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News From The Jornada

The Jornada

Science-based Knowledge for Sustainability of Rangelands   Learn More

Editorial

Growing the USDA The Long-Term Agroecosystem Research (LTAR) network   Learn More

Research Results

Four Recently Published Papers   Learn More

News

Adaptive Monitoring in Support of Adaptive Management: Rangeland Special Issue
Mapping the Social Context of Agroecoregions   Learn More

Media

Opportunities and challenges of grass-finishing on desert pastures   Learn More

The Jornada

Science-based Knowledge for Sustainability of Rangelands

Our mission is to conduct long-term, collaborative research to sustain agriculture and other land uses in rangelands. Our research group is collaboration of the USDA Agricultural Research Service, New Mexico State University, and USDA Natural Resources Conservation Service in Las Cruces, New Mexico. We link site-based research on ecosystem change, innovative livestock production systems, and ecological restoration with national and global research on land health monitoring and decision support tools. We are a part of the USDA Long-Term Agroecosystem Research and Long-Term Ecological Research Networks. We host the USDA Southwest Climate Hub and collaborate with the Asombro Institute for Science Education. See Jornada website

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Editorial

Growing the USDA The Long-Term Agroecosystem Research (LTAR) network

by Brandon Bestelmeyer

Laboratories of the USDA Agricultural Research Service (ARS) and universities have been producing exceptional agricultural and ecosystem science for many years. Many of these accomplishments come from focused research over a period of several years. In the 1970s, long-term, place-based research became a priority with the recognition that many ecosystem processes could only be understood with multiple experiments conducted at the same research sites over decades. This led to the US Long-Term Ecological Research (LTER) Network which has been highly successful; the Jornada Basin LTER is celebrating its 40th year of operation this year. LTER has its roots in studying fundamental ecological processes in a variety of ecosystems. Understanding of ecosystem processes is necessary for ecosystem management, but it is not sufficient. The need for long-term, management-focused studies in "agroecosystems"—that are actively managed to provide a variety of ecosystem services—was inspired by the successes of LTER. Consequently, the USDA Long-Term Agroecosystem Research (LTAR) network was formed in 2012, including a program at the Jornada. The goal of LTAR is to create an infrastructure for research, education, and outreach to improve the capacity of farmers and ranchers to provide agricultural and ecosystem goods and services under changing conditions. Eighteen sites currently comprise the network, including 14 sites primarily managed by ARS, two sites co-managed by ARS and university partners, and two sites managed by universities or non-profit organizations. These sites were selected based on their long-term research capacities and to represent a diversity of agroecosystem types across the United States. While many ARS and non-ARS sites conduct long-term agricultural research, LTAR sites are expected to conduct research that is coordinated among sites and partnering institutions to provide a broad array of scientific information that can be extrapolated to regional and national levels. There are currently 21 coordinated site experiments and over 60 multi-site projects have been established to develop and test strategies that increase productivity and profitability of agriculture, reduce negative environmental impacts, and promote human well-being. While benefits of coordinated, long-term research for agricultural goals are becoming clear, it is also clear that more sites are needed in the network, as well as resources to engage more farmers, ranchers, and land managers directly in LTAR research. Please visit this website to learn more about LTAR.

<u>Research Results</u>

Four recently published papers are highlighted below. We constantly update our papers and abstracts--over 3,300 of them. To view papers go to [Jornada Bibliography](#).

Mechanisms and drivers of alternative shrubland states
Analyses of historical map data show that ecological transitions occur between shrub functional groups as well as from shrub to grass dominance. See the paper [here](#).

The genesis of the Jornada criollo cattle program
Scientists at the Jornada Experimental Range introduced Raramuri criollo genetics to the research herd about 15 years ago in an effort to capitalize on their ability to thrive in harsh landscapes of the Chihuahuan Desert. See the paper [here](#).

Measuring the social and ecological performance of agricultural innovations on rangelands: Progress and plans for an indicator framework in the LTAR network
We present a method for measuring outcomes of management innovations against site-specific benchmarks, which can be applied in grazinglands worldwide. See the paper [here](#).

Making research relevant: Sharing climate change research with rangeland advisors to transform results into drought resilience
Rangeland climate adaptation are more effective if they are tailored to local drought exposures, sensitivities, and adaptation opportunities. See the paper [here](#).
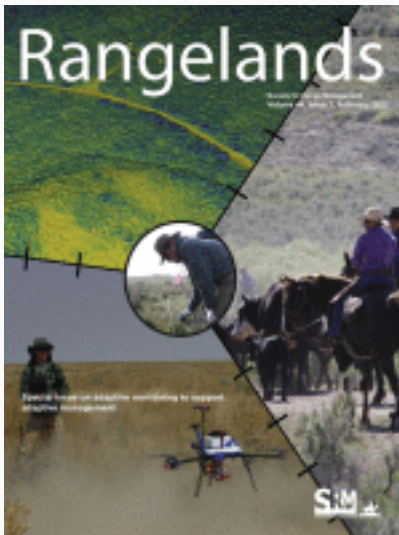
<u>News</u>

Adaptive Monitoring in Support of Adaptive Management: Rangeland Special Issue

by Jeff Herrick

Adaptive management provides a flexible and iterative framework for identifying and addressing rangeland management concerns. This framework defines and facilitates the crucial processes of learning about the condition of rangelands, understanding how those

conditions change in response to management actions, and revising management actions while considering new information and conditions. Rangeland monitoring is a key mechanism for learning about rangelands and supporting land management through time. Over the last several decades, scientists and resource managers have encouraged agencies, community groups, and operators to reevaluate their rangeland monitoring practices and to embrace contemporary ideals of standardization, statistical rigor and inference, and data management. New technologies provide emerging opportunities for gathering, analyzing, and delivering monitoring data to rangeland communities. As a result, there is increasing investment in coordinated national monitoring programs and elevated emphasis on multi-stakeholder monitoring. This special issue of *Rangelands,* guest edited by Jornada scientist Dr. Sarah McCord and Dr. David Pilliod at USGS examines the many aspects of contemporary monitoring to support adaptive management. The open access special issue brings together scientists and managers to take the next step in the ongoing dialogue about the value of current monitoring approaches and contemplating the future of rangeland monitoring. The goal is to prepare the next cohort of rangeland scientists and natural resource specialists for the future of adaptive management in our nation's rangelands through the collection, stewardship, and use of monitoring data. This special issue covers a variety of topics, including: (1) lessons from university and professional monitoring courses for teaching monitoring to the next generation; (2) opportunities for improving data quality in monitoring; (3) sample design tools to empower spatially balanced, survey designs; (4) strategies for incorporating meaningful qualitative assessments into monitoring protocols; (5) remote sensing products for aiding management decisions; (6) perspectives on leveraging vegetation monitoring data for wildlife habitat modeling and assessments; (7) ways to engage community-led monitoring; and (8) examples from successful place-based monitoring and national monitoring programs. See more here.

Mapping the Social Context of Agroecoregions

by Zachary Hurst

Mapping the types and locations of agroecoregions, or areas with similar combinations of ecological, production and social systems, is useful for understanding how communities and the landscapes within which they are embedded interact. However, previous descriptions of agroecoregions have not combined social and ecological systems, which has limited their usefulness for researchers. To help solve this problem, scientists from across the Long-term Agroecosystem Research Network (LTAR) are working in three teams (environment, production, and human dimensions) to describe and map agroecoregions across the continental United States. Ultimately the agroecoregions they identify will be incorporated into work, such as performance indicators and modelling, that LTAR is undertaking.

Zachary Hurst, a researcher at the Jornada Experimental Range, has been helping lead the team tasked with describing the social context of these regions. They are adapting a social ecological systems framework developed by Elinor Ostrom to help guide their efforts. Using this framework they searched for county-level data that could be used to characterize the Actors and Governance Systems of agroecosystems, from which they selected the most appropriate data. From these data, which were mostly from USDA and Census Bureau sources, ten attributes were used to group the counties into a range of between three and twenty different types. After looking at these results, the team selected seven types of counties as the best number to describe the human context of agroecoregions. These county types have some distinct regional patterns related to where they are found in the U.S. (Figure 1). The western, central, southeastern, and northeastern counties each have similar combinations of county types. These results are in the process of being combined with those of the ecological and production teams. The agroecoregions that result will help us learn more

about landscape processes in agricultural areas through time. For more information about this research, please contact Dr. Zachary Hurst (zachary.hurst@usda.gov).
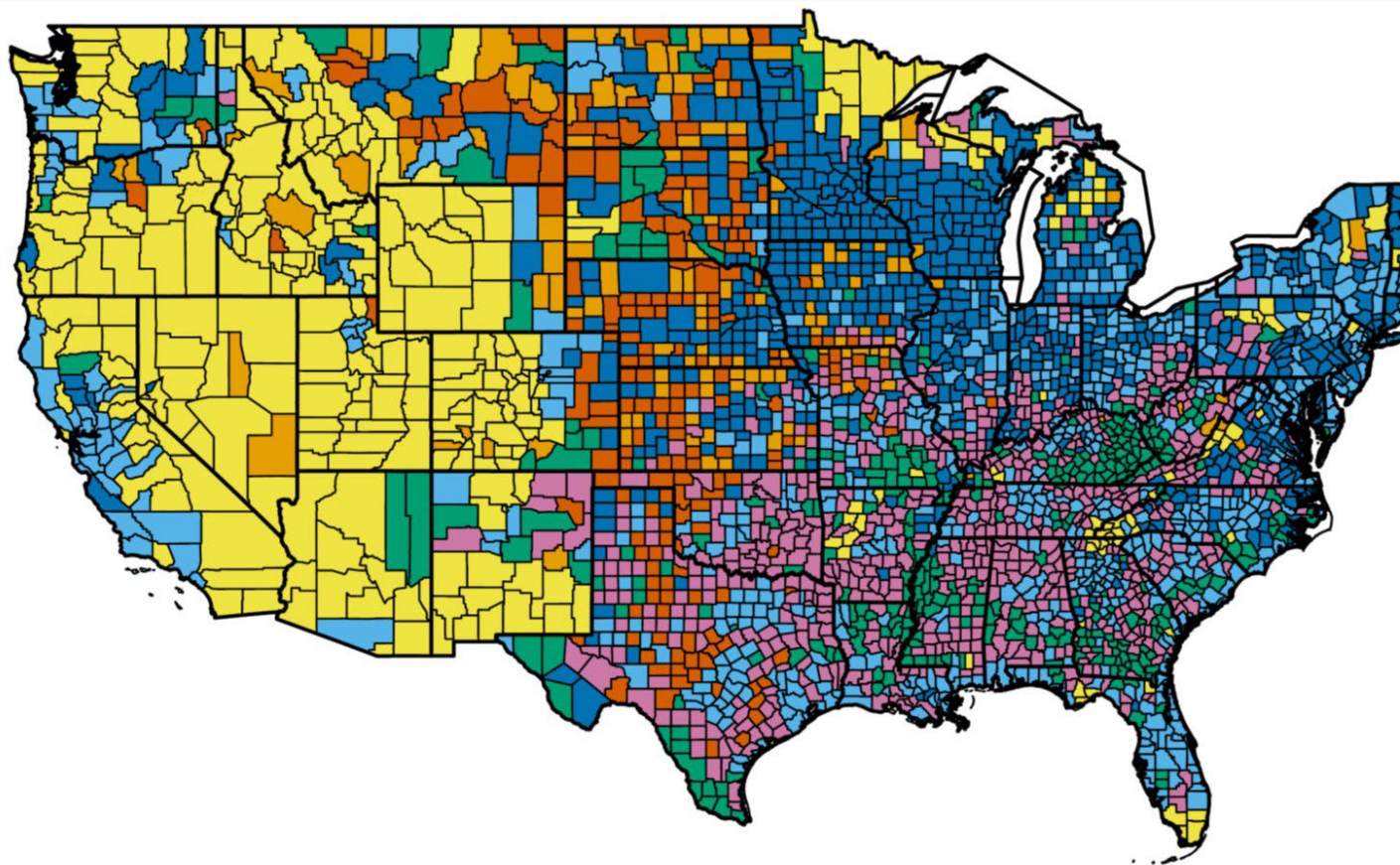

Figure 1. Map of the continental United States showing regional patterns in the seven types of counties used to describe the social context of agroecoregions.

Media

Opportunities and challenges of grass-finishing on desert pastures

by Skye Aney

Opportunities and Challenges of Grass-finishing on Desert Pastures

Skye Aney, Zach Hurst, Greg Torell, Emile Elias, Joel Cisneros, Ethan Wright, Glenn Duff, Craig Gifford, Brent Auvermann, Jean Steiner

This presentation is part of the Sustainable Southwest Beef project at NMSU and the Jornada, which is evaluating Raramuri Criollo cattle, precision technologies, and tradeoffs among beef supply chain options from pasture to plate to enhance ranch and rangeland resilience in the Southwestern US. The project engages ranchers, educators, and students in collaborative research and Extension to develop a decision support dashboard and train the next generation of researchers and producers.

See video here.