



## Landscape processes

# The Issue

Changes to tropical savanna landscapes are driven by short-term climatic fluctuations, long-term climate changes, and by land management practices. Understanding these drivers of change is essential for achieving the sustainable management of tropical savannas and predicting the outcome of management guidelines.

# CSIRO Research

CSIRO has been using computer simulation models to understand landscape changes by exploring and testing different scenarios of fire, grazing and tree clearing. The aim is to provide guidelines on sustainable land use using the predicted outcomes of various simulations. This research includes:

- The "savanna" model (developed by Mike Coughenour, Colorado State University, USA) has been used to explore how woody thickening might occur across a savanna landscape at Kidman Springs in the Victoria River District, Northern Territory. Significant thickening was found to spread across the landscape under a scenario of no grazing and fire. The use of fire with no grazing or light grazing was able to control this thickening.
- A new version of the savanna model (Savanna.au) has been developed for Australian savannas. This version has an improved interface between hydrology and ecology and is now being used to explore the impacts of different savanna disturbances (e.g. grazing, clearing) on runoff and erosion and the effects of exotic grassy weeds.
- It is important to have an understanding of the condition of the landscape at any point in time. This provides a reference point by which to gauge change. A simple indicator of the potential for a landscape to retain resources (i.e. not lose or 'leak' water and soil sediments from the system) has been developed. This index is based on data obtained from remote-sensing, including both aerial videography and satellite imagery.
- In collaboration with CSIRO Alice Springs and the Northern Territory Department of Business, Industry and Resource Development, a range of field measurements have been conducted to document vegetation changes inside and outside cattle exclosures on Kidman Springs, VRD. These exclosures were established in 1973. There has been a remarkable recovery of vegetation on red soils, which in 1973 was in a very barren state. The vegetation on black soils was in better condition in 1973, and remains so today both inside and outside the exclosures. These measurements help to validate and parameterise the various models used.

### Research Staff

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### Collaborators

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