

## CHAPTER V

### Indicators for Maintenance and Enhancement of Multiple Economic and Social Benefits to Current and Future Generations

#### INTRODUCTION

Sustainability and use of rangelands is inherently linked to the sustainability and health of complementing and supporting social and economic infrastructures. Social and economic infrastructures provide the context in which rangeland use occurs and continues. To look at rangeland sustainability exclusive of that social and economic context is to look at an incomplete picture. In the Sustainable Rangeland Roundtable (SRR) discussions, emphasis has been generally given to ways in which the natural resource base benefits the economy and society. SRR gives equal consideration to the reciprocal relationship between the potential positive and negative impacts of the economy and society on the sustainability of rangelands.

The fundamental realization that rangeland sustainability must be examined within the social and economic framework exposed a dilemma. It is difficult to define measures that directly and unambiguously relate rangeland conditions or use to social and economic structure or activity. One part of that dilemma is that social and economic structure is bigger than rangelands. Rangeland plays different roles in different places. In some areas rangeland and rangeland use play a major role in the social and economic framework while in other areas rangeland plays virtually no role. Hence, social and economic relationships present and attributable to rangeland in one place might be present in another place, but attributable to some other factor. Because of the different levels of involvement of rangeland (or any particular resource use) in the social and economic framework of a given place, the decision was made to consider indicators of the health and sustainability of communities, of which rangelands and rangeland use are one of multiple components.

Directly measuring economic and social indicators at the national and even regional levels of analyses presents some conceptual and methodological challenges when the objective is to provide unambiguous empirical associations with other indicators of rangeland health. These challenges include: (1) establishing and documenting the relationship of economic and social factors to rangeland sustainability; (2) issues associated with the unit of analysis (scale); (3) determining causal relationships among socioeconomic and ecological indicators; and (4) the availability of indicator data.

Each of the socioeconomic indicators indirectly reflects different conceptual ways to examine the data. These indicators include economic and social structures that are generally associated with individual and community well-being. For example, measures of demographic structure provide indirect indicators of population stability, distribution of populations by age, gender, ethnicity, social stratification, as well as rates of change that can be assumed to indirectly measure actual well being of individuals and their communities. The conceptual and methodological challenge is to establish the degree of association among these indicators that can be reasonably attributed to the relationship between rangeland health and human activity. Even in sub-regions of the United States that are predominantly characterized by rangeland ecosystems, the economic and social activities occurring within landscapes may have limited direct impact on rangeland ecology. A rural community, for example, may be gaining in

population due to natural amenities that influence retirement settlement while the number of people in direct production activity on rangeland is in decline. Or, as rural communities diversify their economic base, they provide off-ranch employment opportunities that make it easier for economically marginal ranching operations to stay in business. Portraying the health and sustainability of economies and communities, and then associating those communities with rangeland areas, provides a more complete picture from which to assess the health and sustainability of rangeland uses.

The socioeconomic indicator group decided that the pragmatic way to address the lack of direct measures was to provide a minimum number of indicators that could cover basic conceptual issues associated with economic and social activity. While this provides a basic set of data set, there will not be support for statistically detecting interaction effects and estimates of the strengths of association for socioeconomic.

The issue of scale was a persistent challenge for this group. Given the local nature of social and economic structures, and the potential for great diversity of economic and social conditions within any county, state, or region, the methodological problem of “teasing out” measures of activities directly related to rangeland ecology was difficult. The linkages between rangeland use, with the corresponding social and economic benefits of that use, and the ecological health of the range are defined in few, if any, cases. This is especially true as the scale of analysis moves from local or specific areas to a regional or national level. Extending the scale of analysis to a national scale can mask problems that would show up at more local scales.

Social and economic data are frequently reported at the county level. In most cases the sampling unit is at a finer level, such as the individual, family, or household. In some cases opportunities may exist for spatial and temporal analysis below the county level. This is true of census data, where TIGER files make some analyses possible at the census tract (sub-zip code) level. It is less true of data outside the census. The number of years that data have been collected varies by indicator and will need further definition when databases are completed.

We have chosen to use three groupings of indicators comprising a more complete view of rangeland sustainability and use in the larger social and economic context in which rangelands exist and use occurs. “National Economic Benefits” defines the types of products coming from rangelands and valued by society. “Community Well-Being and Capacity” seeks to define how communities are doing in rangeland-dominated areas. “Community Level Explanatory Indicators That Might Be Relevant to Sustainability” seek to understand how communities affect rangelands. Each indicator is discussed within its grouping according to the indicator name, its importance, geographic variation, scale, data sufficiency, and clarity to stakeholders.

## **NATIONAL ECONOMIC BENEFITS**

National Economic Benefits indicators relate to the products and benefits derived from rangelands and rangeland use. The interpretation of these indicators can be meaningful at the national or regional level as well as the local level.

### **The Value of Forage Harvested From Rangeland by Livestock**

*Importance: What does the indicator measure and why is it important to sustainability?*

Livestock grazing is the historical economic use of rangelands and continues to be an important use on both public and private lands. Measuring the value of this use remains

important to understanding a major economic and social benefit derived from rangelands. The amount of forage is measured in an indicator under the Productive Capacity criterion.

*Geographic Variation: Is the indicator meaningful in different regions?*

Debate continues about regional differences in the value of forage for livestock production. Private land lease rates are different by region (generally less in Arizona and New Mexico and highest in Colorado, Montana, and Wyoming). Total grazing costs (fee and non-fee costs) are highly variable with as much difference within regions as between regions. Grazing cost data are not collected and reported regularly. Private land lease rate data are collected at the state level but USDA/NASS believes state level estimates are not valid except to measure general trends.

*Scale: Is the indicator meaningful at different spatial and temporal scales?*

This indicator appears to be meaningful at multiple spatial and temporal scales. Differences in data and data trends are observed through time and with data collected at the state level. Values are expected to vary generally among and within states. However, given current national data collections, the scale most appropriate would be at the state level. It should also vary through time as relative demand for forage by livestock producers shifts to meet supply and demand for their products in the marketplace.

*Data*

Data in each indicator is classified as A, B, C, and/or D depending on whether methods and procedures for data collection and reporting sufficient and whether data sets of a useable quality at the regional-national levels exist. For this indicator, it is judged that data should be rated as **A** – Methods and procedures exist for data collecting and reporting and data sets of useable quality exist at the regional-national level.

While the procedures for forage valuation are accepted, their use is not always consistently applied. There are generally four methods that have been used to estimate forage value: private land lease rates adjusted for lessor services, competitive bid, replacement feed value, and marginal value analysis. Of these, the private land lease rate (unadjusted for lessor services) is the only one consistently collected on a national scale.

Private land lease rate data are currently collected on a monthly lease rate basis for private, non-irrigated grazing land from the Agricultural Survey Data collected in January. The USDA reports these results as annual state and regional data at <http://usda.mannlib.cornell.edu/reports/nassr/price/pap-bb/>. Lease rates are reported on a \$/head, \$/AUM, and \$/cow-calf pair basis. The data are repeatable and reasonably accurate. The survey data have been criticized for being based on hearsay and the small sample size collected by state. The data are somewhat controversial as these data are used as part of the federal grazing fee. The average lease rate measures both the forage value and the value of leasehold services provided by the lessor. No attempt is made in this data set to arrive at only the forage value for either private or public lands.

Once we are able to establish a forage value, total forage value can be estimated when total AUMs from rangeland are determined. The finest level of detail given current reporting of average lease rates would be at the state level, but there is some question whether data are reliable when disaggregated to that level.

*Clarity: Do stakeholders understand the indicator and indicator unit?*

The value of forage used by livestock is understandable and interpretable through time and space. In its current form, however, few stakeholders understand that it measures more than just the value of forage. As long as the bundle of attributes and services that are valued as part of the estimated “forage value” is relatively constant over time, the problem for trend analyses (of the measure containing more than actual forage value) is mitigated.

## **Value of Non-Livestock Products From Rangeland**

*Importance*

This indicates the economic value of products produced from rangeland that are not related to livestock production, including recreation, scenic views, nature experiences, open spaces, etc. Rangelands produce more than just livestock and wildlife. The value of these other outputs is important for recognizing the contributions of rangeland and especially to understand the wide range of outputs produced. The combination of non-livestock products of interest to stakeholders and those that can be monitored through time needs to be identified. Once that combination is known, values can be derived through a variety of market and nonmarket valuation techniques.

*Geographic Variation*

There is not sufficient information to answer this question because no clear definition of what is being valued and measured has been devised. Once the types of products of interest are identified and values determined we expect that there will be geographic variation based on supply and demand conditions. The concept is robust and has meaning in any area where rangelands exist. Even if rangelands do not exist in an area, the concept has meaning related to open space in general.

*Scale*

Once the values of the products of interest have been determined, we expect that the values will be sensitive to changes in supply and demand over time and among locations.

*Data*

Ranking this indicator according to the classification scheme does not lead to a clear-cut choice. Depending on the specific product chosen, the data could be classified as **A** – Methods and procedures exist for data collecting and reporting and data sets of useable quality exist at the regional-national level; **B** – Standardized methods and procedures for data collecting and reporting exist at the regional-national level, but useable data set(s) do not exist at the regional-national level; **C** – Some data set(s) exist at the regional-national level, but methods and procedures are not standardized at the regional-national level; or **D** – Conceptually feasible or initially promising, but no regional-national methods, procedures, or data sets currently exist.

Depending on the type of non-livestock product of interest, data methods and availability will have different levels of development. Some data may exist for non-livestock outputs on federal lands and state trust lands (classification C) but we do not know of a data source for private lands, and some of the data may be proprietary. Some wildlife species in specific situations have been evaluated for their values using both travel cost and contingent valuation methodologies with varying availability and scope (classification A or B). However, for the most

part, no data exists (classification D). For this indicator to be useful, the other non-livestock rangeland outputs would have to be clearly identified.

#### *Clarity*

The indicator could be understood once the set of non-livestock rangeland outputs to be valued is defined. Stakeholders understand dollar values. Some care must be taken to ensure that the dollar values derived through various nonmarket valuation techniques are comparable to those determined in the marketplace.

### **Number of Visitor Days by Activity and Recreational Land Class**

#### *Importance*

This is a measure of the amount of recreation use on rangelands. It has relevance to sustainability as a measure of benefits from recreation. Recreational land classification into primitive areas, roadless areas, open public land, private lands, and other types provides one possible basis to compare the types of recreation and how those change through time.

#### *Geographic Variation*

There is some geographic variation in use because rangeland recreation use is generally highest at sites that are relatively close to population centers with the exception of national parks and monuments that draw visitors from around the world. There are regional variations in the popularity of outdoor recreation activities (e.g., hunting is less popular on a per-capita basis in the Northeast, while residents of the Southeast are less likely to hike), but we do not know of differences within the rangeland regions of the United States. The concept is robust and has meaning in any area where rangelands exist. Even if rangelands do not exist in an area, the concept has meaning related to open space in general.

#### *Scale*

The indicator is more meaningful at smaller spatial scales than at larger ones since social and economic impacts of use are highly variable from location to location. Dispersion of use is as important as magnitude of use. Highly aggregated measures of use, e.g., national level measures, lose that information component of dispersion. It is meaningful over multiple time scales.

#### *Data*

Some data set(s) exist at the regional-national level, but methods and procedures are not standardized at the regional-national level (classification C). There are two problems associated with recreation use monitoring. First, different land management agencies use different measures and obtain data in different ways, although the lack of consistency will decrease somewhat when the Forest Service and BLM switch to a “visitors” measure instead of the current “recreation visitor-days” measure (an RVD is 12 person-hours, a measure that is more valid because it better accounts for duration of use, but has proven too difficult for the multiple-use agencies to measure over extensive landscapes.) Second, these measures are not tied to land types but to ownerships. There is not a good way to aggregate use data from multiple agencies, although the Forest Service attempts to estimate use across ownerships in its periodic RPA assessments.

*Clarity*

If the stakeholders understand recreational land classifications and measures of recreational use, the indicator will be clear, especially at more local scales of analysis.

**Reported Threats to Quality of Recreation Experiences***Importance*

This indicator is envisioned as a way to address a problem inherent in simple measures of recreation use: rangeland sustainability is influenced by the ecological and social impacts of recreation use, and these impacts are not necessarily correlated with user density.

Biophysical impacts of recreation typically follow a curvilinear pattern where marginal change in impacts (e.g., soil compaction, change in plant species composition) becomes smaller as use levels increase. Therefore, changes in visitor numbers may or may not indicate loss of value at the site level, depending on whether use is already low, moderate, or high. Social impacts of recreation – crowding, conflict between user groups, and depreciative behaviors – are more dependent on characteristics of the use and users than on simple numbers of users, although the potential for conflicts between users increases with the number of users.

Accordingly a useful indicator of recreation value should account for quality of use as well as quantity. One way to do this would be to create a composite index based on the reports of managers of a scientific sample of rangeland recreation settings, stratified by number of discrete units and spatial extent of ownerships. The questions to be used in this index would include:

1. “How would you characterize the level of crowding complaints by recreationists in your jurisdiction during the past year: significantly decreased, slightly decreased, same, slightly increased, or significantly increased?”
2. “How would you characterize the level of conflicts among recreation user groups in your jurisdiction during the past year: significantly decreased, slightly decreased, same, slightly increased, or significantly increased?”
3. “How would you characterize the level of depreciative behaviors (vandalism, littering, rule violations, etc.) in your jurisdiction during the past year: significantly decreased, slightly decreased, same, slightly increased, or significantly increased?”

There is also the need to develop quantitative criterion related to physical features such as road density, trails, home density, etc., to complement the subjective information provided by managers and put it in context.

*Geographic Variation*

There is no reason to expect geographic variation in reports or types of threats, although the likelihood of problems is greatest at sites closest to population centers that have the highest levels of visitor use and in areas that attract multiple types of recreationists. The concept is robust and has meaning in any area where rangelands exist. Even if rangelands do not exist in an area the concept has meaning related to open space in general or to any area where recreation occurs.

*Scale*

The indicator should be meaningful at various spatial scales, although management utility may decrease as spatial scales increase. If reporting criteria are not changed, the indicator should remain useful over time.

*Data*

Standardized methods and procedures for data collecting and reporting exist at the regional-national level, but useable data set(s) do not exist at the regional-national level (classification B). The method is technically feasible, easily aggregated, interpreted, and repeated using standard survey protocols. Measures are subjective so there will be random error associated with differences in the perceptions of persons completing the questionnaires, but there is no reason to suspect systematic bias on the part of respondents (i.e., some people will tend to overestimate, others underestimate). Therefore aggregated data should be reliable if sufficient responses are obtained on a regular basis.

*Clarity*

With sufficient explanation of the definitions of terms such as “crowding,” “conflict,” or “depreciative behavior” as used in recreation management, the data should be understandable by a wide range of people.

### **Value of Investment in Rangeland, Rangeland Improvements, and Recreation/Tourism Infrastructure**

*Importance*

This indicates expenditures on new and existing structures and similar inputs for a variety of uses. It is the amount agencies and individuals actually spend on infrastructure for any given use of rangelands. It would be useful if data could be found to differentiate between public investment, private investment, and cost sharing (joint investment). In terms of sustainability, it should indicate how much the current generation is willing to invest in maintaining current usefulness of the resource base for a variety of uses. Investment explicitly implies that funds are being expended to obtain future returns from productive rangeland uses. Productive rangeland uses include more than just livestock production.

*Geographic Variation*

The concept is robust and has meaning in any area where rangelands exist. Even if rangelands do not exist in an area, the concept has meaning related to open space in general. On a regional comparison, it will indicate where the demand for different uses is shifting through time.

*Scale*

If annual investments can be tracked and old investments depreciated, value of investments can be obtained and show how they change through time. Data should be amenable to aggregation at any spatial scale. It is not particularly relevant at the site or climatic scales.

*Data*

This indicator is conceptually feasible or initially promising, but no regional-national methods, procedures, or data sets currently exist (classification D). While we should be able to monitor it if data are consistently reported, at present, other than on federal lands, it is not likely that data will be reported consistently. The Bureau of Land Management (BLM) reports on units and dollars spent on range improvements annually via Public Land Statistics and should also be

available for the USDA Forest Service (USFS). Private land data may be available through Natural Resources Conservation Service and some of the subsidy/cost-share programs through USDA. In terms of in-kind contributions there is an old data set out there via Grazing Advisory Boards (8100 funds) on BLM and possibly from the USFS that includes some or all of this through time.

It may be possible to develop a data collection protocol where none exists by using a standard survey without requiring a huge data collection effort. The method is technically feasible, easily aggregated, interpreted, and repeated using standard survey protocols. Measures are subjective so there will be random error associated with differences in the perceptions of persons completing the questionnaires, but there is no reason to suspect systematic bias on the part of respondents (i.e., some people will tend to overestimate, others underestimate). Therefore aggregated data should be reliable if sufficient responses are obtained on a regular basis.

#### *Clarity*

The aggregate numbers through time should be understandable with little interpretation. It is important to differentiate actual dollars from in-kind investments.

### **Rate of Return on Investment for Range Livestock Enterprises**

#### *Importance*

This indicates whether ranch families are making a competitive rate of return on their investment from producing livestock on rangelands. If the rate of return on rangeland-based livestock operations is not competitive, it may indicate that other forms of returns are important, other sources of income are important, or that the ranch is likely to be converted to other uses.

#### *Geographic Variation*

The indicator is likely to be sensitive to geographic locations. It could be useful given adequate data, but for the most part current data are not collected and reported in a similar and consistent way. Comparison across regions and states is not possible without adjustment for differences in opportunity cost valuation. The concept, however, is robust and meaningful in any region where livestock enterprises occur.

#### *Scale*

It could be meaningful at the individual ranch, county, regional, and national levels as measured over time.

#### *Data*

Data are conceptually feasible or initially promising, but no regional-national methods, procedures or data sets currently exist (classification D).

Western universities periodically prepare cost and return estimates for range livestock operations at the county, region, or state level. Although standardization is improving, methodological differences exist across institutions and researchers. All geographic areas are generally not updated annually and many cost and return studies are only done every five to 10 years. Some states have no information. The Economic Research Service (USDA-ERS) makes cost and return estimates at the national scale using surveys conducted every five to eight years for each commodity. USDA Livestock budgets are defined across wide geographic areas.

Livestock cost and return estimates consistently show that livestock producers are not currently and have not in the past made a competitive rate of return on investment. Ranches are overpriced relative to the value of the livestock produced. Livestock is the only product considered in the cost and return series.

Another potential data set would be Table 4 in the State-level Census of Agriculture. This table of data collected every five years gives average net returns from agricultural sales (by farm) with data reported by county. Data includes both farms and ranches.

Texas A&M University (<http://agecoext.tamu.edu/spa/>) is leading the effort in Integrated Resource Management – Standardized Performance Analysis (SPA) for beef cattle production. Data such as return on assets are available for some regions and may be more universal as the program develops.

For the data to be useful, new data consistently gathered and reported would have to be initiated. These data would need to use similar accounting procedures and valuation of opportunity costs. It would have to be done in a timely manner. Because land appreciation is a major long-term return from ranch ownership, this variable would have to be measured (it currently is not measured in a site specific way).

#### *Clarity*

Data are not consistently reported or recorded. The concept of rate of return on investment is widely understood, but this is subject to consistent reporting which is not done with regard to livestock cost and return estimates. This tends to make such reporting confusing and less understandable by stakeholders.

### **Number and Value of Conservation Easements Purchased**

#### *Importance*

This indicator measures the number of conservation easements and number of acres protected under conservation easement. This is an indicator of the presence and trend of open-space or other undeveloped or minimally developed land areas. It is a measure of amenity availability and speaks to the desirability, adaptability, and resilience of communities, and the community perception of the importance/value of that land use or asset to some extent.

#### *Geographic Variation*

It should be sensitive to comparisons among geographic areas. The concept is robust and has meaning in any area where rangelands exist. Even if rangelands do not exist in an area the concept has meaning related to open space in general.

#### *Scale*

Data are recorded for individual land trusts and conservation easements. Data could be tabulated at various levels with the most likely compilation being at the county level.

#### *Data*

Methods and procedures exist for data collecting and reporting; and data sets of useable quality exist at the regional-national level (classification A). Data are compiled by various land trusts and conservation groups and reported centrally to the Land Trust Alliance (LTA) at <http://www.lta.org>. The LTA compiles information about conservation easements by state. Data

on the number and size are collected from surveys with known groups doing land trusts and conservation easements. Additional potential sources of data include:

Agricultural Resources and Environmental Indicators, 1996-97, Margot Anderson and Richard Magleby, Agricultural Handbook No. 712. 356 pp, Jul 1997.

Wiebe, Keith 1995. AREI Updates: Land Trusts. Natural Resources and Environment Division, Econ. Res. Serv., U.S. Dept. Agr. Number 13.

It may be possible to develop a data collection protocol where none exist by using a standard survey without requiring a huge data collection effort. The method is technically feasible, easily aggregated, interpreted, and repeated using standard survey protocols. Measures are subjective so there will be random error associated with differences in the perceptions of persons completing the questionnaires, but there is no reason to suspect systematic bias on the part of respondents (i.e., some people will tend to overestimate, others underestimate). Therefore aggregated data should be reliable if sufficient responses are obtained on a regular basis.

#### *Clarity*

The indicator is probably understandable to stakeholders. The number and area of conservation easements or land set aside as open-space or minimal development are understandable. Whether they are interpretable in a consistent way over time is less clear.

### **Expenditures (Monetary and In-Kind) on Restoration Activities**

#### *Importance*

This indicator measures the amount of funds that organizations and individuals contribute to rangeland restoration activities. It indicates the strength of importance people place on restoring rangelands. These expenditures are made to maintain, enhance, or restore the rangeland ecosystem without explicit monetary future returns expected from the investment.

#### *Geographic Variation*

It can indicate how different regions perceive the need for and their ability to fund rangeland restoration activities. It only applies to areas that are degraded in some way, but it would apply equally in any geographic region.

#### *Scale*

It shows how change is occurring in different regions over time. Like other indicators, data are tied to local areas. Because the indicator only applies to areas that have undergone degradation, it is not clear how well the measure could be aggregated and interpreted at broader scales.

#### *Data*

We are not sure whether it is classification C (some data sets exist at the regional-national level, but methods and procedures are not standardized at the regional-national level) or D (conceptually feasible or initially promising, but no regional-national methods, procedures or data sets currently exist), but it likely only exists at the local/regional scale for different organizations and more readily for public land than private land. It is probably also only available by organization and not using any standard protocol.

*Clarity*

If data were available, it would be understandable to stakeholders, but interpretation might be problematic.

**The Threat or Pressure on the Integrity of Cultural and Spiritual Resource Values***Importance*

This indicator measures the intensity of concern and pressures for management. Cultural and spiritual resources are assets valued by all sets of people. It is important to track how those assets are being maintained.

This is important because it measures status of a characteristic of rangelands valued by people and protected by federal law. It is assumed that when spiritual or cultural values are threatened by activities on rangelands, citizens will suffer loss of value from those rangelands, and may act to protect those values in ways that decrease the value of other resources (e.g., by restricting livestock grazing or recreation access).

*Geographic Variation*

It can be meaningful at different levels of individual jurisdictions, regions, or all U.S. rangelands. The concept is robust and has meaning in any area where rangelands exist. Even if rangelands do not exist in an area the concept has meaning related to open space in general, where cultural and spiritual values might exist.

*Scale*

An index such as this can be aggregated at various spatial scales, and will remain useful over multiple time scales as long as the survey instrument is not changed (although it may be advisable after a few years of measurement to evaluate whether the instrument is measuring what it is intended to measure; if not, some adjustment to the questions may be needed).

*Data*

The indicator is conceptually feasible or initially promising, but no regional-national methods, procedures or data sets currently exist (classification D). A method described below is technically feasible, easily aggregated, interpreted, and repeated. Measures are subjective and care must be taken to ensure against bias of any kind in the estimates. Aggregated data should be reliable if sufficient responses are obtained on a regular basis. Despite the legal protection afforded to cultural/spiritual resources, there currently is no regular, large-scale effort to monitor their status.

This method could be a two-part, subjective measure of increase/decrease in concern over potential threats or pressures placed on spiritual and cultural resources. Probably the best way to do this would be via two direct questions on an annual survey (census or random sample) of field-level managers of public rangelands. While it is likely to also be important on private lands, those data are not likely to be known, available, or acknowledged.

1. "How would you characterize the level of public concern expressed during the past year over the status of spiritual resources (e.g., religiously important sites; citizens' ability to obtain desired contemplative benefits from rangelands) in your jurisdiction: significantly decreased, slightly decreased, same, slightly increased, or significantly increased?"

2. “What is your perception of the occurrence of incidents during the past year that compromised the integrity of historic or archaeological sites within your jurisdiction: significantly decreased, slightly decreased, same, slightly increased, or significantly increased?”

#### *Clarity*

Units will be based on the type of cultural and spiritual resources monitored. Some will be individual items while others will be in acres or number of sites. How well these aggregate from the individual sampling unit to regional or national units and remain meaningful is unknown.

## **COMMUNITY WELL-BEING AND CAPACITY**

Indicators titled “Community Well-Being and Capacity” are intended to portray social structure. When measurements are made at anything larger than a community level, they begin to lose meaning when the appropriate theoretical concept is a community or at least a relatively local unit of social organization (county level is a reasonable approximation of a local level because of the wealth of social and economic data available at the county level). County-level data offer us a “glimpse” of social structure for the communities that exist within a county, at best. What characteristics describe the “community” as a whole and the interactions/relationships between individuals within the community? We think that consideration of and tracking those characteristics over time are related to the resiliency of a social system and its ability to weather and adapt to changing resource conditions. Its focus and interpretation is only indirectly tied to rangeland, but the health and resiliency of the local social and economic structure may play a role in the sustainability of rangeland and rangeland use.

### **Poverty Rate – General**

#### *Importance*

The USDA in cooperation with other federal agencies sets the poverty rate at the level where one-third of the household budget or more is going to food. It is assumed that any household that spends one-third of its budget on food is unlikely to be maintained at a minimal quality of life.

This general poverty rate is a gross measure of social stratification that indicates the level of poverty within the county. Greater social stratification is related to a reduced ability to sustain counties. This indicator is needed to interpret interaction effects with other indicators.

#### *Geographic Variation*

There is geographic variation in poverty rates in the rangeland region of the United States that is associated with the percentage of minority residents living in a particular county.

#### *Scale*

These data are easily aggregated. Income data used to determine poverty levels are adjusted periodically for changes in economic conditions in order to maintain their usefulness over time.

*Data*

Methods and procedures exist for data collecting and reporting and data sets of useable quality exist at the regional-national level (classification A). Data are collected and reported as part of the U.S. Census of Population.

*Clarity*

The indicator is understandable by stakeholders, but it needs to be interpreted in relation to other indicators to be related to sustainability.

**Poverty Rate – Children**

*Importance*

This is a ratio of persons less than 17 years of age who live in households determined to be at or below the poverty threshold. It measures the proportion of children in poverty. Higher rates are associated with lower integration into the community and the higher likelihood of undesirable outcomes like reduced health, human capital, social capital, and so on. This indicator is needed to interpret interaction effects with other indicators.

*Geographic Variation*

There is geographic variation in poverty rates in the rangeland region of the United States that is associated with the percentage of minority residents living in a particular county.

*Scale*

These data are easily aggregated. Income data used to determine poverty levels are adjusted periodically for changes in economic conditions in order to maintain their usefulness over time.

*Data*

Methods and procedures exist for data collecting and reporting; and data sets of useable quality exist at the regional-national level (classification A). Data are collected and reported as part of the U.S. Census of Population.

*Clarity*

The indicator is understandable by stakeholders, but it needs to be interpreted in relation to other indicators to be related to sustainability.

**Income Equality**

*Importance*

This indicator measures the extent to which income is equally distributed among households in the economy. It addresses economic distribution and equity. It indicates the general welfare of the community by looking at the distribution of people across the range of incomes. It is a direct measure of economic and social stratification. The lower the equality, generally the lower the cohesion or integration of the community.

*Geographic Variation*

The indicator is sensitive to geographic variation, especially when used in conjunction with poverty data.

*Scale*

Different values will be obtained depending on spatial scale, implying care must be exercised in interpretation. In other words, as the scale of aggregation is increased, different distributions of income equality can be obtained.

*Data*

Methods and procedures exist for data collecting and reporting and data sets of usable quality exist at the regional-national level (classification A). Data are collected at the county level and this is the most useful scale. The use of Gini coefficients to measure income equality is one standard method. Such coefficients are available at web sites such as <http://www.unc.edu/~nielsen/data/data.htm>.

*Clarity*

The indicator is understandable by knowledgeable stakeholders, i.e., people who have some understanding of diversity indices, but interpretation should be in conjunction with other indicators.

**Index of Social Structure Quality***Importance*

Social science literature often addresses the multidimensionality of concepts that are being measured using indices – the adding together of multiple indicators to create a single broad based measure. These indices are subject to the same rules of validity and reliability as the data upon which they are based. The quality of social structure will include access to and quality of medical care (e.g., per capita hospital beds, physicians, nurses), presence of cultural community services, public recreational facilities (expenditures per capita), and crime rates. This is an indicator of the capacity of communities to address the quality-of-life and may indicate their willingness to address environmental issues.

*Geographic Variation*

The index should be able to detect differences in regional variation. The concept is robust and has meaning in any area.

*Scale*

The index should be sensitive to changes in both temporal and spatial scales. While data are collected at local levels, it can be aggregated to virtually any scale. Because they are based on local conditions, though, interpretation becomes problematic at higher levels of aggregation.

*Data*

Standardized methods and procedures for data collecting and reporting exist at the regional-national level, but useable data set(s) do not exist at the regional-national level (classification B). The base data are collected, but the specific index has not been developed.

It is imperative to recognize here, as well as other places where indices are proposed, that indices can hide countervailing influences. Thus, increases in one component can cancel out decreases in another. Also, while indices can simplify the presentation of or results to non-specialists, they can bury political and moralistic biases and allow more general and benign but deceptive labels. In general, it is very difficult to keep indicators politically and moralistically neutral such that they don't favor or disfavor some groups.

*Clarity*

Whether the index will be understandable to stakeholders is unknown.

**Community Satisfaction**

*Importance*

This indicator measures the degree to which the local community feels about sustaining local resources and attitudes that contribute to a social foundation for acting to achieve sustainability. This indicator is hypothetical at this point, but could provide useful information on how communities feel about natural resources.

*Geographic Variation*

Survey questions can be designed that apply across regions to avoid problems associated with geographic variation.

*Scale*

Survey data could be relevant at all spatial and temporal scales as long as consistent questions were asked.

*Data*

Methods and procedures exist for data collecting and reporting; and data sets of useable quality exist at the regional-national level (classification A). The National Opinion Research Center (NORC) collects data that may (but not necessarily) provide a useful data set, and it may be possible to work with them to add some questions to their periodic surveys. While the methods and some data exist at the regional-national scale, there is a need to improve the data collection over time.

An additional source of data is:

Shields, D.J., I.M. Martin, W.E. Martin, and M.A. Haefele. 2002. Survey results of the American public's values, objectives, beliefs, and attitudes regarding forests and rangelands. USDA Forest Service, Rocky Mountain Research Station, Gen. Tech. Rep. RMRS-GTR-95.

*Clarity*

While it will be necessary to explain factors that go into characterizing "satisfaction," stakeholders of all types should easily understand the general concept.

## **Federal Transfers by Categories (Individual, Infrastructure, Agriculture, and Others)**

### *Importance*

Federal transfer payments (e.g., food stamps, social security, Medicare/Medicaid, Women, Infant, and Children – WIC, Forest Service payments-in-lieu-of-taxes, crop loans, crop subsidy payments, emergency livestock feed payments) are a relatively stable source of income to local, especially county level, governments during most any economic condition. It is also a stable source of income to individuals during virtually any economic condition, i.e., stable during economic downturns when other income sources may be more volatile. This is another aspect of economic resiliency and capacity to endure changes in economic condition.

### *Geographic Variation*

The meaning does not vary across region so it can be used anywhere.

### *Scale*

It is most meaningful at more local levels because smaller, local economies are more volatile and threatened by changing economic conditions than are larger regional or national economies. But local levels, such as counties, could be aggregated to form a regional or national level indicator. It is also meaningful over time. Measurement over time is an ideal tracking and monitoring mechanism.

### *Data*

Methods and procedures exist for data collecting and reporting and data sets of useable quality exist at the regional-national level (classification A). The U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information Service, (<http://www.bea.gov/bea/regional/reis/>) has this data from county level through national level.

### *Clarity*

County level data would be most understood by stakeholders and is most likely to be available.

## **Presence and Tenure of Natural Resource Non-Governmental Organizations at the Local Level**

### *Importance*

The presence of private sector non-government organizations (NGOs) is considered to be an indicator of professional administrative capacity for managing community projects relating to rangeland sustainability that otherwise would be unsupported by government agencies. It is also an indicator of how strongly such groups feel about the importance of natural resources in an area.

### *Geographic Variation*

It is unknown whether this indicator would be sensitive to geographic variation since data for this indicator are not collected at a regional level, but differences are assumed to exist.

*Scale*

It is unknown whether this indicator will be sensitive to spatial and temporal scales. It will depend on the degree to which the assigned number can be standardized across regions.

*Data*

The indicator is conceptually feasible or initially promising, but no regional-national methods, procedures, or data sets currently exist (classification D). Since data do not exist, it would be a matter of determining which groups fell into this classification (e.g., The Nature Conservancy, Sierra Club, land trusts) and how many had offices and representatives in given areas.

*Clarity*

It is unknown whether stakeholders will understand this indicator, but is assumed that they will once data are collected.

### **Sources of Income and Level of Dependence on Livestock Production for Household Income**

*Importance*

This indicator measures the dependence of ranch families on livestock production for household income. Recent surveys have shown that few ranchers rely totally on the ranch for family income. Measuring the livestock component of disposable income and the percentage of ranchers highly dependent on livestock for income might be the most useful indicator.

It measures the percent of disposable income coming from livestock production on the ranch. Higher dependence on the ranch for income may relate to the level of grazing during drought and the ability to follow sustainable grazing practices.

It also measures reliance on ranches for employment and apparent absentee management and ownership of the ranch. Ecological sustainability via grazing use rates may depend on the rancher's level of dependence on the ranch for income. As income dependence goes up, ecological sustainability may be affected. Alternatively, as non-farm income goes up, it is possible that family sustainability is affected. The linkages have not been determined.

*Geographic Variation*

If data were available, we assume that geographic variation will be apparent. Sources of income data are collected at the county level for all states. The data are equally meaningful in all regions.

*Scale*

It would be meaningful if data were available to measure the level of dependency. The Agricultural Resource Management Survey (ARMS) database may provide useful information depending on the level of aggregation desired.

*Data*

Depending on the data source, data may be classified as either B (Standardized methods and procedures for data collecting and reporting exist at the regional-national level, but useable data sets do not exist at the regional-national level) or D (Conceptually feasible or initially

promising, but no regional-national methods, procedures or data sets currently exist). There are data sources for components of the questions about dependency on livestock production for household income. Some data may provide an indication of level of dependency. However, a drawback includes data collection interval. Census of Agriculture data are collected every five years and do not distinguish between farms and ranches. ARMS data may be another potential source but these data are collected at different intervals.

The Census of Agriculture reports on operator characteristics. Three reported characteristics could be useful for this indicator: (1) On farm operated versus not on farm operated; (2) Operators by principal occupation, Farming versus other; (3) Operators by days worked off farm, broken down by day categories, 1 to 49 days work off farm, 50 to 99 days, 100 to 149 days, 150 to 199 days, 200 days or more.

Data are not available specifically on the level of income dependency on livestock production from any known source on a consistent basis. Additional information may be obtained from the following sources.

Nora L. Brooks and Donn A. Reimund. 1989. Where Do Farm Households Earn Their Income? ERS AIB560

Victor J. Oliveira. 1990. Nonfarm Employment of Farm Operators, Hired Farmworkers, and Unpaid Farmworkers. ERS AER624

Robert A. Hoppe, Robert Green, David Banker, Judith Kalbacher, Susan E. Bentley. 1997. Structural and Financial Characteristics of U.S. Farms, 1993: 18th Annual Family Farm Report to Congress. USDA, ERS. Rural Economy Division No. 728.

Robert A. Hoppe, James Johnson, Janet E. Perry, Penni Korb, Judith E. Sommer, James T. Ryan, Robert C. Green, Ron Durst, and James Monke. 2001. Structural and Financial Characteristics of U.S. Farms: 2001 Family Farm Report. ERS Agriculture Information Bulletin No. 768.

Economic Research Service. Agricultural Resource Management Survey. Farm Financial Management data, Selected Farm Operator Household Financial Characteristics. [http://www.ers.usda.gov/Data/farmfinancialmgmt/hhf\\_typmenu.htm](http://www.ers.usda.gov/Data/farmfinancialmgmt/hhf_typmenu.htm)

### *Clarity*

There are no specific data on the level of dependency available. The indicator would be clear if such data were available.

## **Employment Diversity**

### *Importance*

An Economic Diversity Index could be developed to relate what industries/sectors are present in an economy and is typically measured in terms of employment. If economic diversity is defined as “the presence in an area of a great number of different types of industries” or “the extent to which the economic activity of a region is distributed among a number of categories,” then it is useful to have a summary statistic to describe the diversity of an area and compare it to other areas. We think that economic diversity is related to economic resiliency and the ability of an economy to respond to and adapt to changes in conditions.

*Geographic Variation*

Economic diversity can be compared across regions and interpretation is similar in different regions. Diversity of a region is measured against a uniform distribution of employment where the norm is proportional employment in all industries. A diverse economy is diverse in any region.

*Scale*

The indicator is most meaningful at more local levels and is typically measured at the county level. The reason is that larger economies (such as at the regional or national scale) are more diverse just by virtue of their size. It is very meaningful over time as a way to monitor and track changes in conditions.

*Data*

Methods and procedures exist for data collecting and reporting and data sets of useable quality exist at the regional-national level (classification A). The U.S. Census Bureau collects the information as part of the Economic Census Data. Changes from Standard Industrial Classification (SIC) to the North American Industrial Classification System (NAICS) makes comparisons over longer time periods difficult. Only national and state level data have been made comparable between SIC and NAICS as noted at <http://www.census.gov/epcd/ec97sic/>. An example of the data set is found at the U.S. Census Bureau, 1997 Economic Census Data, <http://www.census.gov/epcd/www/econ97.html>.

Economic diversity indices, using the Shannon-Weaver entropy function, have been computed for all U.S. counties, labor market areas, BEA functional economic areas, BEA component economic areas, and states using IMPLAN employment data for the years 1977, 1982, 1985, and 1990-1993. Also, indices have been computed for three levels of industry aggregation: 1-, 2-, and 4-digit SIC groups. ([http://www.fs.fed.us/institute/economic\\_center/spatialdata3.html](http://www.fs.fed.us/institute/economic_center/spatialdata3.html)).

Additional information may be found in:

Ashton, P.G., and J. B. Pickens. 1995. Employment diversity and economic performance in small, resource-dependent communities near western national forests. *Society and Natural Resources*. 8:231-241.

*Clarity*

The details of how the index is calculated might not be well understood, but that shouldn't pose significant problems as far as people understanding the concept of economic and employment diversity.

**Agriculture (Ranch/Farm) Structure***Importance*

This is a multi-indicator measure of direct production in agriculture. A farm or ranch is defined as having \$1,000 or more in gross agricultural sales (although other definitions could be used besides the "official" government definition). Other indicators include type of commodity raised, acres in production, categories of farm sales (measure of scale), and the business organization (e.g., individual, partnership, corporate).

Farm structure is an indirect indicator of production capacity for food and fiber. It has become a data point for different perspectives to assess whether or not production can be sustained. There is not broad agreement on how the data might be interpreted, but there is agreement that these data are the basis for assessment.

#### *Geographic Variation*

The indicator will be sensitive to differences in localities.

#### *Scale*

While the indicator will be sensitive to changes in spatial and temporal scales, there may be some adjustments for changes in definition over time and for inflation/deflation.

#### *Data*

Methods and procedures exist for data collecting and reporting and data sets of useable quality exist at the regional-national level (classification A). Potential sources of data include:

USDA, National Agricultural Statistics Service. 1997 Census of Agriculture.

<http://www.nass.usda.gov/census/>.

USDA, National Agricultural Statistics Service. 1992 Census of Agriculture.

<http://www.nass.usda.gov/census/census92/agrimenu.htm>.

USDA, Economic Research Service. Farm structure, income, and performance.

<http://www.ers.usda.gov/catalog/CatalogByTopicID.asp?PDT=1&SON=TRUE&PTD=&SBY=TITLE&TID=102200>.

#### *Clarity*

The indicator should be understandable by stakeholders.

### **Years of Education**

#### *Importance*

This indicator measures the years of formal education of the population. It is an important measure of the human, and to a lesser extent the social, capital available for sustaining social groups. Data are collected by both census enumeration and through the Current Population Survey. A person is asked to indicate the number of years of education completed ranging from no formal education to years of graduate education.

#### *Geographic Variation*

Education levels vary somewhat by state but are more closely associated with the percentage in a particular region of urban residents (who have greater opportunities for employment that requires higher education) than with geographic factors.

#### *Scale*

Data are easily aggregated at various spatial scales. The indicator is meaningful over time as well, although data should be reported in comparison with overall education levels, which generally have been increasing in the U.S. over time.

*Data*

Methods and procedures exist for data collecting and reporting; and data sets of useable quality exist at the regional-national level (classification A).

*Clarity*

All types of stakeholders should easily understand the indicator.

**COMMUNITY LEVEL EXPLANATORY INDICATORS THAT MIGHT BE  
RELEVANT TO SUSTAINABILITY**

Indicators titled “Community Level Explanatory Indicators That Might Be Relevant to Sustainability” are the most likely to be directly tied to rangeland sustainability. They describe the population and conditions in local areas (and with continued measurement, will track changes in the population and conditions over time) in ways that are conceptually linked to rangeland use and sustainability. They also attempt to capture some of the underlying beliefs and attitudes in local areas relevant to the way in which people relate to and interact with natural resources in general, and rangeland in particular. They are described as “might be relevant to sustainability” because the linkages are neither documented nor unambiguous. Establishing some of the specific linkages between the indicators and rangeland sustainability is a subject for continued research.

**Value Produced by Agriculture and Recreation Industries as Percent of Total Economy**

*Importance*

Agriculture and recreation based industries appear to be the two important sectors of the economy related to rangeland sustainability. While neither occurs exclusively on rangelands, tracking what happens to them in rangeland-dominated counties should indicate the pressures being placed on rangelands. As population grows and economies change, we expect that there will be a differential affect on rangelands.

*Geographic Variation*

The intent of this indicator is to track it in rangeland counties. We expect that the indicator will be sensitive among regions. Agriculture and recreation based industries will show some differences in different places as far as specific activities, but measured in value terms as a proportion of total output the indicator is meaningful in different regions.

*Scale*

We expect that the indicator will be sensitive to spatial and temporal changes. This requires that the relationship between the community and rangeland use can be quantified.

*Data*

Methods and procedures exist for data collecting and reporting and data sets of useable quality exist at the regional-national level (classification A). While both data and methods are available, the linkage between the data and sustainability measures needs to be strengthened. Data are available from the U.S. Census Bureau, 1997 Economic Census Data, <http://www.census.gov/epcd/www/econ97.html>.

*Clarity*

The indicator should be understandable by the stakeholders.

### **Employment, Unemployment, Underemployed, and Discouraged Workers by Industrial Sector**

*Importance*

This set of data will provide information on the vitality of the local economy. High percentage values in the unemployed, underemployed, and discouraged categories would indicate an economy in trouble. Underemployment occurs when one is employed, but at less than the desired level, e.g., employed part time when full time employment is desired. “Discouraged workers” are those who are unemployed and no longer actively looking for employment. If high proportions of such workers are present in rangeland-related industries (e.g., livestock production, recreation, tourism) the sustainability of rangeland related activities might be questioned. Such changes would indicate how society was demanding uses from the rangelands and how such demand was being supplied.

*Geographic Variation*

Data are collected at the local level and aggregated to larger geographic scales. The concepts are meaningful in any region.

*Scale*

Although with commuters across county lines, the data may be less sensitive at local scales than at larger spatial scales. We expect the data to also vary over time.

*Data*

Methods and procedures exist for data collecting and reporting and data sets of useable quality exist at the regional-national level (classification A).

*Clarity*

The indicator should be understandable by stakeholders as long as they understand the definitions and terms of employment reporting.

### **Land Tenure, Land Use, and Ownership Patterns by Size Classes**

*Importance*

This indicator measures changes in ownership (e.g., public vs. private, production agriculture to residential lots), ownership stability, and how the land is being used. It will measure how quickly rangelands are turning over (i.e., converting from one owner or use to another). It is important to sustainability because conversion to low density rural housing developments will have an effect on many aspects of rangelands (e.g., loss of open space, habitat fragmentation, noxious weeds) as well as maintaining future options for the land. It is also important to know what the land use is becoming as turnover is occurring.

*Geographic Variation*

It is meaningful at a variety of geographic scales. Locally it will provide an indication of how a particular urban area is developing. Regionally it will provide a look at which areas are most at risk from development. Nationally it will provide an indication of what is happening to rangelands in general and the pressures that are being placed on them. At the climatic scale, it will only give an indication of where people are choosing to live if, and when, climate changes.

*Scale*

The indicator should be sensitive to both spatial and temporal scales. Differences in data appear to be observable over the five-year time frames in the census.

*Data*

The indicator seems conceptually feasible or initially promising, but no regional-national methods, procedures or data sets currently exist (classification D). Most of the data come from the Census of Agriculture that is conducted every five years (2002, 1997, 1992...) and the Agriculture Economics and Land Ownership Survey. However, data are not reported in the form called for in this indicator. Sales classes rather than tract sizes report ownership and tenure data. For what is available, statistical repeatability, reliability, and accuracy are generally high. Data collection is reported over time with any differences in data collection and analysis methods disclosed. One of the problems appears to be that neither the Census nor USDA currently sorts the data by tract size. Nevertheless, it appears that the data are available since land tenure, ownership patterns, and tract sizes are all reported – usually sorted by income levels for ranches.

*Clarity*

The indicator should be understandable and interpreted consistently over time. It will show gains and losses in land over time.

**Population Pyramid and Population Change***Importance*

Population pyramids are the most common basic description of a population's structure. It requires actuarial data on gender and age. Data are organized into five-year age cohorts. Each population pyramid provides a snapshot of the distribution of age groups and gender. For example, the baby boom cohorts between 1945 and 1960 bulges out as they move through an otherwise relatively rectangular population structure.

This measure directly provides evidence of community sustainability. A population pyramid that varies little from the youngest to the oldest cohorts is considered to be sustainable. The proportion of population in general age classes is informative; very young or very old age structures indicate differing needs with respect to social and economic structures that are more/less likely to be derived from or associated with rangeland activities. The indicator measures the proportion of the population that is male and female that, in conjunction with age, indicates demands on the social organization as it relates to providing social and economic services within a community.

This indicator would measure changes in components of the population between base years, probably U.S. Census years. Births, deaths, and net migration patterns are also important components to understand population change in a community. It indicates a wide variety of

associated pressures on resources such as land, water, economy, and fiscal capacities. It would also provide supporting information for understanding and interpreting those component changes in population

*Geographic Variation*

The indicator is expected to be sensitive to differences based on location.

*Scale*

The indicator is expected to be sensitive at all spatial and temporal scales.

*Data*

Methods and procedures exist for data collecting and reporting; and data sets of useable quality exist at the regional-national level (classification A). The website [www.census.gov](http://www.census.gov) contains the data for the various decennial population databases. Other sources of data include the CIESIN population dataset for migrations and the LANDSCAN dataset.

*Clarity*

While the combination of concepts/data into a population pyramid is not as easily understandable, the broader notion that the composition of population is changing over time is understandable by a wide range of people. The indicator should be generally understandable by stakeholders although the linkage to rangeland sustainability may be more difficult.

**Income Differentials From Migration**

*Importance*

This indicator measures the differentials between existing household income in an area and household income of in-migrants. It addresses whether the people moving in are wealthier than those already there. Retirees or the wealthy do not usually rely on local natural resources for livelihoods in the same fashion as long-time residents.

*Geographic Variation*

This indicator is designed to show differences among regions.

*Scale*

This indicator is expected to be sensitive to both spatial and temporal scales. Data are available and meaningful across a wide variety of scales, though interpretation is more straightforward at local scale.

*Data*

Methods and procedures exist for data collecting and reporting; and data sets of useable quality exist at the regional-national level (classification A). Data are available from the following sources: the current U.S. Census population reports, the CIESIN population dataset for migrations, and the LANDSCAN dataset. Direct data for measuring this indicator are explained at <http://www.irs.gov/pub/irs-soi/prodserv.pdf>. This explains how to get the county-to-county migration files from the IRS that directly measures household income from current residents, out-migrants, and in-migrants by county.

*Clarity*

The idea that in-migrants might be different from current residents is understandable by the stakeholders.

**Length of Residence (Native, Immigrant More Than 5 Years, Less Than 5 Years)**

*Importance*

This indicator measures the years of residence in a particular community and relates strongly to social cohesion/integration and willingness to interact with others for a common good. This indicator is also a measure of economic stability.

*Geographic Variation*

The indicator should be sensitive to regional differences.

*Scale*

The indicator should be sensitive to spatial and temporal differences.

*Data*

Methods and procedures exist for data collecting and reporting and data sets of useable quality exist at the regional-national level (classification A). The Census of Population and the Current Population Survey collect data on tenure of residence for households (whether they own rangeland or not). A person is asked to indicate how long they have lived in a particular locale (house, town, etc.). The primary question is whether or not a person has lived in a place for less than five years or five years or more.

*Clarity*

The indicator should be understandable by stakeholders.

**Income by Work Location Versus Residence**

*Importance*

This indicator relates to whether income is generated where one lives or from outside the area of residence. It should indicate whether the residence community has both economic and social emphases to the income earner. It measures whether rangelands are providing the desirable rural setting where people want to live, but without the employment opportunities they require.

*Geographic Variation*

By its nature, this indicator will show regional differences.

*Scale*

We expect that this indicator will be sensitive to both spatial and temporal scales. We expect that it will be most spatially sensitive at smaller scales since commuting patterns are limited.

*Data*

Methods and procedures exist for data collecting and reporting; and data sets of useable quality exist at the regional-national level (classification A). The easiest data sources are to use the location adjustment in the Regional Economic Information System (REIS) produced by the Bureau of Economic Analysis and the journey-to-work data from Bureau of the Census.

*Clarity*

The indicator should be understandable by stakeholders.

**Public Beliefs, Attitudes, and Behavioral Intentions Toward Natural Resources***Importance*

Public perceptions, intentions, and behaviors influence cultural, legal, and public policy decisions toward the management, consumption, and preservation of natural resources. In order for rangeland management decisions to be socially sustainable (especially on public lands), they must achieve and retain some minimum threshold of social acceptability. Moreover, information about people's preferences and behavioral intentions can help in defining appropriate benchmarks for some SRR indicators. This indicator would provide for regular measurement of preferences, attitudes, and intentions with respect to rangelands. Social science research indicates that a person's behavior in political and planning arenas is influenced by his/her beliefs, attitudes, and behavioral intentions. Other indicators provide for measurement of behaviors (e.g., recreation uses, property sales, participation in restoration activities, etc.) but there are none that focus on the perceptual factors that guide those behaviors. Since there are no inventories of public preferences or values concerning the natural resource foci of the various sustainable roundtables, data on public perceptions is often not diffused to the larger public or to the full spectrum of natural resource managers. These data would be applicable for all natural resources.

*Geographic Variation*

This is a sampling issue. Data can be collected at the national, regional, state, or county level, but it becomes increasingly more expensive as the level becomes smaller. Because research has consistently shown regional and rural/urban variations in attitudinal data regarding natural resources, national-level results may not always be appropriate, but they can be useful in many cases if applied with care.

*Scale*

Whether the indicator is sensitive at all spatial and temporal scales depends on data design and collection. The survey can be structured to be meaningful at different spatial scales. Temporal availability can be weekly to annually.

*Data*

This data for this indicator is problematic. Some data sets exist at the regional-national level, but methods and procedures are not standardized at the regional-national level (classification C), while other data is conceptually feasible or initially promising but no regional-national methods, procedures, or data sets currently exist (classification D).

The National Opinion Research Center (NORC) data sets exist but are not presently measuring rangeland issues. Some national-level studies have evaluated public beliefs and

attitudes regarding federal rangeland management and analyses included regional comparisons, but they have not been repeated through time. Methods and survey instruments from this study may be modified for periodic re-sampling, although additional information would need to be gathered on issues not considered in the original study. The survey may answer many questions managers have about public attitudes and perceptions. There are some data sets for specific rangeland-related questions currently available. Data sources include:

- Brunson, M.W., and B.S. Steel. 1994. National public attitudes toward federal rangeland management. *Rangelands* 16(2):77-81.
- Brunson, M.W., and B.S. Steel. 1996. Sources of variation in attitudes and beliefs about federal rangeland management. *Journal of Range Management* 49:69-75.
- National Opinion Research Center. General Social Survey, 1972-2000. University of Chicago. <http://www.icpsr.umich.edu:8080/GSS/homepage.htm>.
- Shields, D.J., I.M. Martin, W.E. Martin, and M.A. Haefele. 2002. Survey results of the American public's values, objectives, beliefs, and attitudes regarding forests and rangelands. USDA Forest Service, Rocky Mountain Research Station, Gen. Tech. Rep. RMRS-GTR-95.

### *Clarity*

These variables may be among the most likely to be understood by the public and specific natural resource stakeholders.

## CONCLUSION

The development of indicators for the social and economic benefits criterion has focused at three levels. First, our focus was on the products derived from the rangeland ecosystems that are used by communities. Second, we focused on the communities themselves and how they react to what is happening in the larger ecosystem. Finally, we tried to examine whether what is happening in the community is having an impact on the rangeland ecosystem.

Each set of indicators centered on these three ways of viewing the interactions among the ecological, social, and economic systems. In order for this approach to be useful, we reiterate again that data must be sorted by rangeland counties. While this definition needs to be developed, refined, and tested, we believe it is the only way to look at social and economic data in a useful way.

In order to be helpful in policy discussions we need simple, yet comprehensive, composite indices of socioeconomic conditions that could be displayed in understandable formats. This could be in the form of developing a weighting and aggregation process that addresses the complexity of the systems and could be readily understood, even if not fully agreed with. In our case this may suggest the remaining task is to develop a composite index for each of the three primary groupings. While all the background data associated with the complete set of indicators is developed and considered, it is the next step to offer information to the policy discussion with an answer to the "so what?" question. While we have not taken this step at this point, failing to do this task only delays the inevitable and leaves one with a false sense of security associated with the sustainability discussion.

In closing, we believe that much of the data needed to assess this criterion are currently available. The weakest data currently exists for the first grouping, National Economic Benefits.

Only two of the 10 indicators have good, existing data while two others have partial data. This is in contrast to the Community Well-Being and Community-Level Explanatory indicators groupings where only two indicators in each group do not have methods and existing data. Taken as a whole, the set of indicators should provide information that can be used to assess the social and economic benefits derived from the Nation's rangelands. How this information is integrated with the ecological and legal information into a coherent statement of sustainability remains to be seen. The issue still remains whether data can be disaggregated to the level that is relevant to rangeland dependent community sustainability.