

**GRAZINGLANDS AND GREENHOUSE GASES
(3G)**

PROJECT DESCRIPTION

Resulting from research conducted by the completed GL-CRSP projects, Livestock Development and Rangeland Conservation Tools for Central Asia (LDRCT) and Co-Benefits of Grassland Regeneration of Abandoned Wheat Areas for Carbon Sequestration, the GL-CRSP Grazinglands and Greenhouse Gases (3G) project is producing a scientific volume for the Journal of Rangeland Ecology and Management that helps managers and development agents incorporate rangeland and pasture conservation and management projects as candidates for generation of carbon credits. The volume is scheduled for publishing in the fall of 2008.

PRINCIPAL INVESTIGATOR

Emilio Laca, Ph.D., Associate Professor, Department of Plant Sciences, University of California, Davis, One Shields Avenue, Davis, CA 95616, Phone: (530) 754-4083, Email: ealaca@ucdavis.edu

PROJECT SCOPE

Rangelands, covering approximately one-fifth of the earth's surface, are ill-suited for crop production yet they possess extraordinary capacity for livestock production, providing the main source of forage for livestock, and thus, a subsistence base for some of the world's most disadvantaged communities. In addition to their productive capacity, rangelands also have the potential to be net sources, or sinks, of greenhouse gases, and if incorporated into a carbon exchange market, can significantly enhance livelihoods and promote sound ecological management practices.

The relatively recent appearance of voluntary carbon credit markets are effectively sidestepping stiff Kyoto protocol regulations in favor of more flexible and far reaching methods. The California Registry for example, provides a voluntary, yet rigorous framework for emissions trading. The Registry is also establishing a set of accounting principles for carbon through third party certification, enabling the capability to efficiently measure and verify emissions and to allow for their free trade and marketing. The concept is similar in essence to the Financial Accounting Standards Board (FASB) in that it

provides standards against which company finances may be appropriately analyzed and traded.

The movement towards more rigorous voluntary carbon credit markets is heavily dependent upon greater involvement with the scientific community to ensure that market trading is based on sound and reliable measurement of global carbon fluxes. While the scientific community was a critical partner in establishing the California Registry protocols, its involvement focused primarily on forest carbon fluxes and forestry management. To date, there has been little emphasis on the role of rangelands in the generation of credits. Incorporating rangelands into global carbon markets is critical to the reduction of Greenhouse Gas (GHG) emissions, as well as poverty reduction in arid and semiarid lands.

While most of what is known about the role of rangelands in carbon fluxes has been learned in the past five years, the last volume on the role of rangelands as potential carbon sinks was published more than five years ago. The Global Livestock CRSP 3G project (Grazinglands and Greenhouse



rangelands, this new compendium will move beyond a regional focus to the first global account of carbon fluxes assembled in one volume.

The compendium will be published as a special issue by the journal of *Rangeland Ecology and Management* in the late fall of 2008 and will be subdivided into three main themes: 1) Greenhouse Gases, Rangelands, and Poverty Alleviation, 2) Estimation and Quantification of Carbon Fluxes in Rangelands, and 3) Patterns of Carbon Flux in Rangelands of the World.

The cover of Rangelands announces the special feature on Grazinglands & Greenhouse Gases due for publication in the journal of Rangeland Ecology & Management. Front and back cover images of Rangelands, Vol. 30, No. 3, June 2008. This issue and others can be accessed at <http://www.srmjournals.org>. Images reproduced with permission from Allen Press Publishing Services.

Gas emissions) is in the process of compiling a scientific volume that describes rangeland carbon fluxes and assists managers and development agents to incorporate rangeland and pasture conservation and management projects as candidates for the generation of credits. It is the intention that these credits could then be used to offset the costs of development and poverty alleviation projects with positive outcomes for pastoral livelihoods.

Building on previous Global Livestock CRSP research conducted by the Livestock Development and Rangeland Conservation Tools for Central Asia (LDRCT) and Co-Benefits of Grassland Regeneration of Abandoned Wheat Areas for Carbon Sequestration projects, which provided the first models for carbon fluxes in Central Asian

Grazinglands & Greenhouse Gases

A special feature in *Rangeland Ecology & Management* addressing the role of rangelands in:

carbon sequestration

the carbon credit market

poverty alleviation



Sponsored by the Global Livestock Collaborative Research Support Program with contributions from an international group of rangeland scientists, managers and economists. Publication expected in early 2009.

GL-CRSP: <http://glcrsp.ucdavis.edu>

Rangeland Ecology & Management: <http://www.srmjournals.org/>

Photo by E.A. Laca

Drawing on an interdisciplinary group of leading researchers in the scientific community, the volume will tentatively feature the following chapters within each theme:

Greenhouse Gases, Rangelands, and Poverty Alleviation

1. Requirements for range and pasturelands to generate tradable carbon offsets in the Chicago Climate Exchange.
2. Societal benefits and policy implications.
3. Supplying carbon sequestration from West African rangelands: opportunities and barriers.
4. The Mexican ProArbol program: support for the development of forestry carbon sequestration projects and the relationship with poverty alleviation policies.

Estimation and Quantification of Carbon Flux in Rangelands

5. Improving estimates of rangeland carbon sequestration: a systematic approach to estimate carbon fluxes from rangelands at landscape and regional scales.
6. Quantities and kinds of greenhouse gases exchanged in range and pasturelands as a function of management.
7. Estimation of regional net C flux and uncertainty based on mobile flux stations and downscaling of weather data: a scalable and objective methodology.
8. Cost-effective methods to determine spatio-temporal patterns of soil carbon stocks in range and pasturelands of California.

Patterns of Carbon Flux in Rangelands of the World

9. Ecosystem-scale estimates of productivity, respiration, and light-response parameters of world grasslands derived from flux-tower measurements.
10. Timing of carbon uptake on eleven rangeland sites in the United States.
11. Diurnal and seasonal patterns in ecosystem carbon dioxide fluxes in a temperate grassland.
12. Nutrient cycling, limitation and global change: a synthesis of Jasper Ridge.

13. Spatio-temporal gradients of carbon stocks and fluxes in rangelands of the Rio de la Plata basin.
14. Managing carbon sources and sinks in Australia's rangelands and tropical savannas.
15. Conceptual models of grazing effects on carbon and nitrogen dynamics in rangelands.
16. Landscape distribution of soil organic carbon in Eurasian grasslands and its relation to snow cover and erosion.
17. Land-use influences carbon fluxes in northern Kazakhstan.
18. On the ability of the ORCHIDEE global vegetation model to simulate carbon and water fluxes of a southern Siberian steppe.

By providing a detailed analysis and synthesis of global carbon fluxes and the potential for rangeland inclusion into global carbon markets within a single peer-reviewed volume, the GL-CRSP 3G project takes a crucial step towards the recognition of the importance of rangelands to the global carbon budget. Furthermore, the incorporation of livestock producers and rangeland managers into the global carbon agenda will provide both the potential for improved rangeland management, as well as income generating possibilities for some of the world's most disadvantaged.

3G Funding for 2006-2007	
Total Core Funding	\$26,880
Total Cost Share	\$7,630