



The Last 25 Years: Changes & Reflections

Striving for land health – not for a use or an industry – will help insure humanity’s sustainability and the range science profession.

By Thad Box

In 1979, soon after Americans were allowed behind the Bamboo Curtain, I went to China as the range man on a scientist exchange. A marvelous old geographer in his 80s talked about land degradation after the recent introduction of corn. I asked when corn was introduced. He said the Portuguese brought it about 400 years ago.

Today we meet to discuss our obligations as the voice of rangelands. We act as if the change in American rangelands, and our profession, in the last 25 years is a major event in our journey. How impatiently American we are. We want answers and we want them now.

Our profession formed because a new set of herbivores, domestic livestock, were recently introduced into North America – about five hundred years ago. A hundred and fifty years ago they had spread throughout our continent and exceeded its carrying capacity. The land was a mess. Politicians and producers wanted answers, or more rain, immediately.

During the last seven hundred years there have been many droughts more severe than the one we remember in the 1950s. Stands of vegetation died and were replaced with different species, great gullies formed and thriving cities were abandoned. Such major changes occurred many times before Europeans brought livestock to our rangeland, which by nature is damn dry country.

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Change occurs without our abuses or help. Have changes we made, as a profession, in the last 25 years made us better able to speak for the range? That is the important question today.

American impatience and faith in technology demanded pioneer scientists address grazing and droughts of the late 1880s. Lacking an accepted scientific theory to focus their efforts, early scientists observed and wrote. Dave Pyke and Jeff Herrick discussed how, as ecological concepts developed, especially those dealing with plant succession, they were incorporated into our profession. Slowly, we developed a science that addresses changes in plant communities when foreign herbivores are put on them. We were even seduced into thinking that was our reason for existence. Mike Pellant and Linda Joyce remind us we also deal with biodiversity. Society,

as discussed by Mark Brunson, wants rangelands to satisfy their needs. We claim to serve the land.

In the last century and a half we changed from mule drawn plows to computer controlled tractors, from the pony express to e-mail, and from black powder muskets to nuclear warheads on intercontinental missiles. We no longer move on when we see the smoke of a new neighbor. Thousands of people die when a plane flies into tall buildings. But are we better spokespersons for rangelands?

To look for significance of our 25-year efforts in the last seven centuries, or even the last 150 years, implies we understand the scientific, social, and economic history of the Western United States since pre-Columbian times. We do not. And failure to relate current conditions to an understanding of what happened before the trail herds kept us focused on overgrazing. If that is our only focus, we will soon become irrelevant—or extinct.

Changes In Rangeland Use

Be that as it may, our assignment today is to discuss changes in the past 25 years. I will use my 1977 presidential address made at our annual meeting in San Antonio as a baseline. It was published in the *Journal of Range Management* as “Food, Fiber, Fuel, and Fun from Rangelands.” I will explore how relevance of rangelands has changed for those four products. I will then speculate on how the changes have affected our profession, especially science.

Food – Twenty five years ago most Americans, and almost all range people, considered food production the major use of rangelands. Beef and lamb were preferred meats—consumption increased as disposable income increased. Today, food production from rangelands is important only in poor countries. There milk and meat from native ranges are a significant part of the food supply. But in America, and most industrialized countries, per capita consumption of red meat has declined. It is no longer the preferred food item. Publicity about growth hormones, mad cow disease, and genetic engineering has caused many consumers to consider milk and red meat toxic substances.

Foodstuffs directly gathered from rangelands such as nuts and berries are not important in rich countries because of high labor costs. Rangeland foodstuffs are still important as local nutrients in some poor countries, but few reach the export market.

Fiber – Animal fiber, such as wool, mohair, alpaca, and cashmere, is still valuable, especially in the luxury market. But synthetic fibers fill most niches traditionally available to natural fibers. Twenty five years ago, synthetic fibers were big in

the clothing and general fabric markets, but niche markets remained for animal fibers. Wool, with its thermal qualities, was used for coats and outdoor sportswear. Now we see joggers in spandex and hikers in gortex. Dozens of synthetic fabrics are now developed yearly for specific purposes.

Twenty five years ago wood fiber from rangelands appeared to be growth industry. There was talk of machines “harvesting” mesquite and other unwanted brush to make paper, packing materials, and building board. In the past two decades styrofoam peanuts, plastic wraps and wood produced in humid areas all but killed dreams to produce plant fiber from rangelands.

Fuel – A quarter century ago there was growing demand for rangeland fuel, both the firewood growing on its surface and the vast coal beds beneath them. There was talk of harvesting brush, and even “farming” some species for biomass fuel for electrical generating plants. Deteriorating air quality, from industrial growth and automobiles, caused demand for wood and coal to decline.

Now there are windmill farms sprouting throughout the West. Solar collectors in deserts show promise.

Technology is now available to make electrical energy production a major rangeland use. National energy policy and economics control this developing use, not rangeland suitability or science.

Fun – Fun is still had on rangelands. But the kind of fun has changed. In 1977, sport hunting was, to recreation, what beef was to food production. In the past two decades numbers of sport hunters have declined. Meanwhile large game animals, with the exception of mule deer, have increased. Off road vehicle use increased, now being one of the major problems for public land managers. Hiking, fishing, rock hounding, and mountain biking continue to be important.

Other Uses – Other rangeland uses not included in the four Fs deserve mention. Ranges continue to be a place to put things folks do not want. Remoteness attracts sanitary land fills, biowaste disposal, and even toxic waste. As the human population grew during the past 25 years, the demand

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for places to but things society does not want to see or smell increased. Technology may make waste disposal more acceptable, but politics will be more important than science in future use.

Healthy ranges tie up much of the air's pollution in their vegetation. Industrial pollution and automobile exhausts have created a new demand for rangelands in the past 25 years—carbon sinks. Yet again, national policy, not science, will determine future demand.

Deborah Donahue, in her book "The Western Range Revisited" suggests much of American rangelands should be used as a biodiversity reserve. Other "reserves" have been suggested for watersheds, wilderness, and ecological services in general.

The greatest increase in economic use of rangelands in the past 25 years has been for private amenity reserves. In the 1970s amenity values were solitude, beauty, isolation, etc.—important to the human psyche but difficult to value in the marketplace. With the economic boom of the 90s, those values were incorporated in sale prices of rangelands.

People who made millions in the stock market spent some of that money for a place to retreat from others. Economists dubbed those folks "amenity migrants." Rangeland values soared far above their value for producing goods and services. Some ranches, whose owners placed conservation easements on them to prevent development, actually increased in value. Many rangelands now have a very high value for nothing more than the amenity of space.

Changes In Science

The uses of rangelands have changed, as have the perceptions of those who view rangelands. Science has also changed in the past 25 years. We debate whether those changes are sufficient to evaluate and understand modern rangelands. Here, I will discuss the change in science in two categories: theory and tools.

Advances In Theory – Ecology, a relatively new science, has provided concepts of interconnectedness to our profession since its beginning. We de-

pend heavily on the Clementsian paradigm of succession. For decades we have known that Clement's theory did not accurately describe plant community change on rangelands. In the past 25 years, our profession has taken leadership in debating concepts and developing new theory that more closely reflects community change in arid lands. State and transition concepts came from range people. Some range folks still resist them.

Also in the last 25 years plant physiologists made major breakthroughs in carbohydrate storage in plants, separating C3 and C4 pathways, physiology during stress and other mechanisms of plant growth. We know a lot more about how plants grow, capture energy, and store it.

Since the 1970s animal behaviorists have gone a long way toward understanding how grazing animals learn, and under what conditions they select given plants. Basic research in the fields of ecology,

plant physiology, and animal behavior now gives range managers sound bases on which to evaluate rangelands and build grazing systems. In my biased opinion, research in these three fields has made the greatest additions in the past 25 years to the science of range management.

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But perhaps that is because I am a biologist. Equally important have been development of non-market economic theories, new concepts of spatial analysis and improved social assessment procedures. These advances, as well as the biological theories discussed earlier, have been made possible by vastly improved computational opportunities.

Improved Tools – The development of affordable, high speed computers had an immediate and profound effect on our profession in the last 25 years. Now the range manager can have the computing power of the work stations of two decades ago on his Blackberry or Palm Pilot. His laptop has the power of old mainframes. With wireless capabilities he can search databases from his green pickup and interact with data almost anywhere in the globe. His desktop can run GIS and rather complex models once reserved for super computers.

Large, high speed supercomputers have made new kinds of modeling possible. Large data sets can be

related to specific landscapes. Agent-based modeling allows social and biological data to interact with physical realities of landscapes. New concepts and theories can be tested quickly through simulation. Models for stocking and destocking land in relation to improved weather forecasts are now available.

Sampling tools developed in the past two decades are almost unbelievable to range managers of my generation. A technician can locate his sample area with GPS and be confident someone else can relocate it with accuracy. Data can be collected, recorded digitally, and transmitted electronically, by satellite, to a base station hundreds of miles distant. Individual plants and animals can be identified and marked genetically through DNA. Much of the data people once collected on horseback can be accessed through remote sensing. And the list of sampling tools developed in the past 25 years grows daily.

Social survey instruments have become more sophisticated and reliable. We can better understand what people want, what they are willing to pay for, and how they will behave under different scenarios.

Advanced computational tools now allow range folks to use huge databases that, because of their pure size, were not practical two decades ago. The economic and social information in census databases, the daily weather records of NOAA, regional soil surveys, range survey data and historical stocking rates sitting in files (once it is entered digitally) can be used to develop "state of nature" estimations and simulations that relate to specific landscapes. By relating such data bases as tree ring estimates of past climates and geologically dated erosion events we understand that much of the erosion we previously attributed to overgrazing is really a function of rainfall and geological materials.

Social databases developed for marketing can be used to understand societal values, which can then those related to behavior of recreationists on specific rangelands using GIS. By using large databases, many not developed for range management, and relating them to rangelands with new modeling techniques we have almost unlimited opportunity to understand the land-human interconnection.

In summary, our profession claims to speak for the land. More specifically we evaluate the interactions and interconnections of land-animals-people. For the most part, we consider only the recent past. But new science and tools allow us to probe into

pre-historical rangelands and view the future in ways we could not imagine 25 years ago. Are we up to the challenge?

History tells us that a new set of herbivores was introduced to North America about five hundred years ago. These new animals became dominant and exceeded the land's carrying capacity about a hundred and fifty years ago. We also know that extreme climatic events, particularly drought, and severe erosion events have occurred two to three times a century for the last thousand years.

We have tried to unravel the mysteries of the interactions of climate-land-animals-man for only about a hundred years. And we have met here in 2004 to evaluate the effects of our profession for the last quarter century. Twenty five years over the time scale where we have historical information does not seem very important. Several speakers has indicated that not much has happened—we're talking about the same stuff and doing many of the same things we did a quarter century ago. The scary thing is that we who call ourselves range managers may not have changed enough to take advantage of our new challenges. I'll bet there are papers at this conference based on outdated science and concepts people no longer believe.

There are anecdotal, photographic, and some quantitative data showing ranges have improved over our 25 year time period. But the greatest changes may not be in the land, but in what people want from the land and our opportunities to evaluate what those wants will do to sustainability. In the past two decades the demand for products—food, fiber, fuel— from ranges has decreased. The desire for services and amenities has increased. But livestock grazing still dominates our papers, our discussions and maybe even our heart and soul.

In the very short time of 25 years our science has made significant advances in the understanding of ecology, plant physiology, animal behavior, social assessment, non-market economics and spatial analysis. These, coupled with improved computational power, electronic tools and huge data bases, offer opportunities for major breakthroughs in range management. The last 25 years has produced tools that will allow us opportunities for understanding rangelands we could never have imagined when our society was formed.

The primary limitation on rapid development in

understanding rangelands may be in resistance to change in those of us who make up our profession. As Pogo said, "We have met the enemy and he is us." Many of our members refuse to change. Those who became range managers to feed a hungry world may have difficulty adjusting to rangelands now valued primarily for amenities. Many may become defensive and resentful of the amenity crowd that now dominates rangeland use.

Much of the new science, almost all the new tools and some of the most important databases have developed outside the range field. Most of us do not have mathematic and computational skills to work effectively with new approaches that are available.

If range schools do their job, this will change with each generation of graduates. But even the most quantitative, most theoretically sound range person must rely on specialists from other fields. It is a land ethic that can serve as the integrating mecha-

nism for all the specialists' work. And therein lies the strength of our profession. Developing people who love the land, understand science and believe a sustainable landscape is possible should be our goal.

We are at a critical time in our profession. Some have said that range management is doomed if live-stock grazing is not our major mission. Never before has it been more important for us to speak for land health, and not for a use or an industry. It will be our land ethic, not a beef ethic or a wildlife ethic or a wilderness ethic or an endangered species ethic that will guarantee range management's survival. Healthy land will insure humanity's sustainability. And healthy rangelands will insure our profession will be a valued member of the science fraternity.

A preview of one of the Plenary papers for the Society for Range Management Annual Meeting in Salt Lake City, Utah. The author is a past president of the Society.