

# Economic and Social Impact Assessment of Ranching on Public Lands: A Guide to Concepts, Methods, and Applications

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## Abstract

In the American West, rural communities often experience direct social and economic impacts related to policy changes affecting livestock grazing on federal public lands. Local economies and social structures (e.g., personal and professional networks among community members) remain tied to expenditures from livestock producers in ways that affect the overall well-being of a community. Resident and non-resident users of public lands also benefit from other aspects of working landscapes, such as open space that supports wildlife habitat and rural lifestyles and livelihoods. Social impacts associated with federal lands grazing also include ways communities experience governance through contemporary patterns of litigation and collaboration. For communities facing natural resource management challenges, social and economic issues are often co-analyzed. This manuscript combines insights from economic and social impact assessments to guide their implementation for public lands and rangelands management. After reviewing examples of common concepts, methods, and applications for regional economic analyses and social impact assessments, we present a case study from Owyhee County, Idaho to elaborate on examples of sociological impacts from changes to public lands management policy. Opportunities for management and research on economic and social impact assessments are briefly discussed.

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## Key Points

- ▶ Economic and social impact assessments are critical tools for modeling or documenting a proposed change to management or policy that may enable or constrain economic and social activity with direct and indirect impacts to rural communities and rangelands.
- ▶ It is not possible to accurately predict how many ranchers a federal grazing policy could force out of business, though the question is often asked. The best alternative may be to provide a range of economic impact estimates based on the specified scenarios.
- ▶ In addition to direct economic impacts to livestock production, policy changes that affect ranching operations can indirectly affect the landscape and other regional economic sectors that depend on it.
- ▶ Analyses of the social fabric and structures within rural communities across the western United States require additional scope of work that is relevant to, but absent from, environmental impact assessments.
- ▶ Identifying and measuring social impacts at household and community levels remains a challenge to including social impact assessments for rangeland management.
- ▶ Interdisciplinary frameworks representing socio-economic and ecological processes are critical for supporting analysis and interpretation of stakeholder perceptions of environmental change when these stakeholders’ livelihoods depend on that changing environment.

## Introduction

An economic impact analysis considers the effect of an event on the economy in a specific region, ranging from an individual county or subcounty area to a state or multi-state region. The analysis may consider the impacts of a new policy or project to a specific industry within a region, plus secondary effects on other sectors in the economy that are linked to the affected industry. For public lands, an economic impact analysis is often conducted because there is concern about the potential impacts of a proposed policy on livestock production in relation to the region's economy. Such economic impacts are typically measured in terms of changes in output, employment, and labor income.

A social impact assessment considers the effect of an event on society in terms of the physical and/or psychological change experienced by people, ranging from individual members to household, community, and county-levels or even broader geographic scales. Historically, social impact assessments used secondary data to predict changes resulting from a new policy. For example, projections for a new project might include a slight population increase as temporary workers move into a community near the project location. However, a change in population is just that – a social change process spurred by a new project – while social impacts from a change in population spurred by a new project might include a shortage of housing or a loss of community cohesion (Vanclay 2002). Recently, approaches to social impact assessments have shifted from predictions of change toward processes of community engagement for on-going assessment, management, and monitoring (Esteves et al. 2012). Goals for social impact assessments can include anticipating the consequences of projects and policies (Freudenburg 1986), or empowering people to deliberate their options for response to change (Esteves et al. 2012), or preventing, managing, and resolving conflict (Prenzel & Vanclay 2014). In any case, social impact assessments draw connections between an intervention like a new project or policy, how such an intervention spurs change in processes of society, and how people experience those changes as impacts to their well-being and quality of life.

## Community-Level Policy Impact Analysis

The economic and social impacts of federal management decisions regarding livestock grazing extend beyond livestock producers to the businesses and individuals living in the surrounding communities. In many communities in the western U.S., livestock-related businesses such as feed stores, veterinarians, and equipment dealers, as well as main street businesses, are dependent on and provide services to ranching operations in their vicinity. These links mean that livestock production generates jobs and income not only in the agricultural sector but also in other sectors in the local economy that support livestock production. Beyond jobs and income, the lands associated with ranching also contribute to the quality of life and enjoyment for many area residents and visitors by supporting open space, wildlife habitat, working landscapes, and rural lifestyles. Economic and social impact assessments are critical tools for modeling or documenting a proposed change to management or policy that may enable or constrain economic and social activity with direct and indirect impacts to rural communities and rangelands.

In the following sections, we describe how regional economic linkages and impacts are measured with regional impact assessment tools. We then describe resource amenities commonly associated with ranchlands and often considered in regional economic impact analyses.

## *Regional Economic Impact Analysis*

Economic impact analyses help us understand how various sectors and industries contribute to a region's overall economy. The region can range from an individual county to the entire country. Economic impact is usually measured in terms of changes in economic growth and associated changes in jobs (employment) and income (wages and salaries). To provide a more complete picture of the total economic contribution of an industry, economic impact analyses consider the direct employment and income effects associated with a given economic activity, as well as the secondary employment and income effects resulting from the economic linkages of other economic sectors in the region. Secondary impacts occur because business activities in a region

generally have economic implications beyond their direct effects within a particular industry. This is referred to as the “multiplier” effect.

Multiplier effects occur because local businesses, households, and institutions purchase goods and services from each other. The initial purchase stimulates interactions and creates secondary economic activity in the local economy through re-spending of the original dollars of sales minus the portion of those dollars that leave the local economy. For example, very few of the dollars associated with machinery or equipment purchases are typically retained in the local economy since most of those dollars flow to the location of the manufacturer. By considering the multiplier effect it is possible to estimate the total economic impact of a change within a particular industry on a regional economy.

A multiplier is a single number that summarizes total direct and secondary re-spending impacts from a change within a particular industry. In other words, a multiplier can be thought of as the number of times a dollar is re-spent within a region during a specific time frame. There are many different types of multipliers, including output, income, and employment. Most multipliers are estimated as follows:

$$\text{Multiplier} = \frac{\text{Total Change}}{\text{Initial Change}}$$

The multiplier can vary substantially from barely more than one up to more than two digits depending on many factors, such as the size of the local economy and the amount of local inputs used by an industry. However, output multipliers of three or more are considered large for state-level economies and even more so for county or city economies (Beattie & Leones, 1993). For example, the 2011 IMPact analysis for PLANning (IMPLAN; <http://implan.com/V4/Index.php>) output multipliers for the State of Wyoming range from 1.08 to 2.96 with the average multiplier being 1.44. In general, the size of the multiplier for an individual industry will decrease as the size of the region being considered decreases because there are fewer opportunities for economic interactions. In most cases, large multipliers like 8 or 10 should be viewed with caution since they typically represent the turnover of some portion of the original dollars in the

local economy rather than the actual secondary economic impacts.

The first step in an economic impact analysis is to determine the relevant geographic area for the analysis. This involves determining the location of the direct impacts and the location of the major secondary impacts associated with the economic activity being analyzed. The region analyzed should be large enough to include both types of impacts. However, the decision regarding the relevant geographic area also involves a tradeoff. On one hand, the broader the geographic area included in the analysis, the greater the potential for secondary impacts to occur and the larger the estimated secondary economic impacts. On the other hand, expanding the region of analysis may mask the relative importance of an economic activity to a particular region.

One modeling system commonly used for economic impact analysis is IMPLAN, which provides economic resolution down to the county level (<http://implan.com>). By constructing Social Accounts that describe the structure and function of a specific economy, IMPLAN creates a localized model to investigate the consequences of projected economic activity in a specific geographic region. IMPLAN is often used for economic impact analysis because it is readily available for any county in the United States, it is very detailed (536 sectoring scheme), it is easy to adjust to more accurately reflect the structure of local industries, and it is relatively inexpensive.

Despite the level of detail found in IMPLAN models, there are some limitations in applying the models to livestock production. Although sector 11 in IMPLAN models is labeled “Cattle Ranching and Farming”, it actually combines beef cattle ranching and farming, cattle feedlots, and dual-purpose operations raising cattle for both milking and meat production. Another limitation in IMPLAN models is the lack of a specific hay sector. Hay is a major input in livestock production in many regions of the country, but hay in IMPLAN is part of sector 10: “All Other Crop Farming”. Sector 10 includes hay farming, peanut farming, and all other miscellaneous crop farming (except algae, seaweed, and other plant aquaculture). Due to the aggregation bias associated with both sectors 10 and

11 in IMPLAN, it is desirable to modify these sectors to better represent the economic impact of livestock production in a region. One method to accomplish this is to use livestock and hay enterprise budgets for the region to recalibrate these sectors in the IMPLAN model. Detailed discussion of how to incorporate enterprise budgets into IMPLAN can be found in Coupal and Holland (1995) and Fadali et al. (2012). Some western Land Grant University departments, often in Agricultural or Resource Economics (e.g., <http://web.cals.uidaho.edu/idahoagbiz>) continue to maintain extensive suites of livestock and crop enterprise budgets that can be used for ranch level impact analysis and to recalibrate IMPLAN models.

Another consideration in calibrating regional models for livestock production is the variability in livestock prices. Table 1 summarizes cow-calf production gross returns per cow for the Basin-Range region of the U.S. from 1996 to 2017 (USDA-ERS, 2018). The table indicates that nominal gross returns per cow have ranged from a low of \$378 in 1996 to a high of \$1,076 in 2014. Just in the last three years gross returns have ranged from \$705 per brood cow in 2016 to \$1,016 per brood cow in 2015. Since policy issues associated with the management of natural resources are often based on projections into the future, it may be desirable to use average livestock prices in an economic impact analysis to avoid arbitrarily selecting a low or high year for livestock prices.

Once an appropriately specified regional model is in place, the next step is to incorporate the ranch-level production responses to changes in federal grazing policy to estimate the economic impact on the overall economy in the region. Predicting the adjustments that the typical livestock producer will make as a result of a policy change is challenging. Because of this uncertainty in production responses, it may be necessary to consider more than one production response scenario in the economic impact analysis.

One possible scenario might be the average animal unit month (AUM) scenario. Under this scenario, the change in livestock grazing policy would be reflected in a simple addition or subtraction to livestock production based on the change in AUMs of grazing on federal lands. Because of its simplicity, this

approach is commonly used in estimating the economic impact of livestock grazing.

**Table 1.** Cow-calf production gross returns per cow for the Basin-Range region of the U.S. from 1996 to 2017<sup>1</sup>

Year	Gross Returns	
	\$/Cow	% Change
1996	\$378	
1997	\$489	29.4%
1998	\$478	-2.3%
1999	\$512	7.1%
2000	\$578	12.9%
2001	\$582	0.7%
2002	\$534	-8.3%
2003	\$609	14.0%
2004	\$706	15.9%
2005	\$752	6.5%
2006	\$720	-4.3%
2007	\$682	-5.3%
2008	\$496	-27.3%
2009	\$472	-4.8%
2010	\$571	21.0%
2011	\$649	13.7%
2012	\$745	14.8%
2013	\$781	4.8%
2014	\$1,076	37.8%
2015	\$1,016	-5.6%
2016	\$705	-30.6%
2017	\$710	0.7%

<sup>1</sup>Data from the USDA-Economic Research Service.

A problem with the average AUM scenario is that federal grazing is not typically used in isolation but rather as part of an individual ranch's overall grazing operation. If a ranch is seasonally dependent on federal grazing, as is the case for many western ranches in northern climates, a reduction in federal AUMs can create forage imbalances that produce greater reductions in grazing capacities than just the change in federal AUMs. This suggests that a production scenario based on the changes in the overall ranch production results from a change in federal grazing policy and would be an appropriate scenario to consider in the economic impact analysis. This scenario requires that the ranch-level analysis

discussed in Torell et al. (2014) be conducted to determine the potential changes in overall ranch production. These changes can then be incorporated into the economic impact analysis.

Several studies, including Torell et al. (2002), Rimbey et al. (2003), Taylor (2004), and Teylor et al. (2005), have shown that reductions in federal grazing not only reduce production but can reduce ranch profitability to the point that some levels of reductions may result in sustained negative profitability. For example, Rimbey et al. (2003) found that a 100 percent reduction of Bureau of Land Management (BLM) AUMs in the Marsing Ranch Model caused average annual net cash income to decline from \$21,234 to -\$13,958. Sustained negative ranch profitability suggests that another possible scenario for some federal grazing policy changes may be an economic viability scenario where the entire ranch operation is no longer economically viable without federal grazing and the ranching operation goes out of business. Incorporating this scenario into the economic impact analysis significantly increases the estimated loss to the region's economy from reductions in federal grazing.

Which of these possible scenarios is most relevant for the economic impact analysis depends on variables including: 1) level of ranch dependency on federal grazing; 2) magnitude of change in federal grazing; 3) outside financial resources of the ranch; 4) availability of alternative forage sources; and, 5) the rancher's commitment to continue ranching. These variables are difficult to generalize to individual ranches. As noted in Torell et al. (2014), predicting the adjustments that the typical livestock producer will make to a change in federal grazing policy is challenging. Thus, as was also previously noted, it may not be possible to accurately predict how many ranchers a particular federal grazing policy could force out of business, although that question is often asked. The best alternative may be to provide a range of economic impact estimates based on the three scenarios discussed above.

### **Resource Amenities**

In addition to direct economic impacts to livestock production, policy changes that affect ranching

operations can indirectly affect the landscape and other regional economic sectors that depend on it. In this section, we review resource amenities commonly associated with ranchlands and often considered in regional economic impact analyses.

Due to the intermingled nature of landownership in the western U.S., the management of federal grazing affects a significant amount of private land in the West. Gentener and Tanaka (2002) estimated there were 43.5 million hectares (107.5 million acres) of private land that have been used in association with federal grazing in the eleven western states. The undeveloped nature of private ranchlands and their location in valleys and along riparian areas contribute to the value of these lands in terms of protection of biodiversity (Maestas et al., 2003). Working landscapes can support important natural resource amenities such as open space for rural communities. Open space, or the absence of dense infrastructure development and sprawl, is beneficial to rural lifestyles and wildlife habitat that are valued by residents and visitors. Open space is particularly important because it determines the character of the landscapes surrounding a community. Out of economic necessity, most agricultural operations in the West cover large areas of land; as a result, agriculture can contribute substantially to maintaining open spaces on private lands in a region (Taylor, 2003). This may be especially important in areas where a substantial number of residents commute to jobs outside the county.

Because of the natural resource amenities associated with ranchland, there is often widespread public support for the retention of lands in ranching. For example, a survey sponsored by the Wyoming Stock Growers Association, the Nature Conservancy, and the University of Wyoming (Hulme et al., 2008) found nearly three-fourths of state residents felt they personally benefit from the presence of farms and ranches in Wyoming. In addition, nearly 60% of respondents were concerned about the availability of water for farming and ranching in Wyoming, and nearly 50 % were concerned with the loss of family farms and ranches in the State. The concerns regarding agricultural water and retaining family farms and ranches ranked 3rd and 5th out of seventeen possible concerns facing Wyoming

residents. In a similar study conducted in Idaho in 2010 (Kane et al., 2010), two-thirds of respondents indicated a belief that economic contributions of the livestock industry in Idaho would either be maintained at current levels or increase over the next ten years.

There have been only a few efforts to quantify the values of ranchland amenities to residents and visitors in the West. Studies by Mafnan and colleagues (2005) found that the natural environment, ranchlands, and western historical preservation were the three most important contributors to local quality of life in Routt County, Colorado. The analysis indicated that the value of ranchlands to current Routt County residents is likely to be \$20-\$30 million. Ellingson et al. (2006) found that the natural environment, ranchland open space, western historical preservation, and recreational amenities are local assets that strongly add to the summer visitors' experience in Routt County. The analysis indicated that 50% of Routt County's summer tourists would reduce their expenditures and time spent in the area if existing ranchlands were converted to urban uses. This reduction would cost the county about \$8 million per year in lost direct revenue. Oren and Seidle (2004) found that public open space and private working landscapes of Gunnison, Colorado contribute to the quality of winter tourism in the area. Their analysis indicates that wholesale conversion of local ranchland to tourism infrastructure and second homes may reduce winter tourism by as much as 40%. The impact of such a change, more than a decade ago, could reach a loss of \$14 million dollars and 350 jobs per year. While these economic estimates are not necessarily directly transferable to all locales, they do suggest that there may be significant amenity values associated with ranchlands in other regions.

As a result of development pressures from an expanding population base in the West, there are concerns about the retention of ranchlands as working landscapes. The American Farmland Trust (2002) identified 8.7 million hectares (25.1 million acres) of prime ranchland in the seven Rocky Mountain States that could be converted to residential development by 2020. They defined prime ranchland as agricultural lands with desirable wildlife characteristics including: 1) low rural development

densities; 2) proximity to publicly-owned lands; 3) year-round water availability; 4) mixed grass and tree cover; and, 5) a high variety of vegetation classes. While there was potential for conversion in all seven Rocky Mountain States, Idaho and Montana contained the greatest amount of ranchland that could potentially be converted to urban and exurban developed landscapes (over 2 million hectares [5 million acres] each).

Not all the concerns regarding retention of ranchlands are hypothetical. Travis et al. (2003) found that one-half of the ten counties in the Greater Yellowstone Ecosystem saw at least 25 percent of their large ranches change ownership in just eleven years (1990-2001). Traditional ranchers bought only 26% of these ranches. Although the other 74 percent of the ranches were not necessarily converted to residential development, the authors do note that this trend may lead to instability in the land tenure for ranchlands in the region. Similar patterns of changes in land tenure may be occurring in other parts of the Rocky Mountain Region.

## Social Impact Assessment

### *Principles and Steps*

Like economic impacts within ranching communities, rangeland management also needs to account for the social impacts of projects and policies to rural communities. Social impact assessment (SIA; also frequently termed socio-economic impact analysis) emerged in the 1970s in part as a response to emerging environmental legislation mandating consideration of human communities with respect to resource management decisions (Cramer et al., 1980; Freudenburg, 1986). Although these requirements exist, analyses of the social fabric and structures within rural communities across the western United States require additional scope of work that is relevant to, but absent from, environmental impact assessments. In this context, the frameworks and field of research for SIA shifted from predictive to policy-oriented social research, and core principles and best practices emerged from discussions among scholars and practitioners. Vanclay (2006) compared U.S. and international interpretations of SIA and noted a shift away from guidelines and principles emphasizing the

mitigation of negative impacts and toward principles emphasizing improved livelihoods and well-being.

While there exists a range of paradigms and purposes for conducting social impact assessments, those that address environmental change in rangelands and public lands contexts typically inform environmental impact statements (EIS). The National Environmental Policy Act (NEPA 1969), as amended, requires an assessment of environmental (i.e., ecological and socio-economic) impacts in response to proposed changes on public lands or to public lands management plans. Specifically, Title I, Sec. 101 states:

“it is the continuing policy of the Federal Government, in cooperation with State and local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.”

Sec. 102(A) states that the Federal government shall:

“utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decision making which may have an impact on man’s environment.”

Sec. 102(B) states that the Federal government shall:

“identify and develop methods and procedures, in consultation with the Council on Environmental Quality established by title II of this Act, which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decision making along with economic and technical considerations.”

A routine first step in SIA is to scope the issue(s) and document baseline perceptions of the environmental status quo. Becker (2001) refers to this step as the “initial phase” of social impact assessment project. Following initial scoping and baseline analyses, the “main phase” of a social impact assessment typically involves the creation of hypothetical scenarios for

future visioning exercises, the design of response strategies or management alternatives, an assessment of impacts, and planning for the mitigation of negative impacts (Becker 2001). A social impact assessment project that aligns more with a participatory paradigm would take this phase further by facilitating a deliberation of potential adaptive strategies and by assessing both positive and negative impacts. By adapting this methodology with more participatory exercises, agencies can supplement traditional approaches to issue-scoping while possibly improving the agency’s role in community engagement and empowerment (e.g., Bentley Brymer et al. 2016). These differences across paradigms and in practice, along with the history of the social impact assessment field, are thoroughly reviewed by Esteves et al. (2012) in *Impacts Assessment and Project Appraisals*, a journal for social impact assessment scholars and practitioners. An additional general resource to consider in this realm was generated by federal agency practitioners (National Marine Fisheries Service, 2014).

### **Social Context**

The principles and steps of social impact assessment described above are useful for public lands and natural resource management contexts in which communities rely on the landscape and natural resources for their livelihoods. Understanding social context is critical for effective social impact assessment and analysis. The next section outlines a framework for understanding the social context of rangelands management that relates to how households and communities manage the natural resources they use and rely on for livelihoods. We address three categories of context: 1) adaptation; 2) landscape scale and social structures; and, 3) sociological impacts, often considered non-market aspects of decision-making.

### **Adaptation**

Public rangelands (and many private rangelands) remain subject to multiple-use impacts from a variety of sources such as natural resource extraction, motorized and non-motorized recreation, policies and governance such as species regulation (e.g., the Endangered Species Act), and grazing from wildlife



and livestock. Each of these broad areas has some relation to assessing the social impacts associated with rural households and communities still substantially tied to ranching through cultural and economic connections. In the western United States, ranching relies on a mix of integrated public and private lands to distribute forage consumption across seasonal dimensions. By definition, this integrated access of forage on private and public lands puts operators in the position of social and political negotiations over access and resource management rights (e.g., grazing permits, stocking rates, management options) with state and federal resource management agencies, as well as public lands interest groups. Thus, measuring social adaptation to change and threats to operators' livelihoods connects to an array of governance contexts such as regulatory constraints, the contemporary pattern of litigation and collaboration, and trends of public and political attitudes affecting legislative structures.

Although previous analyses have broached social (or socio-economic) impacts related to rangelands management (Huntsinger et al., 1997; Brunson & Shindler, 2004; Sayre, 2004; Sheridan, 2007), social impact analyses for public lands and rangelands contexts remain relatively few. This gap highlights a limited understanding as to how and why ranching communities function, especially considering shifting economic models that demonstrate non-economic reasons why ranchers may continue their production livelihoods. However, despite the historical gaps in sociological analyses for rangelands research, human behaviors need to be assessed in relation to how they affect ecological goods and services like water quality and soil organic carbon storage. Tanaka et al. (2011) articulated a variety of related social and economic factors affecting ecosystem services on rangelands (e.g., quality-of-life factors, collaboration factors, community stability) and emphasized the need to incorporate non-market valuation into impact assessments.

Social impacts associated with rangelands management and policy can be perceived and experienced by the general population, the sub-population of livestock producers and land/resource managers, and other stakeholders. Because many of the impacts that are experienced at household and

community levels are slow to emerge and not immediately apparent, they are not always directly attributed to specific management actions and policies. Thus, the nature of some social impacts requires longitudinal monitoring and analysis. Considering such lags between cause and effect in time and space for rural households and communities will improve social impact assessments for rangelands management at multiple scales. Important academic literature that can explain more about theoretical background for these concepts includes Collins et al. (2010).

Social impact analyses also need to consider different capitals (e.g., natural, human, financial) that affect and exist within communities (see Emery & Flora, 2006). Relevant approaches have occurred in the past decade, such as:

- Strategies for adapting rural livelihoods to weather and climate risks, and the effects of sharing local knowledge through participatory mapping activities (Valdivia et al., 2010);
- Development of needs assessments in anticipation of large-scale change (e.g., restoration needs for grasslands and shrublands facing increasingly variable climate; Finch, 2012), with a call to develop similar needs assessments for rural communities facing changes to rangelands management with social impacts (e.g., affecting community and social cohesion);
- Disaster readiness and community stability (or, 'resilience') for response to environmental disturbance (Norris et al., 2008); and
- Identification of frameworks for effective partnerships and continuous learning within complex systems such as rangelands (Boyd & Svejcar, 2009; Briske, 2011).

Many of these concepts have not been fully applied to rangeland management contexts beyond case study analyses. Other useful examples exist to illustrate how specific applications, such as social vulnerability analyses, may provide useful analytical insights into rangelands systems (Alessa & Kliskey, 2012).

### **Landscape Scale and Social Structures**

Diaz et al. (2011) made the compelling case for the importance of including social impact analyses that affect or influence large-scale resources. Landscape-

scale management includes not only ecological assessment, but also the extent to which actors work across scales to strategically affect focused areas or larger regions, depending on their objective(s). A broadening of scale for the social components of rangeland management puts policies and resource management decisions in very different contexts compared to earlier eras. Critical social structures to consider in relation to a landscape scale include modern modes of information transfer, the dislocation between place and effect within legal and political structures, and strategies attacking the cultural dimensions of ranching heritage as an unsustainable lifestyle (Brunson & Huntsinger, 2008).

Other analyses have demonstrated the need to integrate social impact data with ecologically-based data (Donovan et al., 2009), and the value of doing so, such as the need for greater integration between ecological and social scales with respect to resource management. As illustrated within a large-scale, long-term project focused on wildfire effects in the Great Basin, encroachment effects such as exurban development can also change the scale at which social effects ought to be considered within rangeland management contexts (see Brunson & Tanaka, 2011). And, as illustrated by analyses in Huntsinger et al. (2012), issues such as wildlife-livestock interactions have begun affecting management decision-making at broader scales in different regions, but with related policy implications at scales critical to rangeland management. In these examples, increased scale of analysis needs to begin to better match household-to-landscape scale effects and include sociological dimensions related to the measurement of social and community well-being integrally tied to resource management (Wilkinson, 1991).

### **Sociological Impacts**

One of the more challenging aspects of including social impact analyses of rangeland management remains identifying, measuring, and assessing sociological impacts in households and communities. The challenges lie not with the ability to document the impacts, but rather in knowing the extent and form that the impacts may take in the wider array of effects experienced within the human community. This type of challenge is one of the key reasons why it

remains difficult to quantify some dimensions of effects and impacts that may lie outside economic modeling which often assumes market-based valuation of goods, services, and outcomes. In the next section, we will use Owyhee County, Idaho as a case study area with examples of social context and impacts from policy, specifically issues with maintaining trust and sense of place.

### **Owyhee County Case Study**

It is important to recognize how much relative rapid social change has occurred in the area in recent decades. First, we have summarized some basic aspects of the economic and land-based profile for the County.

The Owyhee County Natural Resource Plan (2009) indicated that of the 4.9 million acres in Owyhee County, 76% is federal land (almost all Bureau of Land Management), 17% is privately owned, and 7% is state land. Of the 241,484 hectares (596,721 acres) of private land in Owyhee County, the majority is taxed as ranchland (personal communication with Owyhee County Assessor, 12/13/2018). Thus, what happens to ranchland has important implications for private land use in the county. In terms of ranching and beef production, 2018 Idaho Agricultural Statistics (USDA-NASS, 2018) indicated that the January 1, 2018 beef cow inventory for Owyhee County was 48,000 head. This was the largest beef cow inventory in any of Idaho's counties and was 42% larger than the second largest beef cow inventories in the state, Lemhi and Twin Falls Counties (28,000 head).

The prevalence of federal lands in the county means that the implications for private agricultural lands from the management of federal grazing are particularly important in Owyhee County. The 1997 Census of Agriculture (USDA, 1997) for Idaho indicated that there were 122 ranches in Owyhee County that held grazing permits, with 71 percent of these being federal permits and the rest being state land leases. The 122 ranches accounted for 215,196 hectares (531,762 acres) of land in agriculture, which was 71 percent of the total land in agriculture in the county. Thus, most of agricultural land in the county could possibly be affected by changes in federal grazing management.

Agriculture generates significant economic activity in Owyhee County. Data from the U.S. Department of Commerce's Bureau of Economic analysis (2018) indicates that gross agricultural income for Owyhee County was \$290 million in 2017. Of this total, 72 percent came from livestock production including ranching and dairy, 22 percent from crop production, and 6 percent from other income sources including government payments and miscellaneous revenue such as custom work income.

The economic activity associated with agriculture in Owyhee County supports jobs and income in the county. Data from the U.S. Department of Commerce's U.S. Department of Commerce (2018) indicates that there were 1,407 agricultural jobs in the county in 2017. This represented 30% of the total jobs and 35 % of the private sector jobs in the county.

Much of the historical social structure remains intact within Owyhee County. However, obvious change continues to occur. Population encroachment from the burgeoning urban areas to the north, increased use of the landscape for recreational purposes, and a phenomenon of use of the landscape becoming contested by virtue of the long-standing history of livestock grazing on public lands, all exemplify the variety of possible impacts that may manifest differently by household, community, or place. What has become better understood through sociological research on natural resource management impacts, though, is social disruption related to environmental decision-making. This is especially true for local communities that often bear the brunt of the effects with enduring and often irreversible effects (Hunter et al., 2002). To illustrate the sociological impacts, we examine: effects to trust and sense of place.

Ranching communities often face rapid turnover of resource managers within agencies for a variety of reasons. While this is neither right nor wrong for the government agency, this turnover often requires having to reset social relationships, establish new boundaries, and constitute a need for local people to re-orient how they relate to the regulatory structures they remain bound to operate. In a related report (Wulfhorst et al., 2003), we documented these effects as described by interview participants:

*The latest round of BLM changes that hurt us was in the Clinton era. Seemed like the whole Lower Snake District office changed then. They took on this notion that the 'interested public' has as much say as anyone. Well, I know it's public land and all, but it affects whether we can make a living. And just a few people up there can change it all. The District Manager shouldn't have the authority to just change the whole RMP [i.e., Resource Management Plan]...One of them just clearly didn't want the cows out here and said they're the cause of all the damage.*

And,

*Way back in 1968, we had a controversial decision on some allotments over in the Vale [southeastern Oregon] area. The BLM had set up some pilot projects to make improvements, but then just ended up cutting the permits.*

The mismatch between community needs and agency needs can lead to conflict or collaborative approaches among individuals who often have multiple social and community roles. Trust is a form of capital used in social interactions to negotiate and navigate differences in perceptions and impacts. Building trust between community participants, those affected who may not be participating, and the array of stakeholders is paramount to effective policy. In this context, SIA can elicit points of common ground and those needing further attention.

Similarly, sense of place relates to rangeland management, and often in ways not obvious to the agency personnel who deal with the effects of local commitment among the ranching community. For instance, local ranchers who do not always welcome urban recreationists often end up bearing the bulk of the burden for sleuthing the mishaps and accidents that happen associated with a backcountry and remote playground. A local conservation ethic, relating to a sense of place for those who live and work in the local community, drives what they are willing to do in adverse conditions. These factors are illustrated in the following interview data collected in 2002 in Owyhee County, ID:

*The conservationist groups tell us to get the cows off the land. The way I see it though, is that we're the caretakers of the land. I'm constantly picking up*

*trash in the canyon. BLM or the County can't provide the manpower to do all I do. When those folks come down here and get lost, law enforcement comes to us. The community forms a posse, and by necessity, we become the search and rescue. Ranchers are the ones who know the backcountry. It'll bite you if you're not too careful. Those kids from Boise just swarm up here now, but if they want to protect the land they should keep the people out of here. It's people doing the damage, not the cows. The 150 years of ranching we've done here has made all these people want to save it as wilderness.*

And,

*It's not fair or reasonable to ask taxpayers to subsidize these mishaps. You can't expect little old ladies living on a limited income to be paying for these idiots to wreck their ATVs [i.e., All Terrain Vehicle].*

While not always simple to capture with respect to their full effects, the sociological impacts on communities tied to rangelands remain important to document and understand within natural resource decision-making (Wulforth et al., 2006, Wulforth & Rimbey, 2007). Such impacts, along with landscape scale, social structures, and adaptation, provide key social context for social impact assessments conducted in rangelands.

## Methods

Once an SIA practitioner is equipped with guidelines and principles and all relevant social context, an approach to social impact assessment and analysis must be determined. Past SIA in natural resource management contexts have been conducted with both quantitative and qualitative methods, including both quantitative and qualitative analytical techniques.

For example, Cope et al. (2010) reviewed methods for assessing social impacts associated with food safety. They compared qualitative methods (e.g., focus groups, semi-structured interviews) and quantitative methods (e.g., surveys), and found that quantitative methods like surveys may be most useful for obtaining "concern" data, or for scoping the issues among a representative range of stakeholders -

perhaps in the "initial phase" - while qualitative methods like focus groups are most useful for gleaning insights from group interactions (Cope et al. 2010) - perhaps during the "main phase" of social impact assessment.

Participatory approaches have been designed and implemented to capture complexities of arid systems across scales and to allow inclusion of thresholds, feedbacks, and time lags in social impact analyses (Whitfield & Reed, 2012). Bentley Brymer et al. (2016) expanded the conventional SIA framework to integrate social and ecological concepts for scenario design and deliberations during their social-ecological impact assessment for a proposed juniper removal plan on public lands in Owyhee County, Idaho. The conceptual framework integrated ecosystem services and social change process concepts to more holistically represent the social-ecological system and all its changes, and how those changes positively or negatively influence quality of life and well-being. Such integrated frameworks are critical for supporting analysis and interpretation of stakeholder perceptions of environmental change when their livelihoods depend on that changing environment.

## Opportunities for Management and Research

Opportunities for management and avenues for future research to address the social, economic, and social-ecological dimensions of ranching communities include:

- Application of the community capitals framework within regional rangeland management contexts to understand more about effects to local perceptions and well-being from shifting resource policies (e.g., does restriction to natural capital at the local level become a regional economic constraint?)
- Expansion of analyses to document "cultural services" also occurring in the larger realm of ecosystem services and resource amenities related to social decision-making and changing resource management policies.

- Seeking opportunities to develop baseline community profile information to enable better rapid assessment once change is anticipated or proposed for local areas.

This article has discussed the importance of community social and economic impacts associated with changes in management policies affecting ranching and livestock grazing associated with public lands uses in the western United States. Consideration of these impacts is important in order to access the full implications of such management decisions. From a community socio-economic perspective there are several opportunities for future research including:

- Determining the relevant geographical scale and spatial integration for the analysis;
- Modifying regional economic models to better reflect the economic structure of the local economy;
- Incorporating ranch-level analyses into regional-level analyses to expand integration potential of scaled effects; and,
- Estimation of the amenity values associated with ranch resource amenity values, particularly for non-resort areas of the West.

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