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Title: "Develop and document opportunities and success stories for ecosystem services on California rangelands"

Principle Investigator: Stephanie Larson, University of California Cooperative Extension, 133 Aviation Boulevard, Suite 109, Santa Rosa, CA 95403. Phone: 707-565-2621 Email: slarson@ucdavis.edu.

Co-investigators & Cooperators:

Sheila Barry, University of California Cooperative Extension, Santa Clara County, San Jose, CA, USA
Theresa Becchetti, University of California Cooperative Extension, Stanislaus County, Modesto, CA, USA
Morgan Doran, University of California Cooperative Extension, Yolo County, Woodland, CA, USA
Valerie Eviner, University of California, Davis, CA, USA
Karen Giovannini, University of California Cooperative Extension, Sonoma County, Santa Rosa, CA, USA
Larry Forero, University of California Cooperative Extension, Shasta County, Redding, CA, USA
Holly George, University of California Cooperative Extension, Plumas, Quincy, CA, USA
Mel George University of California, Davis, CA, USA
Roger Ingram, University of California Cooperative Extension, Placer County, Auburn, CA, USA

Location of the Project: Sonoma County

Commodity(ies): Rangelands throughout northern California

Funding: $9,500 for Sustainable Agriculture Research & Education

GOALS AND OBJECTIVES:

Ecosystem services are benefits received by the ecosystem lived in, which can lead to desirable environmental outcomes. **Develop and document opportunities and success stories for ecosystem services on California rangelands** goal was to define ecosystem services occurring on rangelands, document best management practices that increase these services, and educate rangeland managers and owners on how to increase economic opportunities in the absence of markets.

The project developed an ecosystem service data base, by working with University of California Cooperative Extension (UCCE) and UC Davis staff, along with key partners such as the California Rangeland Conservation Coalition (CRCC) to organize information (research) documenting rangelands impact on ecosystem services.

Objective 1: Increase specific research based knowledge on how to manage rangelands for specific ecosystem services, gathering pertinent research that documented rangeland contributions to ecosystem services.

Objective 2: Develop a coalition of rangeland ecosystem service stakeholders

Objective 3: Develop educational materials that highlight ecosystem services on California Rangelands through best management practices.

SUMMARY:

Rangelands comprise the largest land mass (40%) in the western states. These rangelands have traditionally been a source of forage for marketable products, such as livestock, which is a leading agricultural commodity and an important source of revenue to local economies. Rangelands owners and managers are familiar with the economic value that rangelands provide – specifically grazing opportunities for livestock; however that large percentage provides so much more. It is a whole ecosystem that provides benefits to the landowner and to all life forms living or passing through that land. The benefit of well-maintained ecosystem services is as small as neighbors that benefit from clean water to as wide as worldwide benefit of clean air and carbon sequestration.

Rangelands and their stewardship also provide valuable ecosystem services. But the potential for rangeland owners and managers to receive additional revenue from their stewardship has had limited documentation. One of the successes of this project was to document success stories from rangelands around the United States.

To assess the potential of payments (additional revenue) for ecosystem services, the project developed a decision support system which identified best management practices on rangelands, using established Natural Resource Conservation Service (NRCS) best management practices protocol. In addition, the implementation of these practices was also documented in a research data base.

This information was presented at several meetings. These meetings ranged from in-the-field rancher meetings, to professional society meetings and educated rangeland owners, managers, and other agency personnel on the types of ecosystem service enhancements achievable through implementation of best management practices on rangelands.
Other programs, which document payments for ecosystem services, were also listed on the web site. This information shows how other NGOS or governmental agencies have paid rangeland owners for ecosystem services provided by their stewardship.
This project was accomplished through the leadership of University of California Cooperative Extension (UCCE) farm advisors and UC Davis researchers, as well as the collaborations with key partners such as the California Rangeland Conservation Coalition (CRCC). It built partnerships with land owners, agencies, NGOs and policy makers acknowledging the importance of managing local rangelands, for the benefit of the manager, and for the extended benefits to the community receiving the subsequent increases in ecosystem services.

SPECIFIC RESULTS:

In order to document the importance of rangelands and their management, Dr. Stephanie Larson, coordinated with other UCCE Natural Resource advisors, Drs. Valerie Eviner and Mel George, to conduct a scientific literature review on ecosystem services. These reviews led to the development of a web site, http://ucanr.org/sites/RangelandES/ which defines ecosystem services, research and opportunities available for California rangeland managers.

Objective 1: Increase specific research based knowledge on how to manage rangelands for specific ecosystem services, gathering pertinent research that documented rangeland contributions to ecosystem services.

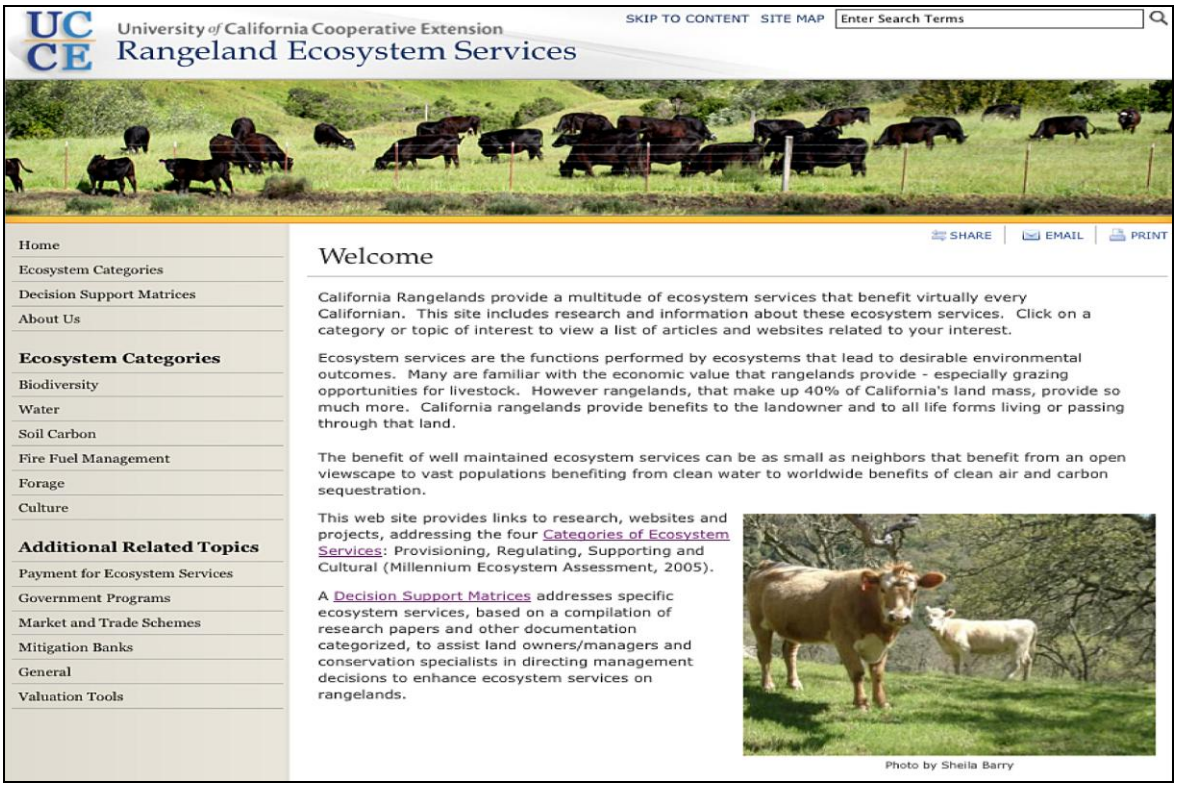

Figure 1. UCCE Ecosystem Services Web Site

- ***An Ecosystem Services (ES) data base was developed to give researchers, agencies and rangeland owners access to information on Ecosystem services occurring on rangelands. The three different areas that have been created relate to research, web sites and ES payments.***

Objective 2: Develop a coalition of rangeland ecosystem service stakeholders

The initial step involved a meeting in Davis with all project collaborators, using the “mind mapping” technique. This technique was used to develop a process that would disseminate the data-based information that had been generated. Figure 2 shows all the possible ecosystem services rangelands can provide.
This mind map was used to develop the “one pagers”, (Figure 4), which combined best management practices, research and the potential resulting ecosystem services.

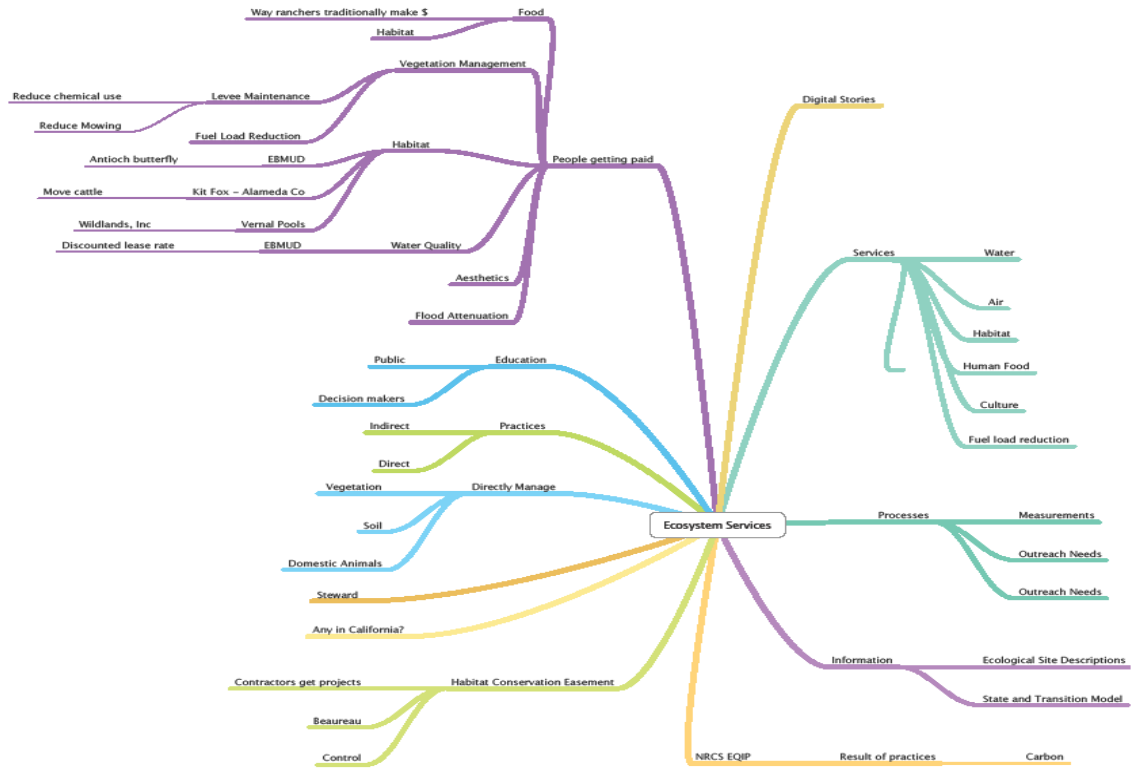

Figure 2. Map Mapping of Ecosystem Services

Following the UCCE project team meeting, another stakeholder group, comprised of policy makers, NGO's and affiliated organizations such as, California Cattlemen's Association (CCA), Farm Bureau (FB), Natural Resources Conservation Service (NRCS), California Rangeland Trust (CRT), and the California Rangeland Conservation Coalition (CRCC) held a meeting to further vet the educational and research based information generated.

- ***Two regional meetings were organized and held for rangeland owners and agencies personnel to discuss ecosystem services provided on rangelands. Working with the California Rangelands Conservation Coalition, the project synthesized their survey results to determine what was currently known and what further needed to be addressed on the subject of ecosystem services on rangelands.***

In addition, a poster, Figure 3, was created and presented at Society for Range Management (SRM) meetings, UC ANR and the CRCC meetings.

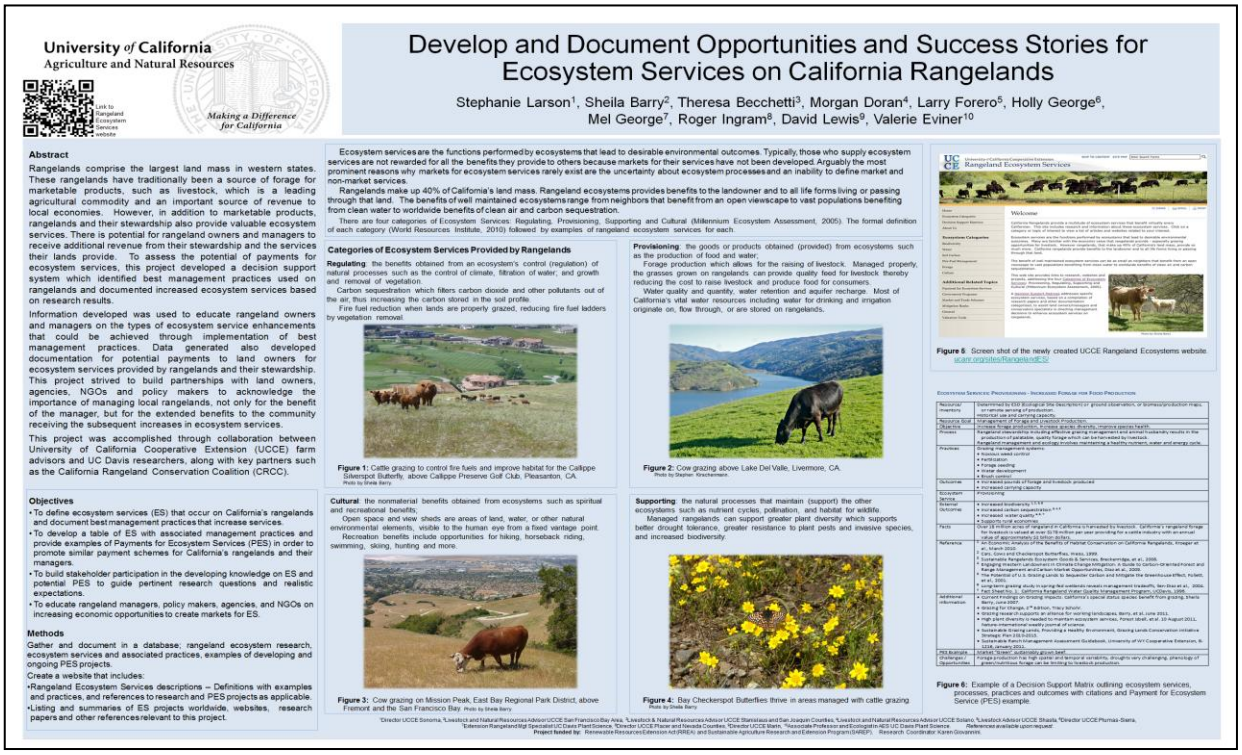

Figure 3. UCCE Ecosystem Services Poster

- ***Poster presented at the California Rangelands Conservation Coalition (CRCC) meeting in January, 2011 and at the UC ANR Programmatic meeting.***
- ***Poster presented at the national Society for Range Management (SRM) meeting in February, 2012 and at the California Pacific (CAL-PAC) SRM meeting in 2011.***

Objective 3: Develop educational materials that highlight ecosystem services on California Rangelands, through best management practices.

Using the ecosystem service millennium categories, (Provisioning, Regulating, Supporting, etc.), "one pagers" were created that combined services, NRCS practices, and research, Figure 4. One pager outlines explain how best management practices, defined practices using the Natural Resource Conservation Service (NRCS). Several one pagers were created and are found on the web site.

ECOSYSTEM SERVICES: PROVISIONING - INCREASED FORAGE FOR FOOD PRODUCTION

Resource/ Inventory	Determined by ESD (Ecological Site Description) or ground observation, or biomass/production maps, or remote sensing of production. Historical use and carrying capacity.
Resource Goal	Management of Forage and Livestock Production.
Objective	Increase forage production, increase species diversity, improve species health.
Process	Rangeland stewardship including effective grazing management and animal husbandry results in the production of palatable, quality forage which can be harvested by livestock. Rangeland management and ecology involves maintaining a healthy nutrient, water and energy cycle.
Practices	Grazing management systems: • Noxious weed control • Fertilization • Forage seeding • Water development • Brush control
Outcomes	• Increased pounds of forage and livestock produced • Increased carrying capacity
Ecosystem Service	Provisioning
External Outcomes	• Increased biodiversity [1, 2, 3, 8] • Increased carbon sequestration [3, 4, 5] • Increased water quality [3, 6, 7] • Supports rural economies
Facts	Over 18 million acres of rangeland in California is harvested by livestock. California's rangeland forage for livestock is valued at over $178 million per year providing for a cattle industry with an annual value of approximately $2 billion dollars.
Reference	[1] An Economic Analysis of the Benefits of Habitat Conservation on California Rangelands, Kroeger et al., March 2010. [2] Cars, Cows and Checkerspot Butterflies, Weiss, 1999. [3] Sustainable Rangelands Ecosystem Goods & Services, Breckenridge, et al., 2008. [4] Engaging Western Landowners in Climate Change Mitigation: A Guide to Carbon-Oriented Forest and Range Management and Carbon Market Opportunities, Diaz et al., 2009. [5] The Potential of U.S. Grazing Lands to Sequester Carbon and Mitigate the Greenhouse Effect, Follett, et al., 2001. [6] Long-term grazing study in spring-fed wetlands reveals management tradeoffs, llen-Diaz et al., 2004. [7] Fact Sheet No. 1: California Rangeland Water Quality Management Program, UCDavis, 1996.
Additional Information	• Current Findings on Grazing Impacts: California's special status species benefit from grazing, Sheila Barry, June 2007. • Grazing for Change, 2nd Edition, Tracy Schohr. • Grazing research supports an alliance for working landscapes, Barry, et al, June 2011. • High plant diversity is needed to maintain ecosystem services, Forest Isbell, et al. 10 August 2011, Nature-international weekly journal of science. • Sustainable Grazing Lands, Providing a Healthy Environment, Grazing Lands Conservation Initiative Strategic Plan 2010-2015. • Sustainable Ranch Management Assessment Guidebook, University of WY Cooperative Extension, B-1216, January 2011.
PES Example	Market "Green" sustainably grown beef.
Challenges / Opportunities	Forage production has high spatial and temporal variability, droughts very challenging, phenology of green/nutritious forage can be limiting to livestock production.

Figure 4. Ecosystem Service One Pager - Food

- ***Educational research and documentation was made available to rangeland owners, UCCE staff and agency personnel via websites and informational pamphlets.***
- ***Two rancher meetings were held in the summer of 2011. Pre and post discussions were conducted to determine what was known about ecosystem services. Ranchers in general were unaware of ecosystem services, but following the meeting they were very interested in learning more.***

POTENTIAL BENEFITS/IMPACTS ON AGRICULTURE AND/OR FOOD SYSTEMS:

Through our collaborative efforts, this proposal generated information about what ecosystem services are, what services are currently being done, and what opportunities are available for increasing the value of services. Early adoption and application of ecosystem services will require stakeholder participation from rangelands managers, agency personnel, such as Natural Resources Conservation Service (NRCS) and policy makers to guide pertinent research questions and realistic expectations. This proposal developed a quantitative analysis (actual services and payments for said services) that occur on rangelands. This can inform landscape managers in making educated management and marketing decisions about ecosystem services. Through the outreach efforts, rangeland owners and managers were motivated to learn more about ecosystem services that could maximize productivity, while enhancing long term sustainability of the landscape.

The information generated from this project connected ecosystem services with the people who can benefit from them. Thus the project can help manage natural resources more effectively, preventing their decline. This information educated many landowners, managers and policy makers on the benefits of implementing these services on northern California rangelands. The educational information developed via a collaborative network vetted existing scientific and popular press information into an educational information package. This information will educate many landowners, managers and policy makers on the benefits of implementing these services on California rangelands.

DISSEMINATION OF FINDINGS:

The information generated through the project was disseminated via the UCCE web site, numerous educational meetings and new articles in local UCCE newspapers and Farm Bureau monthly newspapers.

Literature Cited:

Several research paper, projects and reports are listed at http://ucanr.org/sites/RangelandES/.