

The Future of Range Education

James P. Dobrowolski, compiler

Introduction

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The following workshop proceedings bring together some of the educational leaders in the field of range science to present and discuss a broad collection of issues facing the range management profession. In the spring of 1990, the Society for Range Management (SRM) Board of Directors and the Range Science Education Council (RSEC) established a task group to examine the status and future of range management education. The Board of Directors charged the task group to make an assessment of range management education for the 21st century with the following tasks: (1) Conduct a workshop about the future of range management education at the 1991 SRM Annual Meeting; (2) Conduct a symposium in 1992 at the SRM Annual Meeting to report the findings of subcommittees formed out of the 1991 workshop; (3) Report the conclusions and recommendations of the task group to the Board of Directors. The three-year study will evaluate the status and future of range management education relative to undergraduate education, graduate education and related research, adult and youth extension, and the needs of industry and agencies.

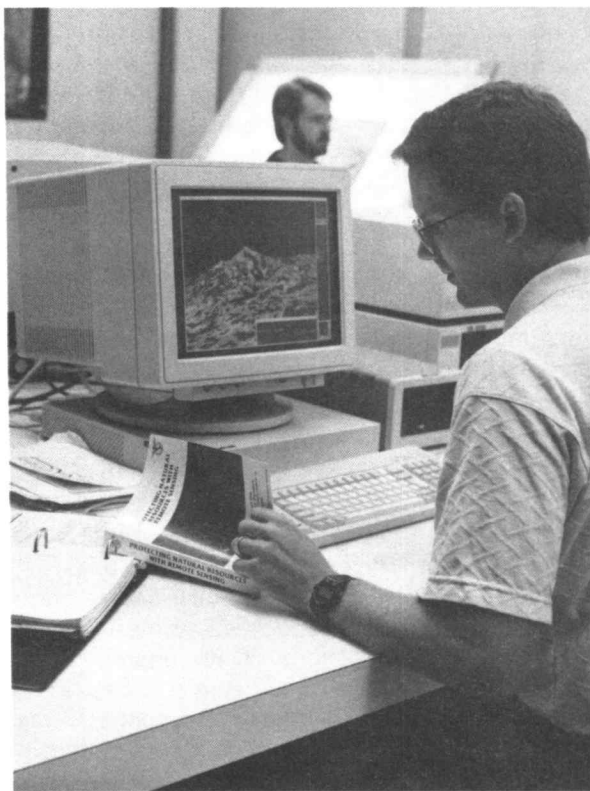
This workshop proceedings is the result of the charge given to the Future in Range Management Education Task Group. It was set up in cooperation with the annual workshop coordinated by the vice chair of the RSEC. A framework for the papers presented in the workshop was established by providing speakers with some thought-provoking questions. However, the speakers were not obligated to specifically address these questions. Some of the questions included:

1. What are some areas where range management has clearly not lived up to its proclaimed commitment to the resource and what is needed to rectify the situation? Have we lived up to the objectives stated on the inside of each issue of the *Journal of Range Management*? Why or why not?

2. Why has our improved knowledge of rangeland ecosystem function not led to better management of the

resource? Is this a technology/information problem, an attitude problem, or a political problem? If it is a political problem, should we as scientists get more involved in the political process?

3. Have we become bogged down in attempting to classify and fit plant communities to a certain system or functionality? Why? Is carrying capacity still a useful concept?



4. Have we considered alternative products from rangeland? Do we need to produce students who will consider alternatives? Will a curriculum in conformity with U.S. Office of Personnel Management (OPM) standards produce a manager who considers alternatives? Do we need retraining to include these alternatives in our courses? How do we establish an on-going dialogue with OPM to keep their standards updated and modern?

5. If we disbanded the range management profession, would the resource suffer? Why?

6. Despite our advanced knowledge, why do some range managers still cling to archaic methodologies, concepts and rules of thumb?

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7. Are U.S. range managers/students learning principles which provide the proper expertise to consult or manage rangelands worldwide?

8. How can we realistically overcome our perceived single commodity orientation in time to become movers and shakers in natural resource management?

9. How can we expect our students and the public to distinguish between range science (apolitical) and range management (always embroiled in politics) if we do not really know the difference ourselves?

10. How can we come up with an incentive structure for range improvement on public lands?

11. Does the SRM encourage change and diversity to meet future needs or is it stagnant and reactionary?

12. Do we need to completely restructure our approach in the teaching of ecology, land management, etc.? It appears that individuals and programs that are impacting natural resources management are coming from the basic biological and physical sciences. How do we create a teaching environment that spawns critical thinking and the need to continually challenge the scientific principles that drive the use and management of natural resources?

13. How can the range profession (mainly the academics) meld with the reported burgeoning interest in conservation biology and ecosystem reconstruction taking place in non-land grant universities, without being swallowed up by them and becoming lost in the process?

14. How can we as range managers get involved in the current movement known as sustainable agriculture? What does this term mean? Does it mean sustainable forever?

Undergraduate Education

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What can you tell your students that is central dogma in range management? The vague statements like "take half and leave half" suggest there are no generally accepted dogmas on which range management is based. Range management is a discipline that lacks a central focus. We all know what range management is, we can define it, and we can describe it. The closest thing that we have to a central dogma remains unpublished. It would be something like, "land used for grazing by large herbivores has a carrying capacity." Holechek et al. (1989) have based range management on five basic concepts:

1. Rangeland is a renewable resource.
2. Energy from the sun is captured by plants, which can only be harvested by the grazing animals.
3. Rangelands supply man with food and fiber at a very low energy cost with ruminant animals.
4. Rangeland productivity is determined by soil, topographic, and climatic factors.
5. A variety of products and amenities are harvested from rangelands.

Rangeland use by ruminant livestock comes as close as

any attempt to state the dogma of range management. Range management has always been an amalgamation of disciplines and subdisciplines, most involving the use of land for the grazing of large herbivores, especially large domestic livestock. I believe the RSEC and Futures in Range Management Education Task Group have the responsibility to outline the basic set of principles to form the basis of range management.

Range management originated from a need to recognize the limits of nature in providing forage for domestic livestock grazing. It has evolved into a separate discipline from its origins in grassland ecology. Yet today many of us are still tied to management with perennial grasses. Fortunately, this tie to perennials is beginning to change and I think this is evidenced in the broader scope of management alternatives outlined in Holechek et al. (1989).

In the future, we are going to have to broaden and deepen our thinking. These efforts do not mean adding more ecological jargon, but achieving a thorough understanding of the plant-animal-environment relationships. These relationships are not new, but perhaps a new way of looking at the concept of range management. I believe we have failed to provide adequate knowledge of the ruminant digestive system and the importance of plant phenology in the diet of ruminants. Application of a thorough understanding of the dynamics of ruminant digestion in relation to the dynamics of vegetal phenology would insure such things as correct stocking rate. It would prevent grazing at the wrong time of year. This understanding would prevent the improper application of grazing systems. It would prevent soil loss and it would maximize net profits. I am not advocating that we envision rangeland as a single resource. Rangeland represents multiple resources. It does mean that we must do a good job of educating our students for the purposes of management of the most important resources.

What are the basics? How do we decide what we teach? What do our students need to know? Well, they certainly need to know some basic science. How much specialization, or how much application? What should be taught regarding holistic resource management, if it is taught at all? Certainly we should include critical thinking in the range management curriculum. Critical thinking is a buzz word that has been floating around the universities now for a few years. What is critical thinking? Broadly, it is the use of any cognitive skill higher than recall. More narrowly, it is defined as the process of evaluating a body of evidence, separating assumptions from observations, and reaching conclusions based on evidence. Either way, it is difficult to teach though easier to test. Unfortunately, many of us are content to assume that students in our classes will acquire the skills of critical thinking elsewhere.

It is said that in a small Moravian village at the time of the old Austrian empire, an inspector from the ministry of education arrived one day to visit the school room. It was part of his duty to make such periodic inspections of the schools. At the end of the hour after he had observed the

class, he stood up and said, "I am glad to see that you children are doing well with your studies. You are a good class. I am satisfied with your progress. Therefore, before I go there is one question that I want to ask. How many hairs does a horse have?" Immediately one little nine-year old's hand shot up. And to the astonishment of both the teacher and the inspector the student said the horse has 3,571,962 hairs. Wonderingly, the inspector asked, "And how do you know this is the correct number?" The nine-year old replied, "If you don't believe me you can count them for yourself." The inspector broke into loud laughter, thoroughly enjoying the remark. As the inspector was escorted by the teacher down the aisle to the door he said "That is an amusing anecdote. I must tell it to my colleagues in the ministry when I return to Vienna. I can already seem them laughing. They enjoy nothing better than a good joke." And he left the school.

It is now a year later, the inspector is back at the village again. As the teacher was walking with him to the door he stopped and said, "By the way inspector how did your colleagues like the story of the horse and the number of hairs?" "Oh", the inspector slapped the teacher on the back and said "Oh yes, I was really anxious to tell this story, it was such a fine story, but you see I couldn't. When I got back to Vienna, I wasn't able for the life of me to remember the number of hairs." Those of you that have shared classroom duty can appreciate the implication.

In the future, we are going to have to broaden and deepen our thinking. If we can make sure that our students get the basics, and are taught how to think critically, they will be better prepared than if they have an abundance of highly specialized coursework.

In the annual RSEC meetings we should review the Office of Personnel Management (OPM) standards for the range conservationist. We should send the results to OPM and other agencies. We should not permit the agencies to dictate course selection or course content. OPM should know that we are consistent and attendant to OPM standards. As many of you know I was opposed to the establishment of an 18 credit hour minimum requirement. I do not oppose the content of the curriculum, only the particular nature of course listings. Because many of our graduates are not employed in range management, and to better prepare our students, we should diversify the curriculum so that our students are better prepared for a broad array of careers. Many universities have implemented or are implementing Bachelor of Science (BS) programs in environmental studies. These programs are multidisciplinary and include significant coursework in biology and chemistry. These programs prepare students to work in careers such as waste disposal and water quality management, not land management. Land-fill management might be a possible career but not necessarily

land management. My former range management students that are presently working as professionals in governmental or industrial water quality or waste management were advised to take a wide variety of courses. As in most professions, experience on the job is necessary in order to be effective. If we make sure that our students get the basics, and are taught how to think critically, they will be better prepared than if they have an abundance of highly specialized coursework.

I am reminded of an apocryphal southern university that implemented a curriculum of alligator farming. They had alligator biology, alligator ecology, alligator taxonomy, alligator recreation, alligator economics, alligator nutrition, alligator watershed management, and so forth. By the way, their graduates could not even get a job as crocodile farmers. What kind of jobs do our graduates attain? A range management career may not be likely. A recent survey documented that in the biological sciences only about 25% of the graduates were employed in biology. In agriculture, the percentage is about 50%. The job placement rate in range management is somewhere in the neighborhood of 25–50%. The best of all disciplines is 80%, and these disciplines are in medically related areas. What do you tell your advisees or perspective students? Do you tell them there is a 1 in 4 or a 1 in 2 chance that they will get a job in range management upon graduation? Or is it your instinct to say something that is less statistical? There are more statistics that I can share with you and those of you that are teachers and advisors want your students to make well-informed choices on their career.

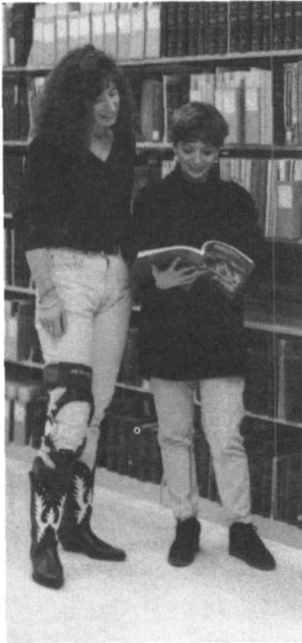
Dr. Mort Kothmann of Texas A&M University sent out a RSEC questionnaire during the fall of 1990. He received a return of about 50% from universities with range management and science curricula. I made an extrapolated estimate of potential graduates based on about 20 universities—seven graduates per year averaged over the past five years. The simple arithmetic results are that over 700 students have graduated in range management in the last five years. The number of range conservationists in the government agencies is relatively small, and openings are typically scarce.

Quality in Undergraduate Education

Most universities do an excellent job of educating graduate students. However, undergraduate teaching often takes a back seat. Most faculty members do not consider themselves to be part of the problem. Most surveys show that we rate ourselves very highly. What is the problem? One of the problems is that undergraduate teaching is not a primary concern of most major universities or even "want-to-be" universities. There is a lot of evidence that administrators talk about the importance of undergraduate teaching but their actions and budgets speak otherwise.

For instance, consider the professorial award structure. Most of us are not rewarded for teaching but for research. You cannot get hired, an increase in salary, promoted or tenured, without research. Brilliant teaching will not save

an aspiring assistant professor if he or she has conducted no research. Mediocre research will usually suffice to obtain tenure regardless of teaching ability. It is no surprise that university teaching awards are available only to tenured professors. What administrator would want to face the embarrassment of having to fire an untenured but excellent teacher because he or she had not done enough research or even mediocre research? Tenure is the ultimate freedom from accountability especially when it comes to teaching. A tenured professor that evolves to poor or no research simply will not get published. But a



tenured professor that teaches poorly will continue to teach. Studies indicate that research prowess is unrelated to excellence in teaching. Unfortunately, few undergraduate students ever have the chance to discover this themselves because often the distinguished researchers are excused from teaching. Much important research comes from universities, but a lot of what is done is mediocre and done for the sake of the career advancement.

A survey concluded that one fifth of college graduates find that their degree has prepared them poorly or not at all for their current positions. Part of this conclusion is due to students finding work outside of their

major. Student advocacy groups are beginning to make themselves heard on campuses. Legislatures are growling about a lack of accountability and the need for assessment. Most universities are in process of implementing the assessment program that has been dictated to them from the state house or from the capital. Last year President Bush and 50 governors set a goal that by the year 2000, United States students would be first in the world in math and science achievement. Events since August 1990 have altered the goals because we are near the bottom overall in terms of education. Whether U.S. students can climb to the top in the next nine years is questionable. If we do not start to emphasize and reward excellence in undergraduate teaching we probably will not achieve this goal.

In closing, my intent was to cause the incipience of thinking about undergraduate education and range management. I do not intend to set the agenda. I do not pretend to possess any special insight into this matter. The collective insight of all of us, plus the application of some critical thinking, will make us better at undergraduate education. Paraphrasing an old adage, "Introspection is good for the soul," I know that if you did not think undergraduate education could be improved, you would not be here.

Comment: We have a thread running through the SRM meetings in Washington, DC, of a lack of communication and technology transfer. Are we stressing the sociology, human ecology, and/or communication skills in our range management curricula?

Nicholson: Most of these topics are usually included in the liberal arts requirements. Most undergraduate degrees have these requirements, but not all. At least as far as our university [Fort Hayes State] is concerned and most others have a liberal arts requirement. There is almost always a social science requirement as well as other requirements in the humanities. These requirements vary from university to university. We do not have a RESC policy or current OPM requirement that requires anything from the social sciences, per se.

Comment: I would submit that in your curricula you should take more control of the socio-political aspect. Socio-political aspects of resource management, negotiation skills, and conflict management should be required of students wanting a position in the federal government. These socio-political skills, in addition to the technical expertise, are what students need. We are really depending on the liberal arts requirements to cover this need. I do not believe these requirements will be adequate.

Nicholson: I agree with you. What you are describing is the addition of more courses to a curriculum that is already very heavy, certainly in the technical knowledge area. I suspect that at some point in time a master of science degree will be a basic requirement. This requirement is probably coming and is certainly something to think about, as a basic requirement for education in range management.

Future Directions For Range Management and Range Graduate Education

Joseph L. Schuster. *Department of Rangeland Ecology and Management, Texas A&M University, College Station, TX 77843.*

The decade of the 90's will be a time of great opportunity and a period of fantastic change. Never in the history of the world has there been a period in which changes are occurring so rapidly, and the next 10 years promise to accelerate this change. The range profession and the role of the range resource manager will change drastically. Change is difficult, but we have the advantage of new knowledge and new technologies to help us accept changes and make the correct adjustments in our approaches to resource management.

Range management in the United States had its beginnings around the turn of the century, but only after some rangelands had been subjected to severe overgrazing and misuse. The discipline of range management was formalized in the 20's; however, it took the Dust Bowl of the 30's to cause a real concern for conservation and range management. Much of the range management information and technology has been developed since the middle

30's, when the great conservation movement began. There will be more technology developed in the next 10 years than in the 50 years since 1940. The next 10 years will bring considerable change in resource use, and consequently the need for new technology in rangeland management. The future will mean more people, more interaction between people, and more pressure on rangeland resources to provide more goods and services. By the year 2000, the world's populations will exceed 6 billion, and the U.S. population will likely exceed 300 million.

Along with more people to feed and clothe, there will be an increasing demand for outdoor recreation, off-site water, and many other alternative uses of rangelands. These pressures, along with environmental concerns and social issues will require different technologies and management strategies than exist today. Range managers of the 90's must be total resource managers with multidisciplinary tools and interdisciplinary approaches to management and decision making.

Those resource managers trained as little as five years ago must accept new technologies, and they must also accept changes in land uses and values. Thus a need exists for continuing education in rangeland resource management. New technology is developing, our knowledge base is exploding, and tools are becoming available that are unfamiliar to traditional rangeland resource managers. As a result, the use of the systems approach to rangeland resource management will be imperative. New knowledge and technology must be learned by all of us as a prerequisite for successful change in the management of rangeland resources. Examples of new technology include decision support systems, expert systems, information management systems, remote sensing, space technology, robotics, genetic engineering, and other high technology areas that offer great opportunities in natural resource management.

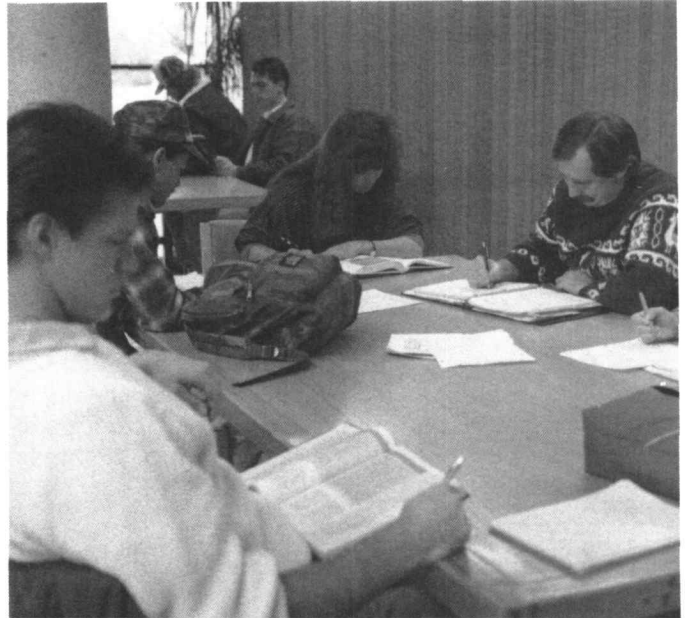
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It is easy to predict better vegetation management tools such as better herbicides, more efficient machinery, better grazing systems, more productive plants and better revegetation techniques. These technologies are continuing to develop; but new technologies must be developed to manage these technologies in the manner required to meet the needs placed on rangeland resources in the future.

The evolution of computer technology and its impact on natural resource management is not complete. Computer technology has already advanced past simulation

modelling, artificial intelligence, databases management, and decision support systems for selecting the best management practices. The next 10 years will see tremendous advances in the use of computers in integrating biological and economic resources and the use of models and decision support systems in resource management.

Biotechnology will expand range production efficiency. Biological efficiency of rangelands will be improved by



the introduction of new forage species. New species, better able to cope with a variable environment, will be developed through genetic engineering processes. Plants which are more photosynthetically efficient and more resistant to environmental stress will be developed and adapted to the rangeland environment. Cloning of high quality superior germ plasm will be commonplace.

We can expect new systems of animal breeding in all classes of livestock. Current embryo transfer, twinning, and ova manipulation will be commonplace. Leaner, more efficient livestock will be genetically engineered for rangeland conditions. Increased production of milk/meat per animal as well as improved carcass characteristics will also be achieved through improvements of regulating the animals' endocrine system and metabolism.

The systems approach to resource management will lead to development of mathematical models and decision support systems which will allow the integration of several disciplines. The rangeland resource manager will be able to factor in both the strategic and tactical level inputs in making decisions about the effects of various practices or enterprises on the resource operation. Inputs to the models will include technical advances in brush management, grazing management, wildlife habitat development, and animal husbandry.

From a global perspective, several major events will impact agriculture and range management in the future. The tremendous advances in computer technology and

the emergence of genetic engineering have already been discussed. A significant rise in the energy and mineral costs can be predicted as influenced by the activities in the Persian Gulf. The resurgence of an environmental ethic will affect rangeland management and what is taught in the classroom. It will also affect the type of research conducted. Range management must be part of the environmental movement. Water quality and quantity are critical, as evidenced by the national and international efforts in watershed and riparian management. There is a continuing emphasis on diet and health which will affect the type of products from rangeland, and economical range livestock production. The unification of Europe, alteration of the Soviet Union, and other world events will influence the range management profession, since tremendous rangeland resources exist overseas.

These changes must influence our research, teaching, career advising, and curriculum development. Graduate education needs in the 90's must respect the increased urbanization of our population. In private land states, range management professionals must understand the needs of absentee owners. A clientele change seems inevitable. New land values and alternative uses of rangeland will increase the required knowledge base of the range professional.

Graduate students need to be exposed to global scale problems and socio-political/human ecology issues. Increased emphasis should be placed on an ecosystem perspective, environmental issues, and alternative uses of rangeland.

With an increased urban population comes a more sophisticated and worldly student. More international undergraduate and graduate students will require some adjustment in research endeavors and curricula. The traditional College of Agriculture is being integrated into other university functions. The land grant system is losing some of its effectiveness and clout at the university level and with legislators.

An image change for range management is necessary. The government agency clientele continue to regard range management as livestock production. The U.S. Forest Service could have forest and rangeland resource divisions, with wildlife, recreation, and water as products and uses in the rangeland division on a forest.

Where do we go from here? Range educators must be responsive to graduate student needs. Students need to be exposed to global scale problems and socio-political/human ecology issues. Range science must address the broader, global needs of society. Social, cultural, political, and international aspects of education should be developed.

Increased emphasis should be placed on an ecosystem perspective, environmental issues, and alternative uses of rangeland. Skills should be developed that are valuable in other aspects of human activities such as recreation,

environmental management, biotechnology, information technology, etc. More emphasis should be placed on conservation, information flow, and less on production. Emphasize entrepreneurship, innovation, and professional ethics.

Students must have the tools available to handle large amounts of information. They should be able to integrate the existing technologies while maintaining an adequate level of field experience. The graduate education experience should provide a strong emphasis on the scientific method, emphasizing research education, not just new technology. Graduate programs should be structured so that students receive experience in the systems approach to rangeland management and experience in a multidisciplinary decision-making process. The development of problem-solving skills is essential. The knowledge of computer applications in natural resource management is also a requirement. Finally, the graduate student needs a basic core of biological and social science courses to become a 90's rangeland manager.

Comment: Do all universities need to address all issues? In this country, we tend to deal with management of private versus public lands. There is a great diversity among universities and we tend to be regional in what we do, because the rangeland resources are different. Rangeland management will be different in Oregon in comparison with the Great Plains.

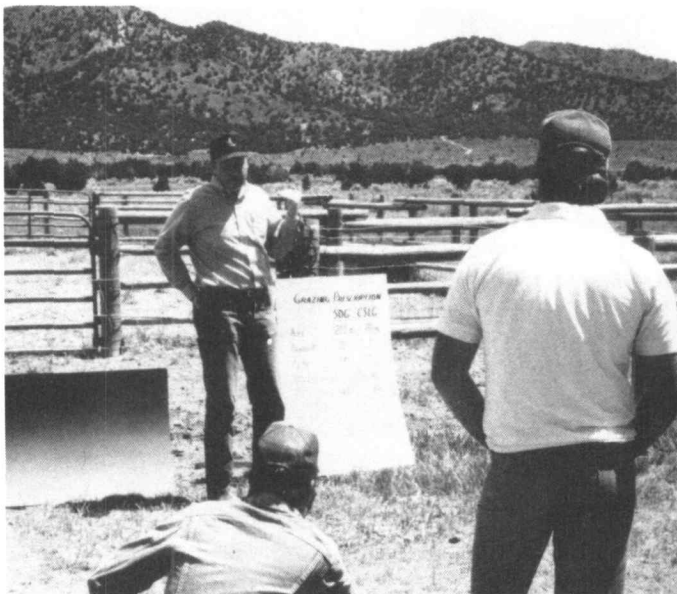
Schuster: I am not saying we should abandon range management. We rely on good range management as a data base. I guess what I am saying is that our students need a core of rangeland resources management. I think if we give them a good biological and sociological basis, some decision-making tools, and insight into the decision-making process, the students will be able to adjust to these changes in range management. We are still going to emphasize a basic range management program, but the emphasis will be on environmental concerns, ecological principles, water, and wildlife, not traditional range management.

The Role of Extension in the Future of Range Management

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What is the mission and function of extension? The process continues to be little understood by those not directly involved, even though extension programs have been conducted for three-quarters of a century in the United States. The Smith-Lever Act of 1914 established a national educational program designed to transfer the results of land grant university research to agriculturists. Initially, extension was organized as a system of practical, "hands-on" education focused on three classical audiences: farmers, rural homemakers and agricultural youth. By design, it was focused on private agriculturists and private land.

In the years since, extension has gradually grown and shifted within a changing society to work with a much broader clientele, including many nonfarm and urban audiences. Likewise it now works on a much wider range of issues, including resource conservation, public policy, consumer well being, and environmental awareness. For example, the public land issues which occupy so much social attention today were not evident in the early 1900's. But production agriculture has continued as a central extension emphasis throughout the nation, and will be the major focus of this paper.



When extension came upon the scene, agriculture was almost entirely focused on the agronomic or intensive as opposed to the ecologic or extensive forms of management. Then as now, the functional edge of extension in achieving its educational objectives rested with the county agent. By design, experience and tradition alike, the county agent is channeled to work with, and thereby develop an affinity for, the private agriculturalist. In this context, the overall effectiveness of the extension agent can often be closely related to the possession of necessary people skills. This concept can be taken further to say that effectiveness always is a function of the degree to which an agent is cast in the societal mores of a given time and place. These influences, although not often articulated by the agents themselves and certainly not by most commentators looking at the extension agent, are extremely powerful. To be effective, an extension agent charged with serving private agriculturalists simply must be cast within their area of relevance and in the way they look at the world, and must possess adequate skills levels. Given major deficiencies in either of these categories, the agent does not last very long. Although this concept is very important, at times it can be a two-edged sword with both strengths and weaknesses. The most apparent conjoined strength and weakness of these kinds of characteristics is

that an agent trained in agronomic as opposed to ecological agriculture tends to be production oriented, but as a converse tends to be somewhat insensitive to extensive management and to the ecological consequences of agricultural technology as well.

In terms of our focus on range management, these characteristics tend to concentrate the efforts of the agent on the ranch itself, often expressed in terms of efforts to strengthen animal management, to improve the range pasture system, and to deal with ranch rather than range economics. There is often a corresponding lack of emphasis on extensively managed grazing land, public lands associated with the ranch, range management, environmental concerns, and new values associated with the use of such lands.

The effects of this type of agent performance can be seen on both private and public land. For example, no one can claim that the range condition of extensively managed lands in a private land state such as Texas is everywhere what it should be. But the effects of agronomic emphasis and ecological de-emphasis are much more vivid in public land states, and the solution of problems they pose harder to comprehend. Given these features, extension in a public land state can be seen to prevent ranchers from meeting their new challenges instead of helping to devise solutions. There are too many county agents whose approach to the rise of environmental concerns, as exemplified by environmental impact statements on grazing, was to help fight the management agencies and grazing critics, instead of helping the rancher deal with the new requirements and obligations. At the extreme, the agent becomes part of the problem rather than part of the solution.

An analog of these kinds of effects can be developed for private land states. Although a considerable number of intensive agricultural concerns remain, there is also a growing need for ecological awareness of environmental concerns on private land. Probably the best example for the county agent is the present concern over water quality and quantity. The concept of water flowing onto a piece of property that should be in the same quality when it flows off that piece of property is going to become steadily a more persuasive argument in land management. It will be the avenue for concern, for legislation, and for regulation which will become larger in the coming years. Such concerns will have a powerful effect on private land uses, and the way that the agent chooses to help private land owners respond to those concerns is going to be critical.

Extension services everywhere must incorporate a requirement of ecological awareness and a heightened emphasis on people skills into their search for new agents. Extension must make a definite effort to expand into audiences beyond farmers, rural home-makers and agricultural youth in order to be effect in the years ahead.

If we say that all of these features, e.g., environmental requirements, extensive management, and public policy, are now part of the extension universe, what will it take to make extension more effective in the future?

First, extension services everywhere must incorporate a requirement of ecological awareness and a heightened emphasis on people skills into their search for new agents. Although it is neither management nor research, extension is the contact point between the land grant university and the person on the ground. This contact is formulated through people skills which will allow agents to interact with the many new audiences of an ecologically aware world.

Second, extension must make a definite effort to expand into audiences beyond the classical three in order to be effective in the years ahead. The same kind of organized extension effort, prescribed by the Smith-Lever Act for agriculturists of the last seven decades, must be directed at other groups over the entire spectrum of production/ecological concerns. These groups will range from bankers on the one hand, who are most concerned with the production function, to more or less prickly environmental groups on the other hand, who do not understand the production function. In public land states, the groups will include public land management agency personnel. This change will likely occur in extension efforts directed to the organized groups, clubs, associations, coalitions, and action agents that are so much a part of our political and social landscape today.

Third, extension agents must expand their concern and their efforts directed toward the general urban public. Unquestionably, dealing with the general urban public is difficult. But because the votes, the money, the power, and the decision-making authority are increasingly vested in the cities, extension simply has to find some way to communicate with urban publics. This communication effort certainly will be diffuse rather than direct, and will probably center on information transfer through electronic media. In turn, this will require different kinds of communication strengths in both extension as an organization and in its agents.

Fourth, extension must be much more proactive in helping private landowners meet their social-environmental challenges. Too often, the response of county agents has been only defensive: How can we defeat them? How can we make them go away? How can we suffer until they do go away so that we can get back to life as it should be? Extension has not been effective in promoting the idea that these issues are here to stay and must be addressed. As important as agricultural technologies continue to be, such as an improved strain of alfalfa for use on improved pastures, it may be even more important to deal with the applications of the Clean Water Act on the land. We may be sure that if land managers assisted by extension don't incorporate such provisions into their management decisions, then someone else will, probably through regulation.

In summary, for extension to be effective, more ecologically trained agents with increased emphasis on people and political skills will be required. Second, expansion of extension efforts beyond the classical audiences to organized groups over the entire spectrum will be needed. Third, new ways to effectively address urban publics must be developed. Fourth, extension activities in helping private land owners meet their social-environmental challenges are sorely needed. I am not pessimistic about the prospects of realizing these changes in extension. The challenges are great, and will require concentrated efforts, but I believe they can and will be met. An outstanding example has been the proactive development of the cooperative resource management program in the public land states. I take great encouragement from this type of activity. I believe extension can remain, if it chooses to remain, the sort of viable tradition-making force in American agriculture that it has been for over 75 years.

Comment: I don't think many people have a feel for range management or the problems faced by private land owners. Couldn't we make better use of television, radio, artists, and others who can educate the public and make the message more attractive? Can a relationship with the public be built?

Johnson: The kind of effort you describe weaves a thread through the concept of expansion beyond the classical three audiences and is the only readily available way for extension to serve the urban public. Such effort can lay the groundwork for contacting certain groups. Certainly, it is a proactive way of helping land managers deal with their social and environmental problems. The overall concept poses something of a problem which has not received much attention. I can remember trying this type of outreach and being admonished by my administrator about the utility of these efforts because of some very practical concerns: 1) these audiences are not contained in the Smith-Lever Act; 2) the efforts do not help farmers and ranchers in the conventional sense; and 3) such programs do not assure political support of the extension plan when budget time comes, because the urban folks are not writing their legislators about extension, but the farmers and ranchers are. Unless we can get the message across that farmers and ranchers are being helped by efforts with the urban public, our efforts will be thwarted—a large problem to be solved.

Comment: I think the land grant universities are moving very much in the direction of tele-conferencing and the use of other telecommunication systems.

Continuing Education Needs in Range Management

F.E. "Fee" Busby. *Winrock International, Morrilton, AR, 72110.*

Winrock International had the privilege of working with the U.S. Forest Service during 1989–90 to develop a continuing education program for personnel involved in rangeland resource management. The project included a

survey of over 700 Forest Service personnel identified by the agency as being involved in "rangeland vegetation management;" two task force meetings of Forest Service, Bureau of Land Management, Extension Service, and university range and wildlife personnel; and participation by Winrock project staff in several national and regional Forest Service workshops and conferences.

The continuing education program recommended as a result of this study will fill part of the gap that exists in educational and career development opportunities available to Forest Service rangeland resource managers. While the study was done for the Forest Service, results should be useful for all agencies involved in rangeland management. The recommended program is designed for mid- to upper-level range personnel with rangeland resource management responsibilities and 10 or more years of experience. It attempts to avoid duplication of other educational opportunities, both within and outside the agency. The recommended program is designed to address needs that can best be met by a nationally coordinated effort.

Continuing education in rangeland resource management should provide the necessary technical and leadership skills to maintain or enhance rangeland ecosystems for the long-term well being of the environment, produce a mix of goods and services valued by society, respond to changing public values for rangeland resources, contribute to the long-term economic and social well-being of individuals, local communities and the nation, and contribute fully to interdisciplinary management of rangeland ecosystems.

Recommended Educational Program

The recommended program is designed to provide rangeland resource managers with the necessary technical and leadership skills to (1) maintain or enhance rangeland ecosystems for the long-term well-being of the environment; (2) produce a mix of goods and services valued by society; (3) respond to changing public values for rangeland resources; (4) contribute to the long-term economic and social well-being of individuals, local communities, and the nation; and (5) contribute fully to interdisciplinary management of rangeland ecosystems.

The recommended program includes three courses.

1. Rangeland policy and socioeconomic—The focus of this course will be to prepare mid- to upper-level rangeland resource managers to identify and deal with societal changes that affect use and management of rangeland resources; to more fully document the social and economic values of rangeland resources; and to use this information in rangeland planning, management, and public policy programs.

The rangeland policy and socioeconomic course was recommended as the first course. It was designed to help rangeland management personnel develop a better understanding of the complex political and economic issues

that must be addressed if successful rangeland management programs are to be developed and implemented. A frustration seems to exist among Forest Service personnel concerning these issues and the societal changes they represent. This course should help range management personnel deal with this frustration.

2. Leadership, communication, and coordination—This course will increase the knowledge and skills needed by mid- to upper-level rangeland managers to work with and guide people in participatory rangeland planning and management programs that balance the needs and wants of people with the use capacity of the land.

This course was recommended as the second in the series because of the need for rangeland management professionals to develop better people skills so they can be more effective in the political and economic environment in which they work¹. This course was designed to capitalize on the increased understanding of the political, social, and economic issues developed in the first course.

3. Rangeland ecosystem management—The focus of the rangeland ecosystem management continuing education course will be to provide mid- to upper-level range managers with new skills and enhanced abilities to manage rangeland ecosystems to meet the needs of individual, rural communities, and society.

This course is the capstone course that will help rangeland management professionals use ecosystem management concepts in new ways in order to be more responsive to the political, social, and socioeconomic issues raised in the first course and the people and participatory management skills developed in the second course.

It was recommended that the course be developed so that participants will track through each of the three courses in the indicated order. Much of the success of the continuing education program depends on how well the first two courses prepare participants to deal with the political and socioeconomic environment in which they work. The third course must help participants develop a new vision of how rangeland ecosystems can "serve the people" in new as well as old ways.

Teaching Approaches and Learning Activities

These courses must utilize "learn by doing" teaching approaches. For example, the "law or business school" approach of pre-class reading of case studies and in-depth discussion by and questioning of participants in class may be a useful teaching approach for the rangeland policy and socioeconomic course. Actual practice of communication skills and role playing should be used in the leadership, communication, and coordination course. Field studies and computer simulations offer useful approaches for teaching the rangeland ecosystem management course. It will be desirable to include in all

¹According to information provided by the Forest Service on December 2, 1991, the Leadership, Communication, and Coordination course will be the first offered. It will be offered at the Bureau of Land Management Training Center in Phoenix, Arizona. It will include participation by both Forest Service and BLM personnel.

courses instructors from the private sector who are influencing or being influenced by Forest Service rangeland management programs.

Individual learning activities should be required of each participant in the continuing education program for rangeland management professionals. The learning activities should relate directly to the participant's job assignment and the needs of the work unit. As a general goal, each learning activity should result in the development of a better strategy for the participant's work unit to work as a team with the public to manage rangeland ecosystems.

The learning activities should be planned and implemented in three stages with the primary emphasis of each learning activity correlated to the course most recently completed by the participant. For example, following the first course each participant should plan a unique learning activity to put into practice the knowledge and skills learned about rangeland policy and socioeconomic issues. The learning activities planned and implemented following the three courses should relate to one another rather than be three separate projects.

Learning activity plans should be developed in draft form at the end of each course and finalized in consultation with the participant's immediate supervisor following the course. Participants should be able to complete their learning activities within six months following the conclusion of a course.

Implementation Strategy

The Forest Service will arrange for these courses to be taught by universities, other agencies, not-for-profit organizations, for-profit businesses. Unique talents will have to be pulled from many sources.

Continuing coordination between the Forest Service and the providers of these educational programs will be necessary to ensure that the course evolves so that learning in later courses builds on knowledge and skills already gained in previous courses and individual learning activities, and that courses remain responsive to current events and issues.

Administrative Considerations in Range Education

John C. Malechek. *Department of Range Science, Utah State University, Logan, UT 84322-5230.*

Planning for the future is risky business, but for educators, it is an especially important task. I am reminded of a quote from one of my favorite philosophers, Yogi Berra: "If we don't know where we are going, we'll end-up somewhere else."

My assigned topic in this contemplation of the future deals with the administrative realm—that is, those factors unique to the academic institution that both hinder and foster the education process. I have organized my talk to first simply identify some issues pertaining to: 1) the student, 2) the university institution, 3) the faculty, and 4) the curriculum. The issues identified may appear rather daunting, so I have followed immediately with a similar list

of some bright spots or hopeful signs. Finally, I have prepared another list of tasks and changes that I think need to be undertaken for us to do a better job of *educating* and *training* (note the distinction here) of young people for professional careers in natural resources management.

Student-Centered Issues

University students are different today in many ways than when I began teaching 20 years ago. For example, we now have non-traditional students—women who are sole providers for families, and older people who are coming to the university for the first time, or who are returning for major career changes.

Entering students continue to come to the university with poorer and poorer preparation in the basics of mathematics, chemistry and communication skills, requiring more time for remediation. This flies directly in the face of the need for more time in the university curriculum for advanced technical courses.

These students often require major advising time, special provisions in scheduling classes, and more moral support than the traditional student of years gone by. Also, more of today's students are married and have families to support than when I went through school. The need to work in order to support a family often means that these people do not have time for extra curricular activities such as honors programs, the plant team and range club. We are also seeing increasing numbers of female students who could benefit greatly from mentoring by female faculty members. We have no women faculty members in the range program at USU and I know of only a handful in the whole profession.

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Today's students, increasingly from urban backgrounds, also need more time for practical, hands-on experience in the skills and arts associated with range management.

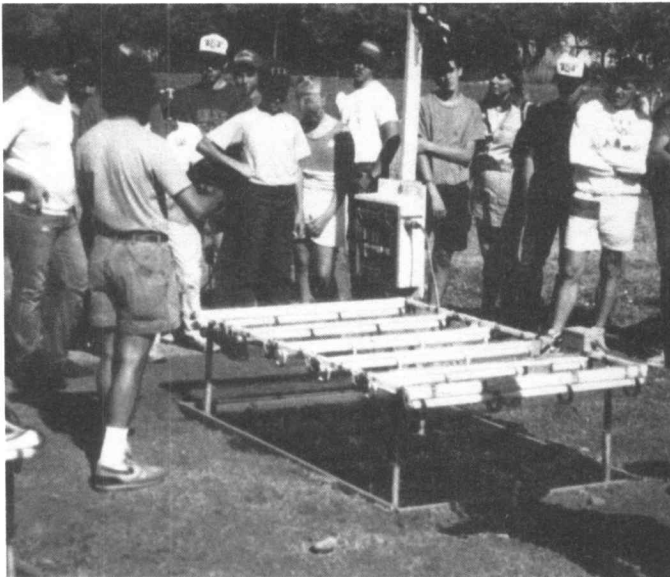
University Issues

There are also numerous institutional issues that affect our plans for the future. Higher education in general is in the midst of major change. Burgeoning costs are causing presidents, provosts, and deans to demand greater accountability with more emphasis on student credit hour (SCH) production. As a result of this SCH emphasis, some of our smaller range programs (e.g., Humboldt State, University of Arizona) are facing threats of elimination. These threats exist despite the fact that student enrollments are growing and job placement is now better than it has been

in a decade. The so-called "bottom line" seems to dictate that small programs are vulnerable despite their current quality and perceived potential. All of us are growing more dependent upon scarce grant dollars to subsidize the teaching function because state-appropriated dollars for departmental operating needs have failed to keep pace with growing costs.

Faculty Issues

These issues I have mentioned are sources of stress to the lives of faculty, especially young faculty who are struggling to gain tenure. Tenure and promotion standards have become more stringent and the increasing demand to raise grant dollars contributes to a stressful



situation. As mentioned earlier, faculty are also spending more time dealing with remediation and students' personal problems. Dual career situations between husbands and wives can also contribute to personal difficulties that spill over into professional lives.

Curricular Issues

Curricular issues are potentially the easiest to deal with because they are mostly under our control. Basically, all that is needed is the resolve and the time to make changes.

To echo statements by earlier panelists, I do not see why OPM standards need to be so inflexible. These need to be reviewed and up-dated regularly so that they become a standard for excellence rather than a lowest common denominator.

OPM standards notwithstanding, departments need to regularly review their curricula and weed out poorly taught or out-moded courses. We can no longer afford to waste students' time and money on worthless courses.

As knowledge expands and as our profession becomes more technically complex, we must resist the temptation to simply add more technical courses at the expense of

the humanities, art and social sciences. Range students, in particular, need intellectual broadening in order to deal with the diversity of people and values they will face in their jobs.

Hopeful Signs

Although there are many challenges, there are also many signs for great optimism in range education. We are in the midst of a general re-discovery of the importance of undergraduate education. A national news magazine recently dubbed 1991 as "The Year of the Student." There has also been a re-discovery of the environment by the American Public. While rangelands remain an obscure concept for the majority of our citizens, important spill-over affects will certainly benefit the cause for rangeland conservation. We have also seen increasing student enrollments for the past three years, partly a result of this increased interest in environmental issues. There are unquestionably brighter employment opportunities ahead for students desiring careers in the federal land management agencies, and this, alone, is a great morale booster. We now have the best educated and brightest young faculty we have ever had in the university. It is vital that university administrators do everything possible to remove obstacles from their creative activities and to assure that they do not become victims of burnout. I personally take hope in the realization that the range-trained student is still one of the best equipped resource professionals to deal with the complex land-resource system we call rangelands. Our major challenge is to overcome the unfortunate image that range managers are livestock managers instead of land managers.

What Needs to be Done?

Allow me to conclude with a few specific suggestions for action on both institutional and personal levels. As a simple, low-cost beginning, university departments can re-institute or strengthen the seminar, especially at the freshman and senior levels. The freshman seminar can be used effectively to teach professionalism, to help establish proper study habits, and to build connectedness to the department and the profession. It also provides an opportunity to acquaint students with the faculty.

We can provide more part-time jobs in the department. Systematic studies have shown clearly that part-time employment in an academic department is one of the most important factors in aiding retention of majors in the academic discipline.

We can streamline the curriculum and be sure that students are not wasting time (money) on worthless or out-dated courses and that they are not having to spend an extra semester or two simply because it is impossible to schedule required courses. We must also practice closer advising. This will mean adopting a more consumer-conscious attitude. We must also do a better job of articulation with our "feeder" schools, considering that many (perhaps a majority) of our students come into range as transfer students rather than as freshmen.

*We must all think and act professionally ourselves.
What we all say and what we do day-by-day speaks
more loudly than any formal course we can ever teach.*

Individually and collectively as a profession there is much that we can and must do. I see outreach education as a vitally needed approach to educating people on the importance of rangelands and range management. This must be done from kindergarten through grade 12 in the public schools and will need to involve universities, public land management agencies, county extension, public schools, 4-H, scouts and youth groups. As individuals, we must all become more involved politically in public education, not only for rangelands, but also for the very sake

of a basic education for our youth. We can tell everyone who will listen that range management is *land management*. We must tell fellow professionals as well as the uninformed general public. Finally, we must all think and act professionally ourselves. What we all say and what we do day-by-day speaks more loudly than any formal course we can ever teach. If we think, act, and dress like cowboys, society at large will regard and treat us like cowboys. I personally take greater comfort in a future where range-trained professionals are being sought for advice and wisdom on land management decisions than in a future where I am regarded, at best, as a colorful anachronism.

Literature Cited

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The Calf Path

One day through the primeval wood
A calf walked home as good calves should;
but made a trail all bent askew,
A crooked trail as all calves do.

Since then three hundred years have fled,
and I infer the calf is dead.

But still he left behind his trail,
And thereby hangs my moral tale.
The trail was taken up next day
By a lone dog that passed that way;
And then a wise bellwether sheep
pursued the trail o'er hill and glade
Through those old woods a path was made.

And many men wound in and out,
And dodged and turned and bent about
And uttered words of righteous wrath
Because 'twas such a crooked path;
But still they followed—do not laugh—
The first migrations of that calf,
And through this winding wood-way stalked
Because he wobbled when he walked.

This forest path became a lane
That bent and turned and turned again;

This crooked lane became a road,
Where many a poor horse with his load
Toiled on beneath the burning sun,
And traveled some three miles in one.
And thus a century and a half
They trod the footsteps of that calf.

The years passed on in swiftness fleet,
The road became a village street;
And thus, before men were aware,
A city's crowded thoroughfare.
And soon the central street was this
Of a renowned metropolis;
And men two centuries and a half
Trod in-the footsteps of that calf.

Each day a hundred thousand rout
Followed this zigzag calf about
And o'er his crooked journey went
The traffic of a continent.

A hundred thousand men were led
By one calf near three centuries dead.
They followed still his crooked way,
And lost one hundred years a day;
For thus such reverence is lent
To well-established precedent.

Sam Welter Foss—1895