Effects of sheep stocking on the population structure of arid shrublands

Susan Barker

Botany Department, University of Adelaide, 1972, pp. 304 Awarded Ph.D.

Changes in plant population structure which result from stocking have been given detailed examination on two well-managed sheep stations, one in the north-east and one in the north-west of arid South Australia.

The work was initiated by an investigation of the physical resources of one of them, to explain the context in which the population studies were carried out. The population studies which followed were based on the premise that there is a decline in stock pressure with increasing distance from a water-point. Using incidence data (analysed by influence analysis) and density data, vegetation pattern close to 8 water-points was compared with vegetation in more distant parts of the paddocks. It was clear that intense stock pressure close to a dam or trough was bringing about a change in vegetation structure. This pattern which was shown to be easily distinguished from pattern induced by topography or soil in a paddock, was taken to denote degradation.

A number of species which had fairly consistent occurrence near the water-points sampled could be regarded as indicators of this degradation. Some reasons for their behaviour in these situations were examined. It is suggested that changed soil structure stimulates invading populations and that if stocking persists in the future such changes may be progressive.

Commensal relationships between some species, which became apparent during the course of the field work, were also examined.

The implications of the outcome of this study for the future of the arid zone are discussed.

Ecological studies of arid rangelands in South Australia[1]

Brendan G. Lay

Botany Department, University of Adelaide, 1972, pp. 171 Awarded M.Sc.

Several aspects of the ecology of arid rangeland were studied by broadscale survey over an area of about 50,000 km^2 in the north-west statistical division of South Australia.

Re-evaluation, after 22 years, of a quantitative assessment of rangeland condition is presented. Density of *Atriplex* and *Kochia* was measured.

A photogeographic survey was carried out at the same time as the bush density survey. The distribution of 41 woody plant species (mainly trees and large shrubs) was mapped by observation using contiguous 3.2 km sampling intervals along the traverse route.

One hundred and two permanent photographic points were set up during the survey to illustrate various shrubland communities, and tree and shrub species used in the phytogeographic survey. These are accurately located and could be re-photographed if this survey is repeated.

Herbarium collections of flowering plants were made throughout the survey and a total of 402 identified species were collected. This collection revealed new localities for many species.

It is concluded that only methods of longterm and broadscale inventory of rangeland condition and trend (such as bush density survey) could provide a practical determination of the effects of management practices on the vast areas of diverse vegetation types of Australia's arid pastoral zone.

[1]This is not the author's summary of his thesis. The reader is referred to the original work for a more complete resume.