



SAVANNA LINKS

Cooperative Research Centre for Tropical Savannas Management

Issue 25
April–June 2003

ISSN: 1327-788X
<savanna.ntu.edu.au>

CONTENTS

NEWS 2–3

- Tropical knowledge
- Public comment sought
- Snugglepots & musclemen
- Environmental alliance

LANDCARE 4

- Challenge is on

LETTERS 5

FIRE 6–7

- Case for wet-season burns

RESEARCH 8–10

- CRC builds knowledge

INDIGENOUS 11

- Land and sea framework

SAVANNA BITES 12–13

Barcode of life | Gulf reef | Purnululu | Minerals atlas | WA NRM | Cultural map | Timor gas | Jewel bugs | NT Greenhouse | Drought CRC | Websites |

READING 14

Country of the heart | Prime Notes | Tourism | Grasses | Green directory | Bush magazine |

CALENDAR 15–16



Established and supported under the Australian Government's Cooperative Research Centres Program



The Gippsland Landcare group, just some of the 680 delegates who attended the National Landcare conference in Darwin in April

Photo: Geraldine Lee

Challenge is on for Landcare

IN early May the National Landcare Conference came to Darwin—a great opportunity for networking and evaluating where the movement is headed. From Victoria to the Top End, delegates gave their views on Landcare: what's working, what's not, and where the movement can strengthen its work. **Peter Jacklyn** reports on pages 4–5.

Managing traditional lands

SHELBURNE Bay in Cape York, pictured below. Traditional owners, the Wuthathi people, have developed a framework to manage land and sea that aims to integrate cultural and conservation values, p. 11.



Photo: Kerry Trapnell



Photo: Greg Miles

Wet-season burning in Kakadu

ARE fire-loving grasses invading the landscapes of Kakadu? Ranger **Greg Miles** outlines a case for wet-season burning to suppress spear grass, pp. 6–7, 11.

Read about new research projects in the TS–CRC, pp. 8–10.

Tropical knowledge in northern Australia

THE past few months have seen a number of symposia and seminars discussing public policy and sustainable development in northern Australia. The Northern Territory University hosted the Charles Darwin Symposia in May with a special on the ABC's Late Night Live and brought together eminent speakers that included Tim Flannery and Australia's chief scientist, Robin Batterham. In Cairns, a new seminar series at James Cook University began in June that is focusing on key challenges for ecological sustainability in the north. The Chief Scientist at Queensland's Department of Primary Industries, Dr Joe Baker, gave a seminar in Townsville that broached the potential that the city, and other northern centres, had in bringing tropical knowledge to the world.

Dr Baker's talk had pertinent implications for research capability in northern Australia as a whole. As he pointed out, many developing countries are in the tropics and have populations largely concentrated within 100 km of the coast. Very few, however, have the first-world research capability that can be found in Australia.

Larry Bannister, director, Innovation & Knowledge Economy, in the NT Department of the Chief Minister, agrees. In November last year, the NT Government launched a discussion paper on a tropical knowledge strategy, which fielded not only the benefits of developing Darwin as a centre for excellence in tropical knowledge, but also the substantial collaborative research linkages that already exist across the north.

"We are very much conscious of how the north has a lot of commonality," he said. "We already have a large

amount of work in the area for what is such a small base, and one of the reasons for that is the successful collaborative arrangements we already have across jurisdictional borders."

The outcome of that discussion paper is now before the Northern Territory Government and may be ready for release towards the end of the year.

A Memorandum of Understanding between the two states and territory is also being discussed, and a framework for such an agreement is under development.

"What we are looking at is what we can do to add value to that (existing collaboration) rather than inhibiting collaborative arrangements that are already flourishing," Mr Bannister explained.

The framework for the MOU should be finalised by the end of the year, with a view to getting it to the heads of state agreement by early 2004.

Contact: Larry Bannister: <larry.banister@nt.gov.au>

Contact: Joe Baker: <joseph.baker@dpi.qld.gov.au>

Read about the NT's Tropical Knowledge Strategy at:

<www.otd.nt.gov.au/dcm/otd/publications/innovation/tropical_knowledge_discussion_paper.pdf>

Living Culture, Living Green: Creating Working Models in Northern Australia seminars are held at James Cook University, Crowther Theatre, Cairns Campus every second Thursday of the month.

Three more symposia are planned for the Charles Darwin series, in July, September and December. Charles Darwin Symposium Series <www.ntu.edu.au/cdss2003/>

CRC: Linking the North

The Tropical Savannas CRC is a joint venture of the major organisations involved in land management of the savannas of north Australia.

It comprises three universities, government agencies from the NT, Qld and WA and the Commonwealth, CSIRO, and representatives from Aboriginal groups and the pastoral industry. The Centre promotes sustainable use and conservation of Australia's tropical savannas by acting as a bridge between agencies engaged in land and resource-management research, and research users and decision makers e.g. pastoralists, conservation managers, Aboriginal land managers, and the tourism and mining industries.

The Centre communicates outcomes of research and other knowledge about the savannas and ensures this knowledge can be used effectively by people living and working in the savannas.

CEO: Professor Gordon Duff
Tel: 08 8946 6834 Fax: 08 8946 7107
Email: savanna@ntu.edu.au
Web: <savanna.ntu.edu.au>

Public comment sought on NRM plans

Burdekin salinity hazard

A MAP outlining salinity hazards in the Burdekin catchment in Queensland is now available, and shows where salinity problems may occur over the next 30 to 50 years.

The catchment covers 13,318,990 hectares in north and central Queensland and about 1.38 million hectares (10 per cent) of land is in the high-hazard category across the entire region, with an additional 1.43 million hectares (11 per cent) classified as a moderate-to-high hazard.

The regional-scale map does not replace on-ground and site-specific environmental impact assessments, and cannot be used to determine if individual properties are prone to salinity.

Go to: <www.nrm.qld.gov.au/salinity>
Tel: (07) 4799 7200

Gulf water resource plan

COMMUNITY comment is wanted for a Water Resource Plan for the Gulf's

rivers in north-west Queensland. An information report just out explains the planning process and outlines water issues and how management strategies might be used for rivers in the plan area.

Towns covered by the plan include Mount Isa, Burketown, Cloncurry, Normanton, Richmond, Hughenden, Croydon, and Georgetown.

A moratorium on applications to take or interfere with water other than artesian reserves in the plan area and on building works to take overland flow water is now in effect.

This does not apply to water for domestic or stock watering or certain developments associated with urban supplies and the mining industry.

Contact: Michael Matthews, Qld Dept. Natural Resources & Mines. Tel: (07) 4799 7850
Web: <www.nrm.qld.gov.au/wrp/>

Written submissions: Mr Peter Gilbey, NRM
PO Box 5318, Townsville, QLD, 4810
Email: <gulf.wrp@nrm.qld.gov.au>



The angle-headed cannibal ant:
Cerapachys singularis

The Sydney Harbour Bridge jogging ant



Genial killer ant: *Leptogenys exigua*

What's in a name? Alan Andersen proposes common names for Australia's ants that capture the imagination as well as the ants' unique attributes
All illustrations Peter Jacklyn

ants have 'sheep-like' heads. Possum ants live in trees and Thumbelina ants have what looks like a 'thumb print' on their backs."

Dr Andersen says ants are chief among nature's engineers, maintaining healthy soils and regulating the flow of energy and nutrients through the environment. They are being used by land managers across Australia as biological indicators to diagnose the health of ecosystems.

Other suggestions from Alan for the country's ants include the Genial killer ant, topless cannibal ant, giant snappy ant, the bulldozer furnace ant, chocolate shield ant, toothless bull ant, the smiling mono ant, dinosaur ants, the striped foaming ant and the Angle-headed cannibal ant.

More information: Dr Alan Andersen
CSIRO Darwin Tel: (08) 8944 8431

Barbara McKaige: Tel: (08) 8944 8411
Email: Barbara.McKaige@csiro.au

Andersen, A. (2002) 'Common names for ants, (hymenoptera, formicidae), *Australian Journal of Entomology*, vol. 41, Issue 14, pp.285-293.

Andersen, A. (2002), *Ants of northern Australia*, <www.publish.csiro.au/books/bookpage.cfm?PID=2546>

Snugglepots and musclemen

MUSCLE man tree-ants, goblin ants, fierce gremlin ants, Snugglepots ants, Jumbuck sugar ants, possum ants and Thumbelina ants. These creatures are not out of a children's book, they're common names proposed by CSIRO's Dr Alan Andersen for some of Australia's native ants.

Up to 20 million ants are found in the Australian environment, and more than 1500 species are found in northern Australia. Although ants are one

of the most familiar group of insects throughout Australia, Dr Andersen said the lack of common names has led to poor public interest in them.

"Scientific names can be rather obscure, difficult to pronounce and can be hard to remember for people who are not scientists," he explained. He also has explanations for the names he proposes.

"For example, Goblin ants are bizarre looking and Jumbuck sugar

Environmental alliance for the north

AUSTRALIA'S Environmental organisations have joined forces to create the Northern Australian Environmental Alliance- NAEA-as a way to better coordinate their efforts across northern Australia. One of the objectives of the group is to develop alternative economic models that would underpin genuinely sustainable development for Northern Australia. These models will be based upon the need to protect ecological and cultural values of the region while developing a diverse, prosperous, sustainable and equitable future for the peoples that live there, says the Alliance.

James McLellan, coordinator of the North Queensland Conservation Council, said the alliance is taking a coordinated approach to conservation issues across the north, rather than duplicating the efforts of single organisations.

"The group allows us to advocate in a holistic way," he said. "Currently we are working together on the National Oceans Office's Northern Regional Marine Planning process and recently we successfully collaborated against applications for the release of GMO cotton in northern Australia."

"We're also working on developing a threats analysis of northern Australia for both marine and terrestrial environments. NAEA will also be engaging on Natural Resource Management Planning processes in northern Australia, including the tropical savannas region. We're really aware that we need new NRM models that are appropriate for northern Australian conditions, instead

of applying southern Australian benchmarks for NRM planning."

The group's vision sees the north as one that has been largely spared the worst impacts of land clearing and over-development, with diverse land and sea environs interconnected and largely intact.

However, the alliance states that the northern region is facing increasing development pressures and urgent conservation challenges.

The members of the alliance are:

- ACF Australian Conservation Foundation
- AMCS Australian Marine Conservation Society
- CAFNEC Cairns and Far North Environment Centre
- CCWA Conservation Council of WA
- EK Environs Kimberley
- ECNT Environment Centre of the NT
- MCCN Marine and Coastal Community Network
- NQCC North Queensland Conservation Council
- QCC Queensland Conservation Council
- TWS The Wilderness Society
- WWF World Wide Fund for Nature

The group is currently run by a committee comprising members of the various organisations, but it hopes to employ a coordinator in the near future.

For more information contact your local conservation group

Landcare shifts ground to regional focus

The National Landcare Conference was held in Darwin in April, hosted by the NT Government and the Tropical Savannas CRC. A first for the tropical savannas, it was an opportunity for northerners to catch up on the national scene and a chance for a national audience to hear about northern land management. *Peter Jacklyn* reports.



Photo: Geraldine Lee

Landcare conference delegates on one of the agricultural tours in the NT

The theme of the conference, ‘Respecting values, working and learning together’ related to how people see and value country in different ways but nevertheless need to cooperate. In northern Australia, views of the land take in more than just a ‘city’ and ‘country’ view, but encompass a range of ways of looking at land, many of which are outside of mainstream Landcare. The conference was a chance for these different views to be presented on the same stage.

So how did it all go? For a start, 680 people showed up, making it one of the largest conferences ever held in Darwin—and well done to the volunteers who made such a big event run smoothly. It wasn’t just the lure of the exotic north that drew people, it is also a time of great change in Landcare and many people wanted to get a clearer idea of where the movement is heading.

Changing times

The major funding source for Landcare—the federal government’s Natural Heritage Trust (NHT)—has shifted its focus.¹ Whereas much of the original NHT (1996–01) was delivered directly to individual community groups, the recent extension to NHT aims to be more strategic and is to be delivered through regional plans.

Michael Taylor, the CEO of the Federal Department of Agriculture, Fisheries & Forestry, sees this as a just one step in a process in which there is more integration between sustainable natural resource management (NRM) and the whole of agriculture. His talk outlined the range of NRM initiatives the Government is involved in and how he saw the new regionally focused Landcare as playing a vital role in building partnerships with industry and helping to spread the sustainable NRM message.

However, according to one of the fathers of Landcare, Brian Roberts of Cairns, Landcare is in danger of “losing its soul”, as it is becoming dominated by bureaucracy, local coordinators are burning out and landholders losing their influence. One of the few landholders to speak at the conference, Jenny Blake, spoke of how many farmers are now wary of too much involvement in Landcare because of the workload of paperwork and strategy meetings.

These last talks seemed to strike a chord with many in the audience. Perhaps this year in particular, some Landcarers are feeling the strain as their funding is drying up before it flows again through the new regional plans.

In areas where regional plans are taking longer to develop, funding has been slashed—the NT Landcare Council, for example, had its annual funding cut by more than half. Quite a few delegates spoke of being disappointed with some of the politicians and bureaucrats who flew in, said all was well, and flew out again.

Caring for country

This conference had a distinctive focus on Aboriginal land management. Michael Storrs of the Northern Land Council and Cherry Daniels, a women’s ranger from Ngukurr in the NT, spoke of the remarkable Caring for Country movement and the indigenous ranger groups that have sprung up across the NT.² This indigenous movement seems to be flowering in a way not unlike that of the early Landcare movement.

Nevertheless indigenous caring for country is clearly different from ‘whitefella’ Landcare. Many of the indigenous people felt uncomfortable at the conference and would have preferred their own meeting and such a gathering was proposed at the end of the conference. (It was also proposed at the end of the International Landcare Conference in 2000). Some non-indigenous people, however, were concerned by this, fearing that Landcare could become mired in a cultural conflict between an Aboriginal land-management movement and a non-indigenous one. It looks like this is one area where there is plenty of scope for more working and learning together.

Measuring progress

Another value system that can incite fear is that of the accountant. In one form or another, accountability and evaluation have become key issues for Landcare. Demands of accountability in the spending of Landcare funds have contributed to the increasing paperwork.

Aside from wanting to know how land managers spend government dollars, there is also an increasing pressure for them to demonstrate that they are looking after land appropriately, in a way that can be objectively measured. The growing use of environmental management systems and the newer Australian Landcare Management System that includes local and regional catchment strategies, were discussed. On one hand these debates at the conference seemed to reflect a growing concern that Landcare needs to show more outcomes than the warm and fuzzy feelings of people working together, and needs hard evidence that

Continued next page

Landcare South Africa

I HAD a pleasant 'walk down memory lane' reading your articles on South Africa (*Savanna Links*, Issue 24, pp 6–7) as I was employed by CSIR Environmentek as an environmental scientist and terrestrial ecologist, and worked with Bob Scholes, before I came to Australia early last year. I have also had some dealings with Timm Hoffmann, while he was with the SA National Botanical Institute, before his recent appointment at the University of Cape Town.

I agree with many of Bob's comments regarding the similarities between southern African and Australian savanna (and other) ecosystem issues, concerns, problems and solutions. As I increase my professional involvement in, and understanding of, the issues here in Australia, I have found it interesting comparing Australian and southern African approaches to similar issues.

I also read your article on Landcare in South Africa with great interest. While Landcare has existed in South Africa since 1997, a similar set-up called 'conservancies' has been around for more than 20 years. The establishment of conservancies among neighbouring farmers and within districts and catchments was (and still is) encouraged by the provincial (state) parks and wildlife agencies, who also used to (some still do) provide extension services to the conservancies.

The conservancies each have their own constitutions and management committees and their activities encompass addressing landcare issues including biodiversity conservation and wildlife management. They also serve to generate agri- and ecotourism opportunities and, depending on their circumstances, generate additional income from offering seasonal hunting concessions etc.

My enthusiasm regarding the effectiveness of conservancies comes from my own past involvement with conservancies in KwaZulu-Natal. Part of my conservation biology Masters research, which looked at the effects of intensive commercial agriculture on farmland biodiversity, was funded by a research and education trust established by several conservancies.

In my opinion, the fundamental difference between conservancies and the current Landcare initiative is that the conservancies were established by ('white') commercial farmers and the Landcare initiative focuses on and is aimed at rural areas inhabited predominantly by ('black') communal farmers. The historic circumstances

surrounding each of these two scenarios have resulted in a range of environmental concerns.

While many of these concerns are unique, a lot of them apply to both commercially and communally managed agricultural land. I have always felt that the conservancies should be strongly encouraged to assist their neighbouring communal farming communities to establish similar movements through the provision of organisational assistance and the transfer of skills, knowledge and experience.

Such an approach would certainly improve and foster better black/white neighbour relations. It would appear that this opportunity is being overlooked by the Landcare initiative.

Finally, in response to your food for thought request, my impressions of urban Australia can best be summed up as 'Lawns and Prawns'.

Lionel Pero, University of Queensland

Burning pastures

I READ with interest Rodd Dyer's views on fire management (*Savanna Links*, Issue 24, pp 9–10). I do appreciate feedback, as it generates exchange of ideas.

Despite my views on not burning our own grass types, I think that some grasses have to be burnt on a regular basis to get any use out of them. For example, in our district, several properties have areas of blady grass which has no feed value over 30 cm high, and these producers have found that if it is burnt at the correct time, that country can be productive.

Another local property in red basalt country is grassed exclusively with black spear grass [*Heteropogon* spp.—Ed], which was managed by burning a quarter of the property each year in rotation, thus ensuring reasonably fresh growth, which appeared to work quite well over a period of time. I do think, though, that a lot of grasses should not be burnt on a regular basis, or not at all, provided that a stocking rate can be maintained so as to achieve the correct balance between feed volume and stock numbers, this being done using local experience.

With regard to what happens to the old dry grass, we have found that it mulches down quite readily, preserving carbon, reducing soil erosion, retaining soil moisture and, in time, creating topsoil. Meanwhile, fresh grass grows through the layer of old grass, even where it is fairly dense.

Keith Atkinson, Camel Creek Station, Ingham, Qld

Landcare shifts ground to regional focus

it is producing results in the landscape. But there is concern that the essence of Landcare—local communities being enabled to work together—is being diluted by the emphasis on bean-counting, strategies and paperwork.

The final word

These were a few of the issues talked over at the conference. So what was gained from the trip north for Landcare? Although the panel discussion at the end of the two days appeared

to turn its gaze back to southern issues, the conference did provide a major stage for northern land management and it was a great place to network with so many delegates. It's probably too early to measure the conference's impact as most of the real talk takes place off stage around the lunch tables and bars.

The last word goes to the bloke who stood up on the final day and said ". . . now we've been inside for two days a lot of us are itching to get

outside and get our hands dirty with Landcare work."

Many of us have become pretty good at talking about land management over the last few years, but it's giving effective support to people who actually manage land that counts.

References

1. *Savanna Links*, Issue 21, pp. 4–6.
2. <www.nlc.org.au/html/care_menu.html>
3. <savanna.ntu.edu.au/news/2003_national_lc.html>

Web: <www.landcareconference.nt.gov.au/>

Fire and spear grass: a case for wet-season burning in Kakadu

Results from CSIRO'S Kapalga fire experiments raise some intriguing questions, writes **Greg Miles**, a ranger from Kakadu Park with more than 20 years' experience. He says apparent contradictions can be explained when seen from a perspective of a landscape under invasion by fire-loving grasses.



Young Kentia Palms at the West Alligator River in Kakadu are protected from fire by a wet-season burn

Photo: Greg Miles

In March 2000, a workshop was held summarising the vast amount of work on fire research undertaken at CSIRO's Kapalga Research Station (see box opposite). Some valuable detail was revealed that placed more pieces into an otherwise sparsely filled jigsaw. However, many of the speakers detailed ongoing ecological processes in the Kapalga experiment that are apparently inexplicable: the eucalypt *E. miniata* should be either extinct or vary rare—instead it is neither.

The results showed that young and old eucalypts are most at risk of being killed by hot fires; *E. miniata* reproduces only by seed and most seedlings are killed by fire be it early or late dry season. Frequent fire has a negative affect on seed production. There was also approximately a 5 per cent loss of nitrogen each year from the biota under an annual fire regime used at Kapalga.

When examined together, and knowing that Kapalga has a history of hot and frequent fires, this information tell us that *E. miniata* (at least) should be either extinct or rare in the study area. This coupled with the finding of nutrient loss tells us that the Kapalga woodlands should rapidly be converting to grasslands or at least host only crippled and stunted woody vegetation. Why is this not so? To my mind, this is a great mystery.

To resolve this and other mysteries posed by the experiment I propose to look at the results from another perspective, in which Kapalga is seen as part of a landscape being transformed by spear grass invasion.

Role of spear grass in the system

From an ecological point of view, local native spear grasses (*Sorghum* spp.) could be considered indigenous weeds in the Top End.

One only need observe their distribution and density in relation to other grass species to get an inkling of this. The grass occupies an extraordinarily wide range of habitats from high, lateritic woodlands, seasonally inundated flats through to sandstone sand-flats and scree slopes. Its hyper-abundance gives the appearance of a plant in disharmony with local floristics.

Fire in the woodlands of Kakadu is largely about spear grass. It constitutes around 40 to 50 per cent of the annual fuel load and the majority of the free-standing fuel, so without spear grass, fires would be much less intense. It is not uncommon to see lowland forest standing in spear grass suffer 100 per cent scorch as early as late April.

Leaf litter is the second major contributor to the annual fuel budget. Leaf litter fires (without spear grass) tend to have a low scorch height and intensity, although in extreme weather conditions, a heavy accumulation of litter can produce very hot fires.¹ Despite its major influence on annual fire, little is known about spear grass in terms of changes in its distribution and density over time. The role of native sorghum in Top End fire regimes needs more examination.

Spear grass on the march?

Some authors have alluded to an expansion in the distribution of spear grass over the past 70 to 90 years. They attribute this to disruption of traditional burning caused by the depopulation of the region by the 1890s and that without a resident and stable Aboriginal population, traditional burning largely came to an end. In its place were many decades of hot, late-season fires which were unchecked by traditional early burning.² There is evidence to suggest that this same scenario is now occurring in central Arnhem Land and the Kimberley.³

Anecdotal evidence from resident old timers also suggests that spear grass was less common 40 years or so ago than it is today.⁴

This apparent invasion of spear grass could be having profound and disturbing consequences. It may be promoting more ferocious and frequent fires that have been implicated in the thinning of the woodlands canopy (a finding reinforced by the Kapalga study). At the same time, this new fire regime may be promoting yet more spear grass.

In many parts of Australia, trees will invade grasslands if fire, especially traditional fire, is not maintained.⁵ For most of the 20th century, however, the opposite was

happening in the Kakadu region. That is, because of hot and frequent woodland fires, the tree-scape thinned and monsoon forests shrunk, apparently in favour of habitats dominated by spear grass.

I believe that in many parts of the Top End not subject to robust fire-management regimes, this negative scenario has significantly worsened since the mid-1980s. At this time the buffalo population suddenly and spectacularly crashed as a result of the National Brucellosis and Tuberculosis Eradication Campaign. Spear grass, which was probably thinned due to trampling by buffalo in the wet season, was apparently released from the constraints of bovine activity and increased in density throughout the region.

Thus, it is my view that from the mid 1980s, dry-season fires became hotter and possibly more frequent with a resulting impact on fire-sensitive ecological communities (such as lowland monsoon forests). However, this increase in fire frequency and, more particularly, temperature, has been subtle and not recognised by the casual observer.

Wet-season burning

The problem is clear enough and most people agree that fire in Top End spear grass landscapes occurs too frequently. A fire regime that burns the same areas one year out of two or three, curtails recruitment of many plant species and, on balance, has harmful ecological consequences. While a rise in spear grass density and distribution seems to be a factor here, it is generally agreed that this situation is also due to the high frequency of fires lit by land managers, and by careless tourists or arsonists.

What is difficult is finding agreement upon a management regime that will reduce this problem. It is clear to most Top End land managers that fire is an annual inevitability and they must plan for it. Unfortunately this backs managers into the 'I will burn it before someone else does' mentality. Right now this is, sadly, probably the best policy, even though it forces managers to burn a lot of country every year. As a result, some places get burnt every year. To turn this negative cycle around only one method seems to hold any promise: wet-season burning (WSB).

For the uninitiated, wet-season burning is used during December or January (in Kakadu) to clear a given area of spear grass. A fire at this time will kill newly germinated grass seedlings growing among the stalks of last season's parent grass. As sorghum is an annual, almost all seed in the soil will germinate in the early wet season. Following the fire, there will be little or no seed remaining and the affected area will be largely free of spear grass (and therefore fire) until the grass population re-asserts itself. This may take three to seven years. In the interim, any fire will effectively be a leaf litter fire.

WSB involves risk. To be effective, spear grass must be retained over a full dry season in order to supply enough fuel to carry fire in December/January. The risk occurs during the late dry season when areas, which have been saved for WSB, are ignited prematurely by lightning or (more commonly) arsonists.

Kapalga fire experiment

CSIRO's Kapalga Fire Experiment in Kakadu National Park covered more than 250 square kilometres, and tested the four major fire regimes common in the Top End. The fire treatments, which took place between 1990 and 1994, were an early dry season burn; three 'progressive' burns through the dry season; a late dry-season burn; and no fire.

Two experiments showed that many plants and animals showed little or no response at all to the varying fire treatments, indicating much savanna biota is highly resilient to fire. In many cases the greatest contrast was between burnt (whether early or late) and unburnt, indicating that fire frequency is a particularly important factor.

Much of the country is burnt every one or two years, but the Kapalga results indicate that many plants and animals require a fire frequency of at most once every three to five years.

Fire in the Tropical Savannas: the Kapalga Experiment (2003), Springer Science Publishing. Contact: Barbie McKaige, CSIRO TERC. Tel: (08) 8944 8411 Fax: (08) 8944 8444 E: <barbara.mckaige@csiro.au>

Kentia palms protected

An excellent case study of WSB in Kakadu was carried out near the West Alligator River crossing on the Arnhem Highway adjacent to Kapalga. Here, Top End endemic *Gronophyllum ramsayi* palms were roasted every year by hot spear grass fires. In 1993 Kakadu rangers subjected the area to a wet-season burn—a well-timed fire that rendered annual spear grass almost extinct locally. Without any further fire suppression the area remained untouched by wildfire until July 2000. Precisely what is called for—and all from one strategic wet-season burn.

One study on the effect of WSB on woodland floristics concluded that any benefit from WSB would be relatively short lived.⁶ But it has taken many years for rangers to refine WSB methods to achieve the best result. It is probable that the one-hectare area used by the floristics study was not large enough to achieve results such as those described for the *Gronophyllum* palms.

WSB is part of an intensively applied and sophisticated prescribed burning regime in Kakadu that is starting to reverse the impacts of spear grass. Evidence drawn from aerial photography and fire-monitoring plots, maintained by Kakadu rangers under the guidance of Dr Jeremy Russell-Smith, point to a cooling of fires and subsequent improvement in the general structure of the woodlands in many areas of the Park.

Conclusion

To return to the mystery of the surviving eucalypts, I would suggest it is because the various fire regimes

Continued page. 11

References

1. Dick Williams pers. comm.
2. Russell-Smith, J., Whitehead, P., Cook, G., Hoare, J. (in press) 'Response of Eucalyptus-dominated savanna to frequent fires: lessons from Munmarlary, 1973-1996' *Ecological Monographs*.
3. Ian Morris pers. comm.
4. The late Fred Pocock and Ian Morris pers comm.
5. Peter Stanton (1997) 'The role of fire: a conservation manager's perspective' in *Fire in the Management of Northern Australian Pastoral Lands*, Occasional Publication No. 8, pp. 48-49. Tropical Grassland Society of Australia.
6. Brennan (1997) 'The impact of wet season burning on herbaceous plants in savanna woodlands in the Jabiru area' in *Proceedings of Bushfire 97*, p 24. CSIRO.

The Tropical Savannas CRC is undertaking many new projects—covering a wide spectrum of land-management issues, from improving our understanding of the landscape to building practical knowledge systems. Each project is listed with its title, key points and project leader or leaders.

CRC builds on savanna knowledge

Landscape Ecology

Project 1.1.3 Soil biota, nutrients and water in savannas

- Determine the role of vegetation (including trees) and soil macro-invertebrates in the dynamics of water, nutrients, soil condition in savannas.
- Determine effects on landscape function from nutrient redistribution in the landscape by water and cattle.

Garry Cook CSIRO SE, Mike Webb CSIRO L&W

Project 1.1.4 Savanna carbon dynamics

- What are the stocks of carbon in savannas, and how is carbon distributed in the landscape?
- How does fire influence tree population structure, and the capacity of woodlands to store carbon.
- How do grazing, fire, clearing and climate change affect soil carbon stores in tropical savannas and how can carbon storage be better managed?

Dick Williams, CSIRO SE, NT, Chris Stokes CSIRO SE, Qld

Rivers

Project 1.2.1 Savanna Riparian Health

- Test and adapt concepts of how savanna riparian systems function
- Develop an understanding of, and indicators for, savanna riparian health in relation to natural and threatening processes
- Develop and test practical management options that maintain savanna riparian health and, if necessary, restore health
- Develop and disseminate best practice guidelines for managing riparian systems in savannas

Michael Douglas NTU, George Lukacs JCU

Fire & Weeds

Project 1.1.5 Grassy weeds in tropical savannas

- Identify and rank current and impending grassy weed threats to tropical savannas.
- Identify combinations of plant traits and environmental factors that favour establishment of weedy species.
- Assess the effects of grassy weeds on basic savanna function within the tropical savannas.
- Combine the information into risk assessments for grassy weeds in different north Australian landscapes
- Identify management strategies necessary to prevent the unwanted spread of weedy grasses.

Samantha Setterfield, NTU, Michael Douglas, NTU

Project 2.2.1 FIREPLAN: Fire management for the savanna community

- Assist regional fire-management projects across northern Australia and Eastern Indonesia.
- Promote patchy fire regimes in all tenures, but especially conservation lands, including demonstrations and

associated research activities.

- Promote development, wider use, and better delivery of appropriate information packages and technological aids (including satellite imagery) for improving savanna fire management.
- Promote post-graduate training opportunities.

Jeremy Russell-Smith, BFCNT

Conservation

Project 1.2.2 Mammal status in northern Australia

- Assess changes in the native mammal fauna at a representative set of sites across northern Australia;
- Assess the timing and rate of such change, and particularly whether the change is ongoing.
- Relate any change to possible causes.
- Provide management advice for landholders for the retention of biodiversity.

John Woinarski, NT DIPE

Project 2.2.3 Biodiversity monitoring

- Can widely used measures of landscape health or pasture condition also be used to predict trends in biodiversity, and which of these measures are most predictive for which components of biodiversity?
- Which components of biodiversity are most affected by a decline in landscape health?
- Consider how biodiversity condition relates to measures of landscape health and ecological sustainability, at various scales.
- Provide a framework and methods for monitoring biodiversity in the northern rangelands.

Alaric Fisher, NT DIPE

Sustainable Grazing

Project 2.1.1 Grazing Management Tools

- Customise methods of estimating long and short-term safe carrying capacity to areas across the tropical savannas and develop techniques in areas where current methods are inadequate.
- Develop a property-scale decision-support and risk management tool for grazing land management.
- Establish a scientific basis for the use of MODIS satellite data for timely paddock-scale monitoring.
- Promote the concept of safe carrying capacity within the wider context of grazing land management.

Neil MacDonald, NT DBIRD

Project 2.1.2 Biodiversity on grazing lands

- Develop a range of land-management scenarios to retain or recover biodiversity.
- Analyse inclusion of economic cost/benefits in conservation management.
- Monitor and evaluate the effectiveness of off-reserve

conservation management scenarios.

- Provide ways to account for biodiversity values in EMS for grazed lands.

Alaric Fisher, NT DIPE

Project 2.2.1 Beef Industry Best Practice Project

- Work with at least four beef industry regional groups to identify principles the groups consider most important for good natural resource management, and how to apply those principles in local contexts.
- Help the industry groups identify research needs for refining local best practice, and working with CRC researchers to meet these needs.
- Develop, test and modify Best Practice NRM for each region.
- Develop training and learning materials to help people implement Best Practice NRM.
- Work with the northern beef industry for Best Practice NRM to be recognised and incorporated in ways that are beneficial for industry and government

Stephen Tapsall, TS-CRC

Indigenous

Project 2.3.3 Indigenous Ecological Knowledge for Land Management

- Conserve Aboriginal knowledge of species and ecological processes.
- Identify, develop and implement processes to enable Aboriginal people to conserve and transfer knowledge of plants and animals.
- Apply Aboriginal ecological knowledge and resource management practices to inform co-management of land and sea country.
- Develop capacity for Aboriginal people to employ science in their land-management systems.
- Facilitate improved participation by Traditional Owners in statutory and other government processes for environmental planning and land-use decision-making.
- Identify Aboriginal agendas and priorities for collaborative research and development.

Tom Vigilante, KLC, Peter Cooke, NLC, Nick Smith, Balkanu Cape York Development Corporation

Project 4.4.2 Integrating research and Indigenous management

- Give voice to Indigenous land managers and owners across the tropical savannas and provide leadership support focused on the research and resourcing needs.
- Increase networking between indigenous owners and managers of land and sea across north Australia.
- Improve their communication and information exchange with outside agencies.

Joe Morrison, NAILSMA

Policy & Planning

Project 3.1.6 Regional planning in the Territory

- Document current governance arrangements for regional planning and management in the NT.
- Assess the needs and potentials in relation to integrated regional approaches to planning & development.
- Review conceptual foundations that underpin regional



Photos: Lindsay Hutley, Alex Kutt, Kathryn Thorburn

Research themes and key result areas

All CRC research projects are arranged into four themes that broadly address savanna land-management issues, with many links between themes and projects. Themes are:

- Landscape Ecology and Health
- Industry and Community Natural Resource Management
- Regional Planning and Management
- Human Capability Development

Key Result Areas

- Healthy landscapes— ecological, economic, and social
- Sustainable management systems
- Viable and socially desirable regions
- Productive and capable people

planning and development and identify frameworks and processes that meet the particular needs of the NT.

- Provide options for regional planning and management policy based on synthesis of these findings for the NT Government.

Geoff McDonald, CSIRO SE

Project 3.3.4 The Outback Atlas

- Develop and publish nationally significant integrated information products that provide key insights into the nature and function of outback regions.
- Provide access to information about those key characteristics of regions on a region-by-region basis.
- Develop a conceptual model which integrates CRC-funded research with expressions of community aspiration and identity across outback regions.
- Represent these social and cultural dimensions that are lacking from alternative atlas products.

Project Leader TBA

Project 3.3.5 Healthy Savanna Planning Systems

- Develop methods to monitor, evaluate and improve regional NRM policy and planning.
- Through collaboration with regional bodies and relevant agencies, apply these methods to planning in the savanna regions.

Continued Page 10

CRC builds savanna-wide knowledge

From Page 9

- Then evaluate the effectiveness of these methods in supporting adaptive management

Geoff McDonald, CSIRO SE

Project 3.3.6 Multiple use in savanna regions

- Undertake research with, and on behalf of, a range of savanna resource users to maximise their contributions to sustainable regional development.
- Develop methods of assessing the impact on savannas of key resource users and key drivers of change. Apply and disseminate these methods.
- Develop methods of analysing trade-offs and synergies between different savanna users. Apply and disseminate these methods.
- Design and evaluate incentives, institutional structures etc. to help maximise synergies between different resource users in savanna regions.

Romy Greiner, CSIRO SE

Project 3.3.7 Predicting Regional & Landscape dynamics

- Integrate the understanding of savanna landscapes and regions into a conceptual framework.
- Use this framework to develop predictive tools to explore landscape and regional dynamics to find management strategies that achieve the best possible outcomes given limited resources.
- Inform Government, R&D providers and other land management agencies in order to help them plan sustainable regional developments.

Adam Liedloff, Natalie Stoeckl, Martin Bell, CSIRO SE

Knowledge building

Project 3.1.3 Institutionalising ongoing participatory knowledge-building

- Help integrate CRC, and other, research-based knowledge around specific regions and issues so it can be used by land managers, planners and policy-makers.
- Conduct participatory knowledge-building activities to better integrate knowledge of regional systems, and make such knowledge more useful to stakeholders at both property and regional scales.
- Encourage adaptive management and monitoring in order to institutionalise knowledge-building.
- Present this integrated knowledge in user-friendly one-stop electronic and non-electronic forms.
- Contribute to PhD and postdoctoral training, with a focus on interdisciplinarity, knowledge creation and integration.

Ockie Bosch, UQ

Project 4.1.1 Higher Education

- Build capacity by providing stakeholders with relevant, current and excellent education programs focusing on tropical savannas management. These programs now include development of a professional doctorate.

Research agency abbreviations

BFCNT	Bushfires Council of the NT
CSIRO SE	CSIRO Sustainable Ecosystems
CSIRO LW	CSIRO Land & Water
JCU	James Cook University
KLC	Kimberley Land Council
NAILSMA	North Australian Indigenous Land & Sea Management Alliance
NLC	Northern Land Council
NT DBIRD	NT Dept. Business, Industry & Resource Development
NT DEET	NT Dept. Employment, Education & Training
NT DIPE	NT Dept. Infrastructure, Planning & Environment
NTU	Northern Territory University
UQ	University of Queensland

Other agencies involved in CRC research are the Qld Departments of Primary Industries, Natural Resources & Mines and the Environment Protection Agency; Meat & Livestock Australia; North Australia Beef Research Council; WA Departments of Agriculture, Conservation & Land Management; and Parks Australia.

- Provide ways in which research outcomes can be communicated directly with stakeholders in that research.
- Increase opportunities for collaboration and links between tertiary education institutions in and outside the region, and among the people working within them.

Penny Wurm, TS-CRC

Project 4.3.1 Communication

- Continue to build on, and support the network of people involved in land management and use in Australia's tropical savannas.
- Assist TS-CRC staff with communication activities.
- Provide this network of people and others with easy access to tropical savanna research and knowledge.
- Publicise TS-CRC findings and outputs.
- Raise awareness of the tropical savannas and its land management issues in the broader community.

Peter Jacklyn, TS-CRC

Project 4.3.2 Tropical Savannas Knowledge for Schools

- Develop an interactive website for schools (Transition to Year 12) to facilitate and enhance teaching and learning about the tropical savannas.
- Develop other useful teaching and learning resources.
- Foster and facilitate maximum uptake of these resources and learning through professional development for teachers.
- Explore the benefits of a northern educators' forum.

Julie Crough TS-CRC, Marisa Boscato NT DEET

For full descriptions of our research projects go to: savanna.ntu.edu.au/research/projects/projects.html

New beginning for managing traditional lands

The Wuthathi people, traditional owners of country around Shelburne Bay in Cape York, have developed a management framework for land and sea that aims to integrate both cultural and conservation values



Photo: Kerry Trapnell

White silica sands on Shelburne Bay. The Wuthathi traditional lands encompass savannas, dune systems and marine areas

The draft Land and Sea Management Framework aims to provide the basis for ongoing and effective management of the natural and cultural values of their region, including the islands. They hope to use it as a guide for the future and as part of ongoing negotiations over protection and management.

Funded through a Natural Heritage Trust grant, the Wuthathi people have put together the framework based on their aspirations and vision for the future of their country.

Arnold Wallis, chairman of the Wuthathi Land trust says the framework has two key management objectives: cultural and conservation values of the area and how to protect, maintain and integrate them.

“This framework is based on our peoples’ long-term understanding of how to look after country, a connection that has never wavered throughout the centuries.

“Our management framework is based on that understanding and reflected in those management objectives.”

The framework is underpinned by the two principles of culture and conservation and develops a management regime consistent with them. It includes the establishment of a Wuthathi Ranger base on the Thingkampu Islands (handed back to Wuthathi in 1997), and implementation of three management programs: Traditional Management

and Policy Development, Day to Day Management and Community Development. It also outlines a series of performance monitoring, research and development, and evaluation mechanisms designed to ensure that the programs achieve the management goals.

In this context, integration and the concept of partnerships are important. The framework outlines some of the possibilities for collaboration that could be developed to ensure a strong resource protection regime.

“While we reserve the right to maintain our views on how to manage country, the building of partnerships with other agencies, research bodies and groups will be crucial to achieve the goals in our framework,” he said.

“The ongoing protection of the beautiful savannas, dune systems and marine areas that distinguish our country is what we all want and can work together to achieve”.

As Gordon Pablo, Elder and long-time campaigner for the rights of the Wuthathi says

“Its our story place . . . I say we want no damage to come to that land because we Aboriginal people belong to that land.

“We like animals, trees, birds belong to that land. And we must respect that land.”

Contact: Mr Arnold Wallis, Chairman, Wuthathi Land Trust
Tel: (07) 4039 8 517 or Melissa Nursey-Bray Tel: 0409 720 873

Case for wet-season burning in Kakadu

From page 7

documented at Kapalga (this would probably apply to much of the centre of the Top End) were relatively recent and atypical. In other words, the Kapalga fire scenario, which may be exterminating the eucalypts, is simply not old enough for us to witness its inevitable and ultimate consequence. The decline in eucalypt recruitment and loss of nitrogen found at Kapalga was a product of relatively recent fires fuelled by spear grass. Arguably, this situation did not exist 200 years ago.

It is proposed here that the careful and sustained use of WSB in the woodlands across the Top End will provide the best means available to reduce both the intensity and

frequency of fires. I am unaware of any other practical method available which can be used on a landscape scale.

However, if wet-season burning is to be widely adopted it must be better understood. To date we know little about its broader ecological impacts. It is paradoxical that the main—if not only—ecological tool available to significantly manipulate fire on a landscape scale has attracted so little scientific attention. Such attention is needed to answer important, and as yet poorly understood, questions about wet-season burning.

More information: Greg Miles, Parks Australia North
Tel: (08) 8938 1100 Email: greg.miles@ea.gov.au

Method to scan the barcode of life

A NEW method to assess biodiversity could substantially speed up species identification, writes *New Scientist* magazine. A unique barcode written into the DNA of every animal could let taxonomists identify every animal on the planet with unprecedented ease, says Dr Paul Hebert of the University of Guelph in Ontario.

The code being used is written on a mitochondrial gene, found in all aerobic life, that codes for a protein called cytochrome c oxidase I. The new method should make life easier for scientists trying to assess biodiversity. Conventional taxonomy demands expert anatomical comparisons of complete animal specimens. It has taken 250 years to classify about 1 million animal species, about 10 per cent of the global total, according to Dr Hebert.

Using the new technique, Dr Hebert has already identified some 500 species of moths and butterflies, and plans to test another 500 by the end of the year. He says making a global inventory of animal life would cost up to \$2.5 billion and take no more than 20 years.

From *New Scientist*, 22 March 2003

<www.newscientist.com/hottopics/biodiversity>

Barcode of Life Website: <www.co1bank.uoguelph.ca/>



Photos: Alex Kutt, Alaric Fisher, Dermot Wait, Greg Calvert

Marine team uncovers Gulf reef

A TEAM of marine explorers discovered a new coral reef just off the Gulf of Carpentaria, questioning the theory that hard coral reefs could not develop in warm waters such as those found in the Gulf.

Dr Peter Harris, expedition chief scientist from Geoscience Australia said the reef, viewed through their echo sounder, looked like a lost city, with flat top and sheer sides. The expedition also found two other types of reef at about 30 metres deep.

“The 100 sq km living reef supports a thriving array of sea-life including soft sponges, corals and shellfish,” said Dr Harris. “Based on our studies, we expect the reefs are far more widespread in the Gulf than had previously been suspected. It seems as though they have existed in the Gulf at different times over the last 100,000 years.”

The expedition from Geoscience Australia planned to find out about sediment movement from rivers into the Gulf and how they move into deeper waters. Instead, they found much of the sediment seen moving in the Gulf, from satellite images, was in fact ancient sands and silts, rather than new sediments from nearby river systems.

Go to: Geoscience Australia: <www.ga.gov.au/>

NT Greenhouse strategy

A new Greenhouse Unit within the Department of Infrastructure, Planning & Environment is now developing a greenhouse strategy for the Northern Territory.

In 2000 the NT contributed 2.7 per cent of Australia’s total greenhouse emissions, which is about 14.4 million tonnes of carbon dioxide or equivalent gases.

The NT has the highest emissions per person of any state or territory and nearly three times the national average of about 27 tonnes per capita. According to the report, the high per capita emissions were partly because of its small population base (about 200,000) extensive savanna burning and high per capita energy consumption much of which is due to industry.

About 47 per cent of emissions are caused from bushfires and savanna burning, leaving bushfire management as a good opportunity for the NT to reduce greenhouse emissions.

A discussion paper is available, ‘Developing a Strategy for Northern Territory Greenhouse Action’, which outlines greenhouse issues relevant to the NT and provides a basis to determine priorities for effective greenhouse action.

Go to: <www.lpe.nt.gov.au/enviro/greenhouse/>

Greenhouse discussion paper: <www.lpe.nt.gov.au/enviro/greenhouse/documents/NTGreenhouseActionStrategy.pdf>

Map identifies culture and values

A MAP identifying values, uses and Aboriginal cultural importance of the lower Ord River area is now available. It shows fishing, pastoralism, irrigation, boating, camping and tourism. Traditional owners and the Mirima Language Centre have enabled the Miriung place names of many features along the lower Ord to be included on the map.

The ‘Lower Ord Waterway Values Map’ was developed by the WA Department of Environment and the Mirima Dawang Woorlab-gerring Language and Culture Centre, in consultation with several interest groups, stakeholders and government agencies.

It is the first time this information has been collated and presented to the general public. A signage project and an information shelter are already being planned as the next project to follow on from the map.

From *The Kimberley Echo*, July 2, 2003

Contact: Jane Rapkins, Kimberley Rivercare Officer

Tel: (08) 9168 1082 Keeley Palmer, Mirima Dawang Woorlab-gerring Language and Culture Centre Tel: (08) 9169 1029

Drought CRC mooted

A NATIONAL Drought CRC may be on the agenda, after the Queensland Government committed \$50,000 to assess its feasibility. The genesis for the CRC, which would focus on drought and climate variability, came from a scientific forum convened in April by Dr Roger Stone, the State

Government's senior climatologist and director of the Queensland Centre for Climate Applications.

The National Drought Forum marked the first time in almost 13 years that scientists had come together from across Australia to present research focused directly on drought issues.

Attendees were asked to focus on the value of a more formal collaboration between the scientists across the varying fields of expertise.

The state government is aiming to nominate the centre for the next CRC round in March next year.

Online minerals' atlas

INFORMATION about Australia's minerals industry is now open to the world through an online National Mines Atlas. The Atlas has information about Australian mineral resources and spatial data on mines and processing centres.

The National Atlas of Mineral Resources, Mines and Processing Centres is a joint initiative of Geoscience Australia, the Regional Minerals Program administered by the Dept. Industry, Tourism and Resources, and the Minerals Council of Australia. The Atlas covers more than 7 million square kilometres with spatial information, search, query and online map-making for mines and mineral deposits. It also has a mosaic of detailed satellite scenes for most of Australia and the ability to link mines, processing facilities and ports in Atlas maps to other websites.

Go to: <www.nationalminesatlas.gov.au>

WA Govt signs NRM agreement

THE West Australian Government and the state's six Regional Natural Resource Management groups have

signed an environmental Memorandum of Understanding designed to better integrate community and Government efforts for biodiversity conservation and sustainable land-use practices.

The agreement formalises working relationships between the State and the regional NRM Groups and will provide a more integrated approach to issues such as funding arrangements under the Commonwealth's Natural Heritage Trust and the National Action Plan for Salinity and Water Quality.

<www.calm.wa.gov.au/>

Bug to chomp bellyache bush

CHARTERS Towers' Tropical Weeds Research Centre has taken delivery of its first shipment of *Agonosoma trilineatum*, the bellyache bush jewel bug. Once sufficient numbers of the insects have been reared from the initial colony, controlled releases will take place at specific sites along the Burdekin River where Queensland's largest infestation of bellyache bush is located. The bug originated in South America, and feeds exclusively on flowers and fruits of the bellyache bush.

Contact Cathy Lockett, NR&M Entomologist, Tel: (07) 4787 0613

Timor Gas deal

CONSTRUCTION of the \$1.6 billion ConocoPhillips LNG plant near Darwin began in late June. The \$3 billion project will bring gas onshore from the Bayu-Undan oil and gas field in the Timor Sea. The deal follows the signing of the Timor Sea Treaty in March between the East Timorese and Australian Governments.

Go to: <www.otd.nt.gov.au/dcm/otd/oil_gas/>

Websites

Masters of climate

THIS site promotes climate information tools and has case studies on how land managers use climate information to manage resources. The case studies are part of the 'Masters of the Climate' project developed by the Climate Variability in Agriculture R&D Program.

<www.cvap.gov.au/mastersofthecolimate/>

Internet library

FARMING communities in rural and regional Queensland can access an electronic library at Queensland's Department of Primary Industries' website. There is also a service (for Queensland residents only) which combines Australia and New Zealand magazines, newspapers and newswires, reference books, and company information.

<www.dpi.qld.gov.au/>

Bushfires and hydrology

CATCHMENT Hydrology CRC has set up a new site focusing on the hydrological impacts of fire. They invite contributions and comments.

<www.catchment.crc.org.au/bushfires>

<david.perry@eng.monash.edu.au>

Collaboration gateway

AUSTRALIAN Collaboration is a collaboration of peak national community organisations which aims to build a sustainable relationship between Australia's social, cultural, environmental and economic policies and activities. Its four main roles are education, advocacy, forum and a think tank.

<www.australiancollaboration.com.au/>

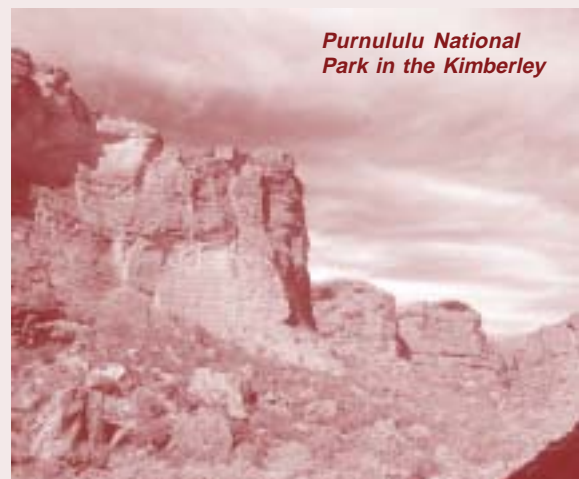
Park wins world heritage listing

PURNULULU National Park in the East Kimberley has been placed on the World Heritage List, Australia's 15th such listing and Western Australia's second. The park includes the distinctive banded orange and grey sandstone towers of the Bungle Bungle range, spectacular domes, gorges and wet season waterfalls as well as many significant Aboriginal art and burial sites.

The United Nations Educational, Scientific and Cultural Organisation's World Heritage Committee made the announcement at a meeting in Paris at the end of June.

Both the federal and state governments supported the park's nomination for the world listing.

Purnululu National Park Heritage information <www.ea.gov.au/heritage/awh/purnululu>



Purnululu National Park in the Kimberley

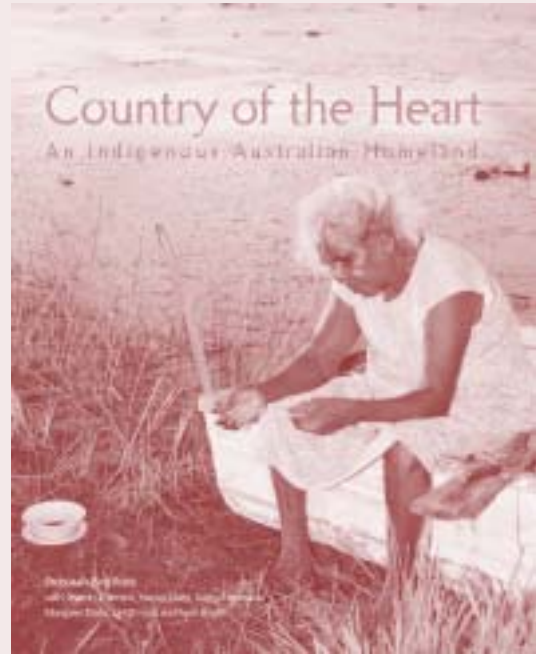
Photo: Colin Totterdell, courtesy of Environment Australia

Journey to the heart

'My strength / The strength of that land /
You can feel it in yourself / you belong there.
It's your country, your dust, your place /
You remember the old people.
The white eagles always greet me/ It's home.
Safety and security / You see the birds, you see the
country / and your senses come back to you /
You know what to do and where to go.'
MakMak people (White Eagle people)

The clan of the white-breasted sea-eagle, or MakMak people's homeland lies largely within the Wagait floodplains, about 100km south-west of Darwin. *Country of the Heart* takes you on a journey to this homeland where you will meet five extraordinary MakMak women: Nancy Daiyi, Kathy Deveraux, Margaret Daiyi, April Bright and Linda Ford. Their strong voices, stories and knowledge of their country are vividly captured through anthropologist Deborah Bird Rose's writing and Sharon D'Amico's photography.

Deborah, in collaboration with the MakMak clan and others, has chosen an innovative way of communicating in the book. She uses multiple layers, text and a photo essay to portray



"a living system that keeps circling back on itself" as well as the abundance and quality of life in an Indigenous homeland.

ISBN: 0 85575 396 X; RRP: \$45.95 204 pp. Aboriginal Studies Press, Available in all good bookshops.

Prime time for land-management information

MORE than 5800 notes and fact sheets on natural resource management and agriculture: it's the latest *Prime Notes* CD-ROM from the Queensland Department of Primary Industries. Information is from a range of research and primary industry bodies, including 42 information sheets on sustainable land management in the tropical savannas from the TS-CRC. As well as general information on the savannas, the CRC sheets include fire and weed management in the Northern Territory, Queensland and the Kimberley in Western Australia. The CD is compatible with both PCs and Macs. Cost: \$49.50.

Contact: QDPI Tel: 13 25 23 or (07) 3404 6999
TS-CRC: <savanna.ntu.edu.au/publications/brochures/savanna_prime_notes.html>

Tourism handbook seeks industry solutions

The *Australian Regional Tourism Handbook: Industry Solutions 2002*, an outcome of the Australian Regional Tourism Convention held last year in Longreach, addresses four key topics: quality visitor experiences; managing total quality product; managing communication; and raising awareness of the value of tourism. Edited by Ian Kelly, the handbook also includes case studies, contacts and fresh ideas.

Published by CRC for Sustainable Tourism Pty Ltd, 2003.
120pp. Free Electronic Download
<www.crctourism.com.au/bookshop/>

Grasses make their mark

THE first results of national research on Australia's 1300 grass species is now available in both book and CD format.

The Queensland Herbarium has released *Flora of Australia, Volume 43, Poaceae 1: Introduction and Atlas* that provides, for the first time in more than a century, an overview of Australia's grass species and a CD-ROM, AusGrass, that provides a user-friendly guide for their identification.

Go to: <www.ea.gov.au/biodiversity/abrs/publications/flora-of-australia/vol43.html>

Green directory points you in the right direction

THE Third Edition of the *Australian Environment Directory* is a 440-page guide to the environment sector at federal and state levels, allowing readers to identify the departments and agencies responsible for programs and relevant legislation. Programs include air quality, catchment management, greenhouse, renewable energy, salinity, land, coastal and marine management. More than 700 research centres and bodies, higher education facilities, organisations and associations are listed.

Cost: \$90; Contact Hallmark Editions
Tel: (03) 9530 8900 Fax: (03) 9530 8911
Email: <ruth@halledit.com.au> Web: <www.halledit.com.au>

Bush magazine provides seeds for thought

THINKING BUSH magazine is a free, occasional magazine looking at new ways of planning, managing and thinking about the Australian bush. It contains articles, perspectives, updates to the latest findings, and interesting facts. Free online and hard copy editions are available from Land & Water Australia.

Go to: <www.lwa.gov.au/products.asp> <subscribe@lwa.gov.au>
CanPrint Tel: 1800 776 616 Email: <lwa@canprint.com.au>

In Search of Sustainability: Online Conference February–October, online

Papers (1500 words) are invited for an internet conference being held from February to October. The aim is to exchange ideas on the long-term sustainability of Australia. Different themes are addressed each month. In November a face-to-face review will be held in Canberra.

Web: <www.isosconference.org.au/>

July

MODSIM International Congress on Modelling and Simulation; 14–17 July, Townsville

Venue: Jupiters Hotel and Casino, Townsville

Theme: Integrative Modelling of Biophysical, Social and Economic Systems for Resource Management Solutions.

MODSIM is the biennial conference of the Modelling and Simulation Society of Australia and New Zealand.

Contact: Convenor David Post

Tel: 07 4753 8500 **Fax:** 07 4753 8600

Email: <David.Post@csiro.au>

Web: <mssanz.cres.anu.edu.au/modsim2003.html>

VII International Rangelands Congress 26 July–1 August, Durban, South Africa

Venue: International Convention Centre, Durban

Theme: Rangelands in the New Millennium

The conference involves 19 theme sessions and eight professional workshops. Themes include biodiversity conservation; vegetation change; global climate change; managing grazing pressure and developing policy.

Contact: Sue Bumpsteed Conferences Ltd

Tel: +27 31 303 2480 **Fax:** +27 31 312 9441

Email: <delegates@sbconferences.co.za>

Web: <www.ru.ac.za/institutes/rgi/irc2003/IRC2003.htm>

August

Farming at the Edge: International Farm Management Congress 10–15 August, Perth

Venue: Burswood Resort and Convention Centre, Perth

The theme, 'Farming at the Edge', highlights issues facing much of Australia and particularly Western Australian agriculture. Issues include application of new technology in extensive systems, risk management, sustainability and community development.

Postal: PO Box 749, Wembley, WA, 6913

Tel: (08) 9387 1488 **Fax:** (08) 9387 1499

Email: <info@eventedge.com.au>

Web: <www.ifma14.com/>

September

Australian Regional Tourism Convention 2003 3–6 September, Hobart, Tasmania

Venue: Hotel Grand Chancellor, Hobart

Themes: Business and community development; networks and clusters, each linked to an off-site case study.

Contact: Australian Regional Tourism Convention Organisers

Postal: Centre for Regional Tourism Research

Southern Cross University, PO Box 157 Lismore NSW 2480

Tel: (02) 6620 3503 **Fax:** (02) 6620 3565

Email: crtr@scu.edu.au

Web: <crtr.crctourism.com.au/CONVENTION/ARTC03/ARTC03.htm>

International Conference on Tropical Savannas & Seasonally Dry Forests 14–20 September, Edinburgh, UK

Venue: Royal Botanic Garden Conference Centre, Edinburgh

The conference will bring together leading researchers in major areas of concern in savanna and dry forests throughout the tropics. Principal themes are plant and animal biodiversity; palaeoecology and environmental change; vegetation and environment and human ecology and development.

Contact: Edinburgh Centre for Tropical Forests

Pentlands Science Park, Bush Loan, Penicuik, Edinburgh EH26 OPH, United Kingdom

Tel: 44 (0) 131 440 0400 **Fax:** 44 (0) 131 440 4141

Email: <savanna-conference@ectf-ed.org.uk>

Web: <www.geo.ed.ac.uk/bblza/sav2003/>

34th Australian Entomological Society / 6th Invertebrate Biodiversity & Conservation Conference

28 September–3 October, Corus Hotel, Hobart

The conference theme, Invertebrates and Environmental Change, encompasses the management of invertebrates from natural to agro-ecosystems and processes of environmental change from a global to a local level. Topics may include conservation management; ecology and population dynamics; special environments; invasive species/quarantine; habitat fragmentation; integrated pest management and fire management

Contact: Conference Secretariat, Conference Design

Postal: PO Box 342, Sandy Bay Tasmania 7006

Tel: (03) 6224 3773 **Fax:** (03) 6224 3774

Web: <www.cdesign.com.au/entomology>

9th PUR\$L National conference 'Salinity under the sun—investing in prevention and rehabilitation of salinity in Australia' 29 September–2 October, Yeppoon

Venue: Rydges Capricorn Resort, Yeppoon

PUR\$L (Productive Use and Rehabilitation of Saline Land) is a collaboration across all Australian states that promotes the positive use of salt land for profitable industries in agriculture, forestry, horticulture, aquaculture, minerals and energy.

Contact: Conference Secretariat, Eventcorp

Postal: PO Box 5718, West End Qld 4101

Tel: (07) 3846 5858 **Email:** <pursl@eventcorp.com.au>

October

3rd International Wildland Fire Conference & Exhibition 3–6 October, Sydney

Venue: Sydney Convention & Exhibition Centre

The conference will present a range of contemporary and future fire-management issues relevant to nations and organisations and enhance global and regional networks of fire management professionals, industry leaders and policy makers.

Global Wildland Summit, 8 October

This summit follows the conference and will bring the world's leading wildland fire-management professionals and practitioners together.

Contact: 3rd International Wildland Fire Conference and Exhibition Managers

Postal: GPO Box 128, Sydney, NSW, 2001

Tel: (02) 9248 0800 **Fax:** (02) 9248 0894

Email: <wildlandfire03@tourhosts.com.au>

Web: <www.wildlandfire03.com/>

November

Invasive Plants in Natural Managed Systems: Linking Science and Management

3–7 November, Florida, USA

Venue: Wyndham Bonaventure Resort, Florida

Plenary Session Themes include: Prevention, Early Detection and Rapid Response; Control, Management and Restoration; Policy, Science and Management; Synthesis and Global Issues. Topics include: biological weed control; managing invasive species; restoring desired plant communities; ecological impacts of invasive plants; global change and invasive plants; mathematical models in understanding

and controlling invasive species; predicting invasiveness and preventing entry.

Email: <ipinams@esa.org>

Web: <www.esa.org/ipinams-emapi7/>

December

3rd International Wildlife Management Congress

1–5 December, Christchurch, New Zealand

Venue: University of Canterbury, Christchurch

The congress will have a strong Pacific and southern hemisphere flavour with the main focus on contrasting wildlife management perspectives.

Contact: Wildlife Congress Secretariat, Centre for Continuing Education

Postal: University of Canterbury, Private Bag 4800 Christchurch, New Zealand

Tel: 64 3 364 2915 **Fax:** 64 3 364 2507

Email: <wildlife@cont.canterbury.ac.nz>

Web: <www.conference.canterbury.ac.nz/wildlife2003/wildlife.html#invitation/>

ESA Ecology 2003

8–10 December, Armidale

Venue: University of New England

Symposia for ESA Ecology 2003 include: ecological functions and values of native vegetation in managed landscapes; disturbance regimes; revegetation schemes; ecology of salinity; profitable and biodiverse production systems; sustainable woodlands; ecological connectivity at landscape, regional and continental scales; ecological thresholds in biodiversity conservation and riverine ecosystems: a multidisciplinary perspective.

Contact: Conference Secretariat,

Postal: University of New England

Armidale NSW Australia 2351

Tel: (02) 6773 2154 **Fax:** (02) 6773 3766

Email: confco@metz.une.edu.au

Web: <www.ecolsoc.org.au/conferences.html>

OUR STAKEHOLDERS



ABORIGINAL COMMUNITIES



PASTORALISM



TOURISM



CONSERVATION



DEFENCE



MINING

Savanna Links is edited and produced by the Tropical Savannas CRC. Articles can be used with permission. For story ideas or contributions, please contact us. Views expressed in *Savanna Links* are not necessarily those of the TS-CRC.

Head Office: Tropical Savannas CRC
Northern Territory University
DARWIN NT 0909
Tel: (08) 8946 6834 **Fax:** (08) 8946 7107
Email: <savanna@ntu.edu.au>
Web: <savanna.ntu.edu.au>

Editor: Kate O'Donnell **Writers:** Julie Crough, Kate O'Donnell and Peter Jacklyn. Non-original material from a wide range of sources.

Kate O'Donnell
<kate.odonnell@jcu.edu.au>
Tel: 07 4781 5967 **Fax:** 07 4781 5515
Tropical Savannas CRC, James Cook University Townsville Qld 4811
Julie Crough
<julie.crough@ntu.edu.au>

Tel: 08 8946 6754 **Fax:** 08 8946 7107
Tropical Savannas CRC, Northern Territory University, Darwin NT 0909
Peter Jacklyn
<peter.jacklyn@ntu.edu.au>
Tel: 08 8946 6285 **Fax:** 08 8946 7107
Tropical Savannas CRC, Northern Territory University, Darwin NT 0909

Front & back cover design
Wwd <www.wwd.net.au>
Printed by PMP Print Townsville

Read *Savanna Links* online at <savanna.ntu.edu.au/publications/savanna_links_all.html>