) Reconcile the campus administrative funding plan with low-overhead grants typical in the college or facilitate the transition away from low-overhead for commodity groups and other traditional funding agencies.
- (11) Increase teaching assistant support for college classes and improve the criteria for distribution of this support to reward faculty in necessary instructor-intensive coursework.
- (12) Charge a college committee or establish a center to decide on and instruct in best practices for online and electronic teaching methodologies. This committee should also advise the dean and college faculty on the benefits and issues in creating a larger-scale, external web-based instruction presence (e.g. MOOCs).
- (13) Charge a committee to help decide on and monitor enrollment growth as part of the campus 2020 Initiative.
- (14) Deploy a team of department-based industry/stakeholder-relations managers to increase communication and coordinate research with industry/stakeholders in concert with CE specialists and other faculty.
- (15) Develop world-class expertise in the use of electronic communication to extend knowledge to stakeholders.
- (16) Work closely with UC Agriculture and Natural Resources (ANR) to redefine Cooperative Extension and roles of senate and specialist faculty, along with students, in delivering knowledge to stakeholders.

Appendix 1. College Visioning Committee membership and charge.

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December 20, 2012

DAVID BLOCK, co chair, Viticulture & Enology
MARK SCHWARTZ, co chair, JMIE
CHARLOTTE BILTEKOFF, Food Science & Technology
JOHN EADIE, Wildlife, Fish & Conservation Biology
ANITA OBERBAUER, Animal Science
TOBY O'GEEN, Land, Air & Water Resources
JAY ROSENHEIM, Entomology
JEFFREY ROSS-IBARRA, Plant Sciences
JIM SANCHIRICO, Environmental Science & Policy
CAROLYN SLUPSKY, Nutrition
AARON SMITH, Agricultural & Resource Economics
MARTIN SMITH, Human Ecology & Veterinary Medicine
KEN TATE, Plant Sciences

RE: Service on CA&ES Visioning Committee (CVC)

Dear Colleagues,

I am writing to ask that you serve on a critically-important college committee to develop recommendations of the vision for the future of the College of Agricultural & Environmental Sciences.


The charge to this committee is quite different from other planning activities undertaken over the past decade in that your committee is asked to focus on the critical issues of the future. I ask that you identify the most important areas of emphasis for the future in which the college should engage, as well as invest/reinvest existing or new resources, to remain the world's leading institution of its kind. In addition to "looking over the horizon" at the big issues of the future, I ask that the committee also identify the existing core competencies that must be maintained (or strengthened) to insure the preeminence of our college.

For those of you who were on campus in the late 1990s, you may recall a planning committee, led by Jim MacDonald, developed a similar document that identified the core programs of the college as well as the opportunities for new programmatic investment. This document was presented to Dean Van Alfen even before his arrival on campus wherein he endorsed the report and used it as the primary blueprint for college FTE investments and resource allocations for new and existing areas of emphasis for many years thereafter. It is my hope that your committee will develop a report that will be of equal value to our new leadership and serve to help inform decisions made for our college into the future.

David Block, Viticulture and Enology and Mark Schwartz, Environmental Science and Policy, have agreed to co-chair this committee. Because of the need to move quickly, weekly meetings will be scheduled on ten consecutive Wednesdays, 1-3 p.m., commencing January 9, 2013. Meetings will be held in the Prato Room of the Parsons Seed Building. Your report will be due in my office no later than Friday, March 29, 2013.

Thank you in advance for accepting this critical committee assignment; no response is necessary unless you are unable to serve.

Best regards,


 Mary E. Delany
 Interim Dean

Appendix 2a. A synopsis of recent college planning efforts.

Year(s)	Report	Synopsis
1998–1999	Steering Committee for Academic and Strategic Planning	Chaired by Jim MacDonald, the SCASP was tasked with identifying high-priority areas, given an expectation of campus growth enunciated by Provost Robert Grey. The "water and watersheds" and "agricultural genomics" priorities were used to drive 11 hires in four departments. Dean Neal Van Alfen also used the plan to drive space allocation decisions. Budget cuts to AES/I&R truncated progress beyond the first two priorities.
2005	Provost Hinshaw Initiative hiring	Provost Virginia Hinshaw issued a challenge for hiring based on research initiatives she identified, many of which mirrored those called out by SCASP. Because of previous planning efforts, the college aggressively was able to strongly compete initiative resources and was awarded 11.5 FTEs matched against 11.5 college FTEs to hire in three primary initiatives (agricultural sustainability, foods for health, and global environmental change), along with positions in two other initiatives (energy for the future, computational characterization of biological networks).
2006–2007	The College Academic Plan	Chaired by Susan Harrison, this committee identified 10 areas as hiring priorities (agricultural sustainability, bio-based materials and processes, biodiversity and ecosystem services, complex microbial systems, environmental and human health, environmental informatics, food safety, global change and watersheds, regional change, and science policy and public perception). Unfortunately, the recession precipitated a 25-percent cut in AES and CE budgets along with a reduction in I&R funding, precluding most of the implementation plans from this report.
2008–2009	Academic Planning Committee (APC)	Chaired by MRC Greenwood, the committee focused on evaluating productivity of college departments with respect to the college mission and to assess demographic risk in particular departments based on a top-heavy age structure. This led to prioritization of new hires for a few departments.
2009–2010	College Planning Committee (CPC)	Co-chaired by Mary Delany and Jan Hopmans, this committee focused efforts on considering risk in small departments, leading to 1) the merger of three small departments to form the Department of Human Ecology; 2) the merger of Nematology with Entomology; 3) the formation of an environmental department group, including Land, Air Water Resources; Environmental Science and Policy; Wildlife, Fish and Conservation Biology; and Environmental Toxicology, for the purpose of planned hiring; and 4) the merger of Textiles and Clothing with Biological and Agricultural Engineering.

Appendix 2b. **A synopsis of change in college size since 2000.**

	2003–04	2012–13
Filled I&R/AES FTE	317.25	272.45
CE specialist FTE	82.34	55.98

Appendix 3. **A synopsis of core strengths and competencies within the College of Agricultural and Environmental Sciences.****Table 1. National Program Ranking**

Agricultural sciences ¹	1	Plant and animal science ¹	1
Agriculture / Agronomy ¹	1	Soil science ^{1,3}	1
Entomology ³	1	Agricultural engineering ²	2
Environment / Ecology ¹	1	Agricultural economics ³	2
Food science and nutrition ¹	1	Plant pathology ³	2

¹ Thompson Reuters (ScienceWatch), 2009–2011² U.S. News and World Reports, 2007³ Chronicle of Higher Education, 2007

Agricultural Sciences division: The academic departments in the agricultural sciences division have exceptional reputations, with the majority of the programs ranked in the top three in the nation as indexed by the *Chronicle of Higher Education*. Within the United States, sciencewatch.com ranks UC Davis as the No. 1 high-impact U.S. institution in Agriculture/Agronomy (2003–2007 data).

Based on total and federally financed R&D expenditures in the agricultural sciences, the National Science Foundation's Division of Science Resources Statistics, Survey of Research and Development Expenditures at Universities and Colleges, FY 2007, ranked UC Davis No. 2 overall (behind the University of Florida), but well above all other national institutions viewed as having comparable agricultural programs (Cornell University, North Carolina State University, and the University of Wisconsin, Madison.).

UC Davis is one of the top three international institutions offering premier programs in the agricultural sciences along with INRA (French National Institute for Agricultural Research; the equivalent of the U.S. Department of Agriculture) and Wageningen University (the Netherlands).

Environmental Sciences division: The four academic departments in the environmental sciences division are renowned for individual disciplinary strengths and collectively for unprecedented breadth, with several programs ranked in the top five nationally. For example, the graduate program in Ecology has been ranked by *US News & World Report* in the top five for more than a decade. The faculty in LAWR were recently funded for a highly competitive Integrative Graduate Research and Training grant (NSF – IGERT).

Human Sciences division: The college has four departments and one division within the human sciences division, with some of the most productive faculty in the country. According to the Faculty Scholarly Productivity Index published by the *Chronicle of Higher Education*, the faculty rank No. 2 nationally in agricultural economics, No. 4 in human development and family studies, No. 9 in food science, and No. 10 in nutritional sciences. ISI Essential Science Indicators ranks UC Davis' food science and nutrition program as No. 1 in the nation.

Other rankings of international graduate programs place the Department of Agricultural and Resource Economics (ARE) as No. 1 in the master's program and No. 2 in the doctoral program. The UC Davis ARE program is ranked by www.econphd.net as No. 2 in agricultural economics and No. 4 in resource and environmental economics. The UC Davis Human Development Graduate Group (which includes members of the Department of Human Ecology (formerly Human and Community Development)) was recently rated by the *Chronicle of Higher Education* as the No. 3 graduate program in the nation.

Appendix 4. **Faculty survey results.**

After working through a deliberative and consultative process of identifying priorities, the College Visioning Committee offered an opportunity for all faculty in the college to express their opinion on the committee's work through a survey which included three types of questions: (a) an allocation portion, in which each person would allocate 100 units across the suite of multidisciplinary opportunities; (b) a ranking portion, in which faculty would rate a suite of resource needs into categories from high to low priority; and (c) an open response portion that allowed individuals to express their opinion.

The CVC offers the eight multidisciplinary opportunities as a suite of generalized problems around which the college can, and should, focus effort. The purpose of this survey is to characterize a general faculty sentiment regarding the multidisciplinary opportunities and resource needs identified by the CVC. It would be inappropriate to treat this as a prioritization of these opportunities and needs. Faculty respondents were not privy to the discussions leading to our prioritization and only had sketch outlines of each of the topics they were asked to respond to. Most probably did not read these materials. As a consequence, these survey results should be considered a barometer of general faculty sentiment and not for detailed prioritization.

The College Visioning "Penny Survey" was open from April 29 until May 7, during which 59 percent (217 of the 366) of people on the CA&ES faculty listserv responded. Numerical data from the survey questions are summarized below.

Faculty Opinion on Multidisciplinary Opportunities

In Question 1 we asked: "Please apportion YOUR professional effort (teaching, research and outreach) into the following eight multidisciplinary opportunities using a total of 100 units. The sum must total 100 points. If these statements do not describe your efforts, please apportion effort under 'other' and then in a following question describe 'other.' Finally, please allow yourself to be forward looking and think about your effort going forward, not necessarily your effort in retrospect."

In Question 4 we asked: "Please repeat Question 1, except this time apportion your 100 points into areas where you think it is most important for the college to develop new expertise. Again, looking forward, and again, the boxes must sum to 100. Also, as a reminder, you are welcome to look at the PDF that came with the original e-mail request in order to think about what was meant by these eight opportunities."

The purpose is to gauge where college expertise is now and where college faculty think that they should be in the future (Figure A1). The survey results show that our faculty are currently well distributed across these eight multidisciplinary opportunities (white bars).

Further, our faculty think that we should remain well-balanced across these eight areas, suggesting that our committee successfully identified high priority areas.

These results also suggest that faculty sentiment remains supportive of the idea expressed in the MacDonald report, that water is a high-priority research area that spans the college. Energy is another area recognized as having increasing importance into the future.

Some of the differences between current and future distributions may result from the particular language we chose. For example, the committee recognized climate change and healthy communities as important areas, but felt that these topics crossed over so many others that they were better treated as integral parts of all opportunities, rather than an opportunity on their own.

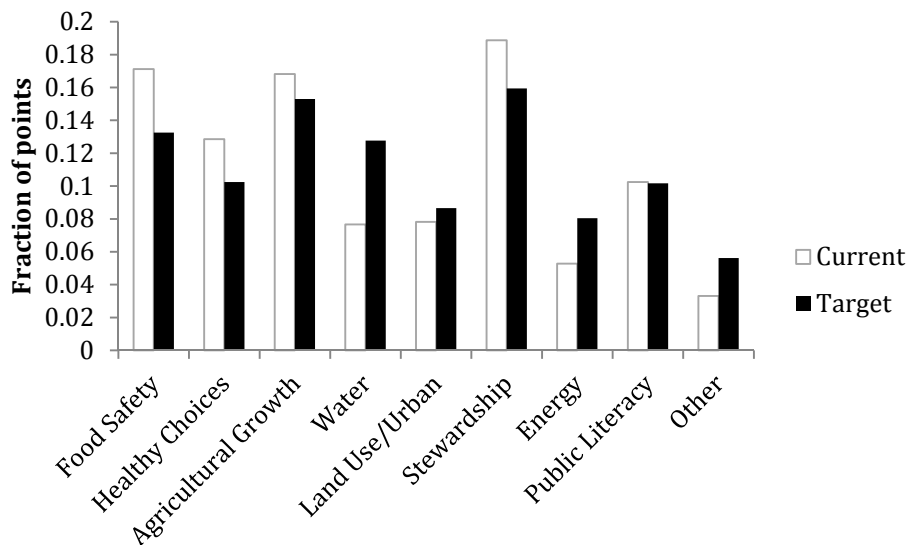


Figure A1. The fraction of total points scored for each of the eight college vision statements, with white bars indicating faculty expression of their current interests and black bars reflecting opinions of future concerns.

Three additional points accompany these data. First, a large number of points (2,600 of 21,580) were counted under “other” for current positioning. These were split between answers that are best classified as “nonscience” answers (e.g., allocation to grants administration or committee service); unclassifiable basic science (e.g., genetics, behavior, fiber). Also note that 45 percent of the points in category 4 (Land use, healthy communities, urban living) were points where people missed the finer text that this category includes community development. Finally, no points were re-allocated into Water quality and quantity; people understood that bin the best.

Faculty Opinion on Resource Needs

The College Visioning Committee deliberated in conference to identify a series of resource needs to propel the college forward. These included some areas of faculty expertise that would be strategic, but also included many other suggestions. These are resource needs that we feel are important to the advancement of the college.

We then surveyed the faculty regarding these needs. Once again, faculty were not privy to the detailed conversation and may or may not have paid much attention to the detail. In fact, the high non-response rate to the question focused on the Chancellor's 2020 Initiative suggests that most faculty did not read the descriptions.

In general, we found that faculty were supportive of these proposed research needs; all options received scores in the moderate to high priority areas. We present these data simply as a rough guide to where the college faculty appear to be distributed relative to their opinions on these resource needs. The survey is not intended as a process of ranking priorities for action.

Question 6 asked about resource needs to achieve the mission of the college: "Please rate the following resource needs for the college. How would you prefer to see limited resources allocated to these challenges in order to best achieve the college mission of leadership among colleges of agricultural and environmental sciences? Resource needs are clustered in groups, but cover a wide array of areas, including faculty hiring, administrative support, facilities, and initiatives. Similarly, a PDF is attached of the original e-mail that explains in further detail specifics of these 18 different needs, in case you are interested."

We aggregated responses into bins of areas and responses, with a key in Table A1.

Table A1. A list of short descriptions graphed in Figures A2-A4.

Figure	Short description for graphs	Question
2	Informatics	Faculty expertise in informatics and the capacity to deal with large data sets
2	Microbial	Faculty expertise in microbial biology
2	Coastal/Marine	Faculty expertise in coastal ecosystems and marine food systems
2	Decision-making	Faculty expertise in decision making under uncertainty
2	Cultural/Policy	Faculty expertise in cultural aspects of implementation, including policy
2	Departmental...	Faculty expertise simply assigned to meet needs based on independently developed departmental plans
3	Facilities	Strengthening facilities to better support research needs
3	Endowments	Resources to attract more college endowments and other development opportunities
3	Teaching credit/ Teaching..	Assess teaching credit and the value of teaching assistants
3	Indirect costs	Evaluate budget model with respect to indirect cost return and state contracts
3	Broaden Cooperative Extension	Evaluation of redefining Cooperative Extension to fit the broadening realm of college outreach
3	College majors	A structured evaluation of college majors and 21st century needs
3	Online teaching	Support for innovative teaching (spanning the spectrum from online to experiential learning)
3	Extension positions	Investment in extension positions that develop innovation in delivering knowledge to stakeholders
4	Extension in....	Investment in extension/outreach positions in industry and stakeholder relations
4	Mid-career hiring	Mid-career hiring to fill gaps in college demographic structure
4	Award management	Administrative support in award management
4	Integrative professorships	Integrative professorships targeting faculty that span multiple disciplines
4	Centers and institutes	Strengthening centers and institutes as research cores
4	2020 Initiative	Focus on the campus 2020 Initiative
4	Integrative fellows	Integrative fellowships to bring international scholars to campus for term visits.
4	Admin for industry relations	Administrative support dedicated to industry relations and outreach management
4	Entrepreneurship	Resources to encourage entrepreneurship

Six resource-need categories asked about specific kinds of faculty hires (Figure A2). One response option was to simply follow departmental plans; scoring an average rating of 2.6 on a 4 point scale, where 1 represents a top priority and 4 represents a low priority. (“Don’t know” received a score of 0 and did not count in the average score). Only “Informatics” on the list scored better than following departmental plans.

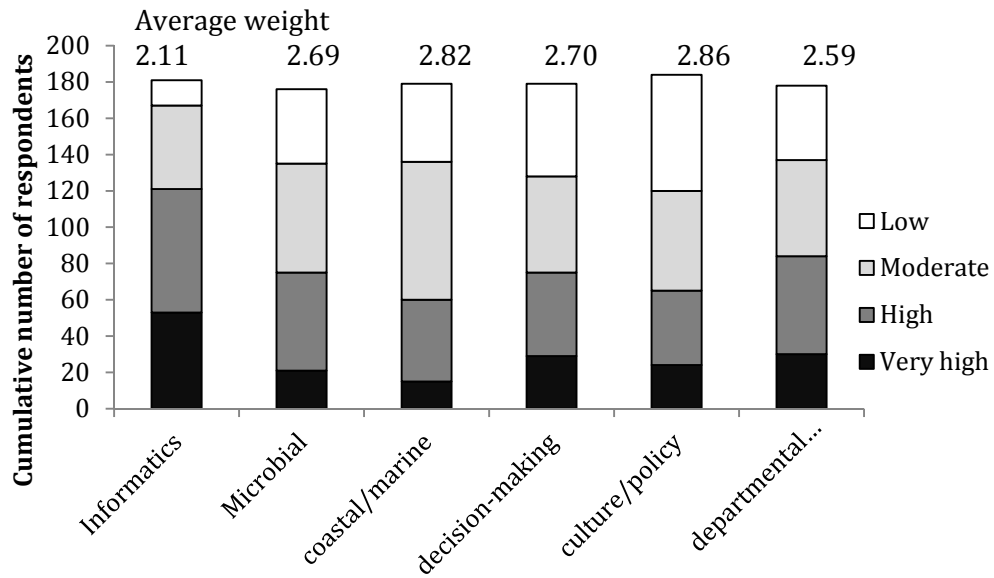


Figure A2. Faculty opinion rankings of the five focal faculty areas along with a sixth option: following departmental plans. Very high priority was scored as 1, with low priority equal to 4. All five areas scored above moderate priority, although only informatics scored above departmental planning priorities.

Among the remaining 16 categories we split the group in halves for graphing purposes. These include the group with the greatest support, leading with attention facilities and endowments.

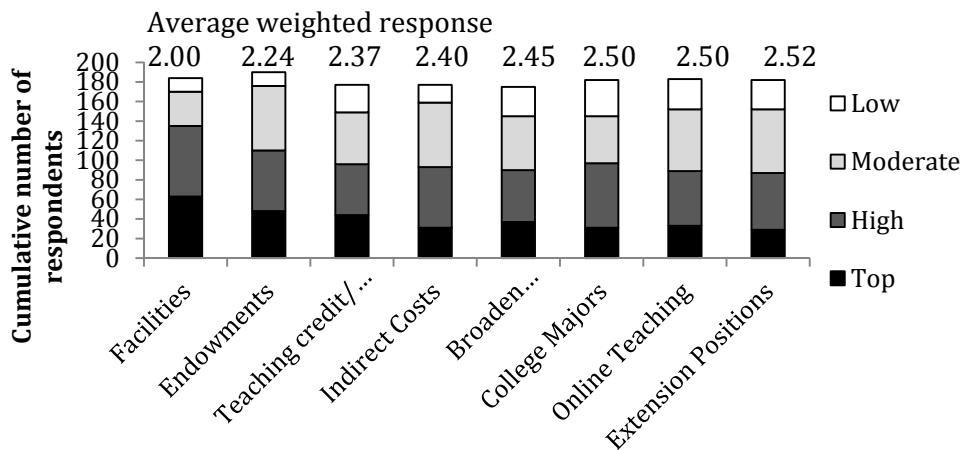


Figure A3. The eight resource needs that score the highest priorities among the faculty surveyed. Very high priority was scored as 1, with low priority equal to 4. All eight areas scored between high (2.0) and midway between high and moderate (2.5).

We present a set of nine areas with lower priority, both ranked from left to right (Figure A4).

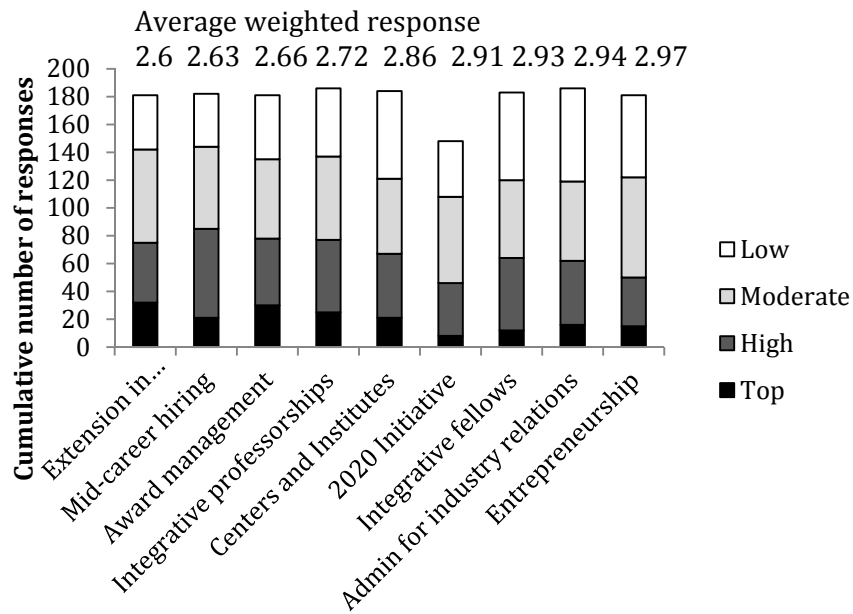


Figure A4. Nine resource needs ranking between the midpoint between moderate and high (2.5) and moderate (3.0).

Text responses on the survey are included in a supplemental file for those interested in detailed responses.