

Use of Ecology on Range Land

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RANGE land may be defined as land where present soils and climate, in conjunction with plant succession, produce natural pastures. In range management we depend upon remnants of climax plant communities to indicate potential grazing value for specific soil and climatic complexes (sites); and upon secondary succession to restore these values where the plant cover is now far below potential. Range management is largely, therefore, applied ecology.

Keep in mind that the ranchers who use range lands are the people who must ultimately apply ecological knowledge. Ecologists seldom operate ranches themselves.

We, therefore, are concerned first with narrowing the gap between ecological knowledge available and the portion used by the ranchers. Progress here must be measured by what shows on the range itself.

There is now a great gap between what is known and what is applied. For that, we range ecologists have to take the blame. Only the exceptional range technician has had even one course in psychology, rural sociology, salesmanship, advertising, or human ecology. Yet the greatest handicap practicing range ecologists

have is ability to sell ecological principles to ranchers.

To be reasonably effective, the field technician must know current local precepts, and must approach groups of ranchers or natural leaders of groups from their viewpoint. Furthermore, we cannot exchange ideas except with a common language. Since the rancher is unlikely to learn the language of the ecologist, it is necessary that we adapt to his.

We know that respected ranchers do not do things greatly different from what they have been doing, or what their neighbors are doing, at the mere suggestion of technicians. As sociologists know, important changes are brought about through actions of groups which have common modes of living, thinking, believing, and systems of values. Ranchers have principles of operation which are axiomatic to them. Our job becomes one of substituting a rule of action in accord with ecological knowledge for a rule not in accord with ecological knowledge.

The new range technician may be keenly interested in ecology. He may actually make some ecologic studies outside his work. But too frequently he fails to see or does not know how to proceed with applications all round him of the most elementary ecologic fundamentals. Actually, he would profit no less than the rancher if he gave first thought to application rather than to obtaining additional information.

An early sign of progress is rancher interest as reflected by questions with ecologic import. This soon turns the field technician to further study because he

then must study if he is to be of continuing service to that rancher. There is no better stimulus to learning than to be confronted by questions from those whom you feel you should answer.

It is commonly said that the cardinal principles of range management are (1) proper numbers, (2) proper season of use (3) proper distribution of grazing over the pasture or range, and (4) proper kind of grazing animals, considering the kind of vegetation. Actually, these four are the most important practices. However, to obtain application of recommended practices, it is usually necessary to have appreciation of principles on which the practices are based. Consequently, when a technician suggests what is "proper", the rancher quite naturally asks, "why?" If he does not ask "why?" it usually means he has not been sufficiently interested to even intend to apply any suggested change. From such experience you are forced to search for the real principles—those that have the weight of natural laws. In such searches the pure science of ecology has been most rewarding. However, applicable information from pure science must be translated into terms of action and repackaged for a specific consumer with a specific need.

Assume that you are a range technician talking to a rancher, or a group of ranchers on their ground. You are aware that they, even as you and I, must usually be exposed to wholly new knowledge about four times before they actually use it in everyday business. You are also aware that the principal urge in human nature is the desire to be important. So you control this urge in yourself as best you can and avoid belittling the knowledge and efforts of those whom you would move to action.

Your comments must be interesting, brief, and without hedging. Hedging is

not in the western tradition. If you speak indoors, it is difficult to avoid abstractions; but on the range you will speak concretely concerning soil you can see and the grass you hold in your hand or point out.

A brief talk can be given as an example of many similar talks with groups of ranchers. It is an approach resulting from trials and errors over several years. The objective is lucid expression of a digestible portion of pertinent ecologic concepts, such as action, coaction, and reaction, climax (from a polyclimax viewpoint), secondary plant succession, the functioning of habitat factors, along with some fundamentals of plant physiology and morphology. Will you listen as ranchers, beginning now?

Many things happen on range land that we don't understand. But there are some natural laws to steer by. These natural laws apply on range land, whether in Texas or Montana. They give us reasons for managing different ranges in different ways and for adjusting to the seasons and years. They might be called principles of operation. I have four.

The first is: *If we keep down the shoot we kill the root!* Green leaves manufacture all the food from which roots grow. In the fall, roots store food that nourishes the new shoots in the spring. Plants are living things. You can make them grow or starve them. Suppose we graze off the shoot that comes from root storage in the spring. This is the shoot which was to have been the food manufacturing apparatus for this year. If the first shoot is grazed, there is usually enough storage to put out another shoot; but if we do this repeatedly in the same season we starve the root, we shorten it, reduce its ability to reach moisture and nutrients. It takes a big factory above ground to turn out much goods. The man whose pasture looks only half used each fall

gets more grazing than the man whose pasture is kept short.

The second is: *Nature abhors a vacuum!* She doesn't like empty space. This is a law of physics but has an analogy on the range. On pasture this means that she tries to keep the soil covered as long as any soil is left. What will she cover it with if we won't let anything grow that's fit to graze? Well, she then covers it with something not fit to graze, or too short to graze. That's why palatable plants on overstocked pasture give way to weeds and woody plants and spiny plants. That's also why tall high-producing grasses give way to short low-producing kinds of grasses. When we keep a grass that normally grows three feet tall grazed down to a height of one and a half inches, we are removing over 90 percent of the food manufacturing apparatus of that plant. In the same pasture there are usually other grasses which are normally short grasses. It's hard for a cow to get more than half their leaves. We say they stand the grazing. Actually, they are so short they can escape being grazed too closely. They, therefore, increase in overutilized pastures. Half of what the big grasses produce is about as much as all of what the short grasses would produce if a cow could graze that close. Under good management, nature takes up the slack, and the taller kinds, if some are left, crowd out the weeds and push short grasses back down to their proper percentage. That means a more productive pasture.

The third principle is: *Nature is always trying to put back the kind of vegetation she had on a piece of ground in the first place!* This is what ecologists call the natural law of plant succession. These changes in the kinds of plants on abandoned fields, in pastures that are rested, along road right-of-ways, and everywhere there is a chance, are all a part of the

process. The changes, if unmolested, go on until there is a kind of vegetation that fits the soil and climate so perfectly that no other kinds of plants can move in. That kind of vegetation is called climax. The climax in forest climates will be some kind of forest. In grassland climate, it will be some combination of grasses. We can even predict what it will be when we know the soil and the climate. This makes range management fairly simple compared to managing a tame pasture. Natural plant succession will increase the better higher-producing plants on ranges in poor condition if we simply give the pasture a rest. Sometimes a change in season of use or in numbers is all that is needed. However, rests usually get quicker results.

This same tendency of nature, to restore the original kind of vegetation, will destroy our tame pastures unless we keep working with them—clipping weeds, fertilizing, renovating, reseeding, etc. The soil was built under nature's mixture of plants. They didn't take out more than they put back. If a tame pasture plant produces more, it also takes more. That's why tame pastures get sod-bound. They hit the bottom of the barrel and we have to fertilize or renovate. On either kind, native or tame pasture, we will manage better if we recognize this natural law of plant succession.

The fourth and last is: *The principal factor limiting growth in grassland climates is water supply!* In forest climates it is fertility. What can we do about water supply? Maybe some day it will be practical to make it rain. Meanwhile, we had better get more of what falls naturally each year stored in the ground. We know that a lot of the moisture that falls runs off because the very surface of the soil is puddled and sealed. We know that puddling is caused by raindrops striking bare soil. We know that if we keep bare

soil covered with green vegetation or a mulch of old growth or with even a bur-lap sack, the soil is not puddled by rain-drops, and much more water soaks in.

We also know that water once stored in the soil in a grassland climate almost all stays there until it is used to raise plants. On range we don't worry about capillary rise. Capillarity doesn't work when the bottom of the wick isn't in the kerosene, and there is no free water table under our ordinary range soils. Evaporation doesn't use much stored soil moisture either. If it did, we couldn't summer-fallow wheat land to store two years of rain for one wheat crop. So the answer is clear: Keep the ground covered and cash in on what the climate has to offer. The man with the bare-looking range needs a rain the most, but when the rain comes he will get less benefit from it than the man whose range is covered with forage. You can dig holes on two sides of a range fence a day after a good rain on dry soil, and you'll often find twice the depth of stored moisture on the side where the ground was covered with vegetation, dead or alive, compared with the bare side.

It's good business to graze about half the year's growth and leave half. The half for grazing will be a bigger half and the other half won't be wasted because, as was said to start with, grass blades are factories and it takes a big factory to turn out much goods. The half

left will mulch the ground so the surface won't seal. In that way, we'll get the water stored in the ground to raise more grass.

With these four simple principles to guide grazing use, the pasture can be well managed.

After the foregoing ecologic chat with ranchers, there usually is enough interest for a thoroughly enlightening discussion. My objective is to be scientific without being technical and to show that it is practical to be scientific.

There may be misunderstandings; you may be misquoted. You will have to give specific instances, and you will have to qualify. However, there will be interest, and you will have given glimpses of ecological knowledge that ranchers will recognize as too fundamental to be without. You will have used ecological knowledge to be helpful now. It will be appreciated, and later you may reap a whirlwind of difficult ecological questions. Ecology will have been presented in phraseology that will be carried home, mullied over in the mind, and enter into discussions. You will have made the start necessary to go further.

Until ranchers discuss matters such as these among themselves, much as they now discuss weather and prices, we will not have conscious application of ecological knowledge over any appreciable part of the vast range area of this continent, nor will there be any effective demand for ecologic research on range land.