PROCEEDINGS OF THE AUSTRALIAN RANGELAND SOCIETY BIENNIAL CONFERENCE
Official publication of The Australian Rangeland Society

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The Australian Rangeland Society

RANGE CONDITION ASSESSMENT: HOW MUCH DO WE KNOW?

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The concepts of range condition assessment have been widely (though not universally) accepted in principle by personnel concerned with rangelands in western New South Wales. The methodology and its application in the field has yet to be determined, although work is currently in progress on these aspects.

The ecological approach (Dyksterhuis 1949) has much to commend it and will undoubtedly be used as a yardstick against which other methods may be measured, although some modifications to the original method may be required for local conditions. Unfortunately, the ecological background required for the successful application of this concept in western New South Wales is far from complete. That grazing by domestic animals and rabbits (not necessarily in that order) has wrought great changes in the vegetation of the rangelands of Australia is unquestioned. What is open to question is how much of the present-day condition of the vegetation is due to grazing and how much is due to other constraints such as edaphic factors, climate, and natural phenomena such as floods and fires.

The authors of this paper form part of the New South Wales Range Assessment Committee and as such have the responsibility of selecting study areas within different range sites for the testing of assessment techniques. Selection is based on the criterion that the areas within each range site have the same topographic and edaphic characteristics but support a different assemblage of pasture plants, and the difference in composition is assumed to be a reflection of past grazing intensity. The three range sites examined to date include bladder saltbush vegetation on the Riverine Plain, bladder saltbush on desert loam footslopes, and mulga on sandy rises. The main difficulty, so far as the authors are concerned, has been to isolate obvious effects of grazing by domestic stock from natural and uncontrolled constraints which periodically impose themselves upon the country.

The order of the four constraints, in terms of impact on the composition of rangeland vegetation, could be

(1) Edaphic factors
(2) Climate
(3) Natural phenomena
(4) Stock management

The four, all of which may be inter-related, will be considered in that order.

(1) Edaphic factors

These are accounted for in site selection by definition. They are of no great concern other than that small differences in soil characteristics, e.g. depth of sandy topsoil, gilgai formation etc. can produce marked vegetation differences. Few paddocks have a uniform soil type, fewer have uniform edaphic features.

(2) Climate

This is probably the most variable and difficult constraint to understand. Long-term climatic factors such as seasonality and amount of rainfall, temperature and wind conditions have an over-riding effect on the type of plants likely to occur on any soil type. However, specific seasonal events can result in marked, shorter-term changes. The accepted folk-lore that summer rains produce grass and winter rains produce forbs is often severely modified. There would appear to be a "law of occupancy" where once a plant has become established on an area it inhibits other plants that may have germinated at the same time, or during a subsequent sequence of climatic events. A dense cover of a vigorous annual such as *Erodium crinitum*, brought about by favourable autumn and spring conditions, could modify the micro-environment to the extent of preventing or reducing the establishment of less vigorous species. While this applies mainly to annuals it can markedly affect the perennial vegetation, particularly during the phase of establishment of new populations. A run of years with favourable summer rainfall followed by a sequence of good winter rainfall years can change the general composition of a pasture quite dramatically and variable seasonal conditions may keep a pasture in a continued state of flux. For the vegetation of western Queensland where a similar situation is apparent, Blake (1938) used the term "fluctuating climax". Allen and Roe (1943) and Everist (in Roberts 1972) described the climax as "opportunistic" as it is the result of rainfall distribution at any particular time, and to a lesser extent to the effect of the grazing animal.

(3) Natural phenomena

These factors which relate to rapid destruction of the pasture, may occur by fire, flood or by pests (rabbits, locusts etc.). Examples of great changes brought about in this manner have been observed on saltbush country. Extensive areas of saltbush killed by local flooding have been revegetated by poverty bushes (*Bassia* spp.). On areas from which the saltbush had been removed by fire, grass swards have now established, although in adjacent unburnt saltbush stands grass is a minor component. Re-establishment of saltbush in affected areas will be a slow process.

(4) Stock management

The effects of this constraint were not always easily discernible in the field, nor were they easy to isolate from the effects of the other variables. Excellent fence-line differences were found but these were mostly related to holding paddocks and homesteads where the areas have been largely denuded of plants and kept that way for fire breaks. This continuous removal of vegetation by grazing and trampling rarely allows any successional community to develop, apart from a cover of annuals in the cooler months. These degraded situations represent the lower condition classes.

The top condition classes, by virtue of definition for the project in hand, have been relatively easy to locate. These are the "best" areas available in the same locality as the lower classes. Contrary to the opinions of some, remnants of pristine vegetation are exceedingly difficult to find, even to the most diligent searcher (always assuming that the searcher knows what to look for!).

Areas in intermediate condition class have been difficult to find even around bores, where the "piosphere" should exhibit an extended intermediate zone between the sacrifice area and the lightly grazed distant zone. Around old bores no longer in use, the "degraded" area extended for little more than 100 m. Around most bores currently in use the vegetation showed little gradual change with increasing distance from the bore. This lack of intermediate composition both in the "piosphere" and in paddocks in general would suggest that the vegetation is very resilient and that moderately degraded areas have recovered with the run of above-average rainfall years.

Occasionally found were fence-line differences showing changes in species but in which both pastures had the same plant type (e.g. in some areas the perennial grass *Eragrostis eriopoda* has been replaced by another perennial *Aristida browniana*. Both species appear to be moderately palatable to stock and the change in species seems to reflect the influence of climatic variables on establishment and suggests that time of utilization could be equally important as degree of utilization of the pasture.).

Conclusion

Grazing by domestic stock can undoubtedly affect the composition of the vegetation. However, before we can expect to monitor range condition successfully and manipulate condition status by stock management more information must be obtained on the effects of the grazing animal relative to, and together with, uncontrolled constraints which act upon the rangeland ecosystem. Perry (1967) states "An understanding of the growth, development, production, and reproduction of the important plant species and the principles governing their response to various factors is basic to community productivity and conservation, to the precise definition of range condition and trend standards and to the interpretation of data from grazing experiments. In Australia very little precise knowledge is available for even such important plants as mulga, Mitchell grass, saltbush, and bluebush." During the past ten years further knowledge has been forthcoming on some of these species but overall the situation has shown little change. There is still much to be learned about the above plants and other key or indicator species such as *Eragrostis eriopoda, E. setifolia, Maireana pyramidata, M. sedifolia, M. astrotricha, Bassia diacantha* (and other *Bassia* spp.), *Cassia* spp., *Thyridolepis mitchelliana, Enneapogon avenaceus* etc.

We feel there is a need for further study of the establishment, growth, reaction to grazing and regenerative ability of the major species, together with studies aimed at defining successional patterns in vegetation communities under different grazing and climatic conditions. Such studies, carried out concurrently with research on range condition assessment would provide a basis on which to establish condition and trend methodology and reduce trial and error management exercises.

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