

State and transition models: Bringing research, extension and management together

Proceedings of a workshop held at the Forestry Training Centre, Gympie, Queensland, September 13-14, 1993

This issue of *Tropical Grasslands* contains papers on vegetation change in the northern Australian rangelands and the value of 'state and transition' models (Westoby *et al.* 1989) for improved land management and enhanced communication about pasture and rangeland management. The papers were presented at a workshop sponsored by the Meat Research Corporation in September 1993.

In supporting the workshop, the North Australia Program (NAPII) Management Committee recognised the powerful role that state and transition models can play in a number of areas that are critical to the sustainable use of grazing land resources. These include:

- identifying the impact of climatic forces, other natural disturbances, and management actions on rangeland condition and stability. State and transition models usually provide a more realistic description of these processes than the models based on ecological theories of succession.
- communication to practical land managers and administrators of both the positive and adverse consequences of different management actions on land resources, particularly the episodic nature of chances (so-called 'windows of opportunity') to effect beneficial change to resource condition. The experience of the NAPII management team was that most people, when exposed to state and transition model concepts, found them much more intuitive and easy to grasp than explanations based on alternative ecological models.
- identification of knowledge gaps in terms of ecosystem responses to natural and management-induced disturbances in the major vegetation communities on which the beef cattle and sheep industries of northern Australia so critically depend.

The workshop had 2 major objectives. These were: (1) to provide information to participants about the latest developments in rangeland ecology, including state and transition modelling — a field that Australian research is setting the lead in at the present time; and (2) to commence the task of constructing representative models for the major vegetation communities of northern Australia. These included the mitchell grasslands (*Astrelba* spp.), bluegrass (*Dichanthium sericeum*) downs, northern and southern black speargrass (*Heteropogon contortus*), ribbongrass (*Chrysopogon* spp.), wiregrass (*Aristida* spp.) and bluegrass (*Bothriochloa* spp.), mulga (*Acacia aneura*) and gidgee (*Acacia* sp.) and brigalow (*Acacia harpophylla*).

On the first day of the workshop, a number of papers were presented by invited speakers with recognised expertise in the theoretical and practical application of state and transition models to rangeland management problems. These covered topics on: vegetation change under natural and management disturbances; converting ecological theories to practical management principles; the value of state and transition models for setting research priorities; practical application of state and transition models to land management problems in the northern Australia, woody weed dynamics and pasture changes; and the value of state and transition models for improving communication and technology transfer.

Small working groups then began the task of modelling the different states and transitions relevant to the major vegetation communities described above. Significant progress was made on the models at the workshop and the participants have subsequently completed this work in conjunction with colleagues in the regions under review.

Prior to the workshop, the Organising Committee prepared and distributed a survey to key individuals in R,D & E agencies throughout Australia, seeking their comments on applications of, and experiences with, state and transition models. From the responses, these models clearly hold wide appeal and have been found to be very useful as conceptual

and communication tools in a range of vegetation types, from grasslands to woodlands. Most of the respondents firmly believe that these models will greatly assist in the synthesis of research and grazier knowledge and, ultimately, serve to facilitate better grazing land management. Among the responses, however, were cautions against users becoming mesmerised by the models' simplicity. In many cases it appears that the focus is more on the 'states' than the 'transitions', with the result that key issues, such as rates of change and the interactions between events and thresholds, may be almost forgotten. The present models have limited spatial context, and therefore, may not adequately represent the changes that occur at different times in different parts of the landscape, and the linkages between these. Finally, the scale of perception will have a major bearing on the nature of the ensuing model, and it is imperative that research workers and practical land managers work together to develop *functional* models.

Through the workshop process the NAPII management team hopes to initiate an ongoing dialogue between research and extension specialists on the one hand, and practical land managers on the other hand, on the function and management of grazing land resources. The state and transition modelling process will also be an important source of additional information in the way that rangeland resources function and respond. This, we believe, will lay the foundation for future research and development, as well as extension, that is specifically targeted to filling genuine knowledge gaps.

By publishing the proceedings, we are endeavouring to expose a much wider audience to the concepts discussed and the state and transition models for various pasture communities developed as a consequence of the workshop. The contents of this special issue should stimulate those associated with land management to adopt a more holistic approach to their management.

John Taylor, Neil MacLeod and Andrew Ash

WORKSHOP PARTICIPANTS

Conservation Commission of the Northern Territory

D.K. Clift

Commonwealth Scientific and Industrial Research Organisation

A.J. Ash, J.A. Bellamy, J.R. Brown, A.C. Grice, N.D. MacLeod, S. McIntyre, J.G. McIvor, J.A. Taylor

Department of Lands, Queensland

J.C. Scanlan

Department of Primary Industries, Queensland

J.H. Chamberlain, R.A. Clark, G. Ford, J.C. Kernot, S.R. McArthur, J.C. Osborn, P.G. Filet, T.J. Hall, P. Jones, D.M. Orr, C.J. Paton, R.G. Silcock, P.N. Vance

Meat Research Corporation

B. Walker

Northern Territory Department of Primary Industry and Fisheries

R.T. Andison, R.M. Dyer, T.G.H. Stockwell

Northern Territory Department of Lands and Housing

T. Wheaton

Producers

B. Banks, M. Debney, N. Mills, C. Seiler

Tropical Beef Centre, Rockhampton

E.R. Anderson, W.H. Burrows

University of New England

R.D.B. Whalley

University of Queensland

J.J. Mott

Western Australia Department of Agriculture

P.E. Novelly