climax use of the term plant association, then disturbed areas could be related to an association only by gradients in climatic and edaphic factors as related to observed gradation in climax vegetation as interpolated or extrapolated from relics.

"Climax vegetation" in the preceding sentence is used in the commonly accepted sense, but not in the sense of the 1968 textbook under consideration. There, climax terminology is in conflict with well-established tenets and common usage. There, three "Primary" climaxes are proposed, including "Topographic Climaxes" as well as Climatic and Edaphic. Also advocated is the term "Zootic Climax" to describe relatively stable vegetation deteriorated due to animal disturbance. A series of "zootic" climaxes could then, I presume, be proposed as a kind of range condition classification. Moreover, "plant succession" which, since Clements' 1916 monumental Carn. Inst. Pub., has referred to changes in plant communities toward a climax, is here also used to refer to changes during degeneration and termed "Retrogressive Succession." Returning to "topographic climax" the classification of variable physical habitat factors by Weaver & Clements has much merit and seems worthy of mention in this connection. In their table below, note that influences of topographic factors are remote, operating indirectly to influence factors that affect plants directly.

<table>
<thead>
<tr>
<th>Direct</th>
<th>Indirect</th>
<th>Remote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Content</td>
<td>Precipitation</td>
<td>Altitude</td>
</tr>
<tr>
<td>Humidity</td>
<td>Soil Composition</td>
<td>Slope</td>
</tr>
<tr>
<td>Light</td>
<td>Wind</td>
<td>Exposure</td>
</tr>
<tr>
<td>Temperature</td>
<td>Pressure</td>
<td>Surface</td>
</tr>
<tr>
<td>Solutes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil Air</td>
<td></td>
<td></td>
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</tbody>
</table>

In rangeland inventories we cannot map Direct factors but we can map precipitation zones (from isohyets) and relevant soil (edaphic) factors as well a telling much about humidity, light, and temperature by specifying a limited geographic area; e.g., Saline Upland 10-14° P.Z., E. Wyo. Thus, a type of community habitat is simply and briefly designated using only the most stable and relevant abiotic features. This is quite unlike the habitat-type approach reviewed here.

Odum (1971 above) has stated quite logically I believe, "The habitat of an organism includes other organisms as well as the physical environment. A description of the habitat of a community would include only the latter." And, as Whittaker (1975) points out, "A species may occupy a range of different habitats . . . ." This is readily verified by brief review of the natural distribution of major range plants, occurring as they do across many states with great differences in latitude and corresponding differences in annual temperature regimes. They may carry the same botanical name, but we know they differ greatly genetically. Blue grama and little bluestem from near the Canadian border have little in common physiologically with their taxonomic counterparts from near the Mexican border.

It appears that at best the habitat-type approach, with its list of species, is a cumbersome method of designating habitats. Along with this, it can be untrustworthy because of genetic variation in widespread species of climax vegetation, or inapplicable in extensive disturbed areas except by reliance on gradients in abiotic factors as related to known gradation in natural vegetation. Such continua of gradients and gradation are now accepted as the rule, while the "discrete units" of the habitat-type definition in the 1968 text are the exceptions. The Soil Survey Manual of the USDA had by 1951 described normal soils as a continuum, and we know arid, semiarid, and subhumid climates do not abruptly change at lines as shown on maps. Hence, most map delineations of rangeland habitats will ordinarily reflect a modal set of characteristics with degree of subdivision determined by range management needs. Sharp, easily mapped, boundaries (discrete units) do indeed occur at abrupt changes in relief, soil material, or land treatment and are most common in mountainous areas; but they are not the rule for rangelands with their vast plains of tundra, desert, steppe, prairie, savannah, and coastal marsh.

Viewpoint: Building a Stewardship Ethic

E. William Anderson

Coordinate resource management and planning (CRMP) is now widely accepted in principle. It has been nationally institutionalized in the U.S. by an interagency memorandum of understanding (1975 Rev. 1980). Several Congressional Acts governing the management of federal renewable resources more-or-less mandate that federal agencies coordinate and consult with owners of dependent private lands and resource-user groups. At least 10 states now have memos of understanding committing their federal and state renewable resource agencies to some type of CRMP activity. Stewardship, which essentially is a synonym for conservation, has become the current key word expressing the preferred working relationship between users and managers of public lands.

One outcome of this progressive and desirable situation is that public land-management field personnel will be working more closely and more frequently with owners of dependent private lands than ever before. It is imperative, therefore, that these agency employees realize that they also will be essentially assisting, or at least influencing, the private landowner in the development of his/her stewardship ethic and personal conservation plan. This activity will augment the program of the Soil Conservation Service, working through organized conservation districts which are legal subdivisions of State governments, that historically and still is the primary source of federal technical assistance to private agricultural landowners. It will also augment the activities of extension agents and consultants who represent the primary

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1 Conservation: the use and management of natural resources according to principles that assure their sustained, highest economic and/or social benefits without impairment of environmental quality (Society for Range Management 1974).
State and nongovernmental sources of technical assistance. There is a valid question involved that all resource workers—SCS, FS, BLM, state, consultant—should contemplate carefully: What is your personal philosophy toward working with private landowners and how proficient are you in helping them develop a stewardship ethic?

The significance of this question is readily seen when one considers that private landowners control most of our critical wildlife habitat, including riparian sites, and a large proportion of our watersheds. Furthermore, where they are personally involved in the application of resource management plans on public lands, the degree to which they understand the goals, objectives, problems, and the plan itself, their knowledge of the area in which they operate, and their genuine desire to produce successful results, e.g., their stewardship ethic, are fundamental ingredients to attaining conservation management of both public and private lands. Never will there be, nor should there be, enough government employees to oversee all facets of each resource management plan on public lands in sufficient detail to produce successful results. The outcome of the over-all renewable resource program, by-and-large, depends upon the resource worker's proficiency in working with and motivating private landowners who are the key ingredient for success.

It has been my observation that resource workers, as a group, have demonstrated a wide range of proficiency in working with landowners—some are excellent, some abhorrent. It is appropriate and timely for each worker to analyze his own situation in this matter. My desire is to help by offering my philosophy based on over 40 years experience in conservation activities.

The Plan

The conservation plan is the product of the knowledge, experience, and desires of the landowner, and the knowledge and skill of the resource worker (hereinafter called a technician). If the combination of these factors results in a conservation plan, then it follows that the quality of the plan depends upon the quality of these factors. Consequently, if the quality of the conservation plan is low, one or more of the input factors must be of low quality.

Responsibilities

Technicians have responsibilities in both sets of factors. There is the responsibility to help landowners develop their knowledge, experience, and desires in respect to resource conservation. There is also the responsibility to improve their own knowledge and skill as resource workers.

Factors concerning the landowner: The landowner's knowledge of conservation is definitely influenced by his contacts with other landowners and the technicians with whom he/she associates. The landowner's experience is influenced by the things he/she does as a result of being motivated by convincing discussions or demonstrations. His/her desires about conservation are influenced by convincing demonstrations, by community (neighbors') accomplishments and attitudes toward conservation, and by convincing discussions particularly those having economic aspects.

The responsibilities that technicians have in contributing to these landowner factors are obvious. Whether we are a range conservationist, agronomist, engineer, soil scientist, educator, biologist, administrator—professional or subprofessional—each technician has an opportunity to contribute towards a landowner's knowledge, experience, and desires in conservation every time a contact is made with him/her or those with whom he/she associates. The conduct of our daily conservation activities, irrespective of what we do, who we work with, or where, can eventually contribute significantly to the quality of conservation plans applied on the land.

Technicians too frequently under-estimate the landowner's capabilities to understand the scientific "whys" of conservation. Most landowners are men or women of sufficient business capability to successfully operate highly complex enterprises. Some are trained academically in resource-oriented subjects equal to, or surpassing, that of the technician. Their knowledge acquired through years, sometimes a lifetime, of practical experience often is unsurpassed, especially on local situations. Unless the landowners are offered more than they already know about the land, resources, and conservation management, how can they learn and acquire additional knowledge? Therefore, as landowners progress in their knowledge of conservation, we technicians must be prepared to help them into new realms of conservation learning. If a stalemate short of a complete conservation plan applied to the land is to be avoided, the technician must be qualified to go the whole way toward a complete program, or obtain assistance from other technicians who are qualified.

Incomplete or poor quality conservation plans are often due to limitations within the technician, which is inexusable. However, poor plans also can be due to limitations related to the landowner and there isn't much that can be done about this except to continue trying to increase his/her knowledge and desires about conservation.

Factors concerning the technician: Technicians have a responsibility to themselves in respect to their knowledge and skill in helping produce a quality conservation plan applied to the land.

Knowledge is "clear perception of truth or fact." Before we can obtain this clear perception, we must have the facts. This means that, in addition to knowledge about basic scientific principles, we must have high quality inventories since we obtain facts about the resources with which we work through inventories. High quality inventories have at least three requirements: (1) they must involve correct techniques; (2) the information provided must be relevant, adequate but not excessive, and accurate enough for the use to be made of it—neither great detail nor accuracy is a reliable criterion of quality and often is a detriment; (3) the data must be properly presented so it can be interpreted correctly. After we have the facts, clear perception requires an understanding of these facts. Therefore, the data must be easily understood.

Skill is "knowledge of an art or science combined with mastery of its techniques." How do we as technicians gain a reasonable skill in renewable resource management? Since skill involves mastery of techniques—doing the job—we can acquire skill only by actually helping apply the conservation plan out on the land. Once a reasonable skill is acquired, the entire role of the technician improves: Knowledge plus Skill equals Proficiency. Therefore, rating proficiency involves analysis of how much is known about the job and how well its techniques have been mastered.

The technician need not try to master all the techniques thoroughly. A reasonable ability is sufficient to make him/her sensitive to the need for practicality and to recognize that there are often limitations as to what can be done. It has been said that a good conservation technician is a jack-of-all-
trades and a master of none, but a better professional goal is to be a jack-of-all-trades and a master of one.

Challenge

The challenge to each technician is to periodically re-evaluate his/her proficiency in the terms described. Just how clear is your perception of the facts with which you are supposed to work? Exactly how well have you mastered the techniques of your discipline, or of conservation generally? Just how much are you contributing to the knowledge, experience, and desires in conservation of the landowners within the area where you work?

The finest type of training becomes nothing more than a notation on the records unless you endeavor to retain it and use it in your work. Knowledge is what you retain of the things you have been exposed to. Skill is how well you learn the techniques of your job. Proficiency is the result of personal endeavor. You have to take the steps of advancement.

All of the above, although mainly inferring application to working with private landowners, applies equally to working with users of public lands who are essentially, part-owners of these lands.

Current Literature of Range Management

This section has the objective of alerting SRM members and other readers of Rangelands on the availability of new, useful literature being published on applied range management. Readers are requested to suggest literature items—and preferably also contribute single copies—for including in this section in subsequent issues. Personal copies should be requested from the respective publisher or senior author (address shown in parentheses for each citation).


Herbicidal Control of Greasewood (Sarcobatus vermiculatus) and Salt Rabbitbrush (Chrysothamnus nauseosus spp. consimilis); by Greg J. Cluff, Bruce A. Roundy, Raymond A. Evans, and James A. Young; 1983; Weed Sci. 31(2):275-279. (Univ. Nev., 920 Valley Road, Reno, Nev. 89512) investigated the influence of plant development on control with 2,4-D and efficiency of alternative herbicides.

Historical and Current Taxonomic Perspectives of Agropyron, Elymus, and Related Genera; by Douglas R. Dewey; 1983; Crop Sci. 23(4):637-642. (USDA, Agric. Res. Serv., Logan, Utah 84322) Presents changes and explains the basis of the changes in the classification and nomenclature of the perennial grasses of the Triticeae tribe.


Increase Production from Dryland Pastures on Sandy Soil; by George Rehm; 1983; Farm, Ranch, & Home Quart. (Neb.) 30(1):18-19. (Agric. Exp. Sta., Univ. Neb., Lincoln, Neb. 68503) Fertilizing native or seeded, cool-season pastures in northeastern Nebraska is discussed, along with low-till sod seeding of intermediate wheatgrass.

Increases in Costs and Returns Due to Intensifying Range Forage Production Surveys: An Information Economic Analysis; by Giles T. Rafsneider, Melvin D. Skold, and Richard S. Driscoll; 1983; West. J. Agric. Econ. 8(1):86-95. (Dept. Econ., Colo. State Univ., Fort Collins, Colo. 80521) Addressed the accuracy issue related to surveys used by the BLM and the USFS and estimated increased costs and revenues from using more intensive survey techniques.


Mountain Thermopsis Toxicity in Cattle; by R.L. Chase and R.F.