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Usable Socio-Economic Science for Rangelands

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On the Ground

- Because humans depend on rangelands for a wide variety of ecosystem goods and services, they have a large stake in research that explores supply and demand for those goods and services.
- Scientists and science users who ranked 142 separate rangeland issues chose a socio-economic concern as most pressing: How to help rural communities plan for, adapt to, and recover from impacts of increased social, economic, and ecological variability.
- Cross-jurisdictional stewardship is required to address many rangeland problems, so it is important to find ways to encourage and assist collaborative management efforts.
- Decision makers and citizens need better ways to sift through the conflicting claims and conclusions available from a growing number of information sources.
- Rangeland communities, and the land itself, require a steady supply of individuals who are both willing and able to choose careers in rangeland occupations.

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Humans depend on rangelands in more ways than many people realize. Just about anyone can tell you that rangelands provide forage for livestock and beef production, settings for hiking or off-highway vehicle experiences, and habitat for wildlife. Fewer may realize that rangelands supply the water used by most people in highly populated US western states such as Texas[1] and California,[2] or that most of the solar, wind, biofuels, and hydrocarbon-based energy in the United States is derived from facilities on rangelands.[3,4] In the states with the fastest-growing populations, rangelands are experiencing significant conversion to intensive agriculture and residential subdivisions.[5] It follows, then, that researchers increasingly must work to understand the numerous benefits that rangelands provide to meet human needs.

It also makes sense that because humans are dependent on rangelands for many ecosystem goods and services,[6,7] they have a major stake in the outcomes of research that explores the supply and demand for those goods and services. The term "usable science" describes science that meets the changing needs of decision makers at multiple scales, from the individual ranch to the nation as a whole.[8] It is difficult to imagine fields of study where it would be more critical to consult with decision makers when choosing research priorities than the social and economic sciences. This is reflected in results of an issue prioritization exercise conducted as part of a workshop on Future Directions for Usable Science for Rangeland Sustainability, held from 2 to 5 June 2014, in Ardmore, OK (see Maczko et al. of this issue). When participants ranked 142 identified issues proposed by five working groups (water, animals, vegetation, soils, and socio-economics), the No. 1 ranked issue overall came out of the Socio-Economics Working Group: understanding and managing for variability (climate, drought, fire), adaptation, and recovery. Clearly this is a critical issue for rangeland decision makers but is also an extraordinarily broad topic that could generate an almost unlimited number of researchable questions. Our principal challenge as members of the Socio-Economics Working Group was to identify questions that could yield the information most desired by decision makers, and that could be defined clearly enough so that high-quality research would be feasible.

No single field of study encompasses the term *socioeconomics*. Our working group included both users (decision makers) and producers of research, with backgrounds in resource economics, applied social science, and rangeland ecology. As interdisciplinary applied scientists, we are experienced at thinking across disciplinary boundaries. Even so, we found that formulating focused research questions within this topical area was challenging. As noted previously, the issues the group identified initially were very broad. There was not enough time to identify research questions that could cover all the various facets of an identified issue. For that reason the questions we settled upon might be best described as research programs that could cover a number of individual research projects over a period of years.

A second challenge, which may be especially applicable to socioeconomic research, is that the answers our stakeholders desired were not always ones that could flow from scientific study. For example, when discussion focused on getting the right sorts of information to knowledgeable users in an accessible form, among the first questions raised was, "How can we make sure the public hears the truth about agricultural production when there are so many groups out there spreading biased or false information?" For most scientists, this question is fraught with untested assumptions, including that the person who asks it knows the "truth" and that other groups are "biased." Instead, most scientists are focused on producing testable, scientific information that can be used to inform decisions. Some social scientists do study persuasion, but their work tends to focus on the psychological processes and factors that lead people to heed a message and act upon it, or on identifying factors that influence how different audiences might respond to the same information.

For that reason it took us a while to agree upon a researchable problem related to this suggestion, which was: What are the rangeland information needs of different audiences, and what are the barriers and opportunities for information transfer to those various audiences? Such a research agenda would not try to suggest what people *should* know – that is a normative judgment, the purview of policy rather than science. Instead, it would identify what sorts of information each audience seeks and compare it to information the members of that audience tend to possess. Then it would identify factors preventing the audience from getting the information it seeks (e.g., communicators don't provide it, or they do provide it but not in a form that's useful to that audience), as well as opportunities for lowering those barriers to information flow.

Despite those caveats, our group was able to identify 30 socioeconomic issues that the research producers and consumers agreed were worthy of pursuing research. Prioritization by the participants in the entire workshop identified four socioeconomic issues of greatest concern, which our working group then explored in depth. These were:

- Understanding and managing for variability (climate, drought, fire), adaptation, and recovery (No. 1 on the overall list of 142 issues);
- Understanding and creating incentives to improve stewardship across boundaries (No. 10);
- Getting the right kinds of information to knowledge users in a form they can use (No. 11);
- Attracting new generations to make a living in rangeland agriculture and associated environmental fields (No. 19).

Research Questions to Address High-Priority Issues

How do rural communities best prepare for, adapt to, and/or recover from impacts of increased environmental and socio-economic variability?

Rangelands today, and the communities that depend on them, are changing in ways that have no historic precedent. Climate change, expansion of renewable energy facilities, and rapid growth of urban and suburban areas (Fig. 1) are just some of the environmental and socioeconomic processes that can demand responses from rangeland decision makers from the ranch scale to the national scale. Often the best policy solutions come when decision makers can review results of past successes or failures. If there are no prior models for comparison, insights from new or existing scientific research can be the best substitute. For example, researchers have explored why some communities in the Southwest recovered after catastrophic wildfire more quickly than others.[9] Scientists could provide insight for decision makers by exploring the implications of that research for understanding recovery for communities devastated by unprecedented drought. Other research might explore factors that enhance or restrict social resilience in rural communities undergoing rapid growth due to new industries, or compare strategies employed by communities to prepare for unprecedented change.

Figure 1. The rapid growth of exurban subdivisions such as this one near Cedar Fort, Utah, is just one of several unprecedented changes confronting rangeland decision makers. (Photo courtesy Mark Brunson).