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RANGELANDS AND THE ACADEMY: OPPORTUNITIES FOR ECONOMISTS IN THE WEST

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Over twenty years ago land grant universities began partnering with the livestock industry to develop the concept of Integrated Resource Management (IRM). While each participating state has its own flavor of IRM, the National Cattlemen's Beef Association (NCBA) describes the general effort in most states by defining IRM as "a producer-focused initiative to enhance the management of all resources to profitably raise beef in a consumer friendly manner with sound environmental and food safety practices through a viable business plan" (NCBA, 2004). In the West, IRM generally focuses on settings where rangeland provides the principal feed resource.

Colorado State University, an IRM pioneer, has maintained an active and vital IRM program over the last two decades that has been sustained through collaborative work among faculty administered in traditional disciplinary units of Agricultural Economics, Animal Science, Range Science, and Veterinary Medicine. In the early years, the program focused on extension education where interdisciplinary teams demonstrated "best practices" to livestock producers throughout the state. Over the last decade, attention has turned to developing resident instruction programs at both the undergraduate and graduate level. Most recently, attention has expanded to the development of coordinated IRM research. This essay is an outgrowth of recent attempts to develop this interdisciplinary research program.

One important component of the IRM research program is the development of mathematical models that simultaneously treat plant, animal, and human behavior and fully account for their complex interactions. This requires participation from each discipline for the quantitative dimension necessary to construct these models. In seeking individuals to participate, it became clear that the Range Science discipline is undergoing significant change. Two years ago the Department of Rangeland Ecosystem Science at Colorado State was eliminated and the range faculty was absorbed into the multidisciplinary Department of Forest, Rangeland, and Watershed Stewardship. Concurrent with this reorganization, the focus of the range-oriented faculty members also began to evolve as retirements were replaced with a "new breed" of scientist or were not replaced at all. Further investigation reveals that this is not just a Colorado State phenomenon, but is indicative of a nation-wide change with significant implications for economists in the West.

Range Science and the Academy

Range management has identifiable origins in land grant universities around the beginning of the 20th century. In the face of widespread overgrazing, soil and plant scientists began to identify means to control grazing to stop the deterioration of rangelands and to initiate their improvement. The discipline of range management continued to develop in this vein until the 1950's when science was brought to the range as never before. During the 1950's, more range research was conducted than all previous years combined (Holechek, 1981). This science provided the basis for the paradigm that was to persist until the early 1970's.

During this period range science focused on increasing livestock production through manipulation of the range environment. Conservation practices were largely focused on rangeland productivity. Interventions

such as brush control, seeding, water development, and rotational grazing became tools of choice (Holechek, 2001). In recognition of the inherent systems-nature of managing range for grazing purposes, many range science departments began to employ animal scientists and economists who focused on these interactions in devising management approaches. In doing so, range science became one of the few disciplines to organize in such an interdisciplinary fashion around a specific application.

During the 1970's a different paradigm for range science began to evolve that mirrored the general shift in public awareness and perceptions of the natural environment (Kothmann, 2001). For public lands in particular, other rangeland uses began to be considered that included wildlife habitat, recreation, and watershed services. This evolution has continued to the present where livestock production has become a minor focus relative to the broader set of non-consumptive uses and intrinsic values. Today, more and more attention is directed toward "designing landscapes" for many different purposes including the provision of open space by both private and public rangelands near urban corridors.

Faculty members in range sciences in each of the 17 western continental states were surveyed to determine the extent of the changes inferred above. Respondents answered open-ended questions to characterize range-focused academic units at their institution. The instrument was designed to discover the focus of the unit's activity, and describe how this focus has changed over the last thirty years. Several respondents indicated their departments had recently changed names or merged with other units to reflect a broader scope of activity beyond range. Today, only 10 of the 17 western states support administrative units that maintain the word "range" in the name. Only three of these host a unit that is identified as solely a "range" department (Texas, Oregon, and Idaho).

Two related issues seem to be driving these administrative changes. First, respondents cited increasing difficulty to secure financial support within their institutions for traditional range science programs. Historically, Hatch funds and the State Experiment Stations funded range research programs. Federal and state legislatures have chosen to fund these endeavors well below historic levels if at all. As institutions become more dependent on grant and contract revenue, it is difficult for the special-purpose department to compete when focused largely on the private interests of a client base that is shrinking in numbers and influence. Consolidation allows for cost savings in administration and allows a broader base for generating required funds.

Second, there is clearly a shift in the scope of problems that faculty are interested in addressing. This is partly a necessary response to the budgetary issue raised first. Several respondents said that their departments saw the best opportunities to pursue funding through nontraditional sources directed toward larger public values associated with topics such as general ecology and ecosystem restoration. Public funding has been increasingly redirected away from livestock grazing issues, *per se*, and toward broader social issues that reflect public values. Investigation of the larger issues associated with these public values, such as ecology and ecosystem restoration, seems to carry its own reward. Respondents indicated greater scientific prestige and perceived relevance of these areas of study as compared to traditional grazing issues. Coupled with the budgetary climate, this disciplinary shift contributes toward the trend of departments that will encompass a broader set of problems than the grazing management focus of the traditional range science discipline.

These observations are consistent with the open dialog that has been documented in recent range science literature. Over the last five years a number of articles have appeared in *Rangelands*, the non-technical outlet for the Society of Range Management, posing the questions of the future of the discipline. These articles have been a blend of views from the traditionalists who seem resigned to losing what once was, and those who welcome the prospect of broadening their horizons beyond "range." The discipline is clearly at a crossroads.

Implications of Change in Range Science

For years, range science departments have been the major source of investigation and information in the arena of grassland and shrubland ecology and associated practices and uses. As noted previously, many of these departments served as integrators that brought the relevant disciplines together in one department to work toward a common goal. However, as range science units reorganize—in many cases being absorbed into larger, broader units—will the common focus remain? While a broader department allows for a greater set of questions to be addressed, the trade-off results in a loss of focus on the traditional issues and problems. It was that very focus that originally led to the integrated nature of the discipline.

Experience with interdisciplinary work elsewhere, such as IRM, teaches us that it is not administrative organization that fosters successful integrative work, but rather a focus on a common, well-defined problem. Historically this has been the case for the study of range science. The main focus had centered on range management for what are primarily private benefits. While the biology of range-livestock systems is complex, the production orientation draws a very distinct objective to guide management. The problem becomes narrowed as attention is generally drawn to the economic production of a single animal species for which there are commonly understood control points in the system. The human dimension is also simplified as profit is the overriding motive in most of these management schemes. This leads to the opportunity for focused integrative approaches common in the traditional range science unit.

As the focus of range science broadens beyond traditional range management to encompass preservation and restoration, the problem becomes much more complicated. Now, the understanding of all plant and animal organisms associated with a given site becomes important. These complications require markedly different understanding and approaches than traditional livestock management. Most survey respondents indicated that their academic units have recognized this and are shifting toward more restoration ecologists and basic biologists on their faculty with less emphasis on livestock production.

The human dimension also becomes much more complicated as the focus expands because the objectives are motivated by public benefits in addition to the private benefits noted before. Now people near and distant from rangelands become stakeholders who must be considered when contemplating uses of these resources. None of the survey respondents, however, indicated that their unit planned to hire any social scientists to address these issues. In fact, several departments indicated that retiring economists who had been in their units would not be replaced.

The expanded dimensionality of the “new range” problem necessitates that many more forms of expertise are required that will be embodied in more faculty. With each individual having a lesser stake in the overall problem and less focus in terms of the general application, there is likely to be less commitment to contribution beyond the area of specialty. Ultimately, with less cross-disciplinary expertise available within the range units and concurrent expansion of sub-disciplines necessary, there is danger of no longer having the critical mass of faculty to work across disciplinary and sub-disciplinary lines to maintain the necessary level of integration to adequately address rangeland issues.

Opportunities for the Western Economist

As discussed previously, range science has traditionally served as a catalyst and bridge builder in the integrated analysis of rangeland issues. However, with the broadening scope of rangeland issues and the changing composition of range science units, the natural synergisms that lead to fully integrated analysis may no longer exist internally. If so, there is a need for leadership to develop these synergies outside of the traditional range units. Economics is uniquely suited to facilitate the broader integration and to provide the basis for useful analysis of these complex problems, bridging the gap between the traditional and emerging uses of rangeland.

Economics is not new to range science. A number of economists have built careers around the traditional aspects of rangeland management and policy and many of them are evolving to the new, broader focus (see Torell et al, 2003 as representative example). However, as range science becomes more focused on the biological and ecological aspects of rangelands, there is an opportunity for economics to become the leader in appropriately integrating this science to address questions of land use policy for both public and private rangelands.

The first step to building these bridges is to help our range colleagues better understand what economics has to offer. Because of traditional roles in production economics, most range scientists tend to equate “economics” with “accounting”, reducing their view of the discipline to a mere summarization of profit and loss for the private entities concerned. Inevitably, the statement is made that the range problem is about “more than economics”, implying that the public and social dimensions lie beyond the scope of economics. Most of the confusion seems to arise from the selection of monetary units as the common metric for economic comparison. Economists must take leadership in demonstrating economics as a science of choice that can be used to address both public and private decisions.

Economists must take the initiative to strike up relationships with the appropriate biological scientists. If we wait to be invited, we will likely be cast in the narrow role of accounting for private monetary effects—if we are invited at all. By initiating dialog before roles are defined, an informal discussion can be conducted to identify potential questions for investigation. This provides the economist an opportunity to explain how economics can be used to evaluate resource allocation from a variety of viewpoints (e.g. private, public, local, national) and how those viewpoints can be reconciled. Further, the continuum of potential analytical approaches can be described in terms of resource and data requirements and respective explanatory power. This discussion also provides the reciprocal benefit of establishing the importance and role of the biophysical science in useful economic analysis. This open discussion should result in relevant, jointly-designed research projects that make appropriate use of economics.

There are several important payoffs to economists providing leadership in range research. First, a significant amount of capital has already been built to solve traditional range problems in an integrated fashion. This knowledge base focuses on what are primarily private benefits. While the public dimension is gaining popularity at the expense of the private, private benefits will always be an important component of any public analysis. However, if the current trend continues, much of the current research capacity for grazing management will be lost as personnel change. Once lost, it is questionable whether the threshold can be regained to reestablish a viable working base. Economists are in a unique position to lead research efforts that leverage the historic capital of traditional integrated grazing management research and to marry it with the newer ecosystems research in order to answer the broader social questions now in demand. This approach provides a synergism that underscores the need for the coexistence of the “new” and “old” range science which is not apparent currently.

There should also be direct reward for those economists who expand into rangeland research. The application of economics to addressing the public values associated with the myriad of rangeland uses is well aligned with the redirection of financial resources previously noted. Project proposals that appropriately address these social and environmental concerns will fare much better than traditional range science activities or those focusing on only the biological dimension. Further, increased involvement by economists in rangeland issues should also provide a general benefit for the discipline. As people encounter useful economic analysis, it creates goodwill for the discipline which can translate into additional resources for further investigation.

The prospect for significant contribution for rangeland analysis extends through all of the sub-discipline areas of economics. In the traditional sense, there are many opportunities to leverage the increased biophysical (ecosystems) understanding as this scientific information can be leveraged for greater modeling opportunities to evaluate grazing decisions in a dynamic setting. Agribusiness and marketing economists can contribute toward the evaluation of specialty and niche marketing of meat and fiber as well

as amenity-based products. In the more public dimensions, natural resources and environmental economists can contribute toward resolving public and private trade-offs by measuring values attached to public dimensions of rangeland. An understanding of the economics of community and regional development would be useful for investigating public policy mechanisms that balance both private and public values such as conservation easements and other land use policies.

Rangelands, public and private, are an important resource in the West. These lands dominate this part of the continent and support many economic activities. Many of the arguments provided to justify leadership on the part of economists could be applied to other natural resources in many other settings. What differentiates rangeland issues is the state of change in the range science discipline. The discipline is at a crossroads and significant resources are currently available to support the study of both traditional livestock grazing management and ecosystem science, though the former is dwindling. Economists have a unique opportunity to leverage these available resources in order to play a vital role in reconciling the public and private interests, and to contribute meaningfully to the dialog around western rangeland policy. However, like so many opportunities, this one won't last.

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