

It is envisaged that, in the next 5 years, the ILC will run approximately 80 000 head of cattle on indigenous-held land and create significant economic, employment and training opportunities for indigenous people in Australia's rangelands. While very considerable change is afoot in the rangelands in terms of re-engaging indigenous people in pastoralism, it is clear that the appropriate level of commitment and capacity does not yet exist to ensure the ongoing success of indigenous pastoral businesses across Australia. The current political climate leaves little room for error, with its significant and hard-edged focus on improved economic outcomes as a key to solving symptoms of dysfunction, disconnectedness and a reduced capacity to participate in socioeconomic systems the rest of us take for granted. It is clearly a matter of small steps leading to larger outcomes, and the transmission of examples of success of some into the practice of others performing less successfully.

13.28.5

Can the commercial value of wildlife enable more sustainable production processes? Pp. 432–436, G. R. Wilson (Rangelands and Wildlife Program, Rural Industries Research and Development Corporation, Canberra, ACT 2600, Australia. Email: georgewilson@awt.com.au).

Sustainable Wildlife Enterprises trials are an initiative of the Rural Industries Research and Development Corporation. They seek to integrate Australia's native wildlife into existing agricultural enterprises. A strategic plan has been prepared and implementation requires the testing of alternative production systems. Nature-based tourism and commercial utilization of native plants and animals, assessed at trail sites in western New South Wales and Queensland, are being used to determine whether assigning a value to these resources can provide an incentive for landholders to protect and restore wildlife habitat, landscapes and biodiversity, and therefore bring about positive changes in landscape health and agricultural sustainability.

TECHNIQUES & METHODOLOGY

16.18

A design for a lightweight, collapsible and inexpensive sampling frame for ecological research and monitoring. Mark Wapstra,^{1,3}

Bill Brown² and Sarah Munks¹ (¹Forest Practices Authority, 30 Patrick Street, Hobart, Tas. 7000, Australia; ²Threatened Species Section, Department of Primary Industries and Water, 134 Macquarie Street, Hobart, Tas. 7000, Australia; ³current address: ECOTas, 28 Suncrest Avenue, Lenah Valley, Tas. 7008, Australia. Email: mark@ecotas.com.au).

Key words: *collapsible, lightweight, monitoring equipment, sampling quadrat.*

Introduction. It is well recognized that on-ground restorationists can often balk at undertaking monitoring prior to and after treatment, for a range of reasons including unfamiliarity with quadrat use and low availability and



Figure 1. Construction of the join.

awkwardness of quadrat frames. As part of a long-term study of leaf-litter-dwelling Stag Beetles being undertaken by the Forest Practices Authority in Tasmania, we needed a 1-m² sampling frame that could be easily carried through dense vegetation and over relatively long distances. At the time, all we had available were heavy metal frames, which were difficult to transport. While the following design was constructed to meet the specific purpose referred to, it has since been used for a number of other applications. We describe the design here for ecologists or restoration practitioners for whom transportability and ease of use may be important considerations.

Design. Materials and methods. The quadrat frame is made from fibreglass or carbon-fibre rods of about 4–5 mm diameter (the type of material used for kite making). The frame pieces are joined using short lengths (c. 4 cm) of soft rubber or vinyl tubing that fits tightly over the fibreglass rod (Fig. 1) but is sufficiently flexible to allow the frame to be collapsed on itself (and be held together for transport by a rubber band).

The rod material is usually black but can be obtained in white or natural. We strongly recommend construction from more visible colours to prevent misplacing the units in dense vegetation. Alternatively, attaching a few short lengths of fluorescent tape works equally well. Fibreglass rods can be obtained from specialty stores (such as fibreglass suppliers, marine equipment manufacturers) or can often be purchased in pre-cut lengths from model-making or toy shops. Prices range depending on the strength (solid fibreglass is around \$A4/m for 3-mm rod to \$A8/m for 8-mm rod; we recommend 4-mm solid fibreglass rod; hollow carbon fibre is



Figure 2. (a) Folded (carrying) position; (b) unfolding; (c) in use surveying leaf litter for invertebrates (note the colour flagging tape).

close to double the price but we do not think the extra strength is warranted).

If the fit of the joining tubing is too loose, contact adhesive will secure the join. The quadrat frame works best if the joining material has no 'memory' of deformation so that the folded quadrat 'flips' into a neat square shape. The use of appropriate joining material is important to ensure the size of the sample area created by the frame is consistent, and the need for a corner brace to force an exact square is negated. Tubing suitable for joining the rods can be obtained from model-making shops (as spare parts for kites) or from specialty hose/fitting suppliers. Cost is variable but is in the order of \$A4/m.

Practical application. We have used the quadrat frame in the field (Fig. 2) in a range of situations including assessing the abundance of ground-dwelling, flightless stag beetles, monitoring the density of burrowing crayfish burrows and searching for cryptic, subterranean plants. In all cases, the 1-m² size was ideal because it could be easily transported to remote sampling sites and could be placed

over low shrubs, logs and other obstacles to allow unbiased sampling. In the case of monitoring the density of crayfish chimneys, the flexible frame was ideal because use of traditional stiff frames is awkward in the habitat occupied by these species, from both a placement perspective (due to dense cover of ground ferns) and an accessibility perspective (steep banks above muddy creeks). The lightweight and inexpensive nature of the frames also allowed us to take multiple frames, allowing many people to survey at the one site in an efficient manner.

Additional circumstances where 1-m quadrats are useful include grassland sampling (where small-scale sampling of high-diversity vegetation is undertaken) and sampling of seedling regeneration after restoration treatments.

We recommend this simple, flexible, inexpensive, lightweight and collapsible quadrat frame to ecological researchers and student organizations either as a replacement for the traditional heavy, inflexible quadrat frame or as a supplement to the traditional frame where a more flexible unit is desired.

WEEDS & FERAL ANIMAL ISSUES & SOLUTIONS**20.27**

FROM: Proceedings of the 15th Australian Weeds Conference. eds C. Preston, J. H. Watts and N. D. Crossman (Weed Management Society of South Australia, Adelaide, SA). (This proceedings contains 256 papers on a range of topics. Copies can be purchased from R. G. and F. J. Richardson, PO Box 42, Meredith, Vic. 3333, Australia. Tel./ Fax: (+61) 03 5286 1533; Email: richardson@weedinfo.com.au).

20.27.1

Invasive alien species: Are we up to the challenge? Pp. 1–5, H. A. Mooney,¹ E. S. Zavaleta² and R. J. Hobbs³ (¹Department of Biological Sciences, Stanford University, Stanford, CA 94305, USA; ²Environmental Studies Department, University of California, Santa Cruz, CA 95064, USA; ³Murdoch University School of Environmental Science, Murdoch, WA 6105, Australia.)

During the past 50 years massive biotic exchange has caused considerable disruption in many of the world's ecosystems because of the inordinate success of invasive alien species; and models predict that these trends will continue. Leafy invasive species are also likely to be favoured by increased synthetic production of nitrogen fertilizers; with N deposition predicted to double in amount by 2050. Climate change is also likely to favour some invasives due not only to the increasing carbon dioxide in the environment but also by range shifts poleward; and changes in climatic extremes (hurricanes and flooding) which will also increase opportunities for invasive species.

It is clear that we have a major global crisis at present and with future trends showing increases in the intensity of the major drivers of the success of invasives the problem is only going to get worse. This paper briefly outlines the current status of international efforts to mount action programs, but it points out that, as the forces of change are extraordinarily strong and the mechanisms for concerted global actions are weak, more radical effort is needed to focus on early warning and early action. The paper concludes with a call for national centres for invasive species that would overcome overlapping mandates of agencies at the national, state and local levels. Such national centres would act like a national centre for disease control that interacts with an international action body mandated to provide early warning and the means for early action just as it is in emerging human diseases.

20.27.2

Seeing the forest through the weeds: Frugivorous birds and rainforest regeneration in subtropical regrowth dominated by Camphor Laurel. Pp. 73–76, Wendy Neilan,¹ Carla Catterall,² John Kanowski² and Stephen McKenna² (¹Byron Shire Council, PO Box 219, Mullumbimby, NSW 2482, Australia; ²Centre for Innovative Conservation Strategies, Griffith University, Nathan, Qld 4111, Australia).

This paper reports on a project that examined the potential for rainforest regeneration in Camphor Laurel (*Cinnamomum camphora*) regrowth in north-east New South Wales by surveying the frugivorous bird assemblage and rainforest plant recruitment in 24 patches of Camphor Laurel regrowth. Most frugivorous birds associated with subtropical rainforest were recorded and almost half of these (16 of 34) species were considered potential dispersers of rainforest plants. Of the 208 plant species recruited to the Camphor Laurel patches, 87%

were of local rainforest origin. Comparisons between the composition of the adult and recruit tree layers suggest birds have largely facilitated recruitment and later successional species are increasing in abundance over time. With careful and strategic management, regrowth dominated by fleshy-fruited exotics may provide opportunities for broadscale reforestation of degraded rainforest landscapes.

20.27.3

Weed proofing Australia: A way forward on invasive garden plants. Pp. 91–94, Andreas Glanznig (WWF-Australia, GPO Box 528, NSW 2001, Australia)

Escaped invasive garden plants are the major source of weeds in Australia. This paper provides substantial detail on a 10-point policy package that can enable both the garden industry and Australian communities to play a significant and positive role in weed proofing Australia. A 10-point policy package includes the following actions: (i) close Australia's front door to new weeds by fulfilling the commitment to subject new plant species to a weed risk assessment; (ii) give garden industry and communities certainty about weed status of garden plants by confirming a national list of invasive plant species under which State, regional and local lists are nested; (iii) better understand the extent and risk from continued trade in invasive garden plants; (iv) build knowledge of sterile garden plants and dynamics of invasiveness; (v) build garden industry understanding about risks and costs of invasive species and capacity for positive action; (vi) mobilize the garden industry to respond positively to the invasive species challenge; (vii) establish a streamlined national regulatory framework to create a level playing field (voluntary approaches alone do not work); (viii) phase out supply and trade of high-risk invasive plants nationally, particularly those that are not yet naturalized or widespread; (ix) increase product demand for low-risk garden plants; and (x) mobilize communities to search and destroy new infestations of escaped invasive garden plants. Victoria already has a world leading 'Weed Alert and Rapid Response System' in place. This needs to be rolled out nationally to encourage communities to take part in surveillance efforts. Garden centres could also promote local surveillance efforts.

20.27.4

A national protocol for postborder weed risk management. P. 57, J. G. Virtue^{1,3} and F. D. Panetta^{2,3} (¹Department of Water, Land and Biodiversity Conservation, GPO Box 2834, Adelaide, SA 5001, Australia; ²Department of Natural Resources, Mines and Water, Alan Fletcher Research Station, PO Box 36, Sherwood, Qld 4075, Australia; ³Cooperative Research Centre for Australian Weed Management).

The National Post-border Weed Risk Management Protocol has been developed to foster the use, standardization and further development of decision support systems for prioritizing weed species for management at the regional, State/Territory and national levels. The Protocol is a systematic process of six stages. Stage 1 is establishing the context; Stage 2 is identifying the weed risk candidates; Stage 3 is analysing and evaluating weed risks; Stage 4 is analysing and evaluating feasibility of coordinated control; Stage 5 is determining weed management priorities; and, Stage 6 is implementing weed management actions based on the priorities determined above. Monitoring and reviewing the process are essential to measuring the effectiveness of each stage and to allow for improvement and reassessment as new information about weed species and/or techniques arise. The protocol has been published jointly by Standards Australia and the Cooperative Research Centre for Australian Weed Management, and is available online at www.standards.com.au.

20.27.5

'Turn the tap off before you mop up the spill': Exploring a permitted-list approach to regulations over the sale and interstate movement of potentially invasive plants in the States and Territories of Australia. Pp. 95–98, Steve Csurhes,¹ Rod Randall,² Christian Goninon,³ Alice Beilby,⁴ Stephen Johnson⁵ and John E. Weiss⁶ (¹Department of Natural Resources, Mines and Water, GPO Box 2454, Brisbane, Qld 4001, Australia; ²Department of Agriculture and CRC for Australian Weed Management, Locked Bag 4, Bentley DC, WA 6983, Australia; ³Department of Primary Industries, Water and Environment, GPO Box 44, Hobart, Tas. 7001, Australia; ⁴Department of Natural Resources, Environment and the Arts, PO Box 30, Palmerston, NT 0831, Australia; ⁵Department of Primary Industries, Locked Bag 21, Orange, NSW 2800, Australia; ⁶Department of Primary Industries and CRC for Australian Weed Management, PO Box 48, Frankston, Vic. 3199, Australia).

By the end of 2006, Australia will have a comprehensive species-level permitted-list system for plants in place at the national quarantine border. The policy challenge now is to consider the need for state-level postborder controls that restrict the sale of invasive plant species that evade the 'quarantine net'. Of particular concern are species that might be smuggled into Australia in the future. In most States and Territories, restrictions on the sale and interstate movement of potentially invasive plants take the form of 'prohibited-lists' of species, with all non-listed species being unrestricted and freely traded. While a prohibited-list approach has merit, evidence is emerging that it may be too slow to respond to the thousands of potentially invasive plant species currently being sold for various purposes, mainly as garden ornamentals, in Australia. An alternative approach may be to list non-invasive plant species that can be legally sold, with all remaining non-listed plant taxa from around the world automatically prohibited until they can be formally weed risk assessed – a so-called 'permitted-list approach'. A permitted-list may offer a more efficient and effective way of prohibiting all un-assessed plant species and could generate greater savings by preventing naturalization of more species than a prohibited-list.

20.27.6

Risk of weed movement through vehicles, plant and equipment: Results from a Victorian study. Pp. 458–461, Michael Moerkerk (Department of Primary Industries, Horsham, Private Bag 260, Horsham, Vic. 3401, Australia).

Over 230 contaminant species or taxonomic groups, including 23 State-declared noxious weeds were identified on 106 vehicles and items of plant and equipment from a number of (Victorian) Local and State government fleets involved in land management. Thirty-nine percent of the 70 passengers and four-wheel drive vehicles assessed and 25% of the 36 items of plant and equipment carried noxious weeds. The most frequent location for finding noxious weeds in passenger and four-wheel drive vehicles was in the cabin (67%) followed by the engine bay (56%). Noxious weeds were found in all locations assessed. Practicing good vehicle hygiene and regular cleaning can reduce the risks of spreading weeds.

20.27.7

Using networks to understand source and sink relationships to manage weeds in a riparian zone. Pp. 466–469, R. A. Lawes^{1,2} and R. R. J. McAllister³ (¹CRC for Australian Weed Management, PMB1, Glen Osmond, SA 5064, Australia; ²CSIRO Sustainable Ecosystems, Davies Laboratory, Townsville, Qld 4814, Australia;

³CSIRO Sustainable Ecosystems, Queensland Biosciences Precinct, St Lucia, Qld 4814, Australia).

In riparian zones weeds spread through the landscape along the watercourse. Streams and rivers are interconnected. The connectivity between streams is influenced by the amount of water flowing through each point. In this study, we estimate the strength of the connection between two points or nodes, based on the volume of water passing from one point to the next. These connectivities are subsequently used to determine the most likely location of weed sources and weed sinks. Weed sources are the areas most likely to contribute to an invasion downstream, while weed sinks are the areas most likely to be invaded. We use a network approach to describe the connectivities between successive nodes of the Burdekin catchment and classify each node into a source or sink based on a water accumulation index. In general, sources were located in the upper portions of the catchment and sinks were located in the medium to lower reaches of the catchment. Some of the minor streams were neither sources nor sinks. We then consider possible management strategies for each of these regions.

20.27.8

Perennial pasture conflicts: Is there a way through? Pp. 687–690, Rieks D. van Klinken,^{1,4} Margaret Friedel² and Tony Grice^{3,4} (¹CSIRO Entomology, 120 Meiers Road, Indooroopilly, Qld 4068, Australia; ²CSIRO Sustainable Ecosystems, PO Box 2111, Alice Springs, NT 0871, Australia; ³CSIRO Sustainable Ecosystems, PO Box Aitkenvale, Townsville, Qld 4814, Australia; ⁴CRC for Australian Weed Management).

Many cultivars of Buffel Grass (*Cenchrus ciliaris* and *Cenchrus pennisetiformis*) have been introduced to rangeland Australia over the past century, including several that have been actively promoted for pasture. It is widely naturalized and is now one of the most important pasture species in rangeland Australia. Although not well studied, numerous individual studies, together with anecdotal observations, suggest that the environmental impacts of Buffel Grass are wide ranging and severe, especially through impacts on biodiversity and fire cycles. Because of the conflict between pastoral use and environmental impact, conflicting interests have prevented constructive progress towards mitigating environmental impacts. As a direct result, there are no national or State/Territory strategies to mitigate environmental impacts; on-ground actions are generally limited and underpinning research lacks strategic direction. This paper discusses the nature of the conflict and identifies steps that could be taken to move the debate to a more constructive footing; particularly the development of a national strategy that could ensure its sustainable use while simultaneously minimizing environmental threats.

20.27.9

Biodiversity threatened by weeds in New South Wales. Pp. 803–806, Paul O. Downey and Aaron J. Coutts-Smith (Pest Management Unit, Parks and Wildlife Division, Department of Environment and Conservation (NSW), PO Box 1967, Hurstville, NSW 1481, Australia).

Alien plants or weeds are acknowledged as a significant cause of global biodiversity decline. However, limited quantitative data are available on the biodiversity threatened by weeds. While there have been numerous studies of the impacts on individual native species, they do not allow for broad trends to be established across many taxonomic groups. One solution is to examine the biodiversity listed as threatened; for example, the 970 listings under the NSW *Threatened Species Conservation Act 1995*. Threat information was compiled from a wide array of sources and condensed into distinct threat

classes. Weeds posed a threat to 45% ($n = 432$) of listings, the majority of which were threatened plants. A total of 127 weed species were recorded as threatening biodiversity in New South Wales, although this number is likely to be much greater as approximately half of the weed threats described did not identify a specific weed species and weed impacts are not confined to threatened species. Twenty weed species posed a threat to five or more threatened biodiversity listings, with eight threatening > 10 listings. Approximately 70% of weeds threatening biodiversity were deemed to be garden escapes, which collectively posed a threat to 190 listings. Unfortunately many of these weed species are still available for sale, highlighting the continual threat of weeds to biodiversity.

EDUCATION & COMMUNICATION

22.2

Seven key tips for a fish friendly farm. Charlotte Grove and Rebecca Lines-Kelly, September 2006 (NSW Department of Primary Industries, Wollongbar, NSW 22477, Australia).

Fish Friendly Farms is a new program developed to educate, assist and encourage farmers to practice sustainable management techniques that minimize impacts on aquatic habitat and native fish populations. Given the marked decline in abundance of native freshwater fish in New South Wales and the large proportion of New South Wales waterways running through agricultural land, there is a clear need for this restoration program that encompasses all aspects of farm management and addresses their potential impacts on freshwater fish and their habitat.

'Seven key tips for a fish friendly farm' is a new guide published for this program, which highlights seven key aspects of farm management and details how they influence the aquatic environment, fish habitat and fish. For example, the importance of a healthy riparian zone to aquatic ecology and ecosystem function is explained with specific consideration to fish populations. The significance of stream connectivity and fish passage in rivers and creeks is also made clear with particular reference to smaller structural barriers such as road crossings and floodgates which, although numerous on farms throughout New South Wales, are often overlooked.

The full document can be downloaded from <http://www.dpi.nsw.gov.au/aboutus/resources>. Additional information about the program is available upon request (charlotte.grove@dpi.nsw.gov.au).

22.3

The Australian natural resource management knowledge system. Andrew Campbell (2006) Land & Water Australia. Available from CanPrint Communications, PO Box 7456, Canberra MC, ACT 2610, Australia, or via <http://www.lwa.gov.au>.

This document attempts to describe and analyse the knowledge system for natural resource management in Australia: how we as a nation "learn" our way to more sustainable systems of land and water use and management. It identifies areas we can focus on to improve the system as a whole, proposing three key analytical lenses for the NRM knowledge system (purpose, cohesion and function) which are each examined in terms of current issues and potential system improvements. It concludes that the system could and should be working much better than it is, but there are no "magic bullets" that will deliver dramatic improvements across the whole system immediately. Rather it identifies a range of measures that, together, would make a big difference over time.

22.4

Knowledge for Regional NRM program. This is a national program funded through the Natural Heritage Trust and managed by Land & Water Australia. Its aim is to build stronger connections between research/information providers and those undertaking Natural Resource Management planning, decision-making, implementation and evaluation activities so each can inform the other.

The overarching objective is to facilitate better linkages between regional natural resource management (NRM) bodies and knowledge providers, and to assist regional NRM bodies to better manage their knowledge. Phase one of the Knowledge for Regional NRM Program, conducted in 2005, investigated and tested ways to improve the adoption and sharing of knowledge by regional NRM bodies and looked for ways to improve knowledge connections between regional NRM bodies and research and information providers. The paper 'Improving the NRM knowledge system for regions' (which can be downloaded from <http://www.lwa.gov.au>) presents the findings of phase one and also outlines a comprehensive approach to improving the NRM knowledge system, especially as it supports regional bodies.

22.5

Ecology and Society is an electronic, peer-reviewed, multidisciplinary journal of the Resilience Alliance, available free of charge by subscribing through the website <http://www.ecologyandsociety.org/>.

The journal publishes papers on topics relating to the ecological, political, and social foundations for sustainable social-ecological systems. As articles are accepted, they are published in an 'Issue in Progress.' At 6-month intervals the Issue-in-Progress is declared a new issue, and subscribers receive the table of contents of the issue via email. This flexibility allows the journal to link published manuscripts as 'special features addressing single themes' that include an introductory and summary manuscript. The articles are linked through a table of contents and announced on the journal's main page.

22.6

RipRap River and Riparian Lands Management Newsletter Edition 31, 2006, showcases and celebrates the work of the National Riparian Lands R&D Program, over the last 13 years. It also contains a complementary 'Legacy CD'. The issue indexes all issues to date and all the technical guidelines produced through the program, as well as summing up the various research projects that have been carried out during the period, with excellent interpretation for management. (RipRap and all technical guidelines can be accessed through the website www.rivers.gov.au.)

BOOK REVIEWS

26.31

Grassy Ecosystems Management Kit: A Guide to Developing Conservation Management Plans.

S. Sharp, J. Dorrrough, R. Rehwinkle, D. Eddy and A. Breckwoldt (2005) Environment ACT, Canberra. Price \$A30.00. ISBN 0 642 60340 5

Remnant grasslands and grassy woodlands in south-eastern Australia are typically small, have large edge-to-area ratios, are subject to multiple threats to their biophysical values, and often have competing interests over their use.

Grassy remnants exist in a matrix of agricultural and urban land use, accompanied by close settlement and myriad agencies with varying commitment and capacity to manage for nature conservation. It follows that their management requires a customized approach, which this kit provides – a practical resource for the many agencies, groups and individuals involved in managing small(ish) grassy remnants. The kit also highlights the important role that this management plays in ‘off-reserve conservation’.

The lead author, Sarah Sharp (Environment ACT), has considerable experience managing grassy remnants in the Canberra region. Collaborating authors Josh Dorrrough, Rainer Rehwinkle, David Eddy and Anne Breckwoldt are similarly experienced. David Eddy’s informative 20-page booklet, *Managing native grasslands: A guide to management for conservation, production and landscape protection* is a valuable component of this kit. Anyone considering using the kit would also be well advised to obtain a copy of, *Grassland flora: A field guide for the Southern Tablelands (NSW & ACT)* (Eddy *et al.* 1998). Appendix 2 of the kit cross-references an extensive list of grassland plants with page numbers in the field guide where a picture and descriptive information can be found.

The kit is designed to assist workers to develop management plans for grassy remnants and applies to both conservation reserves and remnants in production paddocks. Its basic premise is that different parts of a site will have different management histories, and different management requirements. Thus, the first step is delineating management units, and assessing their conservation values through a flora and fauna survey. While the authors emphasize that this is the most important step in the management planning process, and expert assistance should be obtained, they do provide guidance as to how this might be ‘roughed in’ by people with minimal identification skills.

Information is provided to help users identify site management requirements. Two additional components – monitoring management effects, and reviewing the management plan accordingly – collectively form the basis of

adaptive management. A major omission in this section is the lack of emphasis on the importance of a *control* in the monitoring exercise. That is, in order to ascertain the effect of a particular action, it is essential to monitor where the action is not applied, as well as where it is applied. Without a control, it is impossible to tell if effects were caused by the management activity or by other factors, such as different seasonal conditions. Information is provided on monitoring techniques (e.g. ‘100-step transects’ for vegetation composition; or counting individual plants for small populations of individual species). The inclusion of a case study (Crace Grassland Reserve in Canberra), explaining how all steps have been worked through on a real grassland reserve, is of great benefit to the reader.

The kit includes a 60-page workbook that guides the worker through a 16-step management planning process. All steps are explained in a plain and easily read style. There are matters of detail one could challenge. For example, Blue Devil (*Eryngium ovinum*) is described as a ‘disturbance sensitive’ species. This is not the case in Victoria, and Eddy *et al.* (1998) state that it is ‘favoured by soil disturbance’ and ‘is moderately common and widespread’ across the Southern Tablelands. Perhaps a minor point, but the kit premises the assessment of vegetation condition on the relative abundance of listed ‘disturbance sensitive’ taxa.

I would like to have seen exotic taxa denoted with an asterisk throughout, as the excellent line drawings of many plant species include *Briza maxima* and *Aira elegantissima* (syn. *A. elegans*). An inexperienced person may assume these are indigenous plants. Some of the taxonomy is misspelt (e.g. *Cryptandra amara*, *Oxalis perannens*), while the nomenclature for *Convolvulus erubescens* is outdated.

Most of the photos are without captions, and their inclusion would help explain many management issues and concepts. The kit includes a CD containing pdf files of the kit’s components (excluding the Field Guide). Its usefulness would be greatly enhanced with hyperlinks to assist navigation within the kit and to external links.

Notwithstanding these minor issues, the kit is a useful resource for NRM practitioners, students and others wishing to develop management plans for grassy remnants. It is most applicable to those working on the Southern Tablelands, but botanical aspects could be readily adapted for use in other regions.

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26.32

Old Land, New Landscapes: A Story of Farmers, Conservation and the Landcare Movement.

Chris Williams (2004) Melbourne University Press, Melbourne, 208 pages. RRP \$A34.95 (paperback). ISBN 0522 85108 8.

There seems a growing trend for the findings of research projects to be disseminated to a wider audience in the form of a popularized book account, and so it is with the story of the Genaren Hill Landcare Group, the case study for Chris Williams's PhD research.

The book traces the Landcare Group from its beginnings in 1992, with a single landholder and a clearly defined problem that also impacted on neighbouring properties (in this case high numbers of kangaroos), through to an active, local community group with broad interests and aspirations focused on the development of the Genaren Hill Sanctuary. Although the development of the sanctuary forms the key activity around which the study was based, Williams's attention is more on the social dimensions of the project rather than the on-ground aspects, which is where the book's greatest interest lies.

The Genaren property, situated near Peak Hill in central New South Wales, had been farmed by Mike Sutherland's family since the early 1900s, with little in the way of modern agricultural development – conservative grazing regimes on native pastures, and limited cropping on flatter areas. Genaren Hill, an area of some 250 ha of remnant bush, valued initially as a grazing area for wethered rams, was also home for a burgeoning population of kangaroos that used neighbouring paddocks as their abundant feeding grounds. The Sutherlands' concern about the impact of kangaroos, and effects of high grazing pressure (from both kangaroos and stock) on erosion, together with their strong connection with their land and their knowledge of local natural history, sparked a new perception of the Hill. The Hill came to be seen, not as a problem, but as a living treasure of natural resources in a predominantly agricultural landscape, and a potential refuge for small mammals such as bettongs and bilbies, that had roamed the landscape in the past.

Much of the book describes the development of this idea, and the persistence of the Landcare Group in taking steps to realize the sanctuary, culminating with the release of regionally extinct Brush-tailed Bettongs (*Bettongia penicillata*) and Bridled Nail-tailed Wallabies (*Onychogalea fraenata*). The contrasting motivations of individual group members is explored in some detail, with the vision of the sanctuary providing an opportunity for those differing perspectives to converge into a shared goal.

Throughout the book Williams skilfully weaves contrasting threads, drawing on the metaphorical 'foreground' and 'background' of the landscapes, of people and place, providing

depth and texture as the story unfolds. The foreground of the Genaren Hill Landcare Group's dedication and effort to introduce native animals to the Sanctuary is contrasted with the changing policy background in New South Wales at the time, which was clearly not equipped to deal with the practicalities of animal reintroductions, and which was the source of much frustration for the Genaren Landcare members. The eventual realization of the Sanctuary and the release of 12 Brush-tailed Bettongs into the area in 1998, and six Bridled Nail-tailed Wallabies in 1999, is contrasted with the ongoing consequences for the Sutherlands. These consequences included the realities of ongoing management; monitoring and maintenance responsibilities and costs associated with the Sanctuary; and the ongoing short-comings of the New South Wales covenanting process.

Switching between narrative, description and reflection, Williams's account provides an intimate view of the changing landscape of human values in a small area, against the broader physical and political landscape. Drawing from this focus on the human landscape, he develops the idea that individual, personal motivations for nature conservation – however idiosyncratic they may be – are important elements in the restoration of remnant landscapes, which he views as a cultural phenomenon, developing '... new landscapes in an old land.'

This book will appeal to a broad readership, including landholders, students, conservationists, agency staff, and anyone with an interest in the social side of Australian natural history. Its story is interesting and informative, and many lessons can be learnt from within its pages. Its literary style is accessible; and in the true research tradition, this book is amply referenced with over 250 source documents listed in the bibliography. As a book to read for interest, for information, or for learning, *Old Land, New Landscapes* has something to offer for many people.

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26.33

Weeds of the South-East: An Identification Guide for Australia.

F. J. Richardson, R. G. Richardson and R. C. H. (2006) Shepherd, R. G. and F. J. Richardson, Melbourne, xvi and 438 pages. Price \$A69.95 (paperback). ISBN 0958743932.

Australia's weed flora keeps growing, mainly by the addition of ever more escaping garden plants. Keeping abreast of all the newcomers is not easy, but this book will certainly help. It describes and illustrates nearly all of the weeds found in south-eastern Australia, in the region bounded by Adelaide, Hobart and Newcastle. It is an identification guide that relies mainly on its colour photos. More than

1600 are provided, and the standard is high. They are sharp and clear and usually well composed for identification purposes, even the images of grasses, although a few are a tad too small or otherwise inadequate (e.g. *Cabomba caroliniana*). Often there are multiple images of a species to show flowers, fruits and growth form. Some of the more obscure weeds have probably never been illustrated before in Australia. A few weeds are described but not illustrated, mainly the less common grasses.

The text for each plant is very brief, and only provides a few descriptive details. The language is user-friendly, with little botanical jargon. Leaves are described, for example, as 'spoon-shaped' and 'blue-green', and not as 'spatulate' and 'glaucous', as a flora would say. Recent synonyms are provided. There are no keys or distribution maps, very little introductory text, and no advice about weed control. Distributions are indicated by a listing of the States.

Many native plants are featured, including both out-of-range garden escapes and plants that trouble graziers, although unfortunately it is not always clear which is which. A code to indicate whether a weed was environmental, agricultural or both would have helped. Not every displaced native is featured, but the inclusion of 18 wattles (*Acacia* species) shows a serious commitment to this category.

This is a very substantial compilation, but despite the fine photos and friendly text, novices will find it difficult to use for identification. Weeds are ordered according to family, and if you can't place a species in a family, your only choice is to turn the pages looking at all the photos. If you were trying to identify wall pellitory (*Pellitoria judaica*), a common urban weed, you would have to look through 1500 photos before you found it. I don't know how the authors could have avoided this problem; it's just a measure of the size of our burgeoning weed flora. Those who know their families will find this book very valuable for its extensive pictorial coverage of south-eastern weeds. It is very useful as far north as Brisbane (although it does lack many subtropical weeds), and in south-western Australia.

This book overlaps in content and geographical scope with two others. Adam Muyt's *Bush Invaders of South-eastern Australia* (R. G. and F. J. Richardson, 2001) features the worst hundred or so environmental weeds in South-eastern Australia, and provides detailed advice about control. Kate Blood's *Environmental Weeds: A Field Guide for SE Australia* (CRC Weed Management Systems, 2001) covers more environmental weeds than Muyt (in less detail), but contains far fewer than this book. *Weeds of the South-East* is the only one that includes agricultural weeds and rare environmental weeds. It provides yet another demonstration, if one be needed, that our garden plants keep escaping. Again and again I found myself saying: 'Oh, is that a weed too?'

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26.34

Resilience Thinking, Sustaining Ecosystems and People in a Changing World.

Brian Walker and David Salt (2006) Island Press, 92 pages.

Price \$A49.95 (paperback).

ISBN 1 59726 093 2.

Exploring Resilience in Social–Ecological Systems: Comparative Studies and Theory Development.

B. H. Walker, J. M. Anderies, A. P. Kinzig and P. Ryan (eds) (2006) CSIRO Publishing, 240 pages. Price \$A75.00.

ISBN 0643092439.

These two books (on a similar topic and with authors in common) complement each other and can be read in tandem. The first is designed for a general audience while the second, more academic in style, contains additional case studies and more detailed discussion of the concepts underpinning 'resilience thinking', an important science-based way of analysing the sustainability of our social-ecological institutions.

Ecosystem resilience is that property of an ecosystem that enables its recovery after natural disturbances; and is conferred by species through adaptations to similar natural disturbances prevailing over evolutionary timescales. The 'Resilience thinking' approach greatly expands the biological concept of resilience to encompass the capacity of complex *social-ecological* systems to 'absorb disturbances' yet persist, with structure, function and feedbacks largely intact. As such, it is possibly one of the most important analysis and planning ideas available to the current generation of land managers.

'Resilience thinking' is based on the work of ecologist C. S. (Buzz) Holling and others, and has been more strongly integrated as a distinct paradigm over the last decade by the international 'Resilience Alliance' (www.resalliance.org) currently led by CSIRO research fellow Brian Walker. And not a moment too soon. With sound foundations in ecosystem dynamics (mined for their potential to provide insight to the social-economic systems in which we live) the books provide compelling arguments that the adoption of a resilience view by planners, politicians and the community at large may offer us a new mindset capable of triggering myriad solutions to the current trajectories of 'over-development'.

Basic to the idea of resilience thinking is that society and ecosystems are inextricably linked and that natural resources need to be utilized within the constraints imposed by an ecosystem's cycles of disturbance and recovery. The main proposition, however, is that our complex social institutions display similar resilience behaviours as do ecological systems, which suggests that we can examine resilience in social-ecological systems in similar ways we examine resilience in ecological systems.

Two metaphors are used in the books to convey important patterns of change in linked social-ecological systems. The first is the 'Adaptation Cycle' borrowed from both ecological succession and economic theory. In the fore-loop of the cycle, resilience builds up in the 'rapid growth' phase but declines in the 'conservation' phase where, among other things, the most efficient components dominate and diversity and responsiveness is lost. This low resilience exposes the whole system to destabilization by small or large changes that trigger a back-loop in which a 'release' phase shifts to a 'reorganization' phase where diversity is reintroduced. The second main metaphor is that of a basin (shaped by exogenous pressures) in which a ball (ecosystem) moves with the range of conditions imposed upon it. When the shape of the basin is made shallower by outside forces, the ball can roll across the lip of the basin (across a 'threshold') into a different basin, with little likelihood of reversal. This illustrates how an ecosystem, under different external pressures, can shift to a different state, often resulting in loss of ecosystem or social capital characteristic of the original complex social-ecological system.

The chapters of both books are progressively sequenced to build an understanding of how these two concepts apply to the real world, using five case studies in common. The examples illustrate ecological decline and social instability arising from laissez-faire development (or simply over-development) of bioregions such as Florida's Everglades, Wisconsin's Great Lakes District, the coral reefs of the Caribbean and Kristianstad Water Realm in Sweden. The potential for systems to be confronted by ecological 'surprises' is represented by Australia's Goulburn Broken catchment case study, where little buffering exists to provide resilience for a system under increasing threat of rising saline groundwater. All cases are used to illustrate the potential for social-ecological 'transformation' in which release and reorganization phases in the back-loop of the adaptive cycle offer opportunities for innovative solutions that can reduce the tendency of systems to veer towards resilience loss.

Most useful is the reduction of the model (at the end of 'Resilience Thinking') to a shortlist of key attributes needed to maintain or increase resilience in social-ecological systems, even if maintaining these attributes increases short-term costs. These include maintaining a diversity of components (redundancy), recognizing and embracing ecological variability (e.g. drought and flood), retaining modularity (i.e. some unlinked autonomous elements), constructing tight feedbacks (to enable increased responsiveness to change), multiplying networks, fostering innovation, retaining overlaps in governance across scales, and including all unpriced ecosystem services in economic analysis and proposals. Clearly, many of these suggestions are not appreciated in our current, dominant social and political worldviews.

I have few criticisms of the books and the broad paradigms they convey. But I was surprised that neither book (except in the coral reefs chapters) makes strong connections to biological resilience in disturbance adapted/dependent systems, as these could strengthen the validity of applying the concept to whole systems. Similarly, although the adaptive cycle model acknowledges the 'release' phase as potentially beneficial, clarification is needed to distinguish ecological 'disturbances' (i.e. perturbations) from degrading 'impacts' (some of which are caused by *lack* of disturbance). This could be simply conveyed by inclusion of a statement to the effect that perturbations to which a system is adapted can be beneficial (even necessary) while perturbations outside natural parameters can be destructive.

The main value of these books, however, is not any pretense of a perfect formula for resilience analysis but their power to generate ideas. More work will emerge in the future as new ideas about resilience are generated, including (among other topics identified by the authors) work clarifying differences and links between resilience and 'resistance', further study of using resilience analysis for 'whole system' benefit rather than individual unit benefit, and further exploration of potential for appropriate, small disturbances to be used as a restoration and resilience-building tool.

The books stress that resilience thinking is not a formula, but a tool for readers and other researchers to take up, interrogate and put to work to improve their management of complex social-ecological systems. Reading these books (and following links to the electronic journal of the Resilience Alliance at www.ecologyandsociety.org) can provide us with important skills to identify key threats to our systems, levels of manifested or potential resilience, and mechanisms for building or restoring resilience in a world in which there is ever increasing consumption of a declining resource base.

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WEBSITES

25.21

Bushcare volunteering – links to opportunities from Newcastle to Wollongong and west to Blue Mountains are available at <http://www.aabr.org.au>. The page contains links to 39 Council Bushcare webpages (out of 48 Councils in the region). Unlisted groups with volunteer programs (whether or not in New South Wales) are invited to contact enquiries@aabr.org.au to report dead links and suggest new links so that the list (or links) can be updated and extended.

CONFERENCE REPORTS

27.26

Coast to coast 2006 – Australia's National Coastal Conference – was hosted by the Victorian Coastal Council from 22 to 25 May 2006 at the Melbourne Exhibition Centre, Victoria. Copies of abstracts and presentations from the 3-day conference (with three concurrent sessions) can be downloaded from www.vcc.vic.gov.au/coastto coast2006.htm Topics of sessions included Coastal Development and Planning Community and the Coast, Living Oceans, International Relations, Catchment to Coast, Climate Change, Coastal Use – Fisheries, and Coastal Use – Tourism.

27.27

Fenner Conference. The 2006 Fenner Conference 'Integrating Agricultural and Environmental Imperatives for a Profitable and Sustainable Future' was held on 8–9 November 2006 in Canberra. It brought together some of Australia's leading experts in land management, agronomy, conservation, economics, science, policy

and industry to examine and inform the current debate around agricultural productivity and environmental protection. Over 2 days the conference heard the latest research from those improving the land, through revegetation and conservation and those making a living from the land. Although the methods, and often the language, of these two groups differed, their overall aims were closely aligned. Organizers of the event are working towards a paper on the conference and intend to put together a document aimed at governments and agencies involved in land management. The abstracts from the conference are available online at www.pi.csiro.au/FennerConference/index.htm, as will be any future papers.

27.28

Water perspectives knowledge for managing Australian landscapes (booklet) summarizes discussions about National Water Initiative Implementation that took place at a 1-day workshop of invited social science experts in May 2005 to scope a research agenda for funding under Land & Water Australia's 5-year (2005–2010) research strategy. The booklet is available through <http://www.lwa.gov.au>.