

Urban Royal Botanic Gardens Melbourne 

Spotlight

The Newsletter of the Australian Research Centre for Urban Ecology

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CONTENTS

Staff and Student Activities.....	1
Web Site.....	4
ARCUE Additions.....	4
Occasional Papers.....	5
Education Partnership.....	5
Research	6
New Journal.....	8
Upcoming Events.....	8

about her work on 'The distribution, habitat requirements and conservation of the cascade tree frog *Litoria pearsoniana*', Nick Williams presented a paper co-authored with Emma Leary and Mark McDonnell on the 'Landscape ecology of Melbourne's urban grasslands', and Amy Hahs discussed 'The role of biodiversity in ecosystem services' which was also co-authored by Mark McDonnell. Poster presentations highlighted the work of ARCUE's honours graduates Luke Hynes and Gemma Phelan. These were entitled 'Measuring the success of an urban riparian revegetation program' and 'The effects of urbanisation on *Leptospermum myrsinoides* heathland in the south-eastern suburbs of Melbourne.' Work Emma Leary and Mark McDonnell have completed analysing the 'Patterns of public open space in greater Melbourne' was also displayed. Mark, Kirsten and Nick also chaired symposium sessions at the meeting.

STAFF AND STUDENT ACTIVITIES

2000 Conference of the Ecological Society of Australia

The Ecological Society of Australia held its 2000 Conference and meeting at La Trobe University, Bundoora between November 29th and the 1st of December. The theme of ESA2000, 'Ecology in a Rapidly Changing World', was well covered by many interesting papers and posters. The meeting was attended by over 400 ecologists from throughout Australia and from overseas.

ARCUE was strongly represented at the meeting with all ARCUE staff and students attending and most presenting their work. Kirsten Parris spoke

A particular highlight of the meeting was the inclusion in the program of a symposium entitled 'The ecology of cities and towns' which was initiated and chaired by Mark McDonnell and Kirsten Parris. This provided one of the first opportunities for Australian ecologists conducting research in urban environments to present their findings at a national forum. A range of research was presented at the symposium, including papers on weed invasion, landscape fragmentation effects caused by urban development, habitat supplementation and invertebrate ecology. A lot of interest was generated by the symposium and many favourable comments made. This indicates that urban ecology is rapidly becoming an

accepted field of research in Australia which is important as we live in one of the most urbanised countries in the world.

Urban Ecology in Darwin

In August 2000 Nick Williams was invited to present a lecture on Urban Ecology to the School of Biological and Chemical Sciences at Northern Territory University in Darwin. While there he met with students and academic staff to discuss and examine the differences between the urban ecology of a tropical city with that of temperate Australian cities such as Melbourne. Darwin has a number of areas of natural vegetation. Patches of natural bushland that Nick visited included East Point Reserve, Charles Darwin National Park, Casuarina Coastal Reserve and undeveloped patches of bushland around the airport.

The urban ecology of Darwin appears to be more strongly influenced by climate than that of southern Australian cities. This is particularly evident in the vegetation of the urban matrix in which Darwin's bushland areas occur. Many residents desire a very shady garden to provide relief from the heat. Consequently evergreen broad leafed trees casting deep shade are preferred over eucalypts that are considered to allow too much light to penetrate to the ground. Another important consideration in people's minds when planting their gardens is the response of a tree to the cyclonic winds that periodically lash the city. Palms are favoured because of their ability to flex in strong winds rather than break and create flying debris that can cause damage and injury. Many gardens have therefore become lush rainforest style gardens that provide habitat for the goannas and scrub hens that are quite common in the suburbs.

Very little of the city's original vegetation remains outside of the bushland reserves and other undeveloped areas. In comparison to southern cities there are very few remnant eucalypts retained in gardens or as street trees. Cyclone

Tracy which devastated Darwin's built environment in December 1974 has also strongly influenced the city's natural vegetation. In the dry season following the cyclone the large amount of debris stripped from the city's vegetation allowed very large and intense fires to burn and destroyed large areas of rainforest in Darwin. Further and continued loss, particularly of dry rainforest, has occurred because of urbanisation.

Unlike natural areas in the southern states, bushland and parks in Darwin are places that are at least seasonally inhabited by humans. Aborigines who live on out stations some distance from Darwin will often come into the city during the dry season and camp in natural areas. Homeless people may also spend extensive periods in urban bushland. Locally these people are known as the "long grass people". Not only do they camp in the bushland they also use the resources available for fuel and food. At Casuarina Coastal Reserve there were many abandoned camp fires surrounded by the remains of recent meals such as shells of molluscs gathered from the mangroves of the reserve. Urban bushland dwellers also influence the ecology of urban bushland through a higher incidence of fire, either deliberately lit or unintentional fires such as those that escape abandoned cooking fires.

Darwin is currently undergoing a period of prolonged growth with the city's population increasing substantially over the past ten years. However, the geography of the city limits the potential for new growth. Consequently most new development is concentrated to the south of Darwin in the satellite city of Palmerston. Like most cities, as housing estates are developed conflicts have arisen with the natural environment. An expensive new water front development is being built on Darwin Harbour that has necessitated the clearing of a significant area of mangroves. However, many areas of mangroves still exist in the vicinity and the project has been nick-named Baygon Estates due to the large mosquito problem new residents are experiencing!

Parks Victoria Research Partners Program Conference

On the 21st of November the inaugural conference of the Parks Victoria Research Partners Program was held at The University of Melbourne. The Research Partners Program aims to create a knowledge base and facilitate the transfer of information relevant to environmental management. To do this, Parks Victoria has formed partnerships with universities and other research institutes and has provided students with resources and practical assistance to carry out research relevant to park management. In keeping with this aim, the theme of the conference was 'Building research partnerships to integrate research with park management.'

The Royal Botanic Gardens-Melbourne and The University of Melbourne are among the Research Partners involved in the program. Ben Hamilton, a University of Melbourne honours student working with Mark McDonnell at ARCUE, was one of over fifteen students to present work at the conference. Ben presented a progress report on his study of '*Spartina* distribution in and around Reef Island and Bass River Mouth.' *Spartina* is a potentially serious weed invader along our coastal marshes and wetlands.

The Conference provided a valuable opportunity for information to be shared among the students, research partners and Parks Victoria staff, for contacts to be made and for students to gain experience presenting their work to an audience.

USA Study Tour

PhD student, Amy Hahs, spent six weeks in the United States during July and August 2000, visiting scientists who are leading the way in the ecological study of urban and suburban landscapes. She started with a visit to the USDA Forest Service, Northeastern Research Station in Syracuse, New York. There she met researchers

who introduced her to their work quantifying the effects of the urban forest in cities (Dr Dave Nowak), investigating the pattern of disturbance in patches of natural vegetation (Dr Wayne Zipperer) and undertaking meteorological studies in urban areas (Dr Gordon Heisler).

Her next stop was the Louis Calder Center, Fordham University's Biological Field Station in Armonk, NY, where she met with Dr Margaret Carreiro. Dr Carreiro provided an excellent introduction to some of the issues associated with development in the upstate New York area, and explained her own work examining the effects of urbanisation on nutrient cycling in urban forests.

The Baltimore Ecosystem Study was established in 1998 as part of the National Science Foundation's Long Term Ecological Research (LTER) program. During her visit to Baltimore Amy met Dr Richard Pouyat, who described his work on ecological processes in the soil profile.

The Central-Arizona Phoenix (CAP) LTER, also established in 1998, is the second LTER site located within an urban area. Most of the program's researchers are affiliated with Arizona State University (ASU). Amy visited ASU and attended a graduate class on Urban Environments. She had many rewarding interactions with graduate students, and greatly enjoyed this experience. Diane Hope, the CAP program coordinator, provided Amy with an excellent overview of the various projects being undertaken, and more specific information on their vegetation sampling methods.

During her visit to Davis, California, Amy met Dr Greg McPherson of the USDA Forest Service's Pacific Southwest Research Station. Dr McPherson outlined his work that includes an investigation of the costs and benefits for the community of different tree planting scenarios.

While in the USA, Amy attended two conferences - the Ecological Society of America's 85th Annual Meeting in Snowbird, Utah and the American Meteorological Society's Symposium on Urban

Environments in Davis, California. These conferences were a fantastic opportunity to learn and discuss many different aspects of ecological research in urban areas, and provided Amy with a strong overview of the work that is currently being done, and where research may be headed in the future.

Overall, Amy found her overseas experience to be extremely valuable, as it has provided her with an extensive understanding of the current questions and methodologies being adopted by ecologists working in urban areas, and a solid framework within which to conduct her own research. She has returned with a working knowledge of the current national and international standards in urban ecological research, and this will enable her to make a timely contribution to the study of ecology in Australia's urban areas.

Amy's trip was funded by a Melbourne Abroad Scholarship Scheme for Postgraduates and School of Botany Postgraduate Student Travel Award from the University of Melbourne. She also received the Faculty of Science's John S. Turner Scholarship for the year 2000, and a Student Travel Grant from the American Meteorological Society. Her external travel funds were also generously matched by the Baker Foundation.

WEB SITE

The ARCUE web site is finally up and running. It contains information on ARCUE projects and staff, provides a brief overview of urban ecology and lists selected references on urban ecology and road ecology. The site also contains downloadable versions of both ARCUE Occasional Publications as well as several other papers by ARCUE staff. Details of upcoming events are regularly posted on the site and links to relevant web sites are provided. The address of the ARCUE web site is <http://arcue.rbg.vic.gov.au> or it can be accessed through the link on the Royal Botanic Gardens website (<http://www.rbg.vic.gov.au>).

Please let us know of any events, interesting web sites or other relevant information that could be included in the ARCUE web site

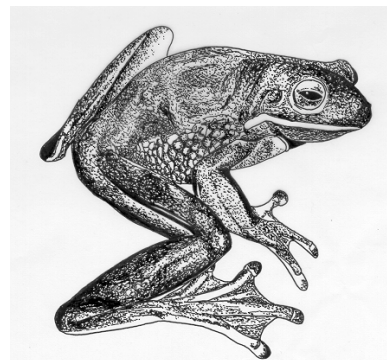
ARCUE ADDITIONS

Kirsten Parris

BSc (Hons), BA, PhD

Kirsten joined ARCUE as a Post-Doctoral Fellow in July 2000. She gained her Ph.D. from the Australian National University where she studied the ecology of stream-breeding frogs the forests of eastern Australia and investigated the habitat variables that influence the diversity and composition of frog assemblages.

Since joining ARCUE, Kirsten has been conducting frog surveys throughout Melbourne. She hopes that her research will result in recommendations for the restoration of aquatic habitats in the greater Melbourne area, so that they may be made suitable for an increased diversity of native frogs.



A list of Kirsten's publications can be found on her web site at http://rubens.its.unimelb.edu.au/~KM_PARRIS or accessed through the link on the ARCUE web site.

Future additions

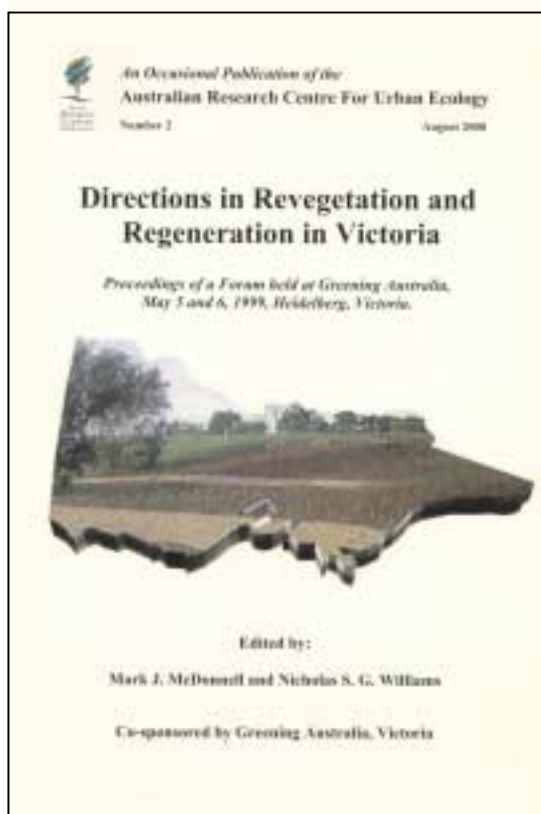
Honours student Tom Browning joined ARCUE in February 2001. Tom will study the seed bank

of remnant heathland patches in the south-eastern suburbs of Melbourne, with a focus on quantifying the size and composition of the soil seed bank. He has experience in botanical and zoological surveys, seed collection, revegetation and the identification and eradication of noxious weeds.

A second Post Doctoral Fellow and an Ecologist will also be appointed in early 2001.

OCCASIONAL PAPERS

Proceedings



The second ARCUE Occasional Publication, *Directions in Revegetation and Regeneration in Victoria: Proceedings of a Forum held at Greening Australia, May 5 and 6, 1999*, was published in August 2000. Edited by Mark McDonnell and Nick Williams, it is a compilation of papers summarising the talks presented at the forum of the same name, which was jointly co-ordinated by Greening Australia and ARCUE.

The Proceedings represents one of the first efforts to document the diversity of people and organisations involved in the revegetation and regeneration of native plant communities in Victoria. It includes sections on practices and approaches to revegetation and regeneration, monitoring and evaluating projects, policy and future directions. The projects described include urban to rural locations and cover a wide geographic range. We hope that the collection of papers presented here will help to improve the knowledge and expertise of those involved with revegetation and regeneration, and, in due course, the success of such projects in Victoria.

The Proceedings is available for \$15.00 from the Royal Botanic Gardens Bookshop (Birdwood Ave, South Yarra) and the NRE Information Centre, (Victoria Pde, East Melbourne). Alternatively, an electronic version can be downloaded free of charge from the ARCUE website.

EDUCATION PARTNERSHIP

The Royal Botanic Gardens (RBG) has recently become involved in a 'Science Partnership' project with the Victorian Department of Education, Employment and Training entitled '*Alien Invaders: Identifying and Monitoring Weeds in the Environment*'. The project involves schools around Melbourne surveying local areas of natural vegetation for particular species of weeds. The initial focus will be natural environments in urban areas which are likely to be affected by urbanisation which includes the presence of a significant suite of weeds.

While the threat of weeds is well known, the precise distributions of weed species are not clearly known or documented. Involving students in such an investigation should improve this situation while allowing students will learn about ecology and biodiversity through practical experience

ARCUE, the Plant Sciences and Education Divisions of the RBG are preparing materials for the project. As part of ARCUE's role, staff will develop a protocol for recording and monitoring populations of environmental weeds that is appropriate to upper secondary students. The project will also make use of our comprehensive database of references concerning the biodiversity of the Melbourne region.

The project will be initiated in October 2001 to coincide with Weedbusters Week.

RESEARCH

The Effects of Urbanisation on *Leptospermum myrsinoides* Heathland in the South-Eastern Suburbs of Melbourne

Heathland dominated by the Heath tea-tree (*Leptospermum myrsinoides*) was once widespread in the area now covered by the south-eastern suburbs of Melbourne. It is now highly fragmented and exists as a range of different sized remnants in urban and rural landscapes.



Working with Mark McDonnell and Nick Williams, Gemma Phelan recently completed her Honours project investigating the effects of urbanisation on these heathlands. Her study addressed three questions:

- 1) What are the landscape and environmental differences between heathland patches in the south-eastern suburbs of Melbourne?
- 2) Do urban and rural heathland patches differ in terms of species composition and structure?
- 3) Are differences in the species composition and structure of heathland patches related to landscape and environmental difference?

Gemma assessed the vegetation composition and structure of sixteen heathland sites. Statistical analyses of the data revealed that patches of urban heathland differ from patches of heathland in rural landscapes in species composition and structure. Although environmental variables including climate and soil nutrient levels vary between sites, the differences in the vegetation could not be attributed to environmental variation between sites.

Among the findings of the study are:

In the absence of a recent fire, species diversity is much lower in urban heathland than rural heathland. However, when a fire has passed through the vegetation within 16 years, species diversity and quality does not differ markedly between urban and rural patches

As a general trend, burnt rural patches consist of a diverse shrub layer with many co-dominant species, while burnt urban patches have a shrub layer that is dominated by a single species, Showy Bossiaea (*Bossiaea cinerea*), with other shrubs present at much lower abundance levels. Rural patches that have not been burnt recently typically retain a diverse array of shrubs and herbs whereas unburnt urban patches lack a shrub layer, having instead, a dense canopy completely dominated by the Coastal tea-tree (*Leptospermum laevigatum*).

The findings of this study have important implications for the management of remnant urban heathlands. Current management practices, although ensuring a degree of vegetation quality, have not maintained urban heathland patches at the quality of those in rural landscapes. The greater effect of urbanisation on unburnt than recently burnt vegetation indicates the need for regular burning to be implemented, in part to remove the dense canopy of *L. laevigatum* that suppresses most other heathland species.

New Honours student Tom Browning will expand upon this work, studying the seedbank of these heathland remnants.

ARCUE's Public Open Space Database for Greater Melbourne

Public open or green space provides many well-documented benefits to urban populations, particularly in the modification of urban climate effects, provision of wildlife habitat and aesthetic benefits and recreation opportunities for urban residents. Melbourne is generally considered to be plentiful in parkland and open space, but is this really the case?

Emma Leary has developed a digital Geographic Information System (GIS) database of public open spaces across Metropolitan Melbourne, which can be used along with GIS software to quantitatively assess the amount and spatial distribution of public open space in Melbourne. The database is comprised of polygons representing public open spaces, and was created using a variety of sources. These included an existing digital database, Metropolitan Open Space (which was provided by Parks Victoria), digital and hard-copy maps supplied by local councils, and the Melway street directory of Greater Melbourne. The public open space database covers an area defined by ARCUE as 'Metropolitan Melbourne', which represents the general extent of urbanisation across the greater Melbourne region, and extends roughly 40km in each direction from the Melbourne Central Business District.

The public open space database contains 7,716 polygons, which together make up approximately 460 square kilometres of public open space. This represents 12% of the Metropolitan Melbourne region. Several different public open space types were identified in the database, including reserves and parks, sporting fields, Parks Victoria reserves, and managed reserves such as flora and fauna reserves, botanic gardens and wetlands.

Using the public open space database and GIS software, values can be found for the total amount and percentage of public open space in Melbourne, the average size of public open spaces and the average distance between public open

spaces. Public open space can also be related to population, using census data, such as calculating the amount of public open space per person. Comparisons can be made between individual Local Government Areas, or between different parts of Melbourne.

The public open space database will provide valuable information to assist with many ARCUE research projects. The benefits of open space in urban areas is well-documented, and the preservation and management of areas of public open space in Melbourne is of particular interest to ARCUE. Knowing more about the amount and spatial distribution of public open space will also help other decision makers and planners involved with the development of Melbourne. For additional information on this database go to ARCUE's web site (<http://arcue.rbg.vic.gov.au>) and go to ARCUE PROJECTS.

Ecological Effects of Roads



Transportation planning typically considers only the direct impacts of road construction, such as loss of vegetation and wildlife habitat. However, the ecological impacts of major roads and freeways are not confined to the area immediately adjacent to the road. Recent research has

demonstrated the existence of a road effect zone around major roads and freeways.

In Melbourne many current and proposed freeways traverse areas of native grassland. In a recent study, Nick Williams, Emma Leary, Kirsten Parris and Mark McDonnell examined the road-effect zone of the proposed route options for the new Hume Freeway F2 Link and assessed the impacts of the routes on the native grasslands of the Merri Creek Valley. In a paper to be published in a forthcoming edition of *The Victorian Naturalist*, they review the major ecological impacts of roads and how roads may affect native grasslands using the proposed Hume Freeway F2 Link as a case study.

NEW JOURNAL

Ecological Management & Restoration



Ecological Management & Restoration, published on behalf of the Ecological Society of Australia Inc., aims to bridge the gap between the ecologists perspective and the field manager's experience.

Publishing peer-reviewed articles, technical reports, news items, reviews and letters on the science and practice of ecosystem restoration and management, this innovative new journal combines a highly readable style with scientifically credible material. *Ecological Management & Restoration* answers the growing need among land managers for reliable, relevant information and acknowledges the need for two-way communication in devising new hypotheses, sound experimentation, effective treatments and reliable monitoring. Original contributions are encouraged from both scientists and practitioners on a wide range of geographic and subject areas.

Mark McDonnell serves on the editorial Board of this new journal.

Further information is available from <http://www.blackwell-science.com/emr>

UPCOMING EVENTS

February 22 2001: *Can Australian Native Plants be Weeds? – A seminar presented by the Weed Science Society of Victoria Inc.*

Monash University, Clayton Campus, Victoria

For more information, phone the Weed Science Society of Victoria on (03) 9576 2949

March 23-25 2001: *5th Biennial Australian Plant Seminar – A Celebration of the Beauty and Diversity of Australian Plants.*

Karwarra Australian Plant Garden, Mt. Dandenong Tourist Road, Kalorama, Victoria.

For further details phone Marilyn Gray at Karwarra Garden on (03) 9728 4256.

April 25-29, 2001: *The 16th Annual Symposium of the U.S. Chapter of International Association Landscape Ecology (US-IALE) - Pattern, Process, Scale, & Hierarchy: Interactions in Human-Dominated and Natural Landscapes*

Arizona State University, Tempe, Arizona, USA.

The conference has a special emphasis on landscapes that have been most profoundly modified by humans.

Details are available on the Symposium web site at

<http://www.west.asu.edu/leml/iale2001>

June 6-8, 2001: *Third International Conference on Ecosystems and Sustainable Development:*

ECOSUD 2001

Alicante, Spain

ECOSUD 2001 is the third international conference in the series on Ecosystems and Sustainable Development. The meeting will provide a forum for the presentation and discussion of recent work on the engineering and modelling aspects of ecosystems and sustainable development.

Special sessions being planned include ecological modelling, conservation, management and recovery of endangered and degraded areas and sustainable development.

<http://wfscnet.tamu.edu/jobs/conf/conf274.htm>

July 5-8, 2001: *Fenner Conference on the Environment - Biodiversity Conservation in Freshwaters: Same Landscape, Different Perspective*

Canberra

Providing adequate freshwater to meet the needs of human health and posterity is looming as the challenge of the 21st century

This conference will provide a forum for fresh approaches and perspectives on biodiversity conservation in freshwaters and other inland

aquatic ecosystems, both modified and unimpacted, and on policies for biodiversity conservation and management.

For further information please visit <http://aerg.canberra.edu.au/fenner>

June 21 – 22 *Remnant Vegetation and Planning Conference*

St Leonards, New South Wales

Draft Topics include:

-The Environment Protection and Biodiversity Conservation Act and remnant bushland

-Greenfields development and the threats from "urbanisation of the countryside"

-Incentives and disincentives for remnant vegetation conservation

For further information contact:

Samantha Newton

Nature Conservation Council of NSW

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July 16-20, 2001: *Detecting Environmental Change: Science and Society*

London, U.K.

This Conference will focus on applications involving the detection and understanding of long-term changes in natural and disturbed environmental systems. It will review methods of environmental change detection across different disciplines by bringing together scientists and stakeholders concerned with monitoring in terrestrial, freshwater, marine hydrological, atmospheric, and social systems.

For further details see the conference web site at

http://www.nmw.ac.uk/change2001/dec2001_home.htm

Urban Spotlight

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