

**Academic Plan**  
**Department of Agricultural and Resource Economics**  
**College of Agricultural and Environmental Sciences**  
**University of California, Davis**  
**March 2008**

## **Introduction**

This academic plan for the Department of Agricultural and Resource Economics (ARE), builds on previous academic plans, the College priorities, and campus plans. The ARE department has 24 senate faculty, and four full time and one half time extension specialists. The faculty services one of the largest undergraduate programs on campus, and provides training to students in a widely recognized top graduate program. In addition, the Department supplies the state, nation and the world agricultural community with rigorous and high quality applied research that provides a framework for technical and policy decisions related to agricultural production, marketing, its resource base, and the resulting environmental impacts.

## **Overview**

The fundamental short-run academic planning problem facing the department of agricultural and resource economics is that we are currently attempting to maintain a superior academic performance with inadequate resources.

### **Academic Performance**

Academic performance can be measured in the success of the undergraduate students, graduate students, and research productivity and impact. Using impartial national metrics specified later in this document we show that our undergraduate program is rigorous, successful, and growing. Our Ph.D. and M.S. programs are highly ranked nationally and internationally. The Chronicle of Higher Education's faculty scholarly product and index ranks the ARE department as second in the nation. ARE also has 850 undergraduate majors and our undergraduate enrollment is among the largest (in terms of student FTE) undergraduate majors in the college.

### **Academic Resources**

Academic planning is about the rational allocation of academic resources, including faculty FTE and lecturer support. The ARE department is currently below its target allocation of faculty I&R. The CA&ES FTE allocation statement dated 10-1-07 shows that ARE is the furthest below its FTE target (-2.00) of any department in the College. Two other departments (Animal Science and Environmental Toxicology) are also significantly below their target. Most departments are slightly over target. While ARE receives substantial support for lecturers, it is not commensurate with current expenditures. In the 2006-2007 academic year the department spent \$68,700 more on lecturers than we were reimbursed, and in the 2007-2008 academic year the unreimbursed expenditure from department resources on lecturers was \$95,722. To correct this problem we will be forced to reduce the number of course offerings and increase the size of many of our core classes from 120 students to 150 students in the 2008-2009 academic year.

Over the next decade the ARE department will adjust to changing research, outreach and teaching priorities and a substantial anticipated change in the faculty due to retirements.

The overall objective is to maintain top-ranked research and graduate programs while also supporting a high quality, large and popular undergraduate program, contributing to the Agricultural Experiment Station (AES) through stakeholder outreach and mission-oriented research, and contributing to high quality extension education for stakeholders throughout the state. This academic plan details ARE's strengths, while focusing on our priorities and targets for the planning period. As part of the process of developing this academic plan, Senate faculty and CE specialists were surveyed regarding key questions facing the department, and reviewed and commented on a draft of the plan prior to its final revision and submission to CAES.

## **Research**

### *Disciplinary leadership*

ARE is widely viewed as one of the top departments in agricultural and resource economics. As noted earlier, the *Chronicle of Higher Education's* Faculty Scholarly Productivity Index ranked ARE second in 2007 with an index value of 1.58, closely behind top-ranked Iowa State University with an index value of 1.61.<sup>1</sup> (Third-ranked UC Berkeley had an index value of 1.51.) The components of the index indicate that work conducted by ARE faculty has been very influential in the profession. Using the *Chronicle of Higher Education's* measure, ARE had the highest number of citations per faculty member, 16, considerably above the 13.04 for Texas A&M (fourth-ranked overall), the 7.8 for Iowa State University and the 10 for UC Berkeley. In another ranking based on publications in 63 top-ranked economics journals, UC Davis ranked second in agricultural economics and fourth in resource and environmental economics.<sup>2</sup>

### *Departmental specializations, core competencies and clusters of excellence*

ARE's fundamental research objective is to engage in work that expands the frontiers of knowledge and to apply this work to issues of importance to stakeholders, especially those in California. ARE focuses on four core competencies: agricultural economics and policy, development economics, environmental and resource economics, and quantitative economics and methods. The department's efforts to address statewide AES priorities and needs, and to maintain its position as a top-ranked agricultural economics department we need to utilize all of our core competencies. Table 1 summarizes some of the technical subfields and specific topics associated with each core competency that are addressed by ARE faculty and specialists. Many of the clusters of excellence span more than one core competency.

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<sup>1</sup> <http://chronicle.com/stats/productivity/page.php?year=2007&primary=2&secondary=18&bycat=Go>

<sup>2</sup> <http://www.econphd.net/rank/rresag.htm>, <http://www.econphd.net/rank/rresag.htm>.

Table 1. Core Competencies, Sub-fields and Clusters of Excellence

Core Competencies	Sub-fields and clusters of excellence
<i>Agricultural Economics</i>	Agricultural finance; Agricultural labor; Agricultural policy and regulation; Water markets and agriculture; Invasive species; Agricultural sustainability; Agri-environmental interface; Bioeconomic modeling; Commodity markets (incl. supply and demand for agricultural products, futures markets); Competitiveness of California farms; Contracting; Food safety; Innovation, Technology adoption and productivity growth; International trade; Market structure and performance (incl. marketing power, marketing margins); Biofuels; Implications of climate change; Marketing orders and other market institutions; Nutrition; Risk management
<i>Environmental and Natural Resource Economics</i>	Agri-environmental interface; Biofuels; Climate change; Ecosystem services; Energy economics (incl. renewable and non-renewable energy sources); Environmental policy and regulation; Invasive species; Natural resource management (in particular watershed, forest, fishery and non-renewables); Natural resource modeling (incl. bioeconomic modeling); Non-market valuation; Recreation
<i>Economic Development</i>	Development and environmental linkages; Ecotourism; Innovation, technology adoption and productivity growth; Labor and migration; Microeconomics of Rural Poverty; Nutrition; Risk and insurance; Rural financial markets; Sustainability and green accounting; Trade and regional development
<i>Quantitative Analysis and Methods</i>	Demand and cost function estimation; Linear, non-linear and dynamic programming; Survey design and analysis; Time series and cross-sectional econometrics

*Anticipated gaps and new opportunities.*

A strong consensus has emerged for the appropriate research emphasis for two new positions in the department. First we need to shore up our work in economic development. Given two relatively junior core faculty in that area, it is important to hire at the senior level in this development economics. Agriculture and rural issues continue to be vitally important in economic development, where the rural poor continue to be a major social issue and food remains and major share of the consumer budget. Economic development is a major interest area of out graduate students and, although many faculty members work on topics in economic development, we must have more faculty who consider development their core field.

The second area of emphasis need for additional faculty is at the interface between agricultural economics and environmental economics. There is no question that environmental and resource issues are among the most important facing California agriculture and global agriculture. And, while a number of faculty members devote some attention to these issues, only one member of the faculty has a research program devoted to this interface, and that member is currently nearing retirement age.

Additional emphasis for new faculty appointments will depend on the pattern of retirements or other vacancies created. Demand for our research from stakeholders far

exceeds the time and resources of the current faculty in all our areas of emphasis. Thus we envision hiring in agricultural economics, resource and environmental economics, development and quantitative methods in the coming years.

## **Agricultural Experiment Station**

### *AES role within California.*

All Academic Senate members in ARE have partial appointments in the Agricultural Experiment Station (AES). Agricultural and Resource Economists in the AES are involved in mission-oriented research and mission-oriented outreach tied to research activity. Research is conducted as part of one or more AES projects. Currently, the department has 16 AES projects ranging from general subject matter areas to short term research. Many of these projects include more than one faculty member. Current AES projects cover a number of important general subject matter areas, ranging from sustainability and green accounting to commodity and futures markets. Table A-1 in the appendix lists current AES projects within ARE.

ARE's AES activities are strongly relevant to the core issue topics identified by ANR's Program Council and address the key components of a successful program.<sup>3</sup> Maintaining and developing further expertise in economics and policy analysis within ANR is essential for successfully addressing critical issues. ARE's core competencies are in precisely these areas.

### *Outreach*

Communicating research results to stakeholders and interacting with outreach sources is important for ARE members, who have a diverse clientele for the results of applied economic research. Our off-campus clientele is defined at state, national and international levels and includes decision makers at all levels of government and industry, including agribusiness, farmers, bankers, educators, consumers, and consultants. Communication methods are diverse and include informal meetings, expert testimony, interviews with media, formal presentations and publications of all types. Consequently, outreach activities range from providing expertise in a general subject area to disseminating the results of a specific research project. A few examples of recent high-profile communications to stakeholders and the public by ARE AES faculty have addressed whether or not California and the U.S. are actually facing a farm labor shortage<sup>4</sup>, the effect of illegal immigration on agriculture, impacts of a new Farm Bill, obesity and the federal food stamp program<sup>5</sup>, and alternative policy approaches for managing the Bay-Delta system<sup>6</sup>.

One particularly important outreach tool for ARE is *ARE Update*, published by the Giannini Foundation of Agricultural Economics six times a year. *ARE Update* provides

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<sup>3</sup> University of California Agriculture and Natural Resources (2005) "Core Issues and Target Opportunities". <http://ucanr.org/PDFs/ANR%20Core%20Issues%2009-05.pdf>.

<sup>4</sup> <http://www.cis.org/articles/2007/back907.html> \.

<sup>5</sup> [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=992493](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=992493).

<sup>6</sup> <http://www.ppic.org/main/publication.asp?i=671>.

an outlet for agricultural economists at Davis and Berkeley to communicate research results with a variety of stakeholders. Over 2,400 policymakers and stakeholders receive print copies of *ARE Update*. In 2006, there were approximately 75,000 downloads of *ARE Update* articles and issues.

The Department has strong linkages with the Agricultural Issues Center (AIC) located in Davis, and directed by one of our faculty members. While AIC is a university-wide center, many faculty in ARE work on a wide range of cooperative projects in the AIC. Two ARE professors and one CE specialist serve as AIC associate directors. Working with AIC, often on multi-disciplinary projects, the ARE faculty gain substantial outreach exposure for their applied and policy related research.

## **Cooperative Extension**

### *CE role within California.*

The five ARE CE specialists serve as conduits connecting the campus to a broad range of industry and public groups. Simultaneously, CE specialists provide disciplinary resources to county CE staff while collaborating with them in providing off-campus education. The content of these educational activities is derived from the mission-oriented research component of CE specialist appointments and other members of the faculty. Like the rest of ARE, the CE component has shrunk over recent decades, with two CE specialists retiring since 1990.

The existing ARE CE faculty have successful programs that are valued by constituency groups, and provide visibility to ARE, UC Davis, and UCCE. For example, the cost studies series, distributed by ARE online through the departmental webpage, and through hard copies, is valued by a number of constituencies in addition to agricultural producers. Farmland appraisers and lenders use the cost studies as a tool when making valuation and lending decisions. The cost studies also benefit producers and other constituencies indirectly through their use by other CE Specialists and AES faculty. In 2007, there were 209,733 hits and 63,638 visits for the cost studies website.<sup>7</sup> Another very visible and successful component of the CE program is the California Agribusiness Executive Seminar. This biannual seminar brings together leading executives in California agribusiness to discuss ways of addressing business challenges, and provides an opportunity for them to interact with faculty and specialists from ARE and elsewhere in CAES. With a CE program that is so under-staffed it is hard to isolate the few highest priority needs, however, one area where the department is lacking in CE expertise is at the interface between agriculture and resource issues. We are also lacking expertise related to field crops and the cattle industries, and finally we have no CE specialist with specific expertise in agricultural policy generally or international trade.

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<sup>7</sup> These statistics exclude hits and visits from known and likely robots. Including robots, there were 750,056 hits and 385,349 visits.

## **Educational programs and goals**

ARE's fundamental education challenge is to sustain an very popular undergraduate major and two top-ranked graduate degree programs. Meeting this challenge will require additional faculty positions and lecturer resources. The contributions of proposed faculty positions to the undergraduate and graduate curricula will be discussed in the later sections on hiring priorities.

### *Graduate Education.*

ARE offers programs of graduate study leading to the M.S. and Ph.D. degrees. About 30 students enter the program each year. On average, Ph.D. students take about five years to graduate. Currently, there are 69 students in the Ph.D. program. Most M.S. students choose to take a comprehensive exam and finish the program in one year. Both programs offer quantitatively rigorous programs of study organized around three fields (i) agricultural economics, (ii) international development, and (iii) environmental and resource economics. ARE integrates students into an active departmental research program that includes collaboration with faculty members that frequently culminates in joint-authored papers, student-run weekly seminars on students' research, participation in national and international professional meetings, and active informal critiques of fellow students' work.

Consistent with its top-ranked research program, two recent rankings placed ARE's Ph.D. program at number two in the world. First, in 2004 Gregory Perry of Oregon State University compiled a ranking from a survey of referees for the *American Journal of Agricultural Economics*, the top journal in the field. Second, the website <http://econphd.net> ranked programs based on research output of the faculty, also in 2004. The American Agricultural Economics Association awards an annual prize for the best Ph.D. dissertation. Since 1967, ARE graduates have won eighteen of these awards, more than any other program. Since 2000, ARE graduates have won three "Best dissertation" awards, also more than any other program. The Perry survey also ranked Master's programs, and it placed ARE's M.S. program at number one.

Our programs are based on a strong disciplinary training in economics. We provide this training by collaborating with the Department of Economics to teach the core subjects of microeconomic theory and econometrics. Many of our students supplement these core offerings by taking other courses in the Department of Economics or the Department of Statistics. Our students sometimes seek to complement their applied economic courses with an understanding of the physical or biological environment that relates to their economic problem. For example, some students interested in environmental economics also study ecology or transportation, some water resource economists also study hydrology, and some development economists also study nutrition. Of the 33 current Ph.D. students who have advanced to candidacy, 12 have dissertation committee members from outside ARE.

Additional course work fits naturally in the third year of the Ph.D. program, after students have completed their basic microeconomics and econometrics training and their required field courses in ARE's core areas and other fields offered by the Economics Department. ARE is currently compiling materials for the self-review component of a regularly scheduled graduate program review. We plan to use the review as an opportunity to examine our curriculum further.

#### *Undergraduate Education.*

The Department of Agricultural Economics offers a BS degree in Managerial Economics, Agricultural Economics, and Resource and Environmental economics. Overwhelmingly, the students select the managerial economics option. Managerial economics is based on the understanding of core concepts in economics and quantitative methods through their application to management problems. Additional courses include finance, marketing, production, policy analysis, and labor economics among others. The objectives of the undergraduate program are closely related to the Department's research and graduate program goals, namely, competence in applied economic analysis as it pertains to management. Additional areas in which undergraduates acquire skills are quantitative and statistical modeling, business law, organizational behavior investment evaluation, and accounting. The hallmark of our undergraduate program is the integration of formal quantitative analysis with applied economic theory.

This combination of management skills and quantitative ability is well received by the undergraduate job market. The demand for our graduates is strong, and the numbers of majors is increasing. The majority of graduates find employment in occupations that capitalize on the training from this degree. For example, a significant number join financial institutions, economic consultant firms, government agencies, and agribusiness firms. Many of our students go on to graduate school in agricultural economics, economics, and professional schools. Recent alumni surveys indicate substantial satisfaction with the basic structure of the program and with the success of graduates in finding meaningful applications of their education

#### *Cross-department teaching*

Several undergraduate courses are taught jointly with other departments. Professor Daniel Sumner is currently co-teaching a course on the economics of the wine industry with the Viticulture and Enology Department. Professor Cynthia Lin, has a joint appointment in ARE and ESP and teaches a course in resource economics taken by students from both majors. Professor Pierre Mérel, is in the process of developing a new course. This undergraduate upper-division course called "Economics of Sustainability" will be a required course for students enrolled in the new Sustainability major, but will be open to other students as well.

## **Future Challenges for educational program goals.**

### *Challenges to the Graduate Program*

A primary barrier to achieving ARE's graduate program goals is the continued increase in graduate student fees and non-resident tuition (NRT) and recent policy changes regarding the requirements for funding NRT. One of the factors that has aided ARE in attracting outstanding graduate students has been its ability to offer multiple years of guaranteed financial support for Ph.D. students. Increased fees and NRT and restrictions regarding the funding of NRT for graduate student researchers will impact ARE's ability to continue to offer competitive financial packages.

A second challenge to the graduate program that can gradually be overcome with changes in the faculty composition is the mismatch between faculty core interests and the fields of interest of the graduate students. Strict categorizations by core area are an inaccurate reflection of the workload of PhD supervision, since an examination of the supervision load reflects many instances of crossover between core areas. For example, faculty member with primary interests in the agricultural economics area often supervise dissertations about resource and environmental impacts of agriculture, and dissertations that focus on agriculture in less developed countries. In general, faculty with their main interests in quantitative methods help supervise dissertations that use advanced econometric tools in the applied areas.

The current breakdown of faculty by primary core area is Agricultural economics and policy 52%, Resources and environmental economics 22%, Development economics 13%, Econometrics 13%. Topics for Ph.D. dissertations over the last 10 years have the following breakdown Agricultural economics 37%, Resource and environmental economics 35%, Development economics 25%. Recently, interest amongst Ph.D. students has shifted towards development, with current enrollment at approximately one third of the students in each main area. We have considered this issue when selecting areas for new faculty hiring.

### *Challenges to the Undergraduate Program*

The lack of teaching resources is the major problem currently facing the managerial economics major.

#### *Student credit hours.*

In 2006-2007, ARE accounted for 21,264 undergraduate student credit hours (SCH) and 2,150 graduate SCH, as reported in Table A-3.<sup>8</sup> These credit hours are driven by a combination of a large number of departmental majors, the enrollment of economics majors in managerial economics courses, and the use of some ARE courses as "service courses" by other majors. ARE's majors and pre-majors account for slightly fewer than

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<sup>8</sup> Based on 403 query in <https://sisds.ucdavis.edu>. These numbers include only courses taught by ARE instructors. Cross-listed courses taught by Department of Economics instructors are excluded.



60% of ARE's undergraduate SCH.<sup>9</sup> Around 12% are students in other CAES majors, and another 12% are Economics majors. The remaining students in ARE courses are enrolled in other majors outside CAES or are undeclared.

In total, twelve other majors either require ARE courses or allow them as an option for a specialization within the major. Nine of these majors are in CAES: Agricultural Management and Rangeland Resources, Animal Science and Management, Community and Regional Development, Crop Science and Management, Environmental Biology and Management, Environmental Policy Analysis and Planning, Food Science, International Agricultural Development, and Textiles and Clothing. The remaining three are in L&S: Economics, International Relations, and Sociology.

ARE does not need to take any steps to sustain student credit hours. In fact, we have the opposite problem of equitably restricting entry to the major so that student numbers do not overwhelm our academic resources. As discussed earlier, ARE currently does not have sufficient resources to serve its current majors and other enrolled students. In order to provide the quality of instruction UCD students expect and deserve, ARE requires additional teaching resources.

If ARE desired to increase SCH, as would be the case under a moderate growth scenario, there are a number of options for doing so. Given that ARE is an impacted major, an obvious approach would involve reducing the minimum GPA requirement for entry into the major from the current level of 2.8, or offering additional sections of courses<sup>10</sup>. Additional faculty positions and resources to hire teaching assistants and graders would be required for the implementation of this option.

The current level of student contact hours for ARE senate faculty as measured by the student to faculty FTE ratio is 14.4 for the 2007-2008 academic year. This ratio is influenced by the large number of small enrollment graduate courses that support the Ph.D. and MS programs, and also by a deliberate policy to improve the quality of student contact with faculty by reducing class sizes. We are responding to pressure to increase the student to faculty ratio by increasing some core class sizes, although ARE faculty members have significant concerns that this may degrade the quality of students' learning experience. As a result, the student to faculty ratio for the next academic year 2008 - 2009 is projected to increase to 17.7. Additional resources to hire teaching assistants and graders would be required for the implementation of this option.

*Teaching roles potentially filled by CE Specialists.*

As documented elsewhere, ARE's CE program is currently understaffed. In addition, the current incentive structure for CE faculty discourages them from teaching courses on

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<sup>9</sup> Based on first majors, 411 query in <https://sisds.ucdavis.edu>. Courses taught by ARE instructors only. Crosslisted SCH *only* include students enrolled in ARE listing of the crosslisted course.

<sup>10</sup> Courses that would serve both ARE's managerial economics majors and students in other majors are: ARE 100A-B, the microeconomic theory sequence; ARE 115A, the economic development course; ARE 130 and 136, two marketing courses; ARE 138, a course in international commodity marketing; ARE 171A, the first course in the finance sequence; and ARE 175, a natural resources course.

campus. In fact, two specialized courses in our undergraduate curriculum that two of our CE faculty are uniquely qualified to teach have been started to enable them to fully pursue their extension obligations. We would like to be able to offer these courses, but with the CE so understaffed and demands from stakeholders overwhelming this does not seem likely.

## **Future Senate Faculty Positions**

Presently ARE has 22.7 I&R/AES faculty, accounting for 14.32 I&R positions and 8.38 AES positions. An additional two positions (1.14 I&R and 0.86 AES) are targeted for ARE but are currently unfilled.

A number of retirements are projected over the 2009 to 2014 planning period. Twelve of ARE's I&R/AES faculty members will be eligible for retirement at age 60 during the planning period: slightly over half of the current faculty. Six were 60 or older as of August 31, 2007. Another six will turn 60 prior to August 31, 2014. All four of ARE's CE specialists will turn 60 prior to August 31, 2014. The consequences for ARE's CE program are discussed in the section on CE priorities.

### *Target size.*

In addition to the two positions that are allocated in the target but currently unfilled, ARE would like to add an additional two I&R/AES faculty members, for a total of 26.7 FTE, and would like to add two CE specialist positions, for a total of 6.0 FTE. The role of these additional hires in ARE's AES program, graduate and undergraduate curricula, and CE program are discussed below.

### *Positions to maintain steady state.*

ARE is currently two positions below its current CAES target FTE allocation. Based on faculty survey responses, the two core areas that clearly have the strongest weighted priority are development economics and the economics of the environmental aspects of agriculture.

### *Highest priority positions for investment above current FTE allocation.*

Under a moderate growth scenario, an investment in two additional FTE would enable ARE to hire in two additional priority areas. There is a strong demand in each of our focus areas for additional positions. Specific suggestions for hiring priorities from faculty respondents are shown in table A-5. This modest increase in FTE represents a 8% (2 FTE ) expansion over the current target FTE. We argue that given the demand of our research and teaching programs the current target for ARE is simply too low.

### *Rationale for college investment.*

There are a number of reasons for CAES to invest additional FTE above the current target allocation in ARE. Investing in ARE is investing in the college's long-term goals. Every applied topic area of interest in the college requires economic analysis to reach its potential usefulness for stakeholders. Second, ANR has identified the functional role of economics in addressing core issues, regardless of the precise issue in question.

Investment in ARE is an investment in the continued success of California's AES. Third, the expertise offered by ARE faculty is essential for the successful completion of many multidisciplinary projects, especially applied projects that address the consequences of specific policies or evaluate the viability of a technology or practice for use by growers or members of another stakeholder group. Many ARE faculty are engaged in multidisciplinary research.<sup>11</sup> Investing in additional faculty will result in additional resources for multidisciplinary efforts.

*Contribution to curriculum.*

ARE sustains a top-ranked graduate program offering Ph.D. and M.S. degrees as well as a rigorous, high-quality undergraduate major that consistently ranks as one of the largest on campus. The challenges facing both of these programs were discussed earlier. All four of the positions discussed above will make substantial contributions to the ARE undergraduate and graduate curricula.

The gap in ARE's core competency of development economics is linked to a gap in the graduate curriculum and has negative consequences for the undergraduate curriculum. ARE offers four graduate courses in development economics (three Ph.D., one M.S.), and has only three specialists in development economics. In 2007-2008 a visiting professor was invited to teach one of the Ph.D. courses, and in 2006-2007 one of the Ph.D. courses was not offered at all. Neither option is a satisfactory long-term situation. At the undergraduate level, the shortage of development economics faculty has had two consequences: first, ARE has used lecturers to teach some sections of ARE 115A, Economic Development, which is a very popular course. For example, in the 2008-2009 course offerings, a section of ARE 115A with a projected enrollment of 140 students had to be cancelled due to the lack of faculty and lecturer funding. Second, ARE has not had the teaching resources to offer additional upper division courses covering economic development, such as a course focusing on development issues in Latin America or a course focusing on economic development, natural resources and the environment.

ARE currently has 5 faculty whose primary research, teaching, and dissertation supervision focus is environmental/resource economics. In addition to supervising a substantial fraction of ARE's large graduate program and teaching core courses, these faculty teach 3 undergraduate field courses (ARE 147, 175, and 176) and 5 graduate field courses (ARE 215D, 275, 254, 276 and 277).

The specific contributions of the additional two proposed positions to the offerings of elective upper division undergraduate courses for ARE's majors and other students, and to the graduate curriculum will depend on the specializations of the hires within the three broad areas identified as priorities. At the graduate program level, hires in agricultural economics and in environmental and natural resource economics would most likely

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<sup>11</sup> Limiting attention to the UC Davis campus, a partial list of the home departments and schools of faculty with whom ARE faculty collaborate includes Animal Science, Food Science, Entomology, Environmental Science and Policy, Graduate School of Management, Human and Community Development, Economics, Land, Air and Water Resources, Nematology, Nutrition, Plant Pathology, Plant Sciences, School of Medicine School of Veterinary Medicine, Soil Science, and Viticulture and Enology.

participate by contributing to instruction in their major field at the M.S. level, Ph.D. level or both. A hire in agri-environmental economics may instruct in the M.S. program, in the Ph.D. agricultural economics field or in the Ph.D. environment and natural resources field. At the undergraduate level, new hires could contribute by addressing gaps in the existing curriculum, by developing new courses, or both.

Regardless of the specific contributions of each hire to ARE's offerings of upper division electives and the graduate program, the two positions will contribute to the undergraduate program by increasing ARE's capacity to offer both upper division electives and the large enrollment "core" courses required for the major. As noted earlier, at the present time, instruction by I&R/AES faculty is disproportionately focused on upper division electives, due to the specialized expertise required for these courses. Lecturers are hired to cover several sections of core courses.

#### *Potential synergies.*

All four proposed positions have natural synergies with other departments within and outside CAES. Footnote 10 provides a partial list of the wide range of departmental affiliations of researchers with whom ARE faculty currently collaborate. The potential for synergies is not fully described by departmental affiliations. For example, ARE's development economics specialists belong to the International Agricultural Development (IAD) group, and a new hire in development economics would mostly contribute to IAD as well. A hire in environmental and resource economics might collaborate with researchers affiliated with the Institute of Transportation Studies, Civil and Environmental Engineering, and Environmental Studies and Policy. Hires for all four proposed positions might be affiliated with the Agricultural Sustainability Institute.

Another source of synergies is the undergraduate program. As discussed earlier, many other majors require ARE undergraduate courses, or include them as part of a specialization within the major. The proposed positions will enhance ARE's ability to serve these students as well as its own majors.

## **CE position priorities**

#### *Current CE Programs and Staffing.*

At present, ARE has four full-time CE specialists (4.0 FTE) and one affiliated Center director with a half-time, soft-money appointment in the department. The disciplinary areas include farm management, financial and risk management, and marketing. Table A-4 summarizes program areas and specific topics addressed by CE faculty in ARE and the affiliated Center director.

#### *Positions Needed to Fill Critical Statewide Needs.*

The last time a CE position was recruited and filled in ARE was in 1990. The demand for economic extension, and the composition of the ARE faculty has changed since then. As a result, there is a poor match between our CE and Senate faculty in terms of

disciplinary assignments. Given the expansion of disciplinary responsibilities of our department and the unfilled retirements of two Specialists in CE, several “holes in coverage” currently exist in our department’s CE programs.

Within the broad area of natural resource economics, more specific priorities include: water economics, energy economics, and environmental sustainability. After resource economics, three additional areas emerged with similar levels of priority: Agricultural Policy, Production Economics oriented to livestock, and Production and Processing Economics oriented to specialty crops.

*How Might These Needs be Filled?* A possible solution is to trade CE FTE between current specialists and Senate faculty within ARE. However, 10 years ago, a college-wide committee considered issues involved in CE-I&R-AES split appointments and found that a CE appointment of less than 0.3 FTE would not likely be effective. Therefore, the only viable solution to filling critical statewide needs for CE programs in agricultural economics is to seek the replacement of the two specialists who have retired.

### **Startup funds and diversity targets.**

Recent hires have been allocated \$25,000 in startup funds (half from ARE and half from CAES), one month of summary salary for two years (funded by CAES), and six quarters of support for a graduate research assistant (funded by ARE). In order to remain competitive in the market for new economics Ph.D.s, we are requesting \$20,000 in startup funds and one month of summer salary for three years from CAES. ARE will supplement these funds with \$20,000 in startup funds and support for a graduate research assistant for six academic quarters and two summers.

Adjusting our diversity targets from the October 31, 2003 Academic Utilization Analysis to reflect recent hires, our diversity goals are 1 African American, 2 Asian Americans, 1 Hispanic and three females.

### **Summary**

The ARE Department has a strong record in research, outreach, and graduate and undergraduate teaching. However, we are facing both short run and long-run challenges. In the short run, we urgently need to recruit two additional FTE to bring us up to the minimum target. In addition, we have the ongoing problem of obtaining sufficient funding to maintain the range of lecturers and courses there have been a characteristic of our undergraduate major. In addition to the target FTE, we require an additional two FTE to expand our faculty core areas into new and evolving areas. Two additional CE FTE would enable us to address a growing clientele for economic extension in the area of natural resources and water. In the longer run, but within the purview of this academic plan, we will have to replace at least six faculty and several CE specialists who are likely to retire in the next six years.

## Appendix

Table A-1. Current AES Projects

Project Title
Immigration and the Changing Face of Rural America
Comparative Advantage and the Management of Exotic Animal Disease in International Meat Markets
Economic Performance in the Food System: Costs, Productivity, Efficiency and Competitiveness
Sustainability, Green Accounting, and Natural Resource Management: With Application to California Agricultural Land
Environmental Regulation, Market Structure, and Consumer Preferences: Policy Implications for Agriculture, Industry, and Trade
Forward Premiums and Price Volatility in Commodity Markets
Economic Analysis of the World Wine and Grape Industry
A Time Series Approach to Analyzing Market and Food Demand Systems
Improving Resource Management with Bioeconomic Modeling
The Structure and Performance of Rural Financial Markets and the Welfare of the Rural Poor: A Comparative Study in Peru and Mexico
Economic and Environmental Impacts of the Adoption of Genetically Modified Foods
The Spatial and Seasonal Pricing Effects of Energy Transmission
The Benefits and Costs of Natural Resources Policies Affecting Public and Private Lands
Market Power, Information and Contracting in Agriculture: Impacts on Performance and Distribution
Increasing Value-Added Profits for Small- and Medium-Scale Growers: The Institutional Market
Marketing and Management for a Changing Agrifood Chain: Educating Tomorrow's Leaders Today

**Table A-2. Examples of ARE Research Regarding ANR Core Issues**

<b>ANR Core Issue</b>	<b>ARE Research and Outreach Projects</b>
<b>High Priority</b>	
Invasive species	Management strategies for starthistle in California Management institutions for the olive fruit fly in California Effect of invasive species management and eradication policies in the presence of commodity programs
Pest management	Net benefits of public sector investments in integrated pest management in California Determinants of dormant season organophosphate use in California almonds Economic viability of methyl bromide alternatives for pest control in California strawberries
Food safety	Traceability, legal liability and incentives for food safety
Sustainability and viability of agriculture	Farm management styles and the adoption of biologically integrated farming practices International agricultural trade Effects of dairy policies on returns to producers Increased pollination costs and changes in honeybee disease and pollination regulations Economic and environmental implications of biofuels
Water quality	Economic viability of best management practices for reducing dormant season pesticide runoff in California Estimation of agricultural pollution abatement costs Citizens' willingness to pay for water quality improvements in California
<b>Medium Priority</b>	
Biosecurity	Foot and mouth disease and trade policy Trade policies and institutions for addressing invasive species
Organic production	Organic produce handlers' relationships with federal marketing orders. Consumer preferences and willingness to pay price premia for organic produce
Air quality	Effectiveness of California smog check program design Economic impact of state regulations to reduce volatile organic compound emissions from pesticides
Land use	Residential development patterns and the recreational and amenity benefits provided by open space
Sustainable use of natural resources	Fisheries management: spatial-dynamic approaches Economic growth and natural resource extraction Economic development and environmental quality
Water supply and allocation	New policy approaches for the Bay-Delta Design of stakeholder negotiations regarding water allocation

**Table A-3. Summary of ARE Student Credit Hours: 2006-2007**

<b>Course Type</b>	<b>SCH</b>
All undergraduate courses	21,264
Lower division courses	1,976
Upper division courses	19,288
All graduate courses	2,510
Scheduled graduate courses	1,172
299 and 299D	1,338
<b>Total</b>	<b>23,774</b>

**Table A-4. Current CE Program Areas**

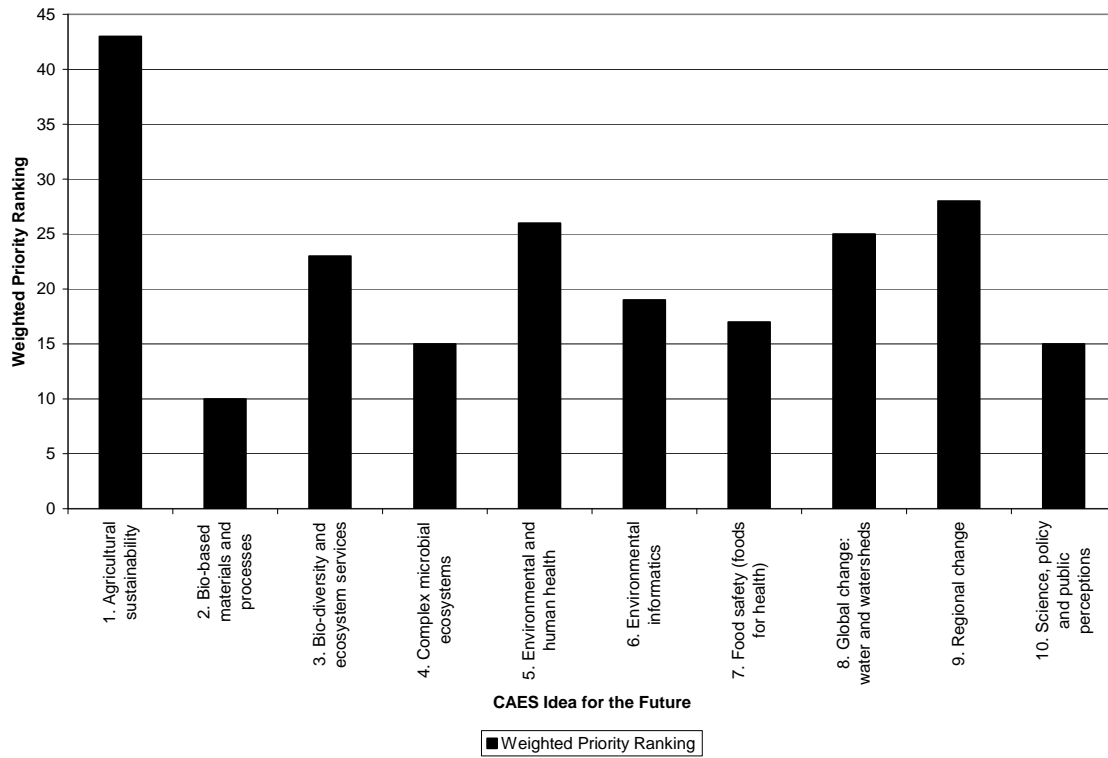
<b>CE Program Area</b>	<b>Specific Topics</b>
Sustainable and organic agriculture	feasibility and performance of alternative farming systems, including economic feasibility of alternative farming practices, size and growth of organic production in California, factors influencing the adoption of alternative farming systems
Economic performance and resource use for California commodities	Profitability and associated resource use for major commodities and niche market commodities across farming system, geographic region, and time; cost studies series
Financial and Risk Management	Financial management; decision-making under risk, risk management methods and tools (e.g. futures markets, crop insurance); effects of technology, globalization of commodity markets, and rising input costs on producers' cropping decisions
Marketing – dairy	economics of dairy production, marketing, consumption, and policy (domestic and international)
Biotechnology	adoption and diffusion of new biotechnologies; intellectual property rights issues in plant genetic resources (incl. with WTO mechanisms)
Marketing – Fresh Produce	fresh produce marketing, food distribution, and international trade in fruits and vegetables
Marketing – Collaborative Structures	use of cooperatives and other business structures to enhance returns to producers; economic implications of vertical linkages between growers and processors, grocers, food service operations and other downstream entities



**Table A-5. Senate Faculty Hiring Priorities**

Priority 1	Priority 2	Priority 3	Priority 4
Development economist (preferably senior)	Environmental valuation economist- junior level	Resources and Agriculture economist	
Agricultural economics, broadly defined	Agricultural economics, use of natural resources (water)	Development economics	Agricultural policy and trade
Senior development economist to replace Rozelle	Environmental economics	Agriculture, health and environment	Environment and development
Development economics	Water economics	Ag economist with focus on China	
Agribusiness	Managerial economics		
International Development Economics	Environmental Economics	Microeconometrics	Agri-environmental economics
Development	Ag marketing	Agricultural finance	
Michael Carter	Finance Person	Econometrics	Agricultural Economics
Environmental/Natural Resource Economics	Economic Development/Environment	Ecosystem services/modeling	Environmental Policy (empirical)
Development	Environmental economics	Water & resource economics	Econometrics panel methods
Development - marketing institutions and trade	agricultural finance	Environmental economics	panel-style econometrics
Interface of agriculture and the environment	Development economics (with sub-emphasis on agriculture or environment -- not labor or finance)	Water economics	Interface of agriculture and the environment (emphasis on climate change or energy and agriculture)
Resource and environmental economics	Regulation (including environmental, agricultural , and development) and industrial organization	Global climate change policy	Regulation and economic development
Agriculture in economic development	Agricultural environmental economics	Environmental economics	Agriculture in economic development
Econometrics	Environmental Economics	Agricultural Finance	Agricultural Production
Development economics	Environmental valuation economics	Agriculture- environmental economics-- water	

**Figure A-1. Links between Departmental Priority Areas (Gaps and Opportunities) and CAES Ideas for the Future: Survey Results\***



\*Figure based on top three priorities of respondents. Top priority assigned a weighting of 3, second priority assigned a weighting of 2, third priority assigned a weighting of 1.