SRM Society for Range Management

Usable Science for Sustainable Rangelands: Conclusions

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On the Ground

- Producers and users of scientific knowledge working together can identify future research directions that will produce usable science to address the challenges of managing for sustainable rangelands.
- Matching the scale of science to the scale of management and ecological and physical processes was a prominent theme identified.
- Similar activities in other regions with participants from the energy sector, wildlife organizations, and recreation enthusiasts can provide additional research directions for sustainable rangelands.

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Bringing together ranchers, landowners, non-governmental organizations, scientists, and government agency managers and policymakers to discuss the concept of usable science was both a challenging and interesting opportunity. The workshop on Future Directions of Usable Science for Rangeland Sustainability (see Maczko et al. this issue) engaged producers and users of rangeland science to develop research questions for sustainable rangelands through a usable science approach. All of the workshop participants seemed dedicated to moving science for rangelands forward by helping define researchable questions that would be useful to the end users on rangelands. Discussions were lively, and everyone participated. The full record of the conference is available on the Sustainable Rangelands Roundtable website.[i] This special issue presents the major outcomes from those discussions, in the context of our current knowledge base. It is our hope that the information generated by workshop participants will offer guidance to research funding agencies and organizations as they develop future funding programs, as well as providing utility to producers and users of rangeland science in developing collaborative efforts to address the challenges facing the sustainability of rangelands.

[i] To read the Proceedings of the Workshop on the Future of Usable Science for Rangeland Sustainability, see http://sustainablerangelands.org/projects_usable_science.shtml.

Summary of Usable Science Research Questions

In this concluding paper, we summarize the main usable science research questions posed by the authors of the five previous articles in this issue on soil health (Table 1), water (Table 2), vegetation (Table 3), animals (Table 4), and social and economic (Table 5). We encourage you to read these preceding articles for the finer details and background on how these questions came to be deemed the most important.

In reviewing these recommendations, there are commonalities and overlap among the groups. For example, the vegetation group focused on landscape level analyses to elevate rangeland science to a new level. The water group similarly emphasized watershed level processes, while the socio-economic group highlighted understanding and creating incentives to improve stewardship across boundaries. Other groups also considered the scale of research and the need to better match it to the scale at which management decisions are made, as well as an appropriate scale on which ecological and physical processes occur.

The effect of various stressors such as fire, grazing, and climate change are identified by most of the groups. There is an emphasis on understanding management effects, both individual and synergistic, on the environment and associated ecosystem goods and services–and on the people who rely on them.

Communicating knowledge about rangelands and livestock was a theme explored by multiple groups. The socio-economic group identified the information needs of different audiences and the barriers and opportunities for information transfer to those audiences as a research focus. The animal group thought there was a need for a synthesis of and effective communication concerning environmental impacts of livestock on rangelands.

Table 1. Research questions identified by the soils group at the Usable Science for Sustainable Rangelands Workshop (see Derner et al. this issue).
How to characterize indicators of soil health for sensitivity to transitions/thresholds of state-and-transition models?
What are the influences of management practices, predicted climate change, and extreme events?
How is soil health affected by prescribed fires and wildfires?
What are the effects of conservation practices (e.g., prescribed grazing, prescribed fire, and brush management) on the chemical, physical, and biological components of soil health?
How can the chemical, physical, and biological components of soil health be enhanced through adaptive management to increase resilience of soils to weather variability and changing climate?
How can the tool kit be expanded to provide more robust and broad assessments of soil health and/or monitoring of the chemical, physical, and biological components for land managers in a timely and responsive manner to facilitate adaptive management?

Managing soil erosion on road restoration in the Tensleep Preserve, The Nature Conservancy in Wyoming. Photo by John Tanaka.

Table 2. Research questions identified by the water and watershed group at the Usable Science for Sustainable Rangelands Workshop (see Dobrowolski and Engle this issue).
How can we cultivate an awareness of the human and biophysical linkages within a rangeland watershed to develop foundational support necessary to achieve sustainable water use and management?
How do we define the threshold indicator values that tie levels of drought severity with appropriate responses to sustain production?
What are the linkages between rangeland drought management practices and ecosystem health, improved ecological monitoring, and technology adoption behavior?
Are drought management strategies such as 1) encouraging forage sharing; 2) promoting income diversification; and 3) diversifying from a cow/calf operation to both cow/calf and yearlings, among other strategies, going to be effective?
What policies impose obstacles to appropriate management of a rangeland watershed? How to effectively manage those obstacles and determine both intended and unintended consequences?
How can better ecosystem service valuation procedures be developed to assist managers, planners, and policy makers to understand that inherent soil, topography, or climatic restrictions limit rangeland suitability for intensive use, cropland conversion, or urban development?
What technologies can be developed to restore abandoned cropland back to productive rangeland, driven by aquifer depletion, drought, and climate change?