

**PROCEEDINGS OF THE AUSTRALIAN RANGELAND SOCIETY
BIENNIAL CONFERENCE**

Official publication of The Australian Rangeland Society

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The reference for this article should be in this general form;
Author family name, initials (year). Title. *In*: Proceedings of the nth Australian Rangeland Society Biennial Conference. Pages. (Australian Rangeland Society: Australia).

For example:

Anderson, L., van Klinken, R. D., and Shepherd, D. (2008). Aerially surveying Mesquite (*Prosopis* spp.) in the Pilbara. *In*: 'A Climate of Change in the Rangelands. Proceedings of the 15th Australian Rangeland Society Biennial Conference'. (Ed. D. Orr) 4 pages. (Australian Rangeland Society: Australia).

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QUANTIFICATION OF THE FACTORS AFFECTING LONG-TERM VEGETATION CHANGE IN RANGELANDS

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ABSTRACT

Quantification of historical vegetation changes would provide valuable information for prediction of responses to ongoing factors that influence rangelands. A study is proposed to elucidate the factors that have effected such long-term changes.

INTRODUCTION

There have been substantial vegetation changes in rangeland pastures over the last 200+ years. However, accurate records of these changes, particularly in the late 18th, 19th and early 20th centuries are limited. There are significant anecdotal records of these changes, but only limited scientific study. The following factors will be considered in the preliminary research:

- climatic regime - particularly episodic and extreme events;
- fire regime (decline in Aboriginal fire use);
- decline in native fauna populations (e.g. bettong);
- increase in native fauna populations (e.g. kangaroo);
- introduction of feral species (e.g. rabbit, goat);
- control of native and feral animals (e.g. myxomatosis);
- introduction of domestic livestock;
- changes in livestock types (e.g. cattle to sheep);
- changes in livestock breeds (e.g. *Bos taurus* to *B. indicus*);
- integral environmental changes (e.g. soil property changes through soil erosion; impact of woody weed encroachment on herbaceous components);
- changes in grazing management and grazing pressure (e.g. increase in watering points and sub-division).

The study of these factors will not preclude the search for others that may have not yet been considered.

AIM

The basic aim of the proposed research is to accurately identify and quantify the factors that have effected changes in rangeland pastures over time and space. A secondary aim is to develop a methodology for quantification of historical vegetation change in any rangeland type.

METHODS

The methodology to study vegetation change will involve both scientific assessment methodology and review of historical material.

1. *Vegetation type*: Vegetation type will be based on structure and composition. This will be one of the initial tasks - allowing all other data to be collated and analysed in relation to the parameters set by the vegetation type criteria. Within the vegetation type, the range of condition possibilities will be determined.
2. *Vegetation boundaries*: Vegetation boundaries will relate to vegetation types, based on structure, composition and condition as described in point 1.

Historic vegetation boundaries will be determined from historic records, maps and early aerial photographs and satellite imagery. A correspondence survey will be conducted early in the study to develop records from the personal experience of those with knowledge of vegetation changes.

3. *Isotope measurement of soils, plants and other biological samples*: Methodology adopted by Bond *et al.* (1994) will be used to assess changes in soil, plant and other biological samples. This analysis should provide strong evidence for the specific period over which changes have occurred.
4. *Review and analysis of historical records*: An extensive review and analysis of historical records will be carried out to include the range of information and data available, from scientific literature through to anecdotal records. The types of records which will be reviewed and analysed are: explorers records and diaries, botanical surveys, herbarium records, pioneer records and diaries, private and published diaries, records and photographs, historical records of any type and published scientific literature through to the present day.

Integration of Factors

A 'time chart' will be developed for each of the factors that have influenced the vegetation types studied. Integration of data will involve ranking of the factors involved in relation to their level of importance over time and space. The interaction of factors will also be analysed.

Testing and Application of Findings

The determination of the factors involved and their ranking in importance can be tested with predictive computer programs. Conversely, the verified data from the study can be used to test the efficacy of existing programs.

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