Grassland Revegetation in the Pastoral Countries—the Technical, Economic, and Social "How To"

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Editor's Note: This is mainly a "how to" article emphasizing the fact that in much of Africa and Asia there is not enough grass left for simple destocking or management changes alone to make any significant improvement. People are starving to death. The author stresses that revegetation is the only course left for many areas and that it will bring rapid improvement—if the soil is not too far gone.

In recent years range management scientists and ecologists around the world have been producing a copious amount of rhetoric about "desertification" and its present and future dangers to mankind. It is said that desertification is a major world problem growing in magnitude, a malignancy undermining the food-producing capacity of Africa, Asia, and the Mid East and that populations, in effect, are outgrowing the limited biological systems that sustain their life-style. Further, say the reports, the deserts are not growing, but are being relentlessly pulled outward by man with former grasslands assuming the appearance of a lunar landscape on which the dry season flow of watercourses is reduced, while in the wet season the flow is enormously increased. As a consequence, we are told, there is a chain of ecological reactions that will permanently reduce the capacity of the land to support life: dust clouds grow throughout the denuded arid world; city slums grow as the means of survival on the land wanes. Finally, these men of science conclude that since man always seems to undermine his own livelihood by suicidal land use, the deterioration of ecological systems continues to increase quietly and largely unnoticed for years, until one day the system fails assunder with lethal vengeance and we are confronted with emergency salvage operations.

All of this and much more has been printed in publications that speak a scientific "dialect" and are circulated among scholars. While all of this is true, little is being said, in specific terms, about what can be done and how to do it. The task is formidable, but not impossible. Thanks, in large part, to new technology, much more can be done, now, than is generally recognized.

The Technical "How To"

Several machines for grassland revegetation purposes have been available for years. The various adapted species of seed have also been available, if in limited volume. However, the cost of operating these machines and seeding has been too high as a result of the need for more than one operation, or the susceptibility to costly breakdown in a short planting season, or too much specialization on one function (such as brush removal or seedbed preparation). In addition, and of greatest importance, the machine and concept can function well only with the unpredictable advantage of normal or higher rainfall.

As described in the April 1981 issue of Rangelands, the new "land imprinter" appears to be the long-sought answer to semiarid grassland revegetation. Land imprinting is a magnificently simple concept. The machine itself has only two moving parts and does not present either maintenance or breakdown problems. This is of critical significance on rugged and rocky terrain, in remote areas and for a short, but

A fenceline contrast on the Anatolian Plateau in Turkey (Asia Minor). The fence protects an ancient Hilfe (pre-Christ) ruin visible in the background. The vegetation germinating outside the enclosure is a result of spring rains, but consists of more weeds than grass. This level of grazing pressure will lead to desertification.
intensive, operational season. The machine is not expensive and can be fabricated in any large welding shop.

Brush damage, seedbed preparation, and seeding are all performed in one pass over the land. The imprinter does not need to operate on the contour for wherever it goes it leaves a down-slope imprint for collecting rainwater and a cross-slope one for receiving water. Erosion is reduced and rainwater infiltration is greatly increased. Since potential drought is the major risk in revegetation projects, it is this characteristic of retention of rainwater where it falls which allows germination and plant growth to occur even under conditions of less than normal rainfall.

With follow-up grazing management the imprinting does not need to be repeated.

To illustrate the rapidly changing development of the land imprinting concept, a major American farm machinery manufacturer is preparing to produce an imprinting machine to be pulled by a farm-sized tractor. Another group is investigating the feasibility of a self-propelled rangeland imprinter, capable of dealing with large expanses of land where there is no fencing or large rivers and few roads.

The Economic "How To"

While the technological means is the first requirement in the contemplation of a revegetation project, it is by no means a cure-all for the many other obstacles which must be considered and overcome. Project funding must be available and this will depend on motivation as well as availability. Technical feasibility is frequently the initial motivating element in funding arrangement. The need is unquestionable and both domestic and foreign aid funds are seeking out viable programs.* Those people who specialize in funding will have to make the decisions regarding cost-benefit ratios and other competing demands on funds. The general practice has been to spend money in the cities where it will be most visible to people, rather than on distant grassland. Always the result is more hungry people in the future.

A new stand of grass must be protected for at least 2 years. This results in two major problems: what to do with the people who have been dispossessed of their traditional land for that period of time, and how best to control and manage this new forage to prevent the same calamity from happening again? There appear to be workable answers to these questions, and, in fact, there must be, for no country where grass-

*For example, the Arab oil-exporting countries have set up a five-billion dollar fund as development aid for the Arab countries without oil.
land is the major resource can afford to simply allow the land to die. The world cannot afford it and this is why foreign aid is present in these countries.

Site Selection

Project site selection is the next step. This requires expert help because the site must be an ecologically feasible one. A logical location would be an area where grazing damage has been sufficient to have already forced most of the people to abandon it, but where the extent of soil erosion does not yet preclude reclamation. Although virtually all of the land has been overgrazed, the damage always has been most severe within approximately a 2-kilometer radius of a water source. These areas should receive the first revegetation attention. Furthermore, water is one of the most effective ways of controlling livestock grazing patterns. Bore holes with pumps can be shut down, while other types of water sources can be declared off-limits.

The Social "How To"

Project labor requirements should utilize the local people as much as possible. Additional people may have to be nourished by project funds until they can be permitted to return to the land. In this case food aid can be economically as well as socially justified, for without restoration of food-producing resources the need for it only will be magnified in the future. The entire objective of revegetation is to prevent that kind of future. The cost of the amount of food aid shipped to Africa during the last drought across the Sahel could have financed the revegetation of hundreds of thousands of hectares. In effect, the generous help for momentary survival was hindering the long-term means of survival.

After having restored grass to the barren land and provided for the needs of the people for 2 years, the final, most difficult, and longest-term obstacle to revegetation must be confronted. This is the establishing of a system and means of management of grazing on communal or public land. We in the United States recognized the need for government control and management of our extensive public lands early in this century. We developed the federal Forest Service to administer our forests and the Bureau of Land Management to administer our rangelands—from this emerged the modern science of Range Management. Rapidly deteriorating rangeland conditions came under the heavy hand of a concerned and determined government. There is no other means of controlling private and highly competitive self-interest use of public land.

Once the system and means of management are settled upon, the 2-year period is available to breathe life into the training of the embryo of a federal grassland management agency. The ethnic groups from the land involved should receive priority in this training. The best from among those to whom the land and livestock are already a way of life should be given the help of modern range management knowledge. In due time the agency will gain the necessary backlog of experience and knowledge. Although the initial advantages of revegetation would not be present, the agency eventually would assume active management of untreated land.

Enforcement is a necessary part of any kind of effective land management scheme. American land management agencies are supported by full authority. A chain of authority already exists in the tribal groups. If necessary, the army is a good place to begin the enforcement process, especially in preventing invasion by herdsman from other areas. The army speaks with authority; its ranks are those of the various ethnic groups of the country. The army is fully equipped to undertake remote field operations. Young range managers could also arise from its manpower. It is interesting to note here that the Algerian Army was utilized in a massive reforestation program. Give those otherwise idle young soldiers some constructive work to do. No army can serve its country better.

New Opportunity

Primitive pastoral societies have existed largely on low human and animal survival rates. Large families are therefore regarded as desirable, along with large numbers of unproductive livestock. The more animals each herdsman owns the better his family will eat, the more social prestige he carries, and the more likely the survival of a few animals when the next drought strikes. This is known as the "numbers game," which has been intensified by rapidly improved human and animal health care while the elemental forage resource diminishes. It sets a stage where what is good for the actors is disastrous for the audience, or where what is beneficial to the individual due to lack of alternatives is harmful to the society.

In those countries where grassland is a major or even the only resource of consequence, a massive transformation of pastoral attitudes and traditional practices must occur. Any return to the old ways is no more desirable than it is possible. A better future for the people of arid lands depends upon a fundamental shift from a system (or absence of a system) in which the exercise of personal aspirations encourages social suicide to an institutional structure in which those working to improve their own lot are also furthering the long-term welfare of society. This is difficult to foster among people who are ignorant, but not stupid, and who see no viable alternatives to what they are doing presently.

In addition to the social impossibility of implementing such sweeping changes, there is not enough grass left in the dryer parts of Africa, Asia, and the Middle East for management changes alone to bring significant results. The land has been desertified, therefore, a philosophy of the gift of revegetation and the support of the land users for a period will obligate the people to the government. The government has gained com-

Grassland in reasonably good condition in northern Kenya. In contrast to most of the pastoral countries, grazing management has been initiated in parts of this relatively advanced east African country. Two giraffes are pictured with wildebeast in the distance. The wild game herds, where still present, follow a natural migratory pattern much like that of the Nomads and their domestic herds.
mand of the land. A wide gate has been opened to the implementation of broad and desperately needed reforms. An entirely new opportunity is presented where hopelessness was its only predecessor.

Nomadic pastoralists practice a high-intensity, low-frequency pattern of grazing. They migrate to the fringes of the desert during the rains and then back to the higher rainfall belt for the dry season. This is a form of what we range management specialists refer to as deferred instead of year-long grazing, which allows the ecosystem to rejuvenate itself. It is logically attuned to the seasonal rhythm of climate and plant growth and geared to provide adequate forage for the herds throughout the year while still permitting forage regrowth. Its flexibility permits dealing with an unpredictable rainfall pattern. It worked reasonably well until the numbers got out of hand, and then it all fell apart.

Since the government has secured control of the situation by restoring the grass, it can begin to direct these migrations as well as to prevent overstocking. Herds can be counted enroute. Illegal excess animals can be purchased or confiscated. Useful traditional ways can be merged with modern knowledge and authority. In time, specific land and migration routes can be legally allotted to specific herdsmen, as we Americans did in the 1930's. An ethic of land conservation, fortified by self-interest on allotted land, can be injected into the system. Management can be concentrated on survival in the driest years rather than forcing the land to its ecological limits in years of favorable rainfall and blindly accepting disaster in unfavorable years. Drought is a fixed characteristics of grassland climate.

Benefits

It is an established fact of animal science that a few well-nourished animals can be twice as productive as twice as many animals struggling for simple survival. This requires the keeping of grazing pressure and available grass in balance, and the rather paradoxical mathematical formula arises from the nature of body growth. The first half of forage consumed is required just for physiological body maintenance; the next fourth is largely required for reproduction; and the final fourth, if it is available, is utilized for milk production, flesh growth, and fat storage. Any reduction in forage availability is at the expense of these final functions—the only ones which offer benefits to man.

In repairing the environmental damage wrought by man and his animals as a result of ignorance, absence of organization, and sheer numbers, there are far-reaching social benefits in addition to those of more meat, milk, cheese, and animal by-products. A mined-out resource will be restored to self-renewing productivity. The young children destined to form the future generation will not be permanently retarded due to protein deficiency in infancy. Government will be reaching a position to play a strong role in moving excess animals to market. The government can charge grazing fees for use of the land and make its management activities profitable. Pressure can be taken off the city slums by people returning to a healthy and viable pastoral industry. Instead of receiving expensive food aid the people will be producing food in surplus. Export income can be earned from other nations who have more green money than red meat.

After several years of specialized assistance and experience in launching revegetation programs and in developing a land management agency, the recipient country can begin to steer its own course. The necessary seed can be produced domestically. Other lesser problems too numerous to mention here can begin to take care of themselves or become easier to resolve as a result of growing government control of the situation.

Food For Animals Is Food for People, Which Is Food For Thought

Urban dwellers and some government planners tend to view distant grassland as a resource of questionable value. It is vast in extent, but very little of the human benefits from it reaches the cities. Africa, the richest continent in animal-producing resources, is also the poorest in per-capita meat consumption. The annual herd "offtake," expressed as a percentage of the herd which can be marketed each year without reducing herd size, is less than 10% while it is 40% in the United States. Indeed, due to steadily declining land productivity and in a setting where livestock are allowed to die on the land from starvation or even old age instead of reaching the marketplace, there is some understandable justification for concentrating development attention elsewhere—or doing nothing at all. These people are entirely unaware that it is quite possible to have a flourishing dry land livestock industry which can bring considerable prosperity. Witness dry Australia and its profitable meat exports, the Argentine, and the western half of the United States. Unfortunately, there is scant awareness of the potential opportunities and how to begin to approach them.