

responsible for both the land and the animals. Land management standards and criteria for evaluating management and land use could be established by the commune. Such standards would of necessity take into consideration the inherent production capacity of the land. The allocated land would remain under the control of the individual, with the right to hand it down, so long as it was managed within the established standards.

An alternative program could be established in cases where the commune continued to assign or allot smaller number of animals to individuals. Individuals or families could band together into a type of cooperative and manage

their livestock as a single unit. Land would be allocated to the coop on a basis similar to that described above.

Regardless of the program or system devised, the relationship between land and animals must be recognized at all levels from the Central government to the individual. This relationship must establish a balance of land and livestock and the responsibility to assure that balance is maintained. Without such a balance animal production will decline and land deterioration will continue. The awful truth of "Tragedy of the Commons" will be manifested in yet another part of the world.

Exporting Range Extension

Robert D. Kirmse, Alex Dickie, Neal E. Artz, and Val Jo Anderson

Transmitting research findings to producers is the basic mission of Extension, and in the United States methods for accomplishing this have evolved over 70 years to fit the American way of life. The process involves the transfer of useful agricultural information through oral and written media or by demonstrations. Extension as it is known in the United States has generally not been productive in developing countries, and an appropriate model for extension to the diverse cultures of the Third World is not well established. This paper identifies obstacles and explores potentially suitable approaches to successful extension of range management principles in developing countries.

Differences in the Extension Setting

The United States style of agricultural Extension has proven difficult to implement in developing countries, and range management Extension has been no exception to the rule. Four areas which limit the dissemination of range management principles in the developing world are discussed here: physical and biological resource bases, social environment, land tenure, and range management principles.

Physical and Biological Resource Bases

Range management uses principles of physical, biological, and social sciences to synthesize workable management plans for range ecosystems. Stoddart et al. (1975) point out that this synthesis requires a special "feel" for the resources. While the principles of any management science should be universal, the three to four-week assignments typical in many consulting contracts are generally not long enough to permit acquisition of the detailed insights necessary for

refined decision making. The ability to synthesize a workable plan in an unfamiliar environment requires in-depth preparation.

In many instances, extensive resource inventories are available to range Extension personnel, but the long-term cause and effect studies required for optimal management decisions are rare. Host country counterparts constitute a valuable knowledge source, but they typically lack the understanding of Extension education needed to effectively communicate their ecological knowledge. Acquiring the "feel" for grazing resources in foreign lands remains a problem for many Extension specialists.

Social Environment

A successful range manager must be able to apply diverse knowledge to solve social problems as well as preserve natural resources (Stoddart et al. 1975). The differences in social settings between the U.S. and the developing world, however, place increased demands on Extension specialists. The general mandate of range management Extension is to maintain or improve the ecological condition of range resources and to increase their productivity. With these goals in mind, Extension specialists adhere to Extension principles by identifying and prioritizing audiences, identifying their specific needs in view of these goals, and devising activities to address those needs.

In the U.S. this process is fairly clear since the concept of Extension is relatively well understood and accepted by government personnel, producers, and society as a whole. Extension specialists are generally familiar with the production systems with which they work, and the conservation ethic, if not always accepted, is at least widely understood. Furthermore, the concept of range management is assumed to be widely known in our society. When these assumptions are correct, Extension specialists function in a well-established role and their efforts are free to focus on the producer's

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needs. In the developing world, none of these "givens" can be assumed because Extension and range management are typically unknown concepts. Where they are known, they often generate suspicion and resistance because of past failures of range development efforts. Further, the infrastructural support (e.g., mass media, well-trained and equipped Extension agents, ease of transportation, research/demonstration centers) which facilitates effective Extension programs in the U.S. is typically not present in developing countries.

Under these circumstances, Extension specialists must start from scratch—or worse, from a deficit position—to develop credibility and support for an Extension program. Even broadly experienced range Extension personnel cannot be expected to be familiar with the complete production systems of the developing countries they attempt to influence. Furthermore, the U.S. concepts of conservation and sustained yield may be inappropriate in the context of subsistence economies where major concerns are closely linked to immediate human survival. Without proper training, comprehension of the needs of indigenous pastoralists, and dedicated efforts to gain the support of the society, the Extension process cannot be successfully applied.

Land Tenure

The array of land tenure arrangements facing Extension specialists working in developing nations can be as confusing and unfamiliar as the biological and social systems. Land tenure arrangements range from free and open access to grazing resources (Ciriacy-Wantrup and Bishop 1975), through various forms of communal tenure, to public ownership. Private ownership of rangelands in the developing world is rare. Pastoral development policy has generally been guided by the belief that optimal resource management is possible only under private tenure. Countering that idea, current analyses indicate that social and ecological conditions in most traditional pastoral systems dictate some form of communal tenure. Herds are typically small and managed for subsistence production, and spatial and temporal variability of forage and water make mobility and access to large expanses of land essential. These conditions are the rule in many developing countries with extensive rangelands, and they render common use an appropriate, if not essential, form of property rights (Artz 1985).

Traditional common-use structures are often exceedingly complex. In most pastoral situations land use involves overlapping use rights to different resources under various conditions (Riddell 1982). Given that the existing use rights should be built upon rather than replaced, range management Extension personnel must incorporate the complex tenure agreements into Extension planning. Since most technical solutions to range management problems require control over grazing, the most important task facing Extension personnel may be to foster cooperation among the users of communal grazing lands. Range management Extension can play a vital role in developing innovative forms of resource use rights which permit increased livestock production while maintaining the range resource base. A comprehensive understanding of land tenure is a prerequisite of effective Extension.

Range Management Principles

The body of range management literature supports many useful principles applicable to traditional pastoral systems. According to the U.S. Extension model, only range management principles that are empirically supported as well as locally appropriate should be extended. Pastoralists are generally most interested in increasing their herds, though their rangelands are typically grazed to capacity, and options for increasing the carrying capacity are limited. Planting high producing forage plants is often undertaken by would-be development projects, but the effectiveness of this remedy is limited by economic constraints and use rights structures which make subsequent control of utilization difficult. Grazing management appears to be a more promising solution. A review of grazing systems research indicates that special systems have not, however, shown significant or general improvements over continuous grazing (Kothmann 1980). Many systems have significantly reduced animal production because they emphasize real or imagined plant needs rather than increased production of animal products. In short, grazing systems offer no simple solution to inadequate forage production.

Development planners must recognize that too little agricultural research and even less range science research has been conducted in economically deprived countries. Where country-specific research is limited, universal principles and solutions to problems can be a helpful guide for designing the best potential management approaches. Adaptation of range management principles under the physical and social situations in developing countries must, however, be carefully assessed by the range management specialist designing the Extension program. Otherwise, the Extension agent risks ridicule and the loss of credibility which result from a failed demonstration. Worse yet, producers may be led astray, causing losses in productivity and producer income.

Adapting Extension Approaches

The factors just discussed, which limit the success of range management Extension efforts in developing countries, are not presented to argue that Extension is not a valuable service. Nor are they presented to question the validity of the tried and true Extension principles applied in the United States. The argument is simply that the Extension staff must be well prepared and very familiar with biological and social realities in developing countries in order to successfully adapt the Extension approach to meet the specific needs of the community. Several innovative models can guide the Extension specialist in adapting his approach.

The Training and Visit (T&V) system is a good example of how an Extension approach may be effective in development contexts (Moris 1983). The T&V system provides a functional link between Extension agents and researchers who are administratively separated in many developing countries. The Extension service and its field staff provide a mechanism of field implementation and feedback to the research centers which allows researchers to test agricultural practices on farmers' fields. The Extension worker is in turn kept current on research findings by periodic training at the research centers. Under the T&V system, specialists can perform effective Extension roles in developing countries and insure

that research addresses the needs of producers. The producers in turn receive advice based on research conducted under real-life conditions.

The wave of interest in Farming System Research (FSR) holds promise for expediting development of traditional agricultural production systems, including those with range/livestock components and those which depend totally on range resources. FSR combines research and Extension in the same project. The basic FSR approach comprises four stages: description and diagnosis of the problem, program design, field testing, and Extension. Research is conducted on the farm to insure that results reflect the realities facing the producer. The Extension phase can be viewed as extended field testing of research findings leading to further inputs to the diagnostic phase. FSR normally results in recommendations for small, incremental adjustments to traditional systems of production rather than the complete transformations or technical revolutions most often attempted unsuccessfully by development projects. This system of research/Extension requires cooperative efforts by multidisciplinary teams. In this sense, FSR allows the Extension specialist to function in a more traditional U.S.-style role by encouraging the creation of the missing research interaction. The Extension function provides researchers with feedback on production constraints. It then verifies that proposed solutions are within the producers' capabilities and assures that technical recommendations are field tested under area-specific conditions. Once the technology is proven, Extension personnel are familiar with it and, therefore, well prepared to extend it to producers in the area. The on-farm research trials and endorsement by participating producers provide the best demonstration devices possible.

The Training and Visit and the Farming Systems Research approaches are only examples of useful models for potentially effective range Extension in developing countries. The important ingredients are the integration of disciplines, the development of a more ready and active interchange between the Extension and research components, and the implementation of trials under real production conditions. A range Extension project designed to respond to the problem areas identified here would demonstrate the following characteristics: (1) Specialists from the appropriate disciplines would

be readily available to aid Extension personnel in gaining the necessary understanding or "feel" for the resource base. (2) The relevant sociological expertise and research capabilities would be at hand to facilitate effective Extension, and the pertinent social variables would be built into trials conducted under real conditions of production. (3) The appropriate disciplines would conduct integrated on-farm research that would provide useful and easily transferable agricultural information for any given area, land tenure system, and production system. (4) Finally, this design format would allow range management Extension personnel to apply the biological principles which seem valid and make adjustments on the basis of their own expertise and observation. Only the principles and methods which prove appropriate under local conditions would then be extended to the producers.

Such an approach would allow Extension efforts to address problems of a manageable size, to start slowly and work within existing systems, building knowledge and credibility simultaneously. This approach may not produce the immediate results desired by funding agencies, but successful development initiatives leading to improved rangeland management require time. Agencies which find Third World development and individuals involved in the planning process must realize this and assist the Extension process by allowing the time and integration required to adapt range Extension for export.

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1986 Wildlife Transactions

The 1986 issue of the Transactions of the Western Section of The Wildlife Society is nearing publication. This issue includes papers presented at the 1986 joint TWS Western Section and Society for Range Management, California and Nevada Sections meeting held in Sparks, Nev., in January 1986. The meeting theme was "Resource Management: Cooperative Approaches in Wildlife and Range Management Objectives"; however, other topics were also covered.

This volume will be available for \$15.00 (orders post-marked prior to November 1, 1986) or \$20.00 (orders post-marked after November 1, 1986); conference attendees who paid full registration fees (nonstudents) will receive a free copy. Send order with check to Bill Laudenslayer, c/o The Wildlife Society, Western Section, P.O. Box 2567, Sacramento, Calif. 95812.



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