

**Proposal to David and Lucile Packard Foundation**

**Anchor Grant to Advance Nitrogen Science and to  
Support Development of a Center of Excellence for Agriculture and the Environment**

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(Developed in collaboration with University of California faculty and staff colleagues)

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## SUMMARY AND INTRODUCTION

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The Agricultural Sustainability Institute (ASI), established in 2006, provides a hub that links initiatives and education in sustainable agriculture and food systems across the academic departments of the College of Agricultural and Environmental Sciences at the University of California (UC) Davis and with other partners across the State of California. ASI is seeking a \$1,500,000 grant from the David and Lucile Packard Foundation to support a 24-month project focused on greenhouse gas (GHG) emissions and nitrogen (N) pollution in California agriculture. This funding will allow us to initiate important activities in agroecosystem assessment, taking N as a starting point; to foster interdisciplinary research and thereby support career development of junior faculty and young professionals who will be among the next generation of leaders in these areas of science; and to accelerate our efforts in strategic communications with the farm community, policy makers, extension advisors, and the public.

The Packard Foundation's new Agriculture Strategic Plan has aggressive goals and highlights priority areas for action. Given these directions, we see significant opportunities for UC research, teaching, and outreach to contribute significantly to **the Foundation's goal: to achieve a 20 percent reduction by 2020 in projected net greenhouse gas emissions and nitrogen pollution caused by agriculture in the United States**. Further, the Foundation's initiative comes at a time when ASI already has created important institutional building blocks (e.g., operational principles, extensive networks of stakeholders, and establishment of our External Advisory Board) and is prepared to launch new programmatic activities under three themes: agriculture, resources and the environment; food and society; and education and leadership. The Packard Foundation's priorities for climate change and N are excellent starting points for our thematic area in agriculture, resources and the environment. This focus is important; we cannot do everything at once and need to start with issues that rapidly will demonstrate the feasibility and importance of sustainability science approaches to agriculture and the food system.

Support from the Packard Foundation can accelerate the development of ASI as a global center of excellence for application of sustainability science to challenges to food system sustainability, such as climate change, and to seizing opportunities for a transition to a more sustainable agriculture, including greater efficiency in N use. We believe that being a center of excellence means being recognized as the place where farmers and ranchers, extensionists, NGO activists, policymakers, the media, other academics, and the public turn to first for information; it means having a cadre of top scientists doing cutting edge work that responds to users' needs, advances knowledge, and produces scientific innovations that are of direct value in California, across the US, and around the world; and it means being the first choice for scholars and students as a place for research and study.

Full realization of these aspirations for ASI will require a decade or more. This proposal elaborates objectives, activities, and anticipated outcomes for an initial two-year project that will set the stage for a mutually-beneficial partnership between the Foundation and ASI. We look forward to working with the Foundation in a long-term partnership in pursuit of our complementary goals.

## BACKGROUND AND PROBLEM DEFINITION

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Nitrogen is the most crucial mineral element for the global food supply (Galloway, 2005). The tradeoffs involved in agricultural N use represent many of the sustainability issues related to the intensification of agriculture and are intimately linked with some of the greatest challenges we face in the 21<sup>st</sup> century: global climate change, depletion of fossil fuels, and mounting pressure on land, air, and water resources from growing human population and rising incomes (Vitousek et al., 1997; Driscoll et al., 2003). Globally, artificial sources of newly-fixed N now exceed natural sources (60:40), resulting in an N cascade that can have serious impacts on our environment. California, with the largest and most diverse agriculture in the U.S., epitomizes the successes and dilemmas of ever-higher-productivity agriculture. The state earns over \$30 billion annually from agriculture, which accounts for over 13 percent of national agricultural production with less than 4 percent of the nation's farmland. Whether it originates from cropping or livestock, much of the N in California agriculture "leaks" and creates environmental impacts that are only partially documented: eutrophication and anaerobic "dead zones" in certain rivers; pollution of estuaries and coastal areas; high fluxes of nitrous oxide (N<sub>2</sub>O), a potent greenhouse gas; and nitrate contamination of groundwater, which, when used as drinking water, increases health risks (Fenn et al., 2003a, 2003b; Sobota et al., 2008; Burgin and Hamilton, 2007).

Although the beneficial roles of N in agricultural production are well-established, the causes, location, extent, and severity of the associated environmental problems are only partially documented (Driscoll et al., 2003; Puckett et al., 2008). Moreover, these environmental problems are not of equal concern and the feasibility of eliminating all environmental impacts is doubtful. Practical research needs to be done to set priorities for action (where, when, by whom, and how intensively), as well as identify cost-effective means to act (Sobota et al., 2008; Ahearn et al., 2005). But there also are a host of practical reasons why we have not witnessed "integrated nutrient management" moving into the mainstream in the same way that "integrated pest management" now is becoming conventional in California. In contrast to pesticides, for N there is little awareness of the problem by growers or the public, there are few financially-viable or organizationally-feasible options available off-the-shelf, and at least until recently, growers had little incentive to increase N use efficiency because of low costs of energy, inorganic N fertilizer, and irrigation water. In light of these realities, experts on the UC Davis campus meeting early in 2007 concluded that there would be little payoff to additional technical research on "best practices" without integrating those efforts with research on the complex policies and institutional frameworks that shape N use and management incentives.

Of course, the study of agriculture and the environment, by definition, involves complexity. To successfully address the issue of nitrogen pollution, a program must be interdisciplinary, integrating environmental, economic, social, political, and other dimensions of agricultural and food systems. It also must move beyond creation of knowledge to embrace the challenges of spanning boundaries between science, the users of science (including farmers, NGO activists and policymakers), and our broader society. We see an increasing number of interdisciplinary centers aimed at addressing these challenges in other sectors – at Arizona State, Colorado State, Harvard, Michigan, and Stanford – to name a few. We aspire to build upon these and other experiences to develop a center of excellence for sustainability science focused on agriculture and the food system that pursues a user-inspired research agenda; an organization that is known as a knowledge entrepreneur and a

model for the next generation of sustainability science initiatives; and, one that is committed to community engagement and science in the public interest.

The premise underlying this proposal is that prospects for real impact depend on the integration of activities across multiple stakeholders, spatial and temporal scales, and scientific disciplines. This requires an investment in creating permanent capacity to link science with action on N pollution and other agriculture-environment challenges. While this effort can benefit from being built on the land grant heritage of the University of California, rather than starting from scratch, this anchor grant also offers the opportunity to address some fundamental weaknesses in the land grant system (see Appendix 1 for synopsis of relevant studies) and thereby could provide a positive model for institutional change.

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### **OBJECTIVES OF THE PROPOSED PROJECT**

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The \$1.5 million anchor grant requested from the Packard Foundation is designed to leverage the knowledge, people, facilities, networks and other assets of the University of California (see Appendix 6 and 8 for further details) to pursue **four complementary objectives**:

- 1) **to enhance the scientific foundations for implementation of the Packard Foundation’s newly-launched Agriculture Strategic Plan** and, more generally, to inform priorities for research and action on GHG emissions and N pollution from agriculture; and
- 2) **to develop a new generation of leaders** in N research and action – through support for young faculty and opportunities for Packard Fellows – who understand sustainability science and can implement these approaches; and
- 3) **to strengthen the institutional capacity of ASI** to become a leader in sustainability science for agriculture in California, in the first instance, and nationally and internationally in the years to come; and
- 4) **to explore possibilities and modalities for a long-term strategic partnership between the Packard Foundation and ASI**, including active participation from other UC programs.

To achieve these objectives, we propose **three main areas of activity**, described in greater detail in the next section. These activities have significant overlap and support one another, both in design and implementation as well as their contributions to outcomes in the short term and over the years to come.

- 1) Complete a **pilot California nitrogen assessment** that will, among other things, provide timely, science-based syntheses to support the Packard Foundation’s new strategy and that also will shape priority setting for ASI’s thematic programming concerning agriculture, resources and the environment.
- 2) Foster **interdisciplinary research teams**, in which junior faculty affiliated with ASI play leading roles, to investigate GHG emissions and the science and management of N in agriculture, and which also provide opportunities for post-graduate “Packard Fellows” to gain sustainability science experience at a formative stage in their careers.
- 3) Enhance **ASI strategic communications capacities** to engage with the farm community, extensionists, policy makers and the public; to translate scientific information into forms best suited to the needs of these groups; and to deliver that information in a timely fashion.

While the activities proposed in this initial anchor grant center on California agriculture, we envision the outcomes influencing events and learning on a larger scale and building interdisciplinary networks and collaborations that will have far-reaching impacts nationally and internationally. In this initial two-year period, we seek to develop credibility, usefulness, and legitimacy of our program through place-based activities at various scales within California. Although some national and international activities likely will develop in this phase (e.g., nationally through the WK Kellogg Foundation-funded National Symposium on Food Systems and Sustainability and internationally through possible collaborations with the International Nitrogen Initiative and the continuing “subglobal assessment” activities of the Millennium Ecosystem Assessment), the bulk of national and international impacts would come through expansion of networks and deepening of collaborations in the years ahead (beyond the timeframe of this proposal).

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#### **GRANT TERM**

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The activities proposed in this grant cover a 24 month period.

- Estimated project start date: January 15, 2009
- Estimated project end date: January 15, 2011

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#### **PROJECT ACTIVITIES AND ANTICIPATED OUTCOMES**

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##### **ACTIVITY 1: CALIFORNIA NITROGEN ASSESSMENT**

Several forms of N are mobile in soil, water, and atmosphere, and there is still considerable uncertainty about their aggregate flows, ultimate impacts in the environment and best management practices (Kulkarni et al., 2008). As the Foundation has identified in the Agriculture Strategic Plan it is a high priority to address N pollution as well as increase our knowledge regarding N pollution and regional assessments of N.

We propose to conduct a pilot N assessment for California and make the results and data easily available to the farm community, extensionists, policy makers and the public. The assessment will draw upon several datasets including those developed through the Kearney Foundation of Soil Science. The Kearney Foundation is a UC-wide, endowment-funded program focused on soil science research. Both the current director of the Kearney Foundation, Randy Dahlgren, and immediate past director, Kate Scow, are UC Davis faculty members and ASI collaborators. While the work of the assessment would be potentially funded by the Packard Foundation, funding for related meetings, workshops and events will be supplemented by existing ASI budgets for outreach programming.

This proposed pilot assessment of N flows in California agriculture is a strategic starting point for a newly-launched, long-term program to conduct an integrated assessment of California’s agroecosystems, including development of a comprehensive set of indicators that are both scientifically validated as well as meaningful to the agricultural community, policymakers, and the public. The broader effort, of which this proposed work is an important part, is the flagship sustainability science project of ASI. This comprehensive set of agricultural sustainability indicators will be used by diverse stakeholders and will reveal where there has been progress toward a sustainability transition; whether there are tradeoffs across sustainability objectives; which

strategies and responses can be most effective in addressing problems and balancing tradeoffs; and where knowledge gaps matter most. Creation of a comprehensive set of sustainability indicators also will create the capacity to anticipate emerging challenges and opportunities.

Building on our earlier concept note sketching a ten-year strategy to link N science and action ([http://asi.ucdavis.edu/Research/LOI\\_Packard\\_UC%20Davis\\_Nitrogen.pdf](http://asi.ucdavis.edu/Research/LOI_Packard_UC%20Davis_Nitrogen.pdf)), the pilot assessment of N flows in California also would be the starting point for an ASI programmatic focus on nitrogen, food and agriculture, and the environment. (Please see Appendix 2 for a schematic description of how N assessment activities would feed into the ten-year program of work.)

Although an initial step, the work proposed for the next 24 months will help advance the Packard Foundation's strategy for agriculture and the environment through: (1) scientific assessment and synthesis of results on N flows in California agriculture, (2) feeding assessment results into strategic priority setting for further research and practical action, and (3) dissemination of this information in useful forms. This project will help build ASI's capacity in agroecosystem assessment and the results will complement other proposed projects and shape the scientific agenda for ASI going forward. This project also will provide a collaborative focus to engage faculty and students across UC Davis and from partner institutions.

#### **Methods:**

**1) Statewide assessment, inventory, and syntheses** – Assessment of available data and development of suitable indicators of: forces driving change, conditions and trends in agricultural land use, land cover change, and N applications and fluxes. The focus will be on agriculture, but also will take a comprehensive approach to these flows. The methodologies of integrated ecosystem assessment now are well established and can be applied at multiple sites and scales, while encompassing a wide range of stakeholders with different (even conflicting) interests ([www.millenniumassessment.org](http://www.millenniumassessment.org); MA 2003; MA 2005; Reid et al. 2006). The process of assessing existing science from the perspective of users' needs can itself produce important research products (e.g., Wood et al. 2000). The statewide assessment will begin with extensive consultations with stakeholders and particular user groups to identify priorities for assessment questions. Those consultations are fundamental to both the relevance and the legitimacy of the process and play a key role in providing necessary structure and focus. However, perceptions of these assessment priorities and opportunities for action undoubtedly are being shaped by implementation of California's Global Warming Solutions Act of 2006 (AB 32), which already has revealed how limited the knowledge base is for early action in the agricultural sector of the State. Analysis of driving forces (including biophysical and technological as well as social, economic, and political drivers) also can be helpful in identifying priorities for research and policy analyses that help to point toward issues that will be prominent in the future (Geist and Lambin 2002). Existing results for California can be used in this process (e.g., Johnston and McCalla 2004). Overall, this activity is the foundation for a process intended to (a) synthesize available data to create scientifically-valid baselines for nitrogen flows in California, with an emphasis on agriculture and including both crop and livestock activities (see number two and three below) ; (b) analyze those baselines to identify key areas of vulnerability and to prioritize policies and practices that can have a significant impact on GHG emissions from California agriculture (*inter alia* to support implementation of AB 32; see number four below); and (c)

identify relevant data gaps and methodological deficiencies that impair action to mitigate climate change.

- 2) Develop an N budget for California** - Develop a preliminary N budget for the state of California (identifying major pools and fluxes of N). This investigation will gather existing data sets and published information to calculate N inputs (e.g., inorganic fertilizer, manure, sewage, atmospheric deposition, natural N-fixation and agricultural N-fixation) and exports (e.g., river export, gaseous losses, discharge from septic and sewage treatment plants, net food exports) at the county and watershed scales (see Sobota et al., 2008 as a preliminary step). Based on these data, we will calculate the fractional loss of applied N for major watersheds in California.
- 3) Develop N cascade models and feedbacks with human systems** - Conceptual models representing current understanding of N cycling processes in California ecosystems will be developed and displayed on an interactive web site. We will use the “nitrogen cascade” concept to illustrate human interactions with the N cycle and their effects on biogeochemical cycling of N, including feedbacks with carbon and other nutrients, within and between the atmosphere, hydrosphere, biosphere and geosphere. Primary and secondary drivers will be identified along with the level of importance to understand and predict each major process within the N cycle. Metrics and indicators will be developed to analyze interactions between human systems and ecosystems.
- 4) Perform policy analysis of alternative management practices and identify interventions for N reduction** - Develop and assess strategies (including management practices and policy instruments) for excess N removal to decrease the impacts of river N exports, N leaching to groundwater, and gaseous N losses (especially nitrous oxide – a greenhouse gas). As conceptual models, we will utilize approaches, such as the “Wedge Model” (Pacala and Socolow, 2004) for targeting greenhouse gas reductions, and the total maximum daily loads (TMDL) approach for non-point source water pollution (NRC, 2001), to meet various future reduction goals. These analyses will involve a multidisciplinary approach that (i) identifies potential N reduction strategies, (ii) assesses the N reduction capability of various strategies, (iii) provides a cost-effectiveness analysis for the most promising strategies, (iv) assesses the incentives created for farmers, ranchers, and other key actors, (v) identifies the implementation potential within each airshed/watershed, (vi) identifies cost effective policy instruments that would induce adoption of strategies, and (vii) assesses the social acceptance and potential for adoption.
- 5) Communication of assessment results** - Throughout this project, we will convene “California Nitrogen” conferences aimed at gathering insights from stakeholders to help design analysis and strategies. These conferences will also disseminate preliminary project results and gather responses from (i) the scientific community and (ii) important stakeholders – e.g., farmers, ranchers, extensionists, forestry community, environmental and community activists, agribusiness (including the fertilizer industry), and the regulatory community (e.g., Air Resources Board, State Water Resources Control Board, Department of Water Resources, State Lands Commission).

**Anticipated Deliverables:**

- Series of maps identifying N inputs, N outputs, and fractional N losses at the county and watershed scales.
- Map of terrestrially stored (plants and soil) N generated as a function of biome for the state to assist in modeling efforts to predict the fate of N under various global climate change scenarios for California.
- Interactive Web site and tools - series of Web interactive components representing several important environmental pathways of N in the environment and including a narrative for each diagrammed process (see example: [http://sjrdotmdl.org/concept\\_model/index.htm](http://sjrdotmdl.org/concept_model/index.htm)).
- Development of interactive “tool” for analyzing trade-offs of various management practices for reduction of nitrogen pollution.
- Publications.
- Policy briefings in Sacramento for regulators, policy makers, environmental organizations, the farm community and the press.
- Conferences and/or other events to exchange information among researchers, farmers and ranchers, extensionists, community activists, agribusiness, and other stakeholders.
- Doctoral seminar on ‘integrated agricultural ecosystem assessment’ with a focus on GHGs and N. Selected students will receive funding and acquire experience through participation in the pilot assessment project.

**Anticipated Short term Outcomes:**

- Indicator sets comprising credible, useful knowledge on drivers and conditions and trends in N application and flows associated with California agriculture, including sensitivity analyses of these indicators of conditions and trends in drivers and fluxes; coarse statewide maps; and, where appropriate, finer-grain regional maps showing spatial distribution of these conditions and trends (appropriate mapping scales will be identified as part of the assessment).
- Increase our understanding of the primary factors regulating N transformations and clearly identify knowledge gaps that can be used to focus critical research needs.
- Identify knowledge gaps in the science of best-management practices for N reduction and provide the economic, political and social analyses for prioritizing opportunities within an overall strategy for reduction of N pollution within California.
- Identify specific watersheds where best management practices for N reduction strategies could have the largest impact on aggregate fluxes for the state.
- Identify priorities for further policy research.
- Establish a strong partnership with the Kearney Foundation and, potentially, contribute to identifying its next mission starting in 2011. Every five years the Kearney Foundation chooses a new focus for their work. Past missions have included “Soil Carbon and California’s Terrestrial Ecosystems” and “Understanding and Managing Soil-Ecosystem Functions across Spatial and Temporal Scales” and we imagine that the next mission could build upon the results of this assessment.
- Create career development opportunities for future leaders in N science by establishing a fellows program for post graduate researchers who will work with university colleagues and stakeholders to conduct the assessment. These “Packard Fellows” will develop basic skills essential to working

in sustainability science, including experience working in multidisciplinary teams engaged in assessment activities to meet users' needs.

**Anticipated Long term Outcomes:**

- Strengthen the scientific network around N science.
- Improve our understanding of N use in California agriculture through identification of users' needs and priority areas for intervention.
- Frame the research agenda for ASI moving forward.
- Contribute to implementation of the Packard Foundation strategy for agriculture and the environment.

**ACTIVITY 2: INTERDISCIPLINARY RESEARCH TEAMS**

Underpinning much of the Packard Agriculture Strategic Plan is recognition of a need not only for N science, but also of the need for increased capacity for N science. To be successful, we need more science-based information, to be sure, but we also need to nurture the next generation of scientists working on the issues of GHG mitigation, N pollution reduction, and related policy and management questions in agriculture. UC Davis already has a renowned team of academics and, through UC Cooperative Extension (UCCE), a strong link to extension and to end users. In 2005, the UC Davis provost made a powerful statement of support when she allocated eight new faculty positions to ASI, then under development. In a time of tight budgets, this dedication of new positions to agricultural sustainability is noteworthy. Now, three years later, eight of nine positions (an additional position was added since 2005) have been filled. Six of these are with junior level faculty (assistant professors, of whom one has recently been promoted to associate professor with tenure). In addition to these faculty members formally affiliated with ASI through the provost's initiative, we believe that many more could be brought together from fields as diverse as engineering, economics and plant science through a sustainability science program committed to agricultural sustainability. And, as these faculty members are building their research programs, they are necessarily making decisions about the direction of their work based on funding. There is a real opportunity to leverage the campus investment in salary, workspace and start up funds by providing flexible awards and teambuilding activities to encourage creative, user-driven work in the areas of GHG emissions and N pollution.

**Methods:**

**1) Junior faculty award program** - We envision a grant program that will award seven outstanding assistant professors up to \$50,000 (over 18 months) of flexible funding. Primary criteria for awards will be potential for contribution to N science and evidence of commitment to ASI operational principles (as detailed in Appendix 3), which are designed to embody key elements of sustainability science (credibility, usefulness, and legitimacy). Although the N assessment is designed to inform priorities for research and action going ahead, the earlier concept note for a ten-year strategy did identify the following likely areas of follow-on research and it is anticipated that junior faculty awards will cluster in these areas (see Appendix 4 for brief descriptions of these activities):

- **Participatory scenarios exercises** focused on key watersheds and extending the pilot assessment of drivers, conditions, trends, and policy and management responses.
- **N monitoring instrumentation and networks** for key watersheds.

- Action research on **alternative organizational models and incentive mechanisms** for N management in key watersheds.
- **Integrated assessment of technological alternatives** at the farm and ranch scale.

However, within these broad substantive areas, a flexible funding approach will allow junior faculty to play leading roles in determining a forward-looking agenda for N science, not just for their individual research programs but also in interdisciplinary collaboration. This active experience in agenda setting (rather than simply responding to calls for proposals) fits a key purpose of the activity: nurturing a new generation of academic leaders in N science. A design workshop will be held to obtain feedback from junior and senior faculty (who may be asked to act as mentors) on program priorities, development and implementation. An informal poll of junior faculty identified the following potential topics of interest to the goals of the Agriculture Strategic Plan – life cycle GHG emissions models, sustainability assessments of local food systems in relation to GHG emissions, creating mixed teams of growers and scientists for participatory monitoring, and creating an atlas of agricultural sustainability indicators in California using Web-based spatial and graphic tools.

- 2) **Interdisciplinary team development and mentoring** - To further support interdisciplinary team development, we must create opportunities for information sharing and collaboration among faculty in different disciplines as well as between researchers, students, and external partners. Junior faculty members have expressed interest in participating in a forum for sharing knowledge, discussing common interests and brainstorming innovative ideas and possible interdisciplinary projects. Additionally, we plan to hold “writeshops” or retreats for junior faculty and faculty mentors to carve out time for writing, provide mutual support and inspiration, promote interaction across disciplines and academic generations and to take science to the next level. These events will provide a forum to look for potential collaborative opportunities, establish interdisciplinary groups and share new research tools and datasets. This program also will allow UC Davis to explore incentive models to encourage faculty to engage in user-driven, team-based research. While faculty frequently engage in this type of work based on their natural curiosity, merits and promotions within the university system do not adequately value a team-based approach. Philanthropic funding can provide the added incentive through recognition of exemplary efforts.

**Anticipated Deliverables:**

- Develop award program, based on feedback from junior and senior faculty. Award funding to 7 junior faculty.
- Create seminar (or webinar) series as a forum for sharing information among UC Davis and national/international scholars. Note: information from the N assessment could be a focus of these sessions.
- Retreats, professional mentoring, and writing workshops to promote collaboration and sharing of new research and datasets.

**Anticipated Short term Outcomes:**

- Increase focus on agricultural N pollution and GHG emissions by the academic and cooperative extension community as evidenced by papers published (or in process), and graduate students recruited.
- Establish team building and collaborations among scientists from different disciplines at UC Davis, between on-campus faculty and CE Specialists and Farm Advisors, and with end users of the information developed.

**Anticipated Long term Outcomes:**

- Increase in research and publications - This will help achieve the Packard Foundation's stated goal of tripling the scientific literature exploring the costs of N pollution and increased collaboration, information sharing and research output derived from development of a collaboration with the International Nitrogen Initiative envisioned for a later phase.
- Investment in interdisciplinary team development will help faculty develop more innovative, interdisciplinary and team-based proposals for other funding agencies leading to increased funding from outside agencies such as the National Science Foundation.

**ACTIVITY 3: STRATEGIC COMMUNICATIONS**

Funding from Packard Foundation will leverage the resources of the University of California to create a recognized hub of knowledge on GHG emissions and N pollution from agriculture, including biofuels. ASI is well-positioned to serve this role. Already ASI is connected with existing state-wide networks of communication with farmers, extensionists, policy makers, media and the public through the Sustainable Agriculture Research and Education Program (SAREP), a UC statewide program, and UC Cooperative Extension (UCCE). Davis is also a short drive from the State Capitol and already serves as a resource to legislators on agricultural issues. The Agricultural Issues Center (AIC), another UC statewide program, has an excellent track record in spanning the science – policy boundary and is a leading partner in this proposal.

Given our assets, it would seem that UC Davis would already have a well developed communication strategy and a team of individuals working to push knowledge generated on campus out to the community. In reality, the CE Specialists and faculty are stretched thin and are typically reactive, rather than proactive, in communications. The professional communications team on campus is understaffed with one news media specialist serving all of agricultural, nutritional and veterinary science for the campus. The ASI currently has one part-time communications professional, which is a great advantage over other programs, but nevertheless is not an adequate staffing level to realize the potential for activities in this area. We see real opportunities, with philanthropic support, to strengthen the existing communication framework. Currently the ASI is working with a consultant to develop a strategic communication plan which will be presented to the ASI External Advisory Board during the December 2008 meeting. The results of that consultative process may alter our plans but we envision a program that could include the activities outlined below.

**Methods:**

- 1) **Targeted communication with media and policymakers** - An important part of the Packard Agriculture Strategic Plan is increased effectiveness in communication of findings to decision makers. We propose to hire junior professionals as interns to work directly with program staff

and faculty and cooperative extension specialists. Their primary role will be to translate scientific information and data about sustainable agriculture into formats usable by various audiences, including farmers and ranchers, extension advisors, policy makers, and the public. For example, developing press releases on topics of media interest such as effects of agriculture on water quality or the relationship between food miles and GHG emissions from agriculture or creating a seminar series for legislators modeled after the highly successful global warming series developed by the UC Davis Department of Land, Air and Water Resources for legislators and staffers. These interns will also develop Web site content and prepare articles for relevant magazines and other publications. In addition to transmitting information, the interns will be a resource for the farm community and other individuals seeking credible information about agricultural sustainability. Two members of the External Advisory Board (see Appendix 5) are communication professionals (Amparo Perez-Cook and Michael Pollan) and have offered to advise ASI on development of these communications fellowships. The Kellogg Foundation-funded National Symposium on Food Systems and Sustainability, to be organized annually by ASI, will provide additional opportunities to develop working relationships with journalists and policymakers from state and national arenas.

- 2) Engagement with stakeholders** - A collaborative process will be critical to the success of the work done by the ASI in agricultural sustainability broadly, and GHG emissions and N pollution more specifically. ASI has already established its External Advisory Board, representing a wide range of stakeholder groups, but enhancement of other channels of external and internal communication and accountability in priority setting are urgently needed. Without meaningful involvement by stakeholders, we will not be able to address questions or synthesize data in a way that is useful for users through the assessment project, nor will we be successful in our communication efforts or in our research agenda. To this end, we plan to establish communication channels that will permit a meaningful role for stakeholders in identifying sustainability challenges and helping to find practical solutions. This will include institutionalizing a Web-based tool to provide for large-scale stakeholder input, face-to-face consultations (e.g., focus groups), and events to bring together researchers and extension specialists with users (e.g., farmers, extensionists, NGOs, policymakers) and other stakeholders for listening sessions and discussions.
- 3) Web-based information hub** - Create a Web-based portal and tools such as an interactive online database of best practices for various users; a database of experts and other links to useful resources; an online archive of tips, tools, and other resources; self assessment and benchmarking tools; and animated simulations. This also will include development of the interactive Web-tool in collaboration with extension specialists and NGOs, illustrating and quantifying N cycling processes as part of the N assessment project. The longer-term objective is to place all ASI information (datasets, publications, presentations, etc.) in the global public domain in user-friendly formats that meet the needs of specific audiences. In the first phase, the focus will be to ensure the unique and globally significant Russell Ranch databases (emphasizing carbon and phosphorus as well as N), are available for use by researchers around the world.
- 4) Monitoring and Evaluation** – Create internal evaluation mechanisms for ASI to monitor progress toward goals and objectives broadly and with particular emphasis on activities

undertaken with funding received from the Packard Foundation. This will allow ASI and Packard Foundation to adapt the proposed activities as needed through the term of the grant and allow ASI to strategically set new priorities for action.

**Anticipated Deliverables:**

- On-line survey mechanism to solicit stakeholder input.
- Web-based portal and interactive tools. Publications and tools available on Web-portal and hardcopy.
- Searchable online databases (e.g., Russell Ranch research, publications, presentations).
- Targeted communications between scientific experts, the farm community, extensionists, the media and policy makers.
- Regional events to bring together researchers, local farmers, extension advisors and other stakeholders.

\*Note: We anticipate the information acquired through the N assessment will be a key focus of communication activities and deliverables.

**Anticipated Short term Outcomes:**

- Create career development opportunities for young professionals in communications to better link agricultural science with end users, policy makers, and media. These “Packard Fellows” will develop basic skills essential to working in science policy and strategic communications.
- Develop ASI’s capacities in both targeted and mass communications.
- Raise public awareness of N impacts and policy and management options.
- Strengthen connections with the farm community, extension specialists and advisors, the media and policymakers and amplify their attention to salient issues related to N pollution and N management.

**Anticipated Long term Outcomes:**

- Increase profile of ASI as a leading source of information on sustainability science regarding agriculture and the food system.
- Change the way the University of California connects with stakeholders. The interns will be working in novel ways bringing together scientific literature, the university, end users, policy makers and the public. This translational work connecting the university and its stakeholders has traditionally been done by UCCE Specialists and county-based Farm Advisors within the UC system (see Appendix 6). However, these advisors and specialists are now being asked to work differently. Private industry and NGOs have taken on some of the traditional work of advising farmers on techniques but the role of advisors and specialists is no less critical in spanning the boundary between science and agricultural practices in communities across California. The communications interns’ job descriptions (and those for the other Packard Fellows as well) could serve as models for the next generation of advisors and specialists with the potential to transform the public face of the University of California over the next decade as retirements lead to turnover in the system.

## **PROJECT MANAGEMENT AND ORGANIZATIONAL BACKGROUND**

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### **PROJECT MANAGEMENT**

The activities outlined in this proposal will be coordinated through ASI, but will emphasize collaborations across the UC, with UCCE in particular, and other strategic partners (e.g., Sustainable Conservation, Farm Bureau, Natural Resources Defense Council, and the Roots of Change Fund). As director of ASI and SAREP, Thomas P. Tomich will lead the project team, with co-leadership provided by senior faculty (Kate Scow, deputy director, ASI and past-director, Kearney Foundation; Dan Sumner, director, Agricultural Issues Center; Randy Dahlgren, director, Kearney Foundation). Junior faculty affiliated with ASI also will play a key role on the project team and other senior faculty will be asked to act both as mentors and as scientific collaborators for research activities. UCCE specialists also will be contributing to the project. The project team and key collaborators are listed in the Principal Staff section (this also includes CVs for the project’s principal investigators).

A preliminary timeline of key activities and milestones is provided in Appendix 7. The first step in the proposed project will be convening the project team and developing a more complete operational plan to guide the implementation of the project activities and ensure that they interact effectively.

Given our existing programs and facilities, the people already involved, and our established networks and partnerships (outlined in Appendix 8), the pre-eminence of the UC Davis departments and faculty members across the range of relevant agricultural, environmental, and social science disciplines, and our commitment to a user-driven, multi-stakeholder, multi-disciplinary approach, ASI offers an exceptional setting for building a community of scholars collaborating on big, emerging issues involving agriculture and the environment and creating a prototype for the next generation of “boundary-spanning” organizations in sustainability science (Cash et al 2003; Warner 2007). ASI also intersects with statewide programs, such as the Agricultural Issues Center, the Kearney Foundation for Soil Science, and UCCE; all of which have proven successes in creating change in agriculture (these UC programs are described briefly in Appendix 6).

### **ORGANIZATIONAL BACKGROUND**

UC Davis has a 100 year history of serving agriculture and addressing environmental concerns in California and around the world. But, as documented in Appendix 1, there also is wide recognition of the need for a fresh start that extends the land grant heritage in dimensions that embrace the principles of sustainability science. In 2006, the College of Agricultural and Environmental Sciences established ASI to focus research, teaching and outreach on the challenges facing agriculture in the coming century. Many of those challenges and opportunities are echoed in the Packard Agriculture Strategic Plan. The three activities included in this proposal each contribute to elements of Packard Foundation’s goals and help position ASI as a center for excellence, one of the five year outcomes within the Foundation’s U.S. Agriculture Strategy. More fundamentally, we also hope that funding from the Packard Foundation over two years will establish an ongoing partnership and allow UC Davis to explore the potential of new ways of working on major issues through team-based, user-driven research and strategic communication of results to positively affect policy at the state and national level and practitioners’ decision making at the local level.

ASI's **mission** is to ensure access to good food and to promote the vitality of agriculture today and for future generations through integrative research, education, communication and early action on big, emerging issues. Our long-term **vision** is a food and agricultural system that:

- is innovative, adaptive and profitable
- promotes prosperity and equity for people working in agriculture and the food system and their communities
- improves the environment and human health
- provides healthy food for everyone
- builds awareness and understanding of the food system
- engages public participation in policy decisions affecting food and agriculture

Since joining ASI as its first director in January 2007, Thomas P. Tomich has led efforts to build institutional capacity for sustainability science. Examples of progress include: development of a draft strategic plan, including ASI's mission, vision, and operational principles (Appendix 3), stakeholder consultations and the development of a stakeholder inventory, and formation of an External Advisory Committee (Appendix 5) that broadly represents California's diversity.

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## **BUDGET**

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The ASI is requesting \$1,500,000 in funding from the Packard Foundation to support the activities outlined above over a two-year period.

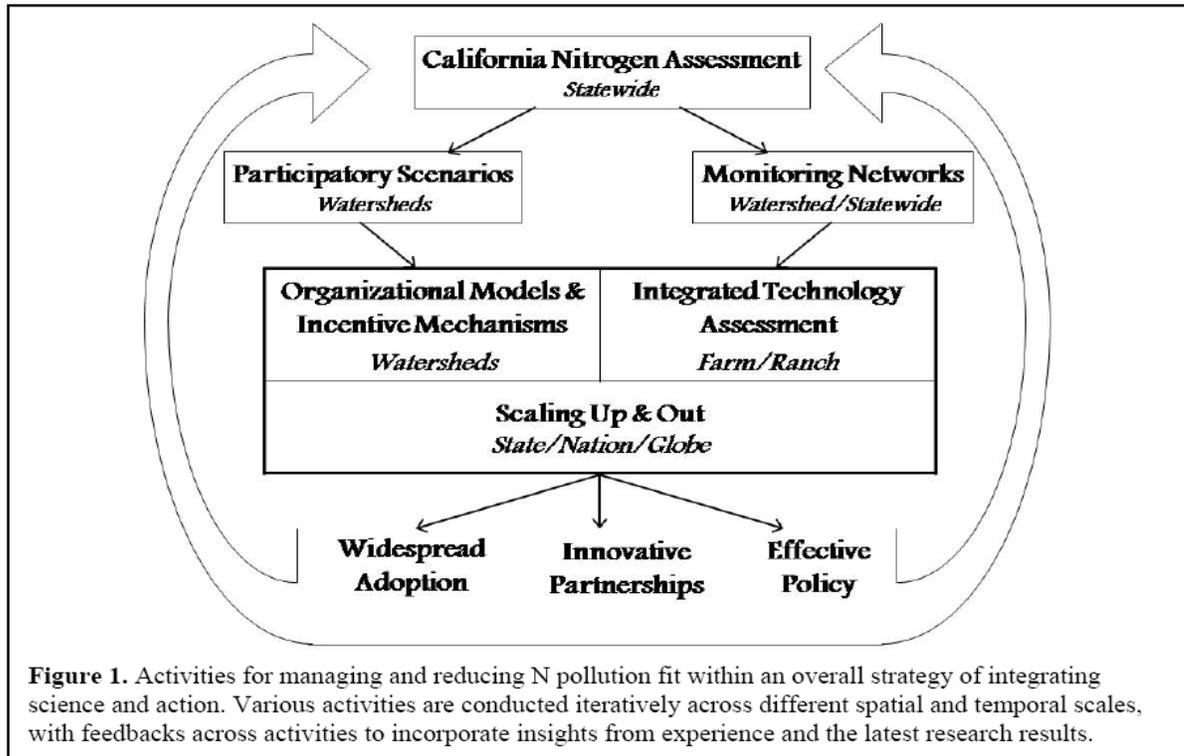
## **APPENDIX 1: THE NEED FOR A FRESH APPROACH**

A report by the National Research Council titled “Colleges of Agriculture at the Land Grant Universities: Public Service and Public Policy” identified a need to (1) develop and expand research programs and academic curricula to reflect a contemporary view of the agri-food systems, (2) remove historic barriers to encourage interdisciplinary research, teaching, and extension collaborations, and (3) engage a wide variety of stakeholders to assess their needs and develop priorities, targeted programs, and effective information delivery modes.

The Kellogg Commission on the Future of State and Land-Grant Universities came to similar conclusions. In particular, the third report in the series “Returning to Our Roots: The Engaged Institution” emphasized the importance of community engagement, outlining seven characteristics of an engaged institution – responsiveness, respect for partners, academic neutrality, accessibility, integration, coordination, and resource partnerships. Moreover, the report noted that lack of stable funding for engagement was a critical problem. The activities outlined in this proposal place a strong emphasis on communication and outreach and support by the Packard Foundation would assist in filling this funding gap.

Further, UC Davis’ College of Agricultural and Environmental Sciences commissioned a study in 2005 to understand external perceptions of the college. This involved in-depth interviews with 37 leaders of stakeholder communities, particularly agriculture. The results showed that the university has a strong reputation as a world class research center with top scientists working on pertinent stakeholder problems, and is a recognized place to turn to for intellectual resources. However, the report identified a notable perception that the college is out of touch with the needs of grassroots farmers and ranchers, that there is lack of progress in technology transfer and that stakeholders are not fully aware of current research and traditional communication tactics are not working. For example, one group leader noted “Get out in our community and be aggressive about learning what we’re facing.” Further, many saw the need for research that worked across problems, rather than in individual disciplines. The report also noted that spiraling budget cuts are perceived to be spreading resources too thin and severely damaging connections to the external community. In this respect, the more recent emphasis of the college in encouraging multi-disciplinary research is a move in the right direction. Specifically, centers of knowledge such as the ASI have been established to reinvent research pipelines to match the science at UC Davis with the needs of stakeholders. However, limited resources remain a problem; more so in the face of looming turnover of our leading experts. UC Davis projects that 43 percent of the college’s faculty will retire in the next 5-10 years. Similar projections have been made for UCCE specialists (52 percent) and farm advisors (50 percent) over the next 10 years. The career development positions outlined in this proposal will take the first step towards training future leaders and filling this resource gap. In addition, the proposed seed funding for junior faculty will assist in furthering their research agenda and raising their profile within the academic community. Funding for such activities is difficult to obtain; the outcomes in this proposal offer an opportunity to bridge this gap and raise the profile of young professionals.

## APPENDIX 2: STRATEGY FOR LINKING NITROGEN SCIENCE AND ACTION



**Figure 1.** Activities for managing and reducing N pollution fit within an overall strategy of integrating science and action. Various activities are conducted iteratively across different spatial and temporal scales, with feedbacks across activities to incorporate insights from experience and the latest research results.

### APPENDIX 3: ASI OPERATIONAL PRINCIPLES

**Practicing sustainability:** we strive to enact sustainability principles and practices in our own activities.

- **“Walking the talk”:** we work to use sustainable practices in our own operations and actively strive to embody our core values.
- **Community:** we embrace and enact the UC Davis Principles of Community in our daily work.
- **Respect for all:** we affirm the inherent dignity in all people and endeavor to relate to all with respect, fairness and justice.

**Legitimacy:** we set our priorities and design our programs in response to concerns and aspirations of stakeholders representing the diversity of California

- **Spanning boundaries:** we serve the entire state, and all segments of agriculture and the food system.
- **Science in the public interest:** we are committed to transparency in governance and priority setting; to open access to results and information; and to accountability to stakeholders.
- **Historical awareness:** we recognize the University’s historic, current, and potential future roles in shaping agricultural and food systems and their effects on environment and society. We strive to make informed and responsible decisions regarding research, teaching and outreach based on this knowledge.
- **Seeking consensus, while respecting differences:** our activities employ a common set of ground rules, including respect for different viewpoints.

**Usefulness:** responsiveness to stakeholders’ needs – the broad interests of society as well as needs of specific groups – is key to the relevance of our initiatives and provides the necessary focus on real issues and opportunities.

- **Communication for impact:** we ensure that input from stakeholders consistently is sought and used effectively and that our products are translated to reach key audiences in forms they can use.
- **Integration of knowledge:** we actively seek and recognize the value of knowledge embodied in experience on farms and ranches, in communities, in industry, and in policy arenas.
- **Commitment to experiential learning:** we recognize the value of learning-by-doing and actively seek to integrate practical opportunities in our educational programs, training, and outreach activities.
- **Creating and sustaining a learning organization:** feedback, monitoring, evaluation, and impact assessment will be embedded in overall design of our activities.

**Credibility:** we hold ourselves to the highest standards of professional integrity and scientific rigor.

- **Forward-looking agenda:** we will create and sustain mechanisms to identify and assess emerging opportunities and threats, based on scientific analyses and stakeholder input and informed by global trends.
- **Broad scope, with multidisciplinary balance:** we integrate economic, environmental, and social dimensions of sustainability.
- **Scientific integration and synthesis:** our activities span big, inter-linked issues and multiple scales – ranging from molecular to global; past, present, future.
- **Open inquiry:** we promote critical analysis to challenge ‘conventional wisdom’ and to expand our understanding of technical, institutional, and policy options using the best natural and social science methods available.

#### APPENDIX 4: EXAMPLES OF POSSIBLE ACTIVITIES FOR JUNIOR FACULTY AWARDS

**Watershed Monitoring Networks.** Monitoring N flows in selected watersheds and on cooperating farms and ranches will serve two purposes: (1) providing **data to fill key gaps** in the California N assessment and (2) **establishing benchmarks** for the impact of the overall strategy outlined in this document. Current N monitoring efforts are partial and fragmented, and have not capitalized on new, promising techniques. There is an opportunity for collaboration between scientists and farmers, ranchers, and other resource managers to develop easy-to-use and scientifically-valid **tools for measurement** of N flows in soil, air, and water (initially within selected watersheds, but later for widespread adoption).

**Participatory Scenarios in Selected Watersheds.** Multi-stakeholder, participatory scenario exercises will help identify **practical response options for specific watersheds**. These exercises will build on analyses of the California Nitrogen Assessment and will be linked to the monitoring networks described above. At a richer level of practical detail than would be possible for the statewide assessment, scientists, community members, and other stakeholders will be organized to assess, in a spatially explicit way, the N flows from crop and livestock systems through their watershed. Such assessments will help identify **critical N pathways**, and locate environmental “hot spots” and options for action in real operational settings. **Place-based watershed teams** will provide the organizational foundation and facilitate communication between organizations that operate at various scales.

**Integrated Technology assessments.** Innovative management practices may have unforeseen repercussions on biophysical processes, economic viability, and the surrounding environment. Moreover, uncertainty in the paths of drivers (e.g., climate, energy prices, commodity markets) means that much is unknown about the key determinants of future profitability for California agriculture. Thus, there is an ongoing need for collaboration between scientists, farmers, and ranchers on integrated **technology assessment spanning agronomic, economic, environmental, and social considerations**. Such collaborations can be used to explore N-efficiencies for animal feeds and fertilizers, and to better manage and mitigate the effects of off-site movement of N. Linked to this activity would be the development of a **user interface** for growers and livestock producers, through which they can calculate ecosystem N costs/benefits across a range of soil types, climate scenarios, and production options.

**Testing Organizational Models and Incentive Mechanisms in Selected Watersheds.** Appropriate incentives to encourage farmers, ranchers, and other resource managers to put alternative agricultural methods into practice do not yet exist. Our challenge is to **engage policymakers** and create institutions that can catalyze and **support cooperation** among stakeholders to achieve collective goals, such as watershed restoration. By building on data and experience generated by place-based monitoring networks and scenarios teams, activities designed to explore pilot approaches and demonstrate their potential for impacts will combine innovative practices and incentive schemes at various spatial and temporal scales. These activities will test, validate, and adapt innovations for more-general use through targeted research, communication networks, and partnerships that take an integrative approach to N pollution problems and opportunities. Innovative **prizes and other rewards** will be used to recognize individuals, small teams, and community groups that achieve real, measurable impacts; social entrepreneurs that create model programs; and multidisciplinary teams of scientists and stakeholders.

From “Improving Nitrogen Management and Reducing Nitrogen Pollution in California: A Multi-scale, Multi-stakeholder Strategy for Agriculture and the Environment” p.3,  
[http://asi.ucdavis.edu/Research/LOI\\_Packard\\_UC%20Davis\\_Nitrogen.pdf](http://asi.ucdavis.edu/Research/LOI_Packard_UC%20Davis_Nitrogen.pdf)

## APPENDIX 5: ASI EXTERNAL ADVISORY BOARD

ASI's external advisory board is structured to reflect a wide range of differing perspectives and is drawn from leaders in their respective fields, including farmers and ranchers; agricultural, environmental, and community organizations; food manufacturers and retailers; educators; policymakers; and the media. This board also serves the functions of SAREP's Program Advisory Committee. The inaugural board will serve for terms of two or three years. Additional board members can be designated as needs and opportunities arise.

### **Candidates who have agreed to be nominated** (in alphabetical order).

**Marcus Benedetti**, President, Clover Stornetta Farms, Petaluma, CA

**Ashley Boren\***, Executive Director, Sustainable Conservation, San Francisco, CA

**John Diener**, President, Red Rock Ranch, Five Points, CA

**Greg Drescher**, Senior Director for Strategic Initiatives, Culinary Institute of America, St Helena, CA

**Mable Everette**, CEO and Founder, Community Nutrition Education Services, and 2007 Roots of Change Leadership Fellow, Inglewood, CA

**Cornelius Gallagher**, Senior Vice President for Agribusiness, Bank of America, Roseville, CA

**Martha Guzman Aceves**, Legislative Advocate, California Rural Legal Assistance Foundation, Sacramento, CA

**Carl Johnson**, Senior Vice President, Chief Strategy Officer, Campbell's Soup Company, Camden, NJ

**Jonathan Kaplan**, Director, Sustainable Agriculture, Natural Resources Defense Council (NRDC), San Francisco, CA

**AG Kawamura**, Secretary, California Department of Food and Agriculture, Sacramento, CA

**Craig McNamara**, President, Sierra Orchards, and Founder, Center for Land Based Learning, Winters, CA

**Amparo Perez-Cook**, Vice President and General Manager, Bustos Media, LLC, Sacramento, CA

**Michael Pollan**, Contributing writer to the *New York Times*, author, and Knight Professor of Science and Environmental Journalism, University of California, Berkeley, CA

**Judith Redmond**, Co-owner, Full Belly Farm, and President, Community Alliance with Family Farmers, Guinda, CA

**Richard Rominger\***, Rominger Farms, Winters, CA

**Howard Shapiro\***, Director, Plant Science & External Research, Mars Inc, and Co-founder, Seeds of Change, McLean, VA and Davis, CA

**Paul Wenger**, 1<sup>st</sup> Vice President, California Farm Bureau Federation, and farmer, Modesto, CA

\*indicates members of the Executive Committee

### **Ex officio members** (in alphabetical order)

**Daniel Dooley**, Vice President, Agriculture and Natural Resources, University of California

**Jennifer Ryder Fox**, Dean, College of Agriculture, California State University, Chico

**Maggie Lickter**, Student representative, UC Davis Students for Sustainable Agriculture

**Neal Van Alfen**, Dean, College of Agricultural & Environmental Sciences, Univ. of California, Davis

## APPENDIX 6: CONNECTIONS TO STATEWIDE SYSTEM

The University of California Division of Agriculture and Natural Resources (ANR) is a statewide network of over 500 researchers and educators dedicated to creating, developing and delivering knowledge and practical information in agricultural, natural and human resources. ANR comprises the Agricultural Experiment Station, Cooperative Extension and statewide programs.

The **Agricultural Experiment Station** is a statewide program conducting mission-oriented research and transferring the basic and applied knowledge to the public. **Cooperative Extension** (UCCE), ANR's outreach arm, has farm, 4-H, and nutrition, family and consumer sciences advisors based in more than 50 county offices. County farm advisors' work is aimed at enhancing California agricultural productivity and competitiveness. Together with farmers, pest control advisors, and industry representatives, they identify current and emerging agricultural opportunities and problems. The advisors collaborate with campus-based Cooperative Extension specialists and AES scientists to research, adapt, and field-test agricultural improvements or solutions and promote the use of research findings. The CE specialists are headquartered at UC Berkeley, UC Davis, and UC Riverside, where they conduct research and coordinate advisors' activities. As a land-grant institution, the Cooperative Extension mandate is tied to the welfare, development, and protection of California agriculture, natural resources, and people.

ANR also manages several **statewide programs** including:

- The **UC Agricultural Issues Center** (AIC) is a forum for the identification and analysis of important issues affecting the agricultural sector. AIC provides broadly based, objective information on a range of critical, emerging agricultural issues and their significance for the economy and natural resources through studies, conferences and publications. AIC studies topics such as international markets, invasive pests and diseases, the value of agricultural research and development, agricultural policy and the rural environment among others. The issues are often global, but AIC emphasize implications for agriculture and natural resources in California. The audience for AIC research and outreach includes decision makers in agriculture and government, scholars and students, journalists and the general public.
- The M. Theo **Kearney Foundation of Soil Science** was established in 1951 through an endowment managed by the University of California Board of Regents. It was created to encourage and support research in the fields of soils, plant nutrition, and water science within UC ANR. Its five-year missions are dedicated to issues of public concern and are planned and implemented to support three major goals of the California Agricultural Experimental Station: (1) To develop knowledge that will ensure a continuing supply of nutritious foods, fibers, and natural resources products in adequate amounts at low cost without adverse effects on the physical environment or consumer; (2) To develop knowledge that will ensure a physical environment of high quality by enabling its users to manage and enjoy their natural resources endowments more wisely; and (3) To develop knowledge that will contribute to the improvement of public health and economic and social surroundings.
- The **UC Sustainable Agriculture Research and Education Program** (SAREP) is a statewide program now managed under ASI at UC Davis. It was created through the grass roots efforts of organizations and individuals concerned about the environmental impacts of agriculture, the health of rural communities, and the profitability of family farming operations in California. At the request of the California legislature, the University of California established SAREP with three mandates: administer competitive grants for research on sustainable agricultural practices and systems, develop and distribute information through publications and on-farm demonstrations, and support long-term research and sustainable farming systems on UC farmlands.

**APPENDIX 7: PRELIMINARY TIMELINE**

<b>ACTIVITIES (Items in italics are key ASI activities that will complement activities proposed in this grant)</b>	<b>Qtr 1</b>	<b>Qtr 2</b>	<b>Qtr 3</b>	<b>Qtr 4</b>	<b>Qtr 5</b>	<b>Qtr 6</b>	<b>Qtr 7</b>	<b>Qtr 8</b>
<b>PROJECT DESIGN</b>								
Develop and revise operational plan for project implementation	X			X				
Coordinate events to both obtain input from, and disseminate information to, stakeholders	X	X	X	X	X	X	X	X
<b>CALIFORNIA NITROGEN ASSESSMENT</b>								
Recruit Packard Fellows for California nitrogen assessment.	X							
<i>New ASI Academic Coordinator starts– will provide scientific leadership &amp; coordination of activities (recruitment Oct-Dec 2008)</i>	X							
Develop work groups to address specific components of operational plan	X							
Conduct stakeholder consultations and identify users' needs	X	X						
Develop assessment questions based on users' needs; identify response options		X	X					
Identify indicators relevant to the assessment questions			X	X				
Literature review and data inventory		X	X	X	X			
Work group assessment of individual components - data mining; assessment of current conditions & short-term trends in indicators & drivers of change in those indicators; assess technical & policy options			X	X	X	X		
Integration of individual components/linking assessment and communications				X	X	X	X	X
Technical advisory committee reviews	X			X			X	
Communication of results tailored to specific users' needs (link to communications activities and fellows)				X	X	X	X	X
<i>Graduate student seminar on "integrated agro-ecosystem assessment"</i>		X				X		
<b>INTERDISCIPLINARY RESEARCH TEAMS</b>								
Design workshop for junior faculty awards; develop program requirements & process	X	X						
Solicit applications for junior faculty award program; distribute funding			X					
Coordinate seminar forums (information from N assessment may be significant focus)				X	X	X	X	X
Coordinate writeshops/retreats to facilitate collaborative research			X		X			X
Organize other training/professional development events				X		X		
<b>STRATEGIC COMMUNICATIONS</b>								
<i>Launch new ASI communications strategy (based on recommendations from communications firm)</i>	X	X						
Recruit Packard Fellows for communications activities		X						
Develop program of activities; prepare communications materials (web-based and hard copy)			X	X	X	X	X	X
Engage IT consultant and develop Web-based portal and tools				X	X	X	X	X
Coordinate outreach events (link to N assessment activities)			X	X	X	X	X	X
<i>National Symposium on Food Systems and Sustainability</i>	X							X
Hire consultant & conduct evaluation of ASI progress (priorities, progress on grant)				X			X	
<b>PROJECT MANAGEMENT</b>								
Recruit administrative assistant to oversee overall project logistics	X							

## APPENDIX 8: ASI INSTITUTIONAL ASSETS

### PROGRAMS & FACILITIES

- **Sustainable Agriculture Research and Education Program (SAREP)** – a statewide program of the University of California with capabilities in grant administration, knowledge management, communication and outreach; recognized as a leader in Biologically Integrated Farming Systems (BIFS).
- **Russell Ranch Sustainable Agriculture Facility** – a 150 acre facility that houses the Long-term Research on Agricultural Systems (LTRAS) and Sustainable Agriculture and Farming Systems (SAFS) projects, the only long-term research facilities for research on sustainability in irrigated agriculture in the Mediterranean climate zones of the world and one of the few facilities of its kind anywhere.
- **Student Experimental Farm** – provides experiential learning for graduate and undergraduate students at UC Davis as well as the Garden-Based Learning Program for K-12 students and teachers.
- Development of a **new undergraduate major** in sustainable agriculture.
- Commitment to lead rejuvenation of **PhD program in agroecology** in the graduate group in ecology.
- **Doctoral seminar** - graduate seminar on "integrated agroecosystem assessment," with a focus on GHGs and N. Provide funding to selected students to participate on N assessment project.
- **Communications strategy** - ASI has engaged a communications firm to design a strategy to promote ASI as a central place to build community and promote serendipitous interactions that encourage creativity, connectivity and collaboration (e.g., social networking technologies, webinars, simulations); develop ideas on how to prioritize and target ASI's communications efforts; and develop other materials to raise ASI's profile and assist in "branding" ASI as an integrative center of excellence.

### PEOPLE

- **Academic Coordinator** - ASI/SAREP is recruiting a coordinator to lead the "Agricultural Resources and the Environment" thematic area and who also will work closely with fellows and staff involved in the N assessment. This includes scientific leadership as well as assisting in coordination of events and strategic communications.
- **24 full and part-time staff**, including core administrative team serving ASI and affiliated programs.
- **Nine new ASI-affiliated professorships**, plus prospects for additional appointments. These include three endowed chairs: Kellogg Chair in Sustainable Food Systems (T Tomich), Boswell Chair in Sustainable Management of Soil Resources (W Horwath), and Sesnon Chair in Sustainable Animal Systems (in recruitment). And six junior faculty in agroecology (J Six), sustainability and society (R Galt), economics of sustainability (P Merel), plant disease management/soil microbiology (J Leveau), pollination ecology (N Williams), and invertebrate community ecology (L Yang).
- 150 other **UC Davis faculty** self-identified as strongly interested in sustainable agriculture.
- 200 members of **UC Davis Students for Sustainable Agriculture**.

### SOCIAL & INSTITUTIONAL NETWORKS

- **Meetings and Conferences** – ASI hosts events, providing forums for stakeholder consultations, collaborative partnerships, and education and outreach. Over the next 2 years, ASI will collaborate with partner institutions to focus events to disseminate information resulting from the N assessment to researchers, users, policy makers, media, and other stakeholders.
- **National Symposium on Food Systems and Sustainability** - ASI will host a yearly symposium to build relationships and facilitate ongoing discussions among the nation's academic leaders in the areas of agricultural sustainability and food systems for the purpose of providing better-

coordinated and more effective guidance to policymakers, practitioners, foundation leaders, and community advocates. Funded for two years by the W.K. Kellogg Foundation.

- An **External Advisory Board**, comprised of diverse perspectives, has been established and will have its inaugural meeting in December 2008. Student input is represented on this board as well as on internal advisory committees through “Students for Sustainable Agriculture,” a campus based organization.
- **Engagement with stakeholders: Online Survey** - Develop, extend, and institutionalize a Web-based survey initiative to provide for large-scale stakeholder input and to create a first-cut for identification of priority issues for sustainable agriculture and food systems in CA.
- Frequent informal **consultations** – Since January 2007, the ASI director has averaged at least 3 stakeholder meetings per month, engaging with over 1200 people, including, young people, farmers, ranchers, extensionists, commodity groups, philanthropists, public officials, social and environmental advocates, reporters, corporate executives, ‘celebrity chefs,’ and food industry leaders.
- **Interdisciplinary research** – ASI is coordinating interdisciplinary research teams looking at broad issues such as climate change and N.
- **Academic partnerships** – ASI has established relationships with faculty and UC statewide programs working on complementary issues (e.g., Kearney Foundation, Agricultural Issues Centre).
- **UC Cooperative Extension** – Strong working relationships through SAREP with UCCE Specialists and county-based Farm Advisors, comprising over 400 UC professionals across the state.
- Leadership of a new **national network** – with funding from the WK Kellogg Foundation, the ASI Director is leading formation of a national network of more than 20 academic leaders in sustainable agriculture and food systems, including directors of counterpart institutes and centers and holders of endowed chairs at land grant universities and other academic institutions across the US.
- **Global connections**– the ASI Director and other UC faculty have extensive professional relationships internationally that will provide the basis for an envisioned international network of leaders in sustainable agriculture and food systems.