

## **Managing and monitoring the biodiversity of the tropical savannas.**

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There has been a substantial “savanna biodiversity” program, in various guises, for the lifetime of two iterations of the Tropical Savannas CRC. The general objectives of this program have been to increase our basic knowledge of the distribution and conservation status of savanna biota; to investigate the impacts of a range of land management regimes on biodiversity; to better incorporate consideration of biodiversity conservation into land management planning and decision-making; to develop robust techniques for assessing and monitoring biodiversity ‘health’; and to provide information about biodiversity in useful forms to a wide array of land managers and other stakeholders.

Over the past decade-and-a-half these objectives have largely been achieved, resulting in a great increase in understanding and appreciation of the biodiversity of the tropical savannas, on lands of all tenures and across a wide range of stakeholder groups. We have compiled near-comprehensive databases of the known locations for vertebrate and plant species across the tropical savannas. A large number of systematic biodiversity surveys have addressed substantial gaps in this baseline information or, where they have resampled areas where historical data exists, been very important in highlighting changes in biota, particularly declines in the small mammal and bird fauna. Research projects have clarified the impacts on biodiversity of grazing pressure from cattle; of clearing and fragmentation, and thickening or thinning, of vegetation cover; of the spread of introduced pasture grasses; and of changes in fire regimes. Robust biodiversity monitoring programs have been implemented in some areas, and we have a much greater understanding of the value, and inadequacies, of various surrogates and indices for biodiversity condition. We have developed robust principles or guidelines for biodiversity-friendly land-management practices, and had substantial input to jurisdictional conservation planning and regional natural resource management plans.

Our projects have generally been collaborative efforts with Indigenous ranger groups, local landcare organisation, conservation agencies, non-government conservation organisations, natural resource management regional bodies, and individual land managers. We have also attracted considerable complementary funding from many sources, including Land & Water Australia, Meat and Livestock Australia and the Natural Heritage Trust, and several ongoing projects will continue to address the objectives of the TS-CRC after its demise.

The wealth of information about biodiversity and the effects of land management compiled during this program is now widely available to land managers and the general public via the user-friendly Land Manager and Biodiversity Info-Net websites. Additionally, this program has been associated with over 200 scientific papers, reports and books relating to savanna

biodiversity and sustainable land management, which have extended to a national and international audience.

These achievements, and much other fine work by those both within and outside the CRC umbrella, have not secured the future for Australia's tropical savanna biodiversity (although it has assisted in clarifying the opportunities and risks). Rather, we feel that we are now close to a critical juncture for this future. There is a narrow and diminishing path between hope and despair for the environmental future of northern Australia. As development and degradation continue and accelerate, we may slide further down the familiar path of biodiversity decline followed over the past two centuries in our southern landscapes. Alternatively, we may recognise and embrace the opportunity to maintain and nurture our largely intact savanna landscapes and to better value and safeguard their magnificent biota.

We attempt here to prescribe some key requirements in order to realise this latter future. These are far broader than a strict research agenda, but this reflects the essential need for a general attitudinal change to how the savannas, and their biodiversity, are perceived, and to the national priorities for natural resource management.

*Correction of the distortion in the national environmental perspective and resourcing for environmental management*

The tropical savannas are alien to most Australians, inadequate attention is paid to their future by southern decision-makers, and resourcing for environmental management is miniscule in relation to their size and significance for biodiversity. While low population density and limited capacity may be impediments to natural resources management, greater investment in maintaining relatively healthy systems will ultimately be far more cost-effective than attempting to restore decimated landscapes and rescue species on the cusp of extinction.

*Systematic long-term landuse planning that recognises and retains conservation values as the foundation of a sustainable future*

The integrity of the tropical savannas and the underlying ecological processes should be recognised as an essential component of the future of this region. Development should proceed only where it does not diminish this essence, and land use planning should be built around maintaining the connectivity and functioning of savanna landscapes.

*Broad-scale programs to staunch ongoing, pervasive decline in biodiversity*

While a number of factors have been implicated in the insidious decline of some components of the savanna biota, a sustained research program is required to better elucidate the causes of decline, linked to carefully targeted management and a program of monitoring biodiversity and its responses to management intervention.

*Implementation of robust, landscape-scale biodiversity monitoring programs, linked to adaptive land management regimes*

There needs to be recognition that biodiversity monitoring should be a foundation for measuring environmental sustainability and a key component of adaptive land management, with adequate, long-term resourcing. The efficacy of land management interventions needs to be assessed by such monitoring programs across all land tenures.

### *Mitigation of the impacts on biodiversity of pastoral land use*

As the dominant land use in the tropical savannas and with virtually complete hegemony over many savanna ecosystems, impacts from pastoralism will continue to be critical to the long-term fate of savanna biodiversity - more so with continuing pressures to intensify pastoral production across this region. These impacts must be mitigated through improved representation of productive landscapes in the protected area system; a combination of appropriate incentives and legislative requirements for the retention of biodiversity on pastoral lands; and tight regulation of land clearing and use of introduced pastures.

### *Secure long-term resourcing for conservation land management by indigenous people*

Indigenous people manage large areas of the tropical savannas, including many of the areas of outstanding conservation significance. Much of this management responsibility has been formalised through the recent development of indigenous land management organisations and indigenous protected areas, as well as joint management arrangements of conservation reserves, but the impediments of limited capacity, inadequate resourcing and insecure or short-term funding must be addressed. As in other tenures, it is important to link funding for environmental management to explicit outcomes and assess the efficacy of management through adequate monitoring.

### *Implementation of a carbon-trading scheme that rewards the retention of native vegetation and the application of benign fire management*

Active management of land to maintain or improve biodiversity values is most likely to occur if landholders receive a tangible benefit from doing so. One promising mechanism by which this could occur is through carbon offset schemes, which may apply both to the retention of native vegetation (which may otherwise be cleared for pastoral or agricultural development), and landscape-scale programs for the reduction in the frequency and severity of fires.

### *A strategy to safeguard the biota most susceptible to impacts of climate global change*

We have done little to address this threatening process during the savanna biodiversity project. While the direct effects of climate change may not be ameliorated, it is essential we understand the risks that it poses to savanna biodiversity, develop strategies to protect the most susceptible elements, and retain intact ecosystems over broad scales in order to maximise options for species' adaptation to these changes.

### *Development of a research and management program for understanding and maintaining tropical savanna dynamics*

The dynamic nature of tropical savannas, both spatially and temporarily, is very important for many components of biodiversity. While we have been very good at studying patterns, we are less advanced in understanding these processes, and this needs to be addressed through "big picture", long term research programs.

### *Elaboration of international linkages to other tropical savannas*

There is a substantial opportunity to increase our understanding of tropical savannas through better communication and collaboration with researchers and land managers internationally, and we can also better contribute to better management of tropical savannas globally.

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