

SECTION I : Cover Page, Project Summary & Funding Request

2010 Sustainable Agriculture and Food Systems Competitive Grants Program

(Download a Word document at: www.sarep.ucdavis.edu/SAREP2010RFP-CoverPage.doc)

Project Title: Evaluating the role of social learning in supporting hedgerow adoption

Proposal Category:

- Planning Grant Education and Outreach Grant
 Research Grant Graduate Student Research Grant – Food & Society

Priority Area:

- Agriculture, Resources and the Environment (ARE)
 Food and Society (F&S)
 Social Learning in Agriculture and Food Systems (SL)

Topic(s) Addressed in Proposal:

- Climate Change (ARE)
 Nutrients and Water in Agricultural Landscapes (ARE)
 Harnessing Ecosystem Services (ARE)
 Closing the Loop: Sustainable Waste Management in Agriculture (ARE)
 Building Regional Markets (F&S)
 Community Food Security (F&S)
 Food System Assessments/Policy (F&S)
 Farmworker and Rural Community Wellbeing (F&S)
 Social Learning in Agriculture and Food Systems (SL)

Principal Investigator (main contact)

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Title: Farm Advisor
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Collaborators:

Identify by "" each collaborator from a county-based UC Cooperative Extension office or a community-based stakeholder group. All proposals must include at least one collaborator identified as such.*

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Project Summary -150 words or less

Agricultural management practices that maximize crop production yields and quality have resulted in environmental degradation, including a decline or loss of biodiversity and ecosystem services. Consequently, there is a need for innovations that build resilience agro-ecosystems to enhance ecosystem services that support crop production and sustain our environment. Restoring natural habitat in working farmlands, such as hedgerows with native plants, is a management innovation that has been found to increase key ecosystem services in adjacent crops including pollination, pest control, and filtration of pathogens. Yet hedgerow adoption by California farmers remains low, despite potential benefits. This reveals a need to build understanding of the decision making process through which farmers evaluate and adopt (or reject) use of hedgerows. Our proposed project evaluates the roles of local diffusion networks, and examines the role of social learning and information sharing, in supporting hedgerow implementation and use on farms in California.

Total funds requested from SAREP: \$10,000

Project Narrative (5-page limit)

A. Relevance to Priority Areas/Topics

- *Category of proposal:* Planning Grant
- *Priority area:* Agriculture, Resources and the Environment (ARE)
- *Priority topic:* Harnessing Ecosystem Services

• *Describe how your project helps address the issues outlined for this priority. Cite results of other related projects or activities--either your own or that of other investigators--and describe how your proposed project will build upon and extend this prior work. Provide a context for how your project fits into existing work.*

Agricultural management practices that maximize crop production yields and quality have resulted in environmental degradation, including decline or loss of other ecosystem services (MA 2005). Consequently, there is a growing call for innovations that build resilience agro-ecosystems and enhance ecosystem services that support and regulate crop production under variable conditions (New Biology, 2009) that help sustain our environment. Restoring natural habitat in working farmlands, such as hedgerows or vegetation corridors with native California plants, is a management innovation that has been found to increase pollinator numbers (Pywell et al. 2005, Hopwood 2008) and may enhance key ecosystem services in adjacent crops including: pollination by native bees (Kremen et al. 2002), pest control (Bugg et al. 1998), and filtration of pathogens (Tate et al. 2006). Yet hedgerow adoption by farmers in California's intensively-farmed Central Valley remains low, despite ecological studies demonstrating potential benefits and funding support from various government programs. This trend reveals a need to build understanding of the decision making process through which farmers evaluate and adopt (or reject) use of native plant hedgerows.

Our proposed research investigates the role of local diffusion networks in providing two pathways to adoption of hedgerows: facilitating social learning and information sharing. Diffusion networks are communities of stakeholders –including farmers, public agencies, and private organizations– that communicate about agricultural practices and issues (Rogers 2003). Recent studies have found that the number and types of connections in these networks affect patterns of information sharing (Conley and Udry 2001, Chiffolleau 2005); and social learning, which are main pathways to adoption of management innovations (Lubell and Fulton 2007). By integrating quantitative survey data (Dillman 1978, Groves et al. 2005), social network analysis, and geographical information on hedgerow adoption (e.g., by district and county), this study will develop a predictive framework of the factors that influence adoption of native hedgerows, and by identifying the roles of social learning and information sharing, detect key actors and communication channels that help to support these decision pathways.

Pathway One: Social Learning

The first component of this research tests the hypothesis that farmer adoption of hedgerows will be strongly determined by social learning. Diffusion networks are described by the connections among individual actors; they facilitate adoption decisions by spreading awareness about the costs and benefits of management innovations. For example, in the case of hedgerows benefits

may include enhanced crop yields due to enhanced pollination and pest control, and costs may include initial investment in plant materials and time needed to manage hedgerows as they mature. We hypothesize that farmers that engage in social learning (e.g., visits to demonstration farms, talking with neighbors about production decisions) will have higher rates of hedgerow adoption than farmers that do not. To test this hypothesis, we will conduct a survey of 100 growers in California's Yolo, Solano, Sacramento, and Colusa Counties. This study region encompasses counties and is a model system because of the extensive coverage (>10,000km²) of farms in the northern Sacramento Valley in different crop types and under a variety of management practices (NASS 2007). This region provides a comprehensive suite of diverse farm operations that can be evaluated as factors in hedgerow adoption.

Pathway Two: Information Sharing

Diffusion networks also facilitate adoption decisions by spreading awareness about the potential costs and benefits of management innovations such as hedgerows (Lubell and Fulton 2007). We predict that adoption of hedgerows will be highest among farmers that are centrally located in their local networks, taking in information from multiple sources. Using network data gathered in our farmer survey, we will investigate this hypothesis. Identifying central actors is critical to strategic support of management innovations since they may effectively act as learning and information hubs. It is equally important to identify actors with few connections that do not engage information from multiple sources, since they are likely to require additional resources to participate in on-farm enhancement programs (Rogers 2003). Our survey will also investigate the type of information exchanged (e.g., perceived benefits/tradeoffs). This addresses a second aspect of the critical gap in our understanding of hedgerow adoption, how growers share information about a practice for which the ecological effects are not yet well understood.

The proposed survey integrates data on both decision pathways, social learning and information sharing. This will allow us to investigate relationships between number and type of connections in local diffusion networks (e.g., farmers that frequently exchange information, farm advisors that provide technical assistance) and how they contribute to decision-making and ultimately influence adoption of hedgerows and similar on-farm native habitat enhancements. We will control for operator characteristics that are often used to explain management practices (e.g., education, and farm capital) and will measure the density and type of connections among actors and describe the local network (Scott 1988). By calculating the bonding connections between farmers, and bridging connections between farmers and other types of stakeholders (e.g., research, extension, and local agencies), we will evaluate the types of relationships that are most important to supporting native hedgerows. We will use multilevel analysis (Gelman et al. 2007) of the survey data to model the likelihood that aspects of these decision pathways influence hedgerow adoption, controlling for other farmer characteristics (Prokopy, 2008).

Integrating data on Social Learning and Information Sharing into the Local Context

The third component of this research examines geographical distribution of hedgerow adoption and compares it with activity among local diffusion networks. Existing work on diffusion of innovations in agricultural management suggest that "champions," local pioneer farmers who lead by demonstration and assist neighboring farmers in adopting management improvements, and "ambassadors," farm advisors who facilitate the champions' work are critical aspects of management innovation (Risgaard et al. 2007, Brodt et al. 2009). We will build on existing

studies that have been done in Yolo County (Brodt et al. 2009, RF Long, unpublished data) by describing social networks in each of the four counties and comparing the network density and type of connection (e.g., bridges between “champions” and “ambassadors,” or lack there of) in each. This is an important step towards systematically identifying which decision pathways are in place in areas where hedgerow adoption has been relatively high (e.g., a small cluster of farms in western Yolo County) by comparing them with networks in neighboring areas where adoption remains low. We will quantify the key elements and area of influence of social networks by integrating survey data and GIS images to examine relationships between diffusion networks and hedgerow adoption at varying spatial scales (e.g., neighbor to neighbor to county-wide).

B. Relevance to Target Audience (Justification)

- *Define the target audience(s)/community for the project.*

The target audience for our results is agencies interested in ecosystem services and natural resource conservation projects on farms. We are already in communication with the Natural Resource Conservation Service (NRCS), Resource Conservation Districts (RCD), University Researchers and Cooperative Extension personnel, the Audubon landowner stewardship program, US Fish and Wildlife service, Community Alliance with Family Farms, and the Xerces Society. Our project is unique in that we are focusing on farmers, yet describing how communities of practice (e.g., networks of farmers, public, and private agencies) could be strategically supported to enhance on-farm habitat restoration. We will also distribute our results through peer-reviewed publications to ensure that our results reach a broad audience.

- *Describe the importance of the proposed research or project to this audience (need).*

Adoption of hedgerow plantings on farms has been successful in western Yolo County, but limited in other places. For example, in 2009, Yolo County planted 44% of the total hedgerow feet in California and 8.5% of the total hedgerow feet planted nationally, NRCS 2009, P. Hogan, personal communication. This information shows the potential for expanding hedgerow plantings. However, in order for our target audience to reach more farmers, more information is needed on the decision making process by which farmers elect to plant hedgerows on their farms. This information will help design strategic communications, education and outreach programs to maximize efforts for encouraging hedgerow adoption on farms.

- *Describe how the target audience/community will be involved in the development and implementation of the project.*

Our collaborators and target audience includes Hedgerow Farms, the RCD’s in Yolo, Solano, and Colusa Counties, and the Xerces Society. All collaborators will be involved in helping to develop and conduct the grower surveys on hedgerow establishment on farms. Once these data are collected and analyzed, we will work collaboratively to develop materials for both farmers (direct support) and outreach and extension professionals (complimentary support) that encourage adoption of hedgerow plantings on farms. Depending on what we find, our results may be important to researchers by identifying priority areas where more information is needed (i.e. pollination ecology, insect pest management), to policy makers to address questions or concerns about hedgerow plantings (i.e. food safety issues), and to educators to provide better assistance to farmers (i.e. cost share information or on-farm assistance with hedgerow establishment). We have already begun this collaborative process through a recent one-day workshop at Hedgerow Farms (Yolo County) through the Agricultural Sustainability Institute’s

2010 National Agricultural Symposium. Our group explored the potential reasons for low adoption of hedgerow plantings on farms, including potential costs and benefits, which has led to the development of this proposal and issues that need to be addressed as discussed in this project proposal.

C. Goals and Objectives

- *Based on the needs of your target audience, state the realistic goal(s) for the project. Goals are purpose statements about what you want the project to accomplish. Under each goal, state measurable, outcome-oriented objectives necessary to reach that goal.*

The first goal of our project is to build understanding of how local diffusion networks facilitate adoption of hedgerows and other on-farm habitat enhancements. To accomplish this, we plan to interview 100 farmers in Yolo, Solano, Sacramento, and Colusa Counties via a survey focused on hedgerow plantings on farms and specifically document the role of local diffusion networks. The second project goal is to use this information to make recommendations regarding how outreach and extension professionals can strategically support pathways to hedgerow adoption. We will achieve this by summarizing our findings and sharing them with extension specialists from the four participating counties through a final report. Additionally, we will disseminate results through presentations to local RCD, NRCS, and UC ANR working groups and develop one news article for popular press. We also intend to publish a peer-reviewed paper on our results for enhanced outreach to a wider audience.

D. Methods/Activities/Timetable

- *Provide a plan that states the project goals and the objectives to achieve those goals. Objectives are the specific actions you will undertake to achieve your stated goals.*

To understand how educators can market hedgerows to farmers to enhance their adoption on farms our project would focus on several objectives as follows: 1) Engage aforementioned partners to develop a survey that focuses on adoption of hedgerows on farms; 2) Distribute this survey to at least 100 growers in Yolo, Solano, Sacramento, and Colusa Counties with follow up personal interviews as needed; 3) Analyze data and interpret results, and 4) Summarize results for project partners and peer-reviewed publication.

- *Include a timetable linked to the various activities and phases of the project. Funding is available for one year projects only.*

Phase I: 2011-12	
Spring	Review literature and develop survey questions.
Summer	Conduct grower surveys.
Fall	Conduct grower surveys. Analyze data and interpret results.
Winter	Summarize results for a peer-reviewed publication. Present results at meetings, workshops, and conferences.
Phase II: 2012-13	
Winter/Spring	Apply for additional grant funds from other agencies.

E. Products

- *Projects should include tangible products (for example, publications, decision support tools, reports, workshop and related materials, etc.). Innovative use of media is encouraged.*

The purpose of our project is to come out with a report that will provide information on the needs of farmers that will help encourage adoption of hedgerows on farms. We also will publish a peer-reviewed publication on the results of our project. In addition, we will work with UC ANR Communication Services to publish a news story that will be sent out to the media (including Ag Alert, Capital Press, and California Farmer).

- *Describe how information and results from this project will be extended to the target audience/community, and beyond to other potential statewide audiences.*

Our project group is especially well-positioned to develop and deliver project reports, Powerpoint presentations for events such as the Ecofarm Conference, ANR Working Groups, local and regional meetings and workshops, and articles for journals and the popular press. We also will disseminate this information through Farm Advisors' newsletters.

- *Planning Grant projects should articulate benefits and provide evidence that the planning will be used for a future research/ extension proposal.*

With support from this planning grant, initially our project will focus on field crop growers. Once we understand the factors affecting hedgerow adoption by this group, we will apply for additional funding through other agencies to expand our target audience to include other types of crops (orchards, vineyards, fresh market, and processed) as well as organic and conventional growers.

F. Evaluation/Lessons Learned

- *Describe how you plan to evaluate and measure whether your stated objectives were met.*

Our first objective is to conduct at least 100 farmer interviews across four counties. We will gauge whether our objective was met based on the completed number of surveys. Since survey response rates are rarely one hundred percent (Dillman 1978), achieving this objective may require identifying more than 100 potential respondents. Our second objective is to present findings on local diffusion networks to key outreach and extension partners in the form of one final report, three presentations and a news article. We will evaluate this objective by quantifying the number of readers that receive the report and attendance at various meetings and presentations. We plan to reach beyond academic audiences by publishing at least one news article for popular press.

- *Describe your plans for maintaining or expanding your project in the future (if relevant).*

Our interests are to obtain funding for a local grower survey on hedgerow adoption by growers, then to apply for additional funds through other granting agencies to conduct a statewide survey on hedgerow adoption by growers.

G. Capabilities of Investigators and Cooperators (not part of 5-page limit)

• *Describe the specific roles and capabilities of each project participant.*

1) **Rachael Long**, Farm Advisor, University of California Cooperative Extension, Yolo, Solano, and Sacramento Counties will be taking the lead on this project. She has 19 years of experience working with hedgerows in agricultural systems, including establishment practices, costs, and ecosystem services. She has also conducted interviews with growers, has written many reports and publications on hedgerows, and has given numerous presentations on hedgerows, and has worked with the media. She will help with grower interviews, analyzing and interpreting results, and writing reports.

2) **Kelly Garbach**, UC Davis Graduate Student is an ecologist with experience with grower surveys and ecosystem management. She will help conduct the grower interviews and analyzing and interpreting results, writing reports, and presenting results.

3) **Dr. Claire Kremen**, Associate Professor, UC Berkeley Environmental Science and Policy Management, is a conservation biologist who has been documenting pollination and pest control services of hedgerows during the past 5 years. She will help with developing our survey and reviewing results and publications.

4) **Dr. Lora Morandin**, Post Doc, UC Berkeley Environmental Science and Policy Management has extensive expertise with ecosystem services of hedgerows. She will help with developing our survey, analyzing and reviewing results, and writing publications.

• *Attach an abbreviated CV or resume (two page limit) for each investigator including past experience with similar projects/activities.*

CV's attached as separate files from Long, Garbach, Kremen and Morandin

• *Attach a letter of support from each cooperating organization, agency, or business. Letters should state how the organization will participate in the project.*

Letters of support attached from the Xerces Society, Yolo, Solano, and Colusa County RCD's (there is no RCD in Sacramento Co). UCCE collaboration in Colusa Co. is unknown at this time due to extensive retirements (three of four advisors).

• *Attach a letter of support and recommendation from major professor or advisor of any graduate students participating in the project.*

Letter attached from Professor Mark Lubell

H. Budget

• Provide a complete budget in the indicated format; show how line items are calculated. Funds requested must be realistic given the objectives of the project. Projects may begin as soon as funding is received, approximately April 1, 2011. Matching funds, including in-kind contributions, are encouraged but not required. Include only direct charges; indirect overhead charges are not allowed.

Budget Category	Requested Funds	Matching Funds	Source of Matching Funds
Personnel 15% time Graduate Student Researcher II	\$7,500	\$4,611	PI Salary match at 5% time plus benefits
Employee Benefits	\$500		
Total Personnel Costs			
Supplies and Expenses (survey reproduction, newsletter, entertainment, ie. coffee during interview)	\$500		
Permanent Equipment	None		
Travel	\$1,500		
Subcontracts	None		
Total Funds Requested	\$10,000		

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