

Range Management in the United States for the Next One to Three Generations¹

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It is difficult to project the longer run future with any assurance, whether one is concerned with rangeland or with any other natural resource. One has only to recall the great changes that the past one to three generations have brought in every aspect of our lives; he would be wise to assume that the next one to three generations will bring equally great changes. The recent past was not, and could not be, accurately foreseen at the beginning of any past period; and today we are uncertain about the nature of future changes, while at the same time assuming they will be very great.

Let us start by briefly recalling some attributes of life in the United States in 1900. In 1900, the total population of the United States was 76 million people; today it is over 200 million. In 1900, the gross national product in current prices was about \$20 billion, today in current prices it is about \$1,000 billion, or apparently 50 times as much; even at constant prices it would be well over 10 times as much. In 1900 there were only 8,000 registered cars in all of the United States; today, there are over 80 million. In 1900 there were no airplanes—the Wright brothers had not yet made their historic flight; today, there are 150,000 airplanes, some with wing span greater than the length of the first flight. In 1900, and long thereafter, there were no space vehicles; today, we have landed several men on the moon, and brought them back safely. In 1900, there was no frozen food industry, no radio, no television, nor any of scores of other production and consumption tech-

nologies that we take for granted today. And the paid vacation was almost unknown—college professors and other teachers got “vacations,” but without pay; and the average work week was 60 hours, today it is about 40.

And one could go on and on, contrasting the situation 70 years ago with that of today. Americans today are more numerous, have higher incomes, are more mobile, travel far more, and have an enormous range of gadgets in their daily lives, compared with a few generations ago.

In another 70 years, by 2040, there will almost surely be more people in the United States than now—how many more, depends upon our reproductive habits, but a population of at least 300 million is highly probable, 400 million not unlikely, more entirely possible. National income, in total and per capita, will almost surely be higher than now—very much higher, probably. Our children and grandchildren may well choose to use much of their higher productivity per manhour by increasing their leisure rather than by increasing their consumption of goods, but we cannot be certain of this either. There is every reason to believe that our technology then will be more advanced than now, in ways we do not now foresee. We live in a dynamic and changing world, and the future is as exciting and as unknown for us as it was for our grandfathers.

Within the range livestock industry, these past 70 years have also seen vast changes. The national forests were only partly established in 1900, now they are fully so. In 1900, the grazing districts were unknown; now all the federal land suitable for grazing use is included within them. In 1900, a lot of what is now privately-owned range, espe-

cially on the Great Plains but elsewhere as well, was still public domain, fast being transferred into private ownership. In 1900, there were 60 million cattle of all ages in the United States; today there are over 110 million head. The type of cattle has changed. In 1900, there had been no range survey, and the idea of managing grasslands and other natural ranges scarcely existed. In the intervening years, science has been applied to range management and to livestock production, with great results. Markets for the range livestock have changed, in location and in type.

One of the major changes over the past 70 years, and more particularly over the past decade, has been the rise in popular support for conservation. There were great conservationists before 1900 and in that year, and there was some popular support. But the average man today gets onto the land and into the forests in a way that was undreamt of two generations ago. Threats to the environment have arisen from many sources, including some from our new technologies, and many new demands are being made upon our natural resources. Whereas use and management of land, forests, and water was once considered the sole prerogative of the owner, today many people who neither own nor directly use such resources nevertheless have very definite ideas about how they should be managed. One can assume that such interest will increase in the future.

Range Management is Practical Ecology

The rancher and the range management specialist are practical ecologists, by necessity. They must work with, and at best manipulate, natural forces; they cannot wholly replace natural vegetation with crops of their choosing, grown by methods they select, as the crop farmer can and does. The range manager accepts the climate and soil as he finds them; he can modify plant cover to some extent, but only within limits. To the natural limi-

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tations of most range areas must be added some economic ones: range areas are, by and large, lands of low physical productivity. A range which yields a ton of harvestable air-dry forage per acre is tremendously productive; the average acre in grazing districts produces less than 100 pounds. Not only is the tonnage low, but these are roughages—valuable livestock feed, but not concentrated feed. Most rangeland responds only modestly to added inputs of labor, capital, and management. Even if some range management practice can double output, this is still only a limited weight of forage per unit of land area. As a consequence, the rancher cannot afford to undertake expensive programs on most range. And, of course, such a low output per acre means that the plant growth can be harvested only by grazing animals. This inevitably leads the rancher and the range manager into livestock operations, with all their specialized technical problems.

In thus stressing the practical ecology aspect of range management, I do not in the least suggest that all past rancher and specialist management of rangeland has been good ecology. As we all know, in altogether too many instances the ranges have been overgrazed, or grazed at improper seasons, or otherwise mismanaged, with consequent loss of productive plants and often with damage to the soil as well. Much of this mismanagement arose from lack of knowledge; some came from lack of control over land use—if one man's cattle did not graze all the grass, someone else's cattle did. My experience and research lead me to the conclusion that range managers as a whole have been neither better nor worse than crop farmers as a whole or than foresters as a whole. In the frontier era of American history, natural resources were relatively plentiful, capital and labor were generally scarce, and exploitation for immediate gain was economically advantageous and sometimes necessary. Modern range manage-

ment has opened up many possibilities for achieving more output from rangeland today while at the same time maintaining or building up productivity for the future. The low point in conservation of cropland, forests, and rangeland seems to have been the 1920s; since then there has been modest improvement for all three, though conditions are far from fully satisfactory today.

Rangeland management of the past was directed primarily toward the output of domestic livestock. Some, not primary, attention was given to game animals and watershed effects. Chemicals were used to control unwanted plant species, or to control predators, or for other purposes. The pollution problems which draw so much attention today were often largely ignored. As we move into a new social and economic era, the ecological requirements of range management have changed, and will change still more. But good range management can never ignore the economics of inputs to the land, and outputs from it—whether the outputs be only beef, or include also various recreational, aesthetic, and other values. These latter outputs are not infinitely valuable, one must consider what he gets for the expenditures he makes.

Projections of the Future

There is a continuum from the past to the present to the future; our only real guide to the future lies in our understanding of the past and present. We often do not understand the past, sometimes we even try to ignore it; our understanding of the present world in which we live is often deficient—as participants, we are not good observers. Our efforts to project the future are often severely inhibited by our preoccupation with the present—and with the present as we see it from our unavoidably rather restricted viewpoint. We usually find it difficult to imagine a future which differs greatly from the present; more commonly, we antic-

ipate modest changes of the present situation.

Though they may be difficult to foresee in general, and impossible to foresee in detail, yet the major innovations and changes of the future may dominate it. For instance, in 1900 it would have been impossible to foresee all the changes in sources and amounts of energy which would develop in the ensuing 70 years; as far as I know, no student of energy problems of that day foresaw anything remotely approaching what has actually happened. But a wild blue yonder guess about sources and uses of energy would almost surely have proven more accurate than a sober and modest extension of the situation of 1900 and of recent trends to that date. Likewise today, we are caught up in many problems of energy production, transmission, and use, including many pollution problems. Most projections include a trend toward more and more energy, from sources now in use or on the horizon of use; but might the course of events be quite different—some wholly new sources, or some actual reduction in energy use, or something else equally unforeseen now? I do not know; I cannot imagine what the drastically new sources or uses might be; but I do know that in the past the unforeseeable has often become the actual, and in the process made a mockery of sober calculations.

I have used the energy example, in part because it is quantifiable and dramatic and important. But one could use other examples, closer to the range livestock industry, of significant changes in technology or in markets or in objectives which have greatly influenced the industry. One can never rule out the possibility of an unexpected major change of some sort. Nevertheless, one can project the future only on the basis of his ability to understand the present and to imagine future change; my comments which follow are as pedestrian as anyone's, while at the same time I realize that time may prove them much in error.

Traditional Outputs of Rangeland

As long as the sun shines and the rain falls, grass and other range forage will grow; and I cannot imagine a world where some, if not all, that is harvestable will actually be used to produce domestic livestock and game animals. Beef, lamb, and wool are the traditional outputs of the range country, and I think it certain they will continue so. But there may be—indeed, it is highly likely that there will be—substantial changes in the way the range is managed, the amount of harvestable forage produced, the way the livestock are operated, and the amount and kind of turnoff.

The Forest Service and the Economic Research Service have been engaged in a comprehensive study of rangeland possibilities—the Forest-Range Environmental Study, which comes down to FRES (someone must have gotten a meritorious promotion for thinking up that one!). I shall not attempt to summarize its findings, which have been reported only preliminarily until now. But, in general, FRES shows that the rangeland of the United States could be made to produce a great deal more forage, which could be the basis for a much enlarged output of range livestock. To produce more, the rangelands would require considerable investment of capital and labor, as well as the conversion of some land from primarily forest to primarily range production, with consequent loss of needed forest products output. The production capabilities of range differ greatly according to site and vegetation characteristics; the precise combination of inputs to achieve the potential would likewise vary greatly.

The physical potentialities of rangeland, while important, are only part of the story; the markets for the output, and the economics of producing it, are equally important. On the market side, rangeland is in a fairly strong position. The demand for beef (the principal range output) is strong and is likely to continue so; as their incomes rise, Americans consume more beef and

better grades of beef. One need only go to a supermarket today, to find best grades of beef selling for as much as \$3 per pound, and to see people buying such expensive beef, to realize that the demand is indeed high. More people and more income per capita will surely add up to a much higher demand for beef in the future. This is not contradictory with the possibility of temporary or shortrun reductions in beef or cattle prices. For a great many farm commodities—wheat and potatoes, to use but two examples—demand is comparatively insensitive to income levels of consumers, and total consumption will not rise more than total population increases, and may rise less. Among the many farm commodities, beef is in a pretty good position to benefit from rising average per capita incomes.

Though great increases in physical output of rangelands are possible, will they be profitable? Here, one must remember again that rangelands produce a small physical output per acre; one must be careful about spending more to increase forage yields than the increased forage is worth. Moreover, range people must remember that much beef is produced from farm pastures and crops; range is an important area of origin for beef, but far from the only one. Great increases in physical output of farm pastures and croplands are also possible; could they be achieved more cheaply than the same increases in output from the rangelands? I do not know, this is not the time or place for a detailed review of the economics of beef production, and I suspect that such a review would be inconclusive in any case. Only time will tell whether range or farm pasture can produce beef more cheaply in the future.

One of the major developments in beef production of the past two decades or so has been the rise of the very large feedlot, where many thousands of head of cattle are fed each year. Economies of scale in use of labor have been one major

factor leading to the development of such large feedlots, but various technological developments have also been a factor. It is generally agreed that such large feedlots can produce beef economically, but it is becoming apparent that the pollution arising out of such enterprises must be controlled and that this will cost money, perhaps seriously reducing the relative economics of such large operations. Can we possibly devise some way that cattle can be fed and fattened, while on the range, from feed produced elsewhere, with the manure returned naturally to the land to its benefit, and all at a profitable relation between cost and output? I confess, I do not know of any such development on the horizon, and I can see major economic problems in any such attempt. But might it be possible to process common farm feed crops such as corn or sorghum into some form that could be distributed over the range from airplanes, letting the cattle feed themselves, eliminating the pollution problem, and the whole operation economically profitable? This is the type of wild dream, probably infeasible, but truly major in its consequences, that I was alluding to earlier. I leave it to you to poke the idea full of holes, or just possibly to make it practical.

Although livestock production is the traditional output of rangeland, and although it will almost surely continue in the future, its precise form and characteristics may well change with time. The need for rangeland research is as great as ever; I have no doubt range researchers will turn up vast amounts of new information, and develop many new ways of managing rangeland better. I am unable to foresee any dramatic breakthroughs, though of course there may be some; but the steady accumulation of knowledge, for ways each of which increases efficiency just a little, in time adds up to a tremendous total. And it is not enough to discover or develop new knowledge; it must be applied, put into practice

on the average ranch or the average acre of rangeland. There surely is room for all the professional and technical knowledge and competence the range management profession possess or can acquire—not all the discoveries have been made yet, by any means!

Rangeland Uses of Growing Importance

To the traditional output of domestic livestock from rangeland must be added some other outputs of recently growing importance; I refer particularly to watershed values, outdoor recreation, aesthetic values, and environmental concerns generally. In the past quarter century, these values have come very much to the fore, and we can expect, I think, a continued rise in their importance; range management in the future will have to deal with such values increasingly.

The extensive rangelands of the United States obviously have considerable watershed, recreational, and aesthetic values; but they also have some limitations for these uses. The situation differs enormously for different range types. The high mountain meadows have an extremely important watershed, recreation, and aesthetic function, to use but one example. Such lands will be in increasing demand for these outputs, often to the extent that traditional livestock production from such ranges must be materially modified or even eliminated. In contrast, much of the lower foothills in the West, with their pinion-juniper forage types, yield relatively little water but often produce a good deal of sediment in the streams and have only limited recreational values. Likewise, much of the Great Plains are not attractive to the ordinary recreationist, nor are they located close to large population centers, hence their total recreation value is relatively low.

The rise in these demands for watershed, recreation, and aesthetics have raised many difficult questions of rangeland management. How can one realistically measure

the value or the importance of these land uses, particularly since these outputs are not sold in the market? How can one measure the worth of these outputs, against the value of beef or other traditional outputs, when it comes to a choice between them? How can one measure the value of these outputs, as compared with the cost of the added inputs necessary to produce them? These are difficult questions, partly technical, partly economic.

In the past two decades, the tools of economic analysis have gradually been brought to bear on some of these problems. I am proud that I have been able to play a role in such application of economic analysis to the problems of land management, especially for these non-marketed outputs. I think that benefit-cost analysis, which includes all the benefits and all the costs, whether bought or sold in the market place, has much to contribute to the management of these resources. But most economic analysis has been deficient, even in strictly economic terms. It is not enough to know that the total value of all outputs, marketed and non-marketed, is greater than the cost of the inputs necessary to produce such outputs; one must go further, and ask: who bears these costs? who gets these benefits? do some groups bear the costs and others get the benefits? can the cost-bearing and the benefit-receiving be brought nearer into coincidence? by what institutional devices, if any, can more equitable arrangements for cost-bearing and value-sharing be developed? In practice, a great deal of the benefits of watershed management, recreation, aesthetics, and the like have been received by groups and individuals who pay little or nothing toward the costs. As long as some or all of these outputs from rangeland are free, or nearly so, to the beneficiaries, then the demand for them will rise and will be, to some extent, irresponsible. No output of rangeland, including water or aesthetic beauty, is free of cost to someone; unless

those who gain also bear some of the costs, rather directly, then they will urge land management practices which they would not undertake if in fact they had to bear the costs.

It seems to me that range managers must be more alert to these relatively new demands on the rangeland than you have been in the past. We must recognize that times have changed since we older persons were young, that new values and new life styles have arisen, and that land and other resources must be managed in new ways. But we must insist that new land uses, however strongly they may be urged by enthusiastic proponents, must be made to demonstrate their worth as compared with their cost and as compared with the uses they displace, and that some means must be found to pay the costs associated with these new uses, including the income foregone because of them.

Some Far-Out Future Possibilities for Rangeland

In addition to the traditional outputs of the range, and in addition to some relatively new uses of growing importance, what far-out possibilities for the use of range might evolve, as we move into the 21st century? Obviously, no one can know what such uses may be; perhaps we cannot even guess very intelligently; but, if my earlier statements are correct, it is to the far-out uses that one must look for really significant changes in the future. The difficulty is, what far-out possibilities really make sense? But let me cast caution to the winds, and conclude with a few speculations.

First of all, ranching may evolve into a form of conspicuous consumption, much like yacht-owning was once. In fact, to some extent it already has done so. Many men who make their money elsewhere, buy and operate a ranch because they like this style of life or because it is a way of gaining a certain social distinction. They can, and often do, pay more for the land and

livestock than the earnings of the ranch can possibly justify, as compared with other sources of investment. Part of their income is psychic. Most such ranch owners do not scorn cash income from ranch operations, and they have a keen sense of how to manipulate the federal income tax laws to their advantage, but many of them would probably continue to operate the ranch even at a net cash loss (after taxes). In this regard, ranch-owning is akin to some forest landowning in the United States today; the usual economic returns are only a part of the reason for resource ownership and management.

How much further might this type of ranch ownership go, over the next several decades? What effect will it have upon the use and conservation of rangeland? What effect will it have upon the commercial ranchers, those who try to make a living and a competitive return on their investment, from their ranch operations? These are not easy questions to answer, but range managers as a professional group should be aware of some of the possibilities in these directions.

How far, if at all, might the range country of the United States become the location for major future urban development? How far might New Towns be located in the Great Plains, the Intermountain country, or in the Southern range country? There is almost complete agreement among social scientists and planners that all net population growth in the future will be located in metropolitan areas. A metropolitan area, by definition, includes a major city of 50,000 or more population. While some cities smaller than 50,000 may increase in population, other small cities and open country will decrease in about the same proportion. There is a good deal of sentiment in the United States that there is something undesirable about having a

large proportion of our total population living on a small proportion of our total land area. The evils and the problems of the cities are often used as an argument that population dispersal should be encouraged. The range country is, by and large, thinly populated. Why not build some cities of modest size (say 100,000 to 200,000 population) in the range country, where the air is clean, the views are wonderful, and the highways are not crowded?

While the United States may well have some free-standing independent New Towns over the next several decades, the difficulties of building such towns are considerable. Not only must they be reasonably self-contained, as far as employment and labor force are concerned, when they are completed, but they must also be in reasonable balance during their construction period. A New Town takes a lot of investment before it begins to repay that investment; land assembly and landholding during the long development period are also serious obstacles. By and large, the range country is not a likely place to put a New Town of 100,000 or more; many of the small cities in the range country have experienced considerable difficulty in attaining an economic prosperity.

If some New Towns were built in the range country, their land area would be very small, in comparison with the total range area; their direct impact upon rangeland would probably be small. But their indirect impacts might be large; the New Town would offer a type of urban contrast, relatively nearby, that might considerably affect ranch people. For instance, ranch ownership by urban people would be stimulated, if their city home were reasonably close to their ranch location.

Might the rangeland of the United States become the depository for a substantial part of the wastes of our industrial civiliza-

tion—a sort of garbage dump extraordinary? We are gradually beginning to realize that disposal of wastes or pollutants from industrial processes is not simple; nothing is ever really destroyed in a world where the law of the conservation of matter is still basic. We can transform the wastes into air or water pollutants, or we can bury them; and sometimes we can recycle them for another round of use. But we cannot really destroy them; they show up somewhere, in some form. Many of the complex chemicals from modern industry are particularly hard to handle. Might we, as a Nation, locate some of our chemical industry plants in the closed watersheds of the Great Basin, where the pollutants could accumulate but not be inflicted on anyone else? Might some range areas become the sites for extensive landfills, to provide a home for the garbage of our larger cities? A proposal, to bury San Francisco's garbage in a range area of northern California, was seriously considered only a few years ago; it was rejected, not because infeasible, but because a cheaper site was found nearby. This idea that rangeland might become the garbage dump of the country will no doubt seem offensive to many range managers. I do not say it will happen; we may indeed develop recycling procedures to the point where they can efficiently handle all our waste problems. But the course of economic and social development of the past three generations (at least) has been toward more and more waste products; we are growing increasingly restive that they should be dumped in our air, water, and land so near where we live. The open range may well be the place where such wastes can be accommodated with the least disturbance to people; you range managers must at least consider this possibility, as you contemplate the longer run future of the range.