



A Workshop on Future Directions of Usable Science for Rangeland Sustainability

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On the Ground

- As funding for rangeland research becomes more difficult to secure, researchers and funding organizations must ensure that the information needs of public and private land managers are met.
- Usable science that involves the intended end users throughout the scientific enterprise and gives rise to improved outcomes and informed management on the ground should be emphasized.
- The SRR workshop on Future Directions of Usable Science for Rangeland Sustainability brought together university and agency researchers, public and private land managers and producers, non-governmental organizations, and representatives of funding agencies and organizations to initiate the process of charting a research agenda for future directions of usable science for rangeland sustainability.
- Workshop outcomes address issues and research questions for soil health, water, vegetation (plants), animals, and socio-economic aspects of rangeland sustainability.

Keywords: usable science, sustainable rangelands, soil health, water, socio-economic aspects, plants and animals.

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As funding for rangeland research becomes more difficult to secure, researchers and funding organizations must ensure that the information needs of public and private land managers are met. Coupled with rangeland research funding constraints are ever-expanding environmental, financial, and societal pressures on landowners and managers, as well as competing land uses and opportunities. Given these challenges, great value can be

gained by more closely aligning on-the-ground scientific information needs with topics being considered by university and agency rangeland researchers, and major research funding organizations. In an emerging era of budget constraints, usable science that involves the intended end users throughout the scientific enterprise and gives rise to improved outcomes on the ground should be highlighted. With this tenet in mind, the Sustainable Rangelands Roundtable (SRR), Consortium for Science, Policy and Outcomes at the Arizona State University, and the Samuel Roberts Noble Foundation partnered to convene a workshop of university and agency researchers, public and private land managers and producers, non-governmental organizations, and representatives of funding agencies and organizations in June 2014 to initiate the process of charting a research agenda for future directions of usable science for rangeland sustainability.

In the United States, rangelands cover over 300 million hectares, or one third of the country, mainly west of the 95th meridian. These lands provide commodity, amenity, and spiritual values¹ that are vital to the well-being of our Nation and must be managed for sustainability. Since its inception in 2001, SRR, a partnership of rangeland scientists and ecologists, policy and legal experts, sociologists, economists, environmental advocates, and industry supporters, has distilled five criteria and 64 indicators for assessing rangeland sustainability and evaluating emergent rangeland management issues and tradeoffs.² The criteria embody social, economic, and ecological factors:

- I: Conservation & Maintenance of Soil & Water Resources on Rangelands
- II: Conservation & Maintenance of Plant & Animal Resources on Rangelands
- III: Maintenance of Productive Capacity on Rangelands
- IV: Maintenance & Enhancement of Multiple Economic & Social Benefits for Current & Future Generations
- V: Legal, Institutional & Economic Framework for Rangeland Conservation & Sustainable Management

Table 1. Issues of importance to sustainable rangelands identified and ranked by the participants in the Workshop on Future Directions of Usable Science for Sustainable Rangelands.

Issues identified and ranked (highest priority to lowest)	Working group
Understanding and managing for variability (climate, drought, fire)	Socio Econ
Transfer of knowledge to land manager	Water
Proactive drought planning	Animals
Forward-looking drought predictors	Water
Increase support of rangeland programs and extension	Water
Proactive watershed management	Water
Understanding plant community adaptability/plasticity in the face of change	Vegetation
Core data sets that are shared	Vegetation
Understanding the importance of diversity	Vegetation
Understand and create incentives for improving land stewardship across bounding	Socio Econ
How to get "right" kinds of information to knowledge users in a form they can use	General
Improve mechanisms for communication/cooperation among diverse stakeholder groups	Vegetation
Landscape change in the face of increasing urban population	Vegetation
Understand role of fragmentation on important ecological processes	Vegetation
Match production system to resource	Animals
Protecting high-quality rangeland watershed (in contrast to mitigation/storage)	Water
Invasive species	Animals
Empower landowners with knowledge	Animals
Improve desirability and opportunity for new generations to make a living on the land	Socio Econ
Drought indicators that are more sensitive on a regional level	Water
Define and implement drought preparedness	Water
Better coordination among research projects	Water
Focus on multiple objective management	Vegetation
Consider full range of invasive species issues	Vegetation
Education/experience of next generation	Animals

Table 1 (continued)

Issues identified and ranked (highest priority to lowest)	Working group
Aligning incentives and outcomes	Animals
Multi-disciplinary, multi-focus research	Socio Econ
Ecological site description states/soil health states	Soil
Understand tradeoffs in forage quantity and quality and fuel load	Vegetation
Understand fire effects	Vegetation
Understand land managers' motivations (profit vs. lifestyle)	Socio Econ
Technological innovations in water management	Water
Tolls to encourage critical thinking about vegetation dynamics across scale	Vegetation
Learning from drought	Vegetation
Matching animals to the resource	Animals
Maintaining affordable water supplies from aquifers in the face of climate change	Socio Econ
Multiple stressors of water (climate change as additional stressor)	Water
Water and increased woody biomass issue (soil resources, wildlife habitat, production ag, watershed)	Water
Better adoption of water conservation policy (e.g., irrigation technology)	Water
Consider multiple scales	Vegetation
Building social capital to enhance adaptive management (trust, reciprocity, and networks)	Socio Econ
Encourage and promote the involvement of younger generations in agriculture	Socio Econ
Building management structure to encourage positive outcomes (incentives not regulations)	Water
Stocking rate flexibility	Animals
Education of non-ag community	Animals
Metrics of sustainability	Animals
Optimize resources: land/water/animals	Animals
Increase improved outreach education and advocacy	Socio Econ
Identify factors driving the motivations of extraordinary producers from a conservation perspective (above-average vs. average producer)	Socio Econ
Relevance of soil survey ESD	Soil

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