SCHOOL OF RESOURCES, ENVIRONMENT & SOCIETY

2003 YEARBOOK

FACULTY OF SCIENCE

THE AUSTRALIAN NATIONAL UNIVERSITY

About this Yearbook

The Australian National University's School of Resources, Environment & Society 2003 Yearbook introduces SRES' staff, graduate and Honours students, their work over the past year, and overviews SRES' teaching programs. Further information is available online at http://sres.anu.edu.au, and in SRES' companion Undergraduate and Graduate Programs Handbooks.

About the ANU's School of Resources, Environment & Society

The ANU's School of Resources, Environment & Society is a significant national and international centre for learning and research. In mid-2003, the SRES community comprised 17 academic staff, 14 research and visiting fellows, 10 support staff, 89 graduate and 23 Honours students, and around 400 undergraduates enrolled in one or more of our courses.

SRES' focus is on the relationships between people and the environment: how societies shape and are shaped by the environment, how societies manage and use natural resources, and how people impact on the environment. SRES draws on both the natural and social sciences to address these issues. Our staff, students and graduates work together in undergraduate and graduate coursework programs that record high levels of satisfaction and employment, and in world-leading research, to help governments, businesses, communities and individuals address the many challenges of sustainability.

SRES' activities in teaching and learning are organised around four undergraduate Program areas - Forestry, Geography, Human Ecology, and Resource and Environmental Management - and in related graduate coursework and research degree programs. At the undergraduate level, SRES offers BA, BSc, BSc(Forestry), BSc(Resource and Environmental Management) and associated joint degrees; at the graduate level, SRES offers programs leading to Graduate Certificate, Graduate Program Diploma, Masters and PhD degrees. These are summarised on pages iv-v of this Yearbook and detailed in SRES' Undergraduate and Graduate Handbooks, available in hardcopy and at our web site.

The research work of SRES staff and students is diverse and wide-ranging, but united by its focus on addressing the challenges of sustainability. Most of SRES' research is conducted in partnership with national and State agencies, businesses, communities and landowners, ensuring its relevance and maximising the benefits of research outcomes.

SRES also works closely with partner Schools, Centres, Departments and Institutes within the ANU - particularly those in the Faculties of Science and Arts, the Centre for Resource and Environmental Studies, with the National Centre for Development Studies, and with the National Institute for Environment - to achieve synergies and efficiencies.

SRES celebrated its second birthday in July 2003. During our second year, SRES staff and graduate students maintained their high international and national profiles and productivity, publishing 3 books and 50 book chapters and journal papers; they developed and delivered innovative undergraduate courses, and attracted c$1.5 M in new external grants to support both staff and student research. Some 12 graduate students, 17 Honours students, and numerous undergraduates completed their degrees. SRES' achievements in the past year are reviewed in the Head's report on pages vi-vii of this Yearbook.

If you're interested in working with SRES, in collaborative learning or research, please contact us to discuss how we might progress our common interests in addressing the challenges of sustainability.

Professor Peter Kanowski

Head of SRES

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HOW TO CONTACT US

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Student Programs Administrator	Ms Panit Thansongsana
Graduate Program Advisor	Dr Richard Greene
• Geographical Sciences	Dr Peter van Diermen
Undergraduate Program Convenors	
• Forestry	Dr Cris Brack
• Geography	Dr Richard Baker
• Human Ecology	Mr David Dumaresq
• Resource & Environmental Management	Dr John Field
Honours Convenors	
• Forestry	Dr John Field
• Geography	Mr Ken Johnson
• Human Ecology	Mr David Dumaresq
• Resource & Environmental Management	Dr Chris Tidemann
Sub-dean	Dr John Field

FOR FURTHER INFORMATION

Prospective undergraduate students should see:

- The ANU Undergraduate Prospectus
- The Faculty of Science Information Guide
- The Forestry, Geography, Human Ecology and Resource & Environmental Management brochures, handbooks, and fact sheets

Prospective graduate students should see:

- The Graduate School Prospectus and the The Graduate School Prospectus Coursework Edition
- The Handbook for Graduate Programs in Resource Management & Environmental Science and Geographical Sciences

This and other information is available from the School and on line:

- for general ANU information and prospectus: http://www.anu.edu.au/
- for SRES, Forestry, Geography, Human Ecology and Resource & Environmental Management information, handbooks and fact sheets: http://sres.anu.edu.au/

Many of SRES' new students on an introductory field class overlooking Canberra, March 2003

SRES offers a range of single and joint undergraduate and graduate degree programs:

- Bachelor and Honours degrees in Forestry and Resource & Environmental Management;
- Geography and Human Ecology programs as part of Bachelor or Honours degrees in Arts or Science;
- coursework graduate programs leading to Graduate Diploma or Master degrees;
- graduate research degrees at Master or PhD level.

All programs are available full- or part-time, and are described in the respective Handbooks, available from us or online at http://sres.anu.edu.au

UNDERGRADUATE DEGREES

1. BSc (Forestry)

The four-year BSc(Forestry) degree:

- offers students a challenging education in forest science and forest management, with broad application in environmental science and resource management in Australia and abroad.
- is directed primarily to educating forest scientists and professional foresters, but its graduates are also attractive to a wide range of employers in environmental science and resource management.

The curriculum comprises:

- the basic physical and biological sciences relevant to forest ecosystems,
- the applied sciences and technologies which support sustainable forest management,
- their application in the context of the political, economic and social dimensions of resource use,
  and emphasises:
  - field-based learning,
  - combining a broadly-based education with specific professional development,
  - opportunities for specialisation.

2. Geography and Human Ecology – BA, BSc and associated joint degrees

All courses offered by SRES can be taken as part of a BSc degree, and all Geography and Human Ecology courses have status for the BA degree. Geography and Human Ecology courses offer students the opportunity to explore a wide range of human - environment issues.

The programs:

- stress the importance of literacy and numeracy, graphical, verbal and analytical skills, and competence in report preparation and presentation;
- include an integral fieldwork component in most courses.

The programs have particular strengths in:

- agroecology
- development studies
- GIS applications
- environmental history
- environmental policy and planning
- human ecology

3. BSc (Resource & Environmental Management)

The three-year BSc(ResEnvMan) degree:

- offers students the opportunity to develop an individually-structured program which best meets their interests in the environmental sciences and resource management;
- comprises a small core of units, around which students can develop knowledge of a diverse range of themes, including:
  - environmental policy
  - forest science
  - geographic information systems
  - regolith studies
  - soil conservation & land management
  - sustainable agriculture
  - vegetation management
  - wildlife science
  - land management

4. BSc (Forestry) jointly with BEconomics, BSc, BA, BA(Visual), BAsianStudies, BCom, BInfoTech
These five-year double degrees:

- complement and enhance the Forestry program by combining it with economics or a range of specialist science topics,
- offer graduates particular employment opportunities which capitalise on these complementarities.

5. BSc(REM) / LLB
The five-year joint Bachelor of Science (Resource & Environmental Management) / Bachelor of Laws links these two complementary degrees, and is well suited to students wanting to develop careers in the emerging fields of environmental regulation.

6. Honours degrees
Each of the degree or double degree programs can be taken with Honours, requiring:

- achievement of sufficient academic standard in coursework, as the basis for admission,
- completion of an individual research project,
- an additional year of study, or - for the Forestry program only - concurrent enrolment in Honours in the fourth year of the degree.

Honours degrees can offer graduates a competitive edge in employment, and direct admission to MSc or PhD programs.

GRADUATE DEGREES

SRES offers:

1. Coursework-based programs

- Graduate Certificate in
  - Forestry
- Graduate Diploma in
  - Science
  - Resource & Environmental Management

(One year of coursework)

- Master of
  - Geographical Sciences
  - Forestry
  - Resource & Environmental Management

(One year of coursework and individual research)

2. Research-based programs

- Master of Philosophy. Two years of individual research
- PhD. Three years of individual research

NON-DEGREE PROGRAMS

We offer a range of non-degree programs - including workshops, lecture series and short courses - on a variety of topics

Contact us for further information

SRES in 2003

SRES celebrated its second birthday in July 2003. This section summarises our achievements in SRES' second year, and our priorities for the year ahead.

The past year

SRES staff continued to focus on the ANU's core activities of research and teaching, both individually and in collaborative partnerships with our students and with colleagues across and outside the ANU. SRES' research activities, measured against criteria such as publications output, numbers of research students, and success in attracting external funding, continue to strengthen. Significantly revised curricula for undergraduate and coursework graduate students reflect both the further development of innovative approaches to teaching and learning, and of increased collaboration both within SRES and with other partners at ANU, such as the National Centre for Development Studies' Environmental Management and Development Program. SRES staff and students continued to play strong roles in the ANU's National Institute for Environment, including in NIE's Environmental Knowledges Forum for new students in the environment, and the NIE workshop on Social Learning for Sustainability.

The working environment for SRES students - particularly graduates - was greatly enhanced by renovations to our buildings, which also allowed iCAM - ANU's Integrated Catchment Assessment and Management Centre, jointly supported by SRES and ANU's Centre for Resource and Environmental Studies - to co-locate to new premises in SRES. The ANU also commissioned architects to design, in a collaborative process with SRES staff and students, a signature building to link the current Forestry and Geography buildings and act as a hub for the Environment at ANU.

In the wake of the devastating January 2003 bushfires in and around Canberra, SRES staff and students worked in various ways with the ACT government and community to address both immediate and longer term challenges.

SRES staff and students

In July 2003, the SRES community comprised 17 academic staff, 14 research and visiting fellows, 10 support staff, 89 graduate and 23 Honours students, and around 400 undergraduates enrolled in one or more of our courses.

Staff changes and notable achievements in the past year included:

* Professors Val Brown (sustainability) and Neil Gunningham (environmental regulation) joined SRES;
* Rob Dyball was appointed to a fractional lectureship in Human Ecology;
* Robin Tennant-Wood joined SRES as a Visiting Fellow;
* Dr Richard Baker was awarded a VC's Teaching Award, was a finalist for a National Teaching Award, and was promoted to Reader;
* two new i-learning courses - SRES1001 Resources, Environment & Society (Dr Richard Baker and Dr Alastair Greig (Sociology, Faculty of Arts)) and GEOG2016 Introduction to Greenhouse (Dr Jeanette Lindesay (CRC-Greenhouse Accounting) and Dr Brendan Mackey) were developed and delivered;
* three books were published with significant SRES staff input: *Leaders and Laggards: Next Generation Environmental Regulation* (Neil Gunningham and Darren Sinclair); *Wildlife, Fire and Future Climate: a Forest Ecosystem Analysis* (Brendan Mackey, Malcolm Gill and Janette Lindesay, with David Lindenmayer and Michael McCarthy); and *Grass Roots & Green Tape - Principles and Practices of Environmental Stewardship* (Anna Carr);
* SRES staff and students published 50 refereed research papers or the equivalent in 2002;
* Professor Neil Gunningham was awarded an ARC Linkage Grant, "Regulatory design for water quality management in urban catchments", with a value of $324,000;
* Professor Peter Kanowski and colleagues from partner institutions, including CSIRO and South Africa's CSIR, were awarded a $1M research grant from ACIAR to develop eucalypts better suited to marginal farmlands in Australia and South Africa;
* Dr Chris Tidemann received $100K from the ACT Government to support development of his newly-patented trap for feral birds;
* SRES staff and students played significant roles in four current Cooperative Research Centres (Greenhouse Accounting, Landscape Evolution and Mineral Exploration, Sustainable Production Forestry, and Vertebrate Pests);
* Dr Geoff Cary and Dr Ross Bradstock (NSW National Parks and Wildlife Service and SRES Visiting Fellow) were closely involved in the successful Bushfire CRC bid;

* Dr Ryde James became and inaugural member of the Advisory Board of ACT Forests, and Dr Brendan Mackey an inaugural member of Catholic Ecocare Australia;
* Dr Brian Turner retired in December 2002 after 18 years of distinguished contributions to and achievement at ANU. Brian continues to work in SRES as an emeritus research fellow;
* Dr Jürgen Bauhus accepted the Chair in Silviculture at the University of Freiburg after six years of significant contribution to and achievement at ANU;
* Dr Anna Carr, who was a research fellow appointed jointly with CRES, accepted an appointment at the University of Surrey;
* Shirley O'Reilly retired in conjunction with the Forestry library's incorporation into the ANU's Hancock Library.

Student achievements

SRES students continued to achieve success in their own right and in collaboration with staff. 8 PhD students - Dominic Kain, Chris O'Hara, Jeewook Rim, Kate Semple, Doug Somerville, Wengui Su, Lorrae van Kerkhoff, and Kimberley Van Neil - submitted their theses; 4 Masters students by coursework and research completed their degrees; 17 Honours students completed their programs.

The achievements of outstanding undergraduate students were recognised through prizes and awards. Philip Alcorn was awarded a University Medal in Forestry, and Ruth Doran the Janet Elspeth Crawford Prize for the outstanding woman graduate in science. School-level awards in 2002 were:

* ACTION Trust Honours Scholarships - Ruth Doran and Kathryn Edwards;
* Forestry Tasmania Honours Scholarship - Phil Alcorn;
* Howlett Honours Prize in Geography - Ruth Doran;
* Jacobs Medal for Outstanding Field Studies in Forestry- Tony Hunn;
* Schlich Memorial Trust Prize for Forestry- Amy Ho;
* State Forests NSW Prize in Forest Mensuration - Geoffrey Kay;
* WP Packard Prize in Geography - Anna van Dugturen.

The year ahead

SRES will - consistent with the ANU, Faculty of Science, and National Institute for Environment strategic plans - continue to:

* pursue research opportunities, particularly in collaboration with external partners in government and industry, and publish the results of this research;
* develop and deliver innovative, collaborative teaching within the School and across the Faculty and University;
* work with the National Institute for Environment, in particular, to enhance the learning environment for graduate students;
* engage with the wider community through various forms of outreach, including collaborative learning and research.

Professor Peter Kanowski

Head of SRES

July 2003

ACADEMIC STAFF

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P.J. Kanowski. BScForHons(ANU), DPhil(Oxon)

Professor

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A. Letcher.

SRES staff, June 2003

Dr Richard Baker

Geography Program Convenor

Reader
Environmental Policy and Planning, Indigenous Resource Management issues, Environmental Education, University Teaching Methods

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Career Brief

Richard was born and bred in Canberra. In 1981 he was awarded the ANU University Medal for his combined Honours degree in Archaeology and Physical Geography. He then worked as an archaeologist and oral historian for the NT Museum before completing a PhD in Human Geography at the University of Adelaide. From 1990 to 1993 he was the inaugural head of the People and the Environment section of the National Museum of Australia. He has taught Geography at ANU since 1994. He was awarded the ANU Vice-Chancellor's award for teaching excellence in 1996 and 2002 and was a National Finalist in the 2002 Australian Teaching Awards.

Research, Teaching & Professional Activities

My teaching at ANU has included coordinating the first year SRES course "Resources, Environment and Society" running "Independent Research Project" (an advanced 3rd year research based course) and co-teaching the 3rd year course "Environmental Politics, Policy and Planning". I have carried out research into teaching methods and been invited to speak on teaching related issues at many forums. In 1999 I took up a visiting fellowship at the University of Washington, Seattle Center for Instructional Development and Research. In 2000 I became the inaugural chair of the ANU Teaching Forum, a group of award winning ANU teachers dedicated to promoting excellence in teaching and learning at ANU.

My research focuses on community participation in resource management and environmental policy. I have worked on these issues in Australia and south-east Asia. I have worked in Viet Nam with the IUCN (World Conservation Union) on issues related to community participation in wetlands management. My work in Australia has focused on indigenous communities and land management issues. This has been written up in two recent books:

Land is Life (published in 1999 by Allen and Unwin) which examined the historical and cultural geography of Aboriginal-European relationships since first contact in the Gulf of Carpentaria region of the Northern Territory and *Working on Country* (published in 2001 by Oxford University Press) which examines contemporary Indigenous management of Australia's lands and coastal regions.

Further personal details, links to publications, recent graduate student details and on line articles on teaching methods are available at http://sres.anu.edu.au/people/baker/index.html

Selected Publications

Baker, R.M., Davies J. and Young, E. (eds) 2001. Working on Country: Contemporary Indigenous Management of Australia's Lands and Coastal Regions, Oxford Uni Press

Baker, R.M. 1999. *Land is Life*: *From Bush to Town - the story of the Yanyuwa people*. Allen and Unwin, Sydney

Baker, R.M. 1999. *Aboriginal Cultural Landscapes*, *Elaine Stratford*, *Australian Cultural Geographies*. Oxford University Press, Geography Meridian series.

Baker, R.M. 1997. Landcare: Policy, Practice and Partnerships: *Australian Geographical Studies*, 35(1) 61-73.

Baker, R.M. 1996. Coming In: The Yanyuwa as a case study in the geography of contact history, 123-166, in Chapman, V. and Read, P. (eds) *Terrible Hard Biscuits*. Allen and Unwin, Sydney.

Baker, R.M. 1996. Landcare groups and university students working together, in V. Brown (ed.), *Landcare Languages*: *A Communication Manual for Landcare*. Canberra, Commonwealth of Australia, 128-134.

Baker, R.M. 1996. "*Supertuts*", "*Yes Minister*" *and action research*: *methods to assist geography teaching*. p189-193 in Proceedings of the Commission on Geographical Education, 28th Congress of the International Geographical Union, Centrum voor Educatieve Geografie Vrije Universiteit Amsterdam, The Netherlands, Amsterdam

Selected Student Theses

McGowan, B. 2002. Dust and Dreams: A regional history of mining and community in SE NSW 1850-1914. (PhD thesis).

Gullett, W. 2001. Environmental decision-making in a transboundary context: principles, challenges and opportunities for precautionary environmental impact assessment. (PhD thesis).

Cooper, D. 2000. An unequal coexistence: From 'station blacks' to "Aboriginal custodians' in the VRD, Northern Australia. (PhD thesis).

Gill, N. 2000. Outback or at home? Environment, social change and pastoralism in central Australia. (PhD thesis).

Woodhill, J. 1999. The Landcare paradox: sustaining rural Australia. (PhD thesis).

Ellemor, H. 1999. Place and natural resource management: The case of the Barmah-Millewa Forest, Australia. (PhD thesis)

Cozens, Z. 2003. Aboriginal participation in resource management on the NSW South Coast. (Honours thesis).

Hill, A 2003. Social economies in the Southern Tablelands of NSW. (Honours thesis).

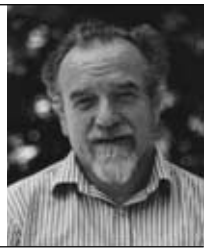
Duus, S. 2002. Dispute resolution in environmental management. (Honours thesis).

Blanch. L. 2001. Good cops, bad cops: contemporary alliances of the Australian environment movement. (Honours thesis).

McMaster, K. 2000. Interpretation for summer recreation in the Kosciuszko Area. (Honours thesis).

Arkle, P. 2000. Physical impact of tourism on the Kosciuszko summit. (Honours thesis).

Dr John Banks



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Dendrochronology, Forest Ecology, Urban Forestry

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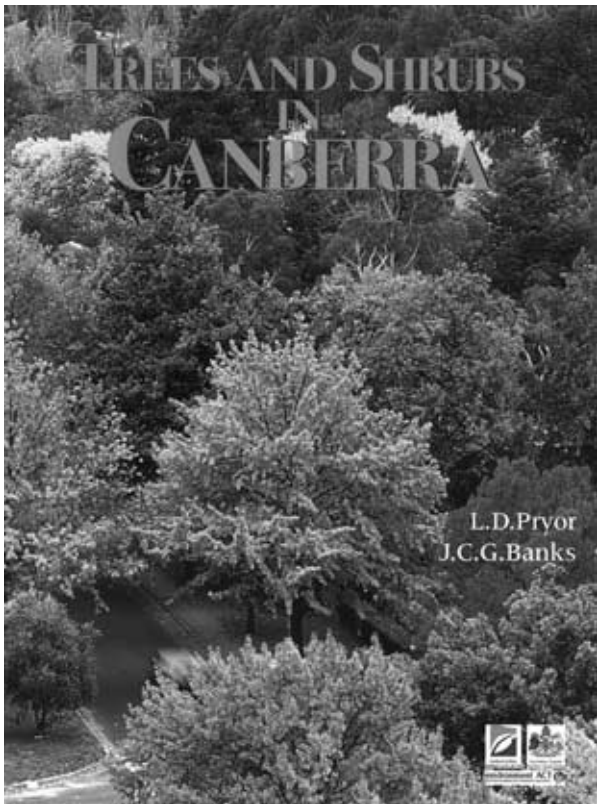
Career Brief

After graduating in Forestry at the Australian Forestry School, John spent three years with Botany and Seeds Section of the Forest Research Institute, Yarralumla, on tree seed collection and provenance studies of Australian trees before returning to ANU to take higher degrees and joining the academic staff at the Department of Forestry, ANU. John have developed skills in dendrology, ecology and dendrochronology and lectured in dendrology and ecology related topics including urban forestry and travelled extensively in the Americas, Asia, Europe and United Kingdom in pursuit of these interests.

Research, Teaching & Professional Activities

My principal research interest is in the use of dendrochronology as a tool for answering questions about trees and their environment. Tree ring studies involve dating the annual growth ring and the study of its chemical and physical attributes to answer such questions as the age of old growth forest and woodland trees, frequencies of forest fire and lethal cold events, dating aboriginal scar trees and performance of trees on disturbed sites, etc. Studies have focussed on the montane forests where trees produce a distinctive annual ring. This work is being progressively extended to other forest and woodland trees and shrubs. I also have a small poplar research program aimed at breeding veneer quality poplar clones for use in farm forestry programs.



Selected Publications

Banks, J. C. G. Brack, C. L. 2002 Canberra's Urban Forest: evolution and planning for future landscapes paper to *Urban Forest and Urban Greening* conference 23-27 Sept. 2002 Copenhagen, Denmark.

Heinrich, I. Banks, J. C. G. 2002 Using the pinning method to track intra-seasonal growth in *Toona ciliata* (Australian Red Cedar) *IAWA Journal* Vol 23 (4) 458

Heady, R.D., Banks, J.C.G., Evans, P.D. 2002 Wood Anatomy of Wollemi Pine (*Wollemia nobilis*, Araucariaceae) *IAWA Journal* Vol 23 (4) 339-357

Banks, J.C.G. and Brack, C.L. 2001. The Wollemi Pine - a captured history. Paper to The Wollemi Pine Rescue Team, Mt Annan RBGS. 9 March 2001.

Eggerton, J.G., Banks, J.C.G. Gibson, A., Cunningham, R.B. and Ball, M.C. 2000. Facilitation of seedling establishment: Reduction in irradiance enhances winter growth on *Eucalyptus pauciflora*. *Ecology* 8(5): 1437-1449

Banks, J.C.G. and Pulsford, I.F. 2000. Dendrochronology and the Australian Cypress Pines. Conference paper to *The Perfumed Pineries*, Coonabarabran, NSW 20-23 Nov. 2000

Cary, G.J. and Banks, G.J.C. 2000. Fire Regime Sensitivity to Global Climate Change: An Australian perspective. Pp.233-246 In *Biomass Burning and its Inter-Relationships with the Climate System*. Innes, J., Beniston, M and Verstraete, M. (eds). Kluwer Academic Pubs. The Netherlands

Banks, J.C.G. 2000. The dendrochronological potential of Australian trees. Ch.12 pages 224-230 In *El Nino History and Crisis Studies from the Asia Pacific Region*. Grove, R. and Chappell, J. (eds). White Horse Press, Cambridge

Banks, J.C.G. 2000. Mistletoe-host relationships in Silver Fir, *Abies alba* Miller: a dendro-ecological analysis of mistletoe dynamics on a single tree. Conference paper *Dendrochronology and the Third Millenium*, Mendoza, Agrentina 20-24 April 2000.

Selected Student Theses

Ho. A. 2002 Particulate pollution capture by *Eucalyptus elata* Dehn in the ACT. (Honours thesis).

Miller, M. 2002 Defining the inverted treeline. (Honours thesis).

Titheradge, S. 2002 Tree crown dieback of *Fraxinus oxycarpa* cv Raywoodii in Canberra's Urban Forest. (Honours thesis).

Dr Cris Brack

Forestry Program Convenor

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Forest Inventory, Forest Mensuration, Carbon Sequestration and Accounting, Forest Modelling, Forest Planning, Urban Forestry

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Career Brief

As a NSW forestry trainee, Cris completed his undergraduate studies at ANU in 1982. After graduation, he was a field forester in the biggest plantation district in NSW. After three years, he was transferred to Sydney as a forest inventory officer, where he designed inventories and information systems for plantations. He continued his studies on management and inventory with a PhD in Canada and returned to Australia as the Senior Inventory Officer for State Forests of NSW. He joined ANU Forestry in June 1994. Cris has subsequently undertaken extensive research and consultancy work throughout Australia as well as Malaysia, PNG, Germany and USA.

Research, Teaching & Professional Activities

My research interests include the measurement, modelling and the effective use of information about trees and forests. The effective use of the information includes the development of decision support systems for native, urban and planted forests as well as the enhancement of teaching and learning techniques.

I regularly collaborate with Federal and State agencies - including the Australian Greenhouse Office, Bureau of Resource Science, National Forest Inventory, Canberra Urban Parks and Places, Department of Sustainability and Environment (Victoria), Forestry Tasmania, Private Forests Tasmania and others - to develop inventory and decision support systems. These developments include modelling fauna and flora habitat supply; advanced inventory approaches (model-based and unequal probability sampling); predicting tree growth, shape and health; and methods to estimate above ground biomass. I develop these systems at national and local forest scales, as well as in the urban environment. The decision support systems I work with incorporate a range of statistical, visual and artificial intelligence tools. I am also a member of the CRC for Greenhouse Accounting; Chairman of the Research Working Group on Forest Measurement and Information Systems; and Chairman of the IUFRO Group 4.02.03 – Inventories on Successive Occasions.

During 2002 I focused my research on improving our ability to measure the multiple values of forests - especially biomass and carbon sequestration - on local, regional and national scales.

Selected Publications

(see also http://sres.anu.edu.au/associated/mensuration/BRACKPUB.HTM)

Brack, C.L. 2002. Pollution mitigation and carbon sequestration by an urban forest. *Environmental Pollution* 116(1): 195 – 200.

Brack, C.L. and Richards, G.P. 2002. Carbon accounting model for forests in Australia. *Environmental Pollution* 116 (1): 187 - 194.

Brack, C.L. (2002) Comparing total tree volume and growth on similar stands of differing tenure. In *Biomass Estimation*: *Approaches for Assessment of Stocks and Change*. G.P. Richards (Ed). National Carbon Accounting System Technical Report no 27: 91 - 142.

Brack, C.L. (2002) Forecasting Carbon Sequestration from Individual Eucalypt Plantations. In *Biomass Estimation*: *Approaches for Assessment of Stocks and Change*. G.P. Richards (Ed). National Carbon Accounting System Technical Report no 27: 105 - 116.

Brack, C.L. and Richards, G. (2002) Development of a National Forest Model. In *Biomass Estimation*: *Approaches for Assessment of Stocks and Change*. G.P. Richards (Ed). National Carbon Accounting System Technical Report no 27: 133 - 139.

Ozolins, A., Brack, C.L. and Freudenberger, D. 2001. Abundance and Decline of Isolated Trees in the Agricultural Landscape of Central West New South Wales, Australia. *Pacific Conservation Biology* 7(3): 195 – 203.

Selected Student Theses

Ho, A. 2002. Particulate pollution capture and retention by *Eucalyptus elata* (Dehnh) in the ACT. (Honours thesis).

Titheradge, S. 2002. Tree crown dieback of *Fraxinus oxycarpa* cv Raywood in Canberra's urban forest. (Honours thesis).

Ellis, P. 2001. The aerodynamic and combustion characteristics of Eucalypt bark - a firebrand study. (PhD thesis).

Getting into the tree crowns: urban forestry and biomass studies

Dr Geoff Cary

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Fire Science

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Career Brief

Geoff graduated with BApp Sc (Environmental Biology) (Hons), University of Technology, Sydney in 1992 and completed his PhD in ecology at the Research School of Biological Sciences, ANU, in 1998. Since his appointment in 1996, Geoff has been the lecturer in fire science and in environmental modelling and coordinator of the first year forestry field trip.

Research, Teaching & Professional Activities

The Bushfire Cooperative Research Centre was recently announced and Dr Ross Bradstock (NSW National Parks and wildlife Service) and I will coordinate a joint project on fire regimes and landscapes. We plan to investigate the sensitivity of risk of fire to management and to variation arising from geographical variation including terrain, climate, fuel productivity and ignition rates. I continued my affiliation with Dr Bob Keane, a research ecologist with the USDA Forest Service, on the application of the Australian FIRESCAPE fire regime model in a northern Rocky Mountain ecosystem, and colleagues from GCTE (Global Change in Terrestrial Ecosystems) Task 2.2.2 (Relationships between global change and fire effects at the landscape scale). The latter project is funded by the US National Centre for Environmental Analysis and Synthesis and we held our final meeting in Santa Barbara, California in February, 2003.

Along with Drs Lindemayer and Dovers, I co-organised the ANU Fire Forum, a significant two-day meeting of influential fire researchers, managers and policy experts attended by over 200 participants discussing key research questions in areas of ecology and environment, fire behaviour and fire regime science, people and property, institutional arrangements and the law, and indigenous land management. The ANU Fire forum was an initiative of the DVC (Research), who provided significant funding, and was opened by the Federal Minister for Science and Ngunawal Elders.

I continued teaching courses in Fire and the Australian Environment, Modelling for Environmental Management, and First Year Field Studies. Next year will see a major review and expansion of the fire science curriculum taught at ANU. Fire weather and behaviour will be taught as part of a second year unit focusing on weather, fire and hydrology. A new third year fire science unit will address fire prediction and modelling, environmental interactions and fire ecology.

Precribed fire for fuel reduction in urban bushland

Selected Publications

Keane, R.E., Cary, G.J. and Parsons, R. (In press) Using simulation to map fire regimes: An evaluation of approaches, strategies and limitations. *International Journal of Wildland Fire* (In Press).

Cary, G.J. 2002. Importance of a changing climate for fire regimes in Australia. In *Flammable Australia*: *The Fire Regimes and Biodiversity of a Continent*. (Eds R.A. Bradstock, A.M. Gill, J.E. Williams). Cambridge University Press.

McCarthy, M.A. and Cary, G.J. 2002. Fire regimes of landscapes: models and realities. In *Flammable Australia*: *The Fire Regimes and Biodiversity of a Continent*. (Eds R.A. Bradstock, A.M. Gill, J.E. Williams). Cambridge University Press.

Bradstock, R.A. and Cary, G.J. 2001. What governs fire regimes ? In: *Proceedings*: *Bushfire 2001. Australasian Bushfire Conference*. 3-6 July 2001, Christchurch, New Zealand.

Richards, R.M., Cary, G.J. and Bradstock, R.A. 2001. The sensitivity of snow gum to fire scarring in relation to Aboriginal landscape burning. ? In: *Proceedings*: *Bushfire 2001. Australasian Bushfire Conference*. 3-6 July 2001, Christchurch, New Zealand.

Cary, G.J. 2000. What technology can do. In: *Fire*! *The Australian Experience*, National Acadamies Forum, Australian Acadamy of Technological Sciences and Engineering.

Cary, G.J. and J.C.G. Banks. 1999. Fire regime sensitivity to global climate change: An Australian perspective. In: *Advances in Global Change Research*. (Eds J.L. Innes, M.M. Verstraete and M. Beniston). (Kluwer Academic Publishers: Dordrecht and Boston.).

Selected Student Theses

Pippen, B.G. 1999. Predicting Fine Fuel Moisture in Shrubby Vegetation. (Honours thesis.)

Stein, B. 1999. A Generalised Linear Model for the Occurrence of Corymbia maculata (Spotted Gum) at Kioloa. (Honours thesis.)

Richards, R. 2000. The sensitivity of snow gum to fire scarring in relation to Aboriginal landscape burning. (Honours thesis).

Nguyen, M. 2002. Effects of Fire on Hydrological Processes. (Honours Thesis).

Mr David Dumaresq

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Human Ecology, Agroecology, Sustainable Systems, Transdisciplinary Studies

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Career Brief

David studied physics and maths at the University of Melbourne before moving to philosophy and social theory at the University of Queensland graduating in 1973. He then spent six years in the Philosophy Department in the Research School of Social Sciences here at ANU working on environmental philosophy, ethics, philosophy of science and social theory. During this time he also took up organic agriculture and the practical application of sustainable production systems. During the 1980s he had a range of part-time teaching positions in the Human Sciences program at ANU while also developing and operating commercial organic farms. In 1986 he completed the first international short course on Agroecology, at the University of California, Berkeley and Santa Cruz campuses. From 1987-90 he was a member of the National Executive of the National Association for Sustainable Agriculture, Australia. In 1987 he took up a part-time lectureship in the Human Sciences Program to teach agroecology and sustainable systems. In 1991 he took up a full-time academic position in the Human Ecology Program. He has been Program convener since 1992. He is actively involved with a range of research and extension projects with farmers and with the wider organic agriculture industry.

Research, Teaching & Professional Activities

My research and teaching is based around three main areas.

Investigating sustainable systems, including whole farm systems and measuring environmental, economic and social impacts, in particular the sustainability of alternative management practices, especially organic farming. Within farming systems I am researching particular agroecological interactions between farming operations, plant growth and soil ecological function. I am completing a 10 year project comparing the sustainability of organic and conventional wheat farming in Australia. Across wider agricultural systems operations I am investigating farmer's ecological behaviour and its relationship to the development of regulatory frameworks for national and international sustainable agriculture.

Within urban systems I am involved in the application of sustainability criteria for planning and construction of human scale communities

I am developing the role of transdisciplinary studies in environmental research and teaching. This involves collaboration with graduate students in the investigation of the foundations and methods of interdisciplinary science, the development of transdisciplinary methodologies and their application to postnormal science and the development of policy. These studies include the development of human ecology as an approach to understanding social and ecological linkages.

Thirdly I have maintained a strong interest in environmental philosophy, in particular in the ethics of eating including the relationship between ecologically and ethically sound consumption. Other ethical issues of concern include the development of transgenics and the ownership of life.

Selected Publications

Dumaresq, D & Greene, R. 2001 Soil Structure, Fauna and Phosphorus in Sustainable Cropping Systems. RIRDC 01/130. 44p

Derrick, J.W. & Dumaresq, D. 1999 'Soil chemical properties under organic and conventional management in southern new South Wales' Aust. J. Soil Res., 37, 1047-55.

Dumaresq, D., Greene, R. & van Kerkhoff, L. (eds) 1997 Organic Agriculture in Australia. RIRDC 97/14. 220p.

Dumaresq, D. 1997 'Industry Profile' in Dumaresq, D., Greene, R. & van Kerkhoff, L. (eds) 1997 Organic Agriculture in Australia. RIRDC 97/14: 1-4.

Dumaresq, D. & Greene, R. 1997 'Review of the Organic Industry', in Dumaresq, D., Greene, R. & van Kerkhoff, L. (eds) 1997 Organic Agriculture in Australia. RIRDC 97/14: 95-109.

Dumaresq, D. & Greene, R. 1997 From Farmer to Consumer: the Future of Organic Agriculture in Australia. RIRDC 97/13. 40p

Dann, P., Derrick, J., Dumaresq, D. & Ryan, M. 1996 'The response to superphosphate and reactive phosphate rock by organic and conventionally grown wheat', Aust. J. Experimental Agriculture, 36: 71-78. (C1)

Carruthers, G. & Dumaresq, D. 1994 'A Controllable and Consistent Method for the Extraction of Soil Fauna', in Pankhurst, C. E. et al (eds) Soil Biota: Management in Sustainable Farming Systems, CSIRO. pp 103-5.

Ryan, M., Chilvers, G. & Dumaresq, D. 1994 'Colonisation of wheat by VA-mycorrhizal fungi was found to be higher on a farm managed in an organic manner than on a conventional neighbour', Plant and Soil 160:33-40.

Mr Robert Dyball

Lecturer
Human Ecology, social learning and change, complex adaptive systems

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Career Brief

Robert grew up in London, England, escaping to Australia in 1981. In Sydney he worked for the NSW Tourism Commission and completed first year Philosophy and Anthropology at the University of Sydney. In 1994 he transferred to Canberra and the ANU, majoring in Philosophy and Human Ecology and graduating with Honours in Human Ecology in 1998. A PhD candidate with the Centre for Resource and Environmental Studies (CRES) Robert has since 1999 been involved in lecturing in the Human Ecology Program. He co-lectures in Human Ecology, Sustainable Systems and Ecology and Social Change and convenes Urban Ecology. Robert has also recently worked as a consultant to the ACT Government's Department of Planning and Land Management (PALM) on urban sustainability issues. He has worked on urban water issues with the Asia Pacific Network and has been involved in a pilot study on materials stocks and flows analysis for Canberra and region - a joint project of the University of Canberra and the Nature and Society Forum.

Research, Teaching & Professional Activities

Current research is on the dynamics of change in human-ecological systems over the very long term, using the rise of the City of London as a case study. I am exploring the extent to which complex adaptive system models are useful aids to understanding patterns of change in such systems.

I am also editing and writing a book *Social Learning for Sustainability*: *Beyond Boundaries* with Meg Keen and Val Brown. This book explores the learning processes needed to accompany the complex social and biophysical changes integral to the transition to sustainability. Through the lens of social learning at the individual, group, community, society and planetary scales, the book draws on a wide range of disciplines and professions in a transdisciplinary approach to linking theory and practice.

Sustainable urban development: O'Connor wetlands

Dr John Field

Sub-Dean, Forestry Honours Convenor, Resource and Environmental Management Convenor

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Earth sciences, farm forestry, soil formation and management, regolith and landscape evolution, sustainable land management

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Career Brief

I grew up in Sydney and was educated at Sydney Boys High, and then the UNSW where I studied geology, geomorphology and pedology at UNSW, completing a 4 year concurrent Honours in Science in 1973. I moved to UNE at Armidale and wrote a PhD on the hydro-bio-geochemistry of small rural catchments. After 6 years' teaching in the Faculty of Natural Resources at UNE, I joined CRA (now RTZ) Exploration in Canberra as an in-house geomorphologist / consultant in their Research Group. In 1986, I joined the then ANU Forestry Department to teach soils to forestry and resource management students. I own and manage a grazing property on which I am practising what I preach by planting trees to demonstrate the integration and viability of agroforestry and farm forestry while maintaining successful cattle, sheep and goat enterprises. I continue to act as a consultant and advisor to the landcare, agricultural, forestry, mining and land development industries. I am also very interested in student services at ANU and advise students on degrees, courses and careers as sub dean to the School.

Research, Teaching & Professional Activities

Soils and landscapes, and any aspect of their formation, evolution and management is a fair summary of my research interests. In this context, I was a founding member of the CRC LEME Mk I and Mk II (Landscape Environment and Mineral Exploration) and continue to work with them in regolith and landscape evolution research and applications.

My fundamental interest in agriculture and forestry is the critical relationship that exists between plants (trees) and soil - the ways in which soil controls the growth of plants, but also the effects that trees have on the formation and evolution of soils and regolith. Other biotic factors are important to the formation and evolution of soils. Regolith and landscapes and these are also subject of my research and that of the postgraduates I supervise.

I have a continuing interest in multipurpose and sustainable utilisation of trees in agricultural and forest land management, planning and development. To this end I lead a major RIRDC funded project on "The Management of Privately Owned Dry Sclerophyll Forests". I am also interested in the "intangible values" of privately owned forestry and farm forestry including environmental services, capital value of land and aesthetic values.

Units I coordinate, or in which I teach, include: Earth Systems, Australian Soils and Vegetation, Agroecology and Soil Management, Regolith, Soil Resources, Land and Catchment Management and Farm Forestry. All these units are also offered at the graduate level and some are offered in professional, short course and in web based format.

Selected Publications

Newham, L., Buller, C., Barnett,P. and Field, J.B. 2001. *Land-use change assessment tools*. Report to Environment ACT, Canberra

Schirmer, J. & J. Field, 2000. *The Cost of Revegetation*. Final Report. ANU Forestry and Greening Australia. Environment Australia, Canberra.

Field, J.B. and J.C.G. Banks. 1998. Effects of Silvicultural Treatments on Growth Rates of Trees and Diversity of Understorey in a Private Dry Sclerophyll Forest, Southern Tablelands, NSW. *Practising Forestry Today*, 18th Biennial IFA Conference, Hobart.

Selected Student Theses

King, C.A. 2002. Evaluating the tangible and intangible values of privately owned dry sclerophyll forest, Southern Tablelands, New South Wales. Hons thesis, SRES, ANU, Canberra

Anderson, G.R. 2001. The influence of macro and meso biota on regolith development and evolution in a dry sclerophyll forest. Hons thesis, SRES, ANU, Canberra

Barnett, P. 2000. Assessing the degradation of function in ecosystems affected by dryland salinity. Hons thesis, Dept Forestry, ANU, Canberra

Otsub, M. 2000. The effects of farm forestry on public roads within the southern tablelands of New South Wales. Hons thesis, Dept Forestry, ANU, Canberra.

Webb, R. 2000. Commercial native species selection for farm forestry on the southern tablelands of New South Wales. Hons thesis, Dept Forestry, ANU, Canberra.

Scown, J. 1999. The influence of livestock dung on earthworm distribution. Hons thesis, Dept Forestry, ANU, Canberra.

McIntosh, C. 1999. Rock weathering, soil formation models and the implications for mineral exploration at Boorowa, NSW. Hons thesis, Dept Forestry, ANU, Canberra

O'Grady, C.M. 1999. Community participation in NSW local government land use policy development processess: Implications for farm forestry. Hons thesis, Dept Forestry, ANU, Canberra.

Dr Richard Greene

Academic Advisor in RMES

Senior Lecturer
Soil and Land Management

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Career Brief

Richard grew up in Perth, Western Australia, with an architect father, and was a keen member of the army reserve and swimmer at Perth's beaches during his university studies. After completing a BSc (with honours in Physical and Inorganic Chemistry) in 1970 from the University of Western Australia, Richard undertook a PhD in Soil Science from 1971-1975, also at the University of Western Australia. He then joined the Victorian Department of Agriculture, and from 1975 to 1985 worked as a soils research officer at the Irrigation Research Institute, Tatura. Then from 1985 to 1993, he worked as a Senior Research Scientist in the CSIRO Division of Wildlife and Ecology, firstly at Deniliquin, NSW, and later in Canberra, ACT. In 1993 he joined the Australian National University as a Lecturer in Soil and Land Management in the School of Resources, Environment and Society.

Research, Teaching & Professional Activities

Research and consulting experience includes:

Rehabilitation of degraded lands: as a Senior Research Scientist with the CSIRO Division of Sustainable Ecosystems, responsible for supervising investigations into methods of rehabilitating degraded rangelands, and later with the ANU involved with evaluation of rehabilitation techniques used to prevent erosion in alpine and sub-alpine areas.

Development of sustainable cropping enterprises: examples include: (i) potato production in high rainfall areas, (ii) cotton production under irrigation in semi-arid areas, and (iii) dryland cereal production under conventional and organic systems of agriculture.

Minesite rehabilitation: at Woodlawn mine co-supervision of research projects investigating (i) methods to stabilise the rock dump, and (ii) effects of acid mine drainage on bioreactors.

Research on aeolian dust implications: as a member of the Cooperative Research Centre for Landscape Environments and Mineral Exploration (CRCLEME), responsible for investigating how aeolian dust accessions can (i) be detrimental to mineral exploration by masking underlying ore deposits, and (ii) contribute to environmental problems of erosion and salinity.

Carbon Sequestration: with other staff from the CRC for Greenhouse Accounting, supervising two PhD students researching the effects of land management on carbon sequestration.

Other Experience

• Consultancies with TRANSGRID on erosion evaluation and EMBRAPA (Brazilian federal research organisation) on management of hardsetting soils.

• Author of approximately 50 refereed publications in clay colloid chemistry, amelioration of soil structure, rehabilitation of degraded lands, and the development of sustainable cropping systems.

• Invited keynote speaker at international conferences on vegetation patterning, erosion processes and management of hardsetting soils.

• Currently federal president Australian Association of Natural Resource Management and member of the McKell Medal Committee for Landcare.

• Funding from competitive research grants from the NSCP, RIRDC, HRDC, ARC.

My current research supervision includes seven PhDs, one masters and three honours students. I also lecture in five undergraduate courses in soil/land/regolith management.

Selected Publications

Butterworth R., C.J. Wilson, C.J., Herron, N.F., Cunningham, R.B., and Greene, R.S.B. (2000). Geomorphic controls on the physical and hydrologic properties of soils in a confined stream valley in NSW Australia. *Earth Surface Processes and Landforms* 25, 1161-1179.

Greene, R.S.B., Valentin, C. and Esteves, M. (2001). Runoff and erosion processes. In *Banded Vegetation Patterning in Arid and Semi-arid Environment-Ecological Processes and Consequences for Management*. (Eds. C. Valentin, D. Tongway, J. Seghieri and J.M. d'Herbes), Springer-Verlag. *Ecological Studies* 149. (pp. 52-76).

Greene, R.S.B., Gatehouse, R., Scott, K.M., and Chen, X.Y. (2001). Symposium report: Aeolian dust-implications for Australian mineral exploration and environmental management. *Australian Journal of Soil Research*, 39, 1-6.

Valzano,F.P., Murphy, B. W. and Greene,R.S.B. (2001). The long-term effects of lime (CaCO3), gypsum (CaSO4.2H2O), and tillage on the physical and chemical properties of a sodic red brown earth. *Australian Journal of Soil Research*, 39, 1307-1331.

Valzano, F.P., Greene, R.S.B., Murphy, B.W., Rengasamy, P., and Jawal, S.D. (2001) Effects of gypsum and stubble management on the chemical and physical properties of a sodic grey vertosol in Western Victoria *Australian Journal of Soil Research*, 39, 1333-1347.

Greene, R.S.B. (2001). Hardsetting soils. In: *The Encyclopedia of Soil Science*. (Ed. R.Lal). Marcel Dekker, Inc.

Greene, R.S.B., Eggleton, R.A. and Rengasamy, P (2002). Relationships between clay mineralogy and hardsetting properties of soils in the Carnarvon Horticultural District of Western Australia. *Applied Clay Science* , 20, 211-223.

Greene, R.S.B., and Hairsine, P. (2003). Elementary processes of soil-water interaction and thresholds in soil surface dynamics: a review. *Earth Surface Processes and Landforms* Special Issue. 'Soil Surface Characteristics: dynamics and impact on soil erosion' (Eds Auzet A.-V., Poesen J., Valentin C) (In press).

Johnston, S.W. Greene, R.S.B., Banks, J.C.G., and Good, R.B. (2003) principles of ecosystem function and sustainability in alpine ecosystems: studies in the tall alpine herbfield community in the Kosciuszko alpine area of NSW, Australia. *Proceedings of International Conference on Alpine Ecosystems*. (In press).

Mays, M.D., Nettleton, W.D., Greene, R.S.B., and Mason, J.A. (2003). Dispersibility of glacial loess in particle size analysis, USA. *Australian Journal of Soil Research*, 41, 229-244.

Mason, J.A., Jacobs, P.M., Greene, R.S.B., and Nettleton, W.D. (2003). Sedimentary aggregates in the Peoria loess of Nebraska, U.S.A. *Catena* (In press).

Little, S.A., Hocking, P.J., and Greene, R.S.B. (2003). A preliminary study of the role of cover crops in improving soil fertility and yield for potato production. *Communications in Soil Science and Plant Nutrition*. (In press).

Professor Neil Gunningham

Environment regulation, management and policy

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Career Brief

Neil Gunningham obtained the degrees of LLB (Hons) and MA (Criminology) from the University of Sheffield, UK, and is a Barrister and Solicitor (ACT). He also holds a PhD from the ANU. Although initially trained in law, his subsequent post-graduate work was in interdisciplinary social science, and for the last ten years he has applied that training principally in the area of environment, with a focus on regulation. He joined SRES in January 2002. Previously he was Foundation Director of the Australian Centre for Environmental Law at the ANU, Visiting and Senior Fulbright Scholar at the Center for the Study of Law and Society, University of California, Berkeley, and Visiting Fellow at the Centre for the Analysis of Risk and Regulation at the London School of Economics. He is also a recent consultant to the Organisation for Economic Cooperation and Development (OECD), to the United Nations Environment Program (UNEP) and to various environmental regulatory agencies in Australia.

Research, Teaching & Professional Activities

My research and teaching interests focus on environmental regulation, management and policy. One strand of my research has been concerned to identify the contribution that broader, innovative forms of regulation can make to environmental law. This includes the potential roles of community participation, information based strategies, environmental partnerships and various forms of co-regulation. I have also sought to explain the interrelation between such mechanisms; and to identify the comparative advantage of different instruments in different institutional, economic and social contexts and to argue the case for developing an optimal regulatory mix.

Another research agenda is to explain why some business enterprises do far more to protect the environment than others, and to understand how regulation could best be designed to address such variability. For example, my work on the pulp and paper industry internationally suggests that improvements in environmental performance over time were associated with increasingly stringent demands from legal and social actors but that remaining variation is associated with 'corporate environmental management style' measured in terms of corporate attitudes, commitments and practices. This raises questions about how and why corporate environmental management styles arise, how they can be facilitated or encouraged by governments, regulators, environmental advocacy organisations or others, and about whether, and under what circumstances, such efforts are likely to succeed.

Most recently, I began researching the effectiveness of current regulatory, quasi-regulatory and other policy strategies for water quality management in urban catchments (including total/integrated catchment management), with a focus on the Swan-Canning river system in Western Australia. This forms part of an ARC Linkages Project in collaboration with a number of government agencies with responsibilities in that area.

Selected Publications

Books:

Gunningham, N Kagan R and Thornton, D (2003). *Shades of Green*: *Business*, *Regulation and Environment*, Stanford University Press, USA.

Gunningham, N and Sinclair D (2002) *Leaders and Laggards*: *Next Generation Environmental Regulation*, Greenleaf, UK.

Gunningham, N. and Johnstone, R. (1999). *Regulating Workplace Safety*: *Systems and Sanctions*, Oxford University Press, UK.

Gunningham, N. & Grabosky, P. (1998) *Smart Regulation*: *Designing Environmental Regulation*, Oxford University Press, UK.

Articles:

Gunningham, (2003) "Voluntary and Negotiated Agreements in Agriculture: Towards a Partnership Approach to Resource Management" *Australasian Journal of Natural Resources Law and Policy* vol 8. No 1, 1-28.

Gunningham & Sinclair, (2002) "Partnerships, Management Systems and the Search for Innovative Regulation in the Vehicle Body Shop Industry" (2002) *Business Strategy and Environment*, 11, 236-253.

Gunningham, (2002) "Regulating Small and Medium Sized Enterprises" *Journal of Environmental Law*, Vol 14 (1), pp1-32,

Gunningham, N. & Young, M. (1997). Mixing Instruments and Institutional Arrangements for Optimal Biodiversity Conservation in *Investing In Biological Diversity*, OECD, Paris, 1997, 141-165.

Mr Peter Isaac

Lecturer
Meteorology, boundary-layer meteorology, surface-atmosphere interaction

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Career Brief

Peter Isaac was born in Scotland in 1956 and emigrated to New Zealand with his family in 1958. His father always said the family got off at the wrong stop and should have continued to Australia but after living here for 8 years, Peter is convinced they got off at the right stop after all.

Peter gained a BSc(Hons) in Physics from the University of Otago, NZ, in 1977 and immediately started work as a labourer. Following career advice from his mother, he sought employment with the Physics Dept., University of Otago, in 1979. When the funding dried up, he moved on to The New Zealand Meteorological Service in 1982, completed the meteorologist training course in 1984 and worked as a research meteorologist until NZ science was restructured in 1992. From 1992, Peter worked as a scientist for the National Institute for Water and Atmospheric Research (NIWA) in New Zealand before a rush of blood to the head caused him to enrol as a PhD student at Flinders University of South Australia in late 1994. He is still writing up his thesis, in between stints as a full-time carer for his 2 young children, a wage earner and a short-term lecturer at ANU.

Research, Teaching & Professional Activities

My primary research area is boundary-layer meteorology but an increasing amount of time is being spent on researching ways to find both time and money to continue in my primary research area. Based on current activity, this secondary research area became the primary area some time this semester.

Within the field of boundary-layer meteorology, my main areas of work have been modelling the impact of industrial emissions on air quality, and, more recently, the exchange of heat, moisture and CO<sub>2 between the surface and the atmosphere at regional scales. My recent research into these regional scale fluxes is stimulated by the desire to contribute to an estimation of the CO<sub>2 source and sink strengths of the Australian biosphere at the continental scale in near-real time. This in turn comes from the belief, perhaps mistaken, that government policy may be better and better targeted if the error bars on the current inventory estimates are reduced.

Being an empiricist at heart, my chosen technique would be direct measurement but, being a realist by conditioning, I accept that the task requires both modelling and measurement in order to cover the range of spatial and temporal scales at which the relevant processes occur.

My particular interest in this field is the use of research aircraft as an instrument platform that can be used to span the gap between the spatial scales of point measurements (~100s m<super>2) and those of remote sensing (~100s km<super>2) and to link the different types of data recorded by point measurements (fluxes of heat and mass) and remote sensing (spectral radiances). Establishing this link allows surface fluxes to be inferred from a combination of point measurements, remotely sensed estimates of model parameters controlling the fluxes at regional scales and a coupled mesoscale/surface interaction model that uses these parameters and real-time assimilation of the available point measurements.

This semester I have taught a first year course called "Introduction to Global Change", a second year course called "Atmosphere, Weather and Climate", contributed to another first year course called "Earth Systems" and delivered 2 presentations to audiences of both staff and students. The first year course has been particularly challenging, since the freedom to create the course carried with it the workload required to generate the course material. This has sometimes frustrated my efforts to be a more effective teacher and to improve the units on offer by adopting different course structures and assessment models. As always, though, the students have been the saving grace with their seemingly boundless ability to inspire and exasperate in equal measures.

Selected Publications

Isaac, P.R., McAneney, J, Coppin, P and Hacker, J, 2003: Comparison of Aircraft and Ground Based Flux Measurements During OASIS95. *Boundary-layer Meteorology* (In Press)

Isaac, P.R., Leuning, R and Hacker, J, 2003: Estimation of Regional Evapotranspiration by Combining Aircraft and Ground Based Measurements. *Boundary-layer Meteorology* (In Press)

R. Leuning, Raupach, M.R., Coppin, P.A.,Cleugh H.A.,Isaac, P.R.,Denmead, O.T.,Dunin, F.X.,Zegelin, S. and Hacker J., 2003: Spatial and temporal variation in fluxes of energy, water vapour and carbon dioxide during OASIS 1994 and 1995. *Boundary-layer Meteorology* (In Press).

Wang, Y.-P., Leuning, R., Isaac, P.R. and Guoyi Zhou, 2001: Scaling the estimation of maximum canopy conductance from patch to region and comparison with aircraft measurements, In *Proceedings of the Forests at the Land-Atmosphere Interface Symposium*, October 2001, Edinburgh, UK.

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Fisher, G.W., Isaac, P.R. and Bromley, A.M., 1989: An Incident of Clear Air Precipitation. *Weather*, 44(4), 155-159

Professor Tony Jakeman

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Integrated assessment, hydrological modelling and environmental education and training

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Career Brief

Tony Jakeman received his Bachelor of Science with first class honours in Pure and Applied Mathematics from the University of NSW in 1973. He was awarded the PhD in Applied Numerical Analysis from the ANU in 1976. After holding a short-term postdoctoral position in Statistics at the University of Florida, he returned to ANU in 1976 and joined the Centre for Resource and Environmental Studies. In 1997 he helped set up the Integrated Catchment Assessment and Management (iCAM) Centre, a continuing joint initiative of CRES and SRES.

Tony has been President of the Modelling and Simulation Society of Australia and New Zealand since 1987 and is Foundation President of the International Environmental Modelling and Software Society. He is on the Board of numerous academic journals and is Editor-in-Chief of Environmental Modelling and Software, an Elsevier journal. He has undertaken invited study leave at Stanford, Cambridge and Lancaster Universities, as well as at the University of Western Australia, CSIRO Land and Water and the UK Institute of Hydrology (Centre for Ecology and Hydrology).

Research, Teaching & Professional Activities

My research interests are hydrology, environmental systems modelling and integrated assessment of catchment issues to promote more sustainable outcomes. My work in iCAM focuses on developing the relevant disciplinary tools and their integration for this assessment. This problem-oriented work is facilitated by a project focus and networking with other research groups and industrial partners in Australia and internationally.

I have supervised over 30 postgraduate students, predominantly at the PhD level. I am also becoming more involved in the supervision of Honours students.

Selected Publications

Jakeman, A.J., Beck, M.B. and McAleer, M.J. (eds.) (1993) *Modelling Change in Environmental Systems*, Wiley Series on Principles and Techniques in the Environmental Sciences, 584pp. (Hardback). (Paperback version 1995).

Ghassemi, F., Jakeman, A.J. and Nix, H.A. (1995) *Salinisation of Land and Water Resources*: *human causes*, *extent*, *management and case studies*, CAB International and UNSW Press, 540 pp.

Mahendrarajah, S., Jakeman, A.J. and McAleer, M.J. (eds.) (1999) *Modelling Change in Economic-Environmental Systems* (Wiley).

Jakeman, A.J. and Hornberger, G.M. (1993) How much complexity is warranted in a rainfall-runoff model? *Water Resources Research*, 29(8): 2637-2649.

Post, D.A. and Jakeman, A.J. (1999). Predicting the daily streamflow of ungauged catchments in S.E. Australia by regionalising the parameters of a lumped conceptual rainfall-runoff model. *Ecological Modelling*, 123 91-104. Croke, B.F.W. and Jakeman, A.J. (2001).

Predictions in catchment hydrology: an Australian perspective. *Mar. Freshwater Res*, 52: 65-79.

Kokkonen, T.S. and Jakeman, A.J. (2001) Comparing metric and conceptual approaches in rainfall-runoff modelling. *Water Resources Research*, 37: 2345-2352.

Parker, P., Letcher, R. A., Jakeman, A. J. *et al.* (2002) Progress in integrated assessment and modelling. *Environmental Modelling and Software*, 17: 209-217

Jakeman, A.J. and Letcher, R.A. (2003) Integrated Assessment and Modelling: Features, Principles and Examples for Catchment Management. *Environmental Modelling and Software*, *18*: *491-501*..

Kokkonen, T.S., Jakeman, A..J. and Young, P.C. Predicting daily flows in ungauged catchments- model regionalization from catchment descriptors at Coweeta. *Hydrological Processes* (accepted).

Merritt, W.S., Croke, B.F., Jakeman, A.J., Letcher, R.A. and Perez, P. A biophysical toolbox for assessment and management of land and water resources in rural catchments in Thailand. *Ecological Modelling* (submitted).

Kokkonen, T.S. and Jakeman, A..J. (2002) Structural effects of landscape and land use on streamflow response. Chapter 14 In *Environmental Foresight and Models*: *A Manifesto*, M.B. Beck (ed.), Elsevier, Amsterdam, pp.303-321.

Letcher, R.A. and Jakeman, A.J. (2002) Catchment Hydrology, In *Encyclopaedia of Environmetrics*, Volume 1, A.H. El-Shaarawi and W.W. Piergorsch (eds), Vol. 1, pp 281-290, Wiley.

Dr Ryde James

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Career Brief

Ryde began his career in forestry in 1960 with the New Zealand Forest Service, subsequently receiving scholarships from the NZFS and NZ Government to study botany at the Victoria University of Wellington and forestry at the ANU. After graduation, he worked in forest planning at the NZFS Head Office, then as a scientist at the NZ Forest Research Institute. He took leave to obtain a Doctorate from Oxford University. Returning to the NZ FRI, he eventually became Program Manager for the Plantation Management Research Group. Ryde took up his current position in the Department of Forestry, ANU, in 1992.

Research, Teaching & Professional Activities

My research falls into three categories: silviculture and the manipulation of plantation crops, forest planning, and urban forestry.

Recent silvicultural research has involved the analysis of growth response over twenty years to unconventional thinning treatments aimed at restricting the diameter distribution of crop trees; and the influence of tree breeding on the quality of trees and logs in tree crops. I am an associate member of three research groups investigating plantation silviculture: an Australian-wide Farm Forestry program coordinated by the Queensland Forest Research Institute, the CRC for Sustainable Production Forestry and the Breeding Objectives Program of the Queensland Forest Research Institute.

A newly established stand of *Eucalyptus globulus* in Western Australia. Since 1996 the proportion of new plantation forest which has been established in hardwoods has increased markedly.

Forest planning describes activities at a range of scales from the national to the compartment level in the field. My work has concentrated on the higher levels, having been involved, with Dr Brian Turner, in providing the official estimates of wood flows by region, through time, for forest plantations in Australia. This work required the application of forest growth models, yield models and the informed interpretation of outputs from these models.

Urban forestry represents a new research initiative for myself and colleagues, Dr John Banks and Dr Cris Brack. We have developed a computer based management system for urban tree assets with the street as the basic unit and are working on the development of management systems at other levels.

Selected Publications

Turner B and James R, 2002: Derivation of indicative yields for major plantation species. Chapter 5, pp93-111, In Richards G.P. (ed) *Biomass Estimation: approaches for assessment of stocks and stock change*. National Carbon Accounting System, Technical Report 27, Australian National Greenhouse Office.

James, R.N. 2001: Defining the product - Log Grades used in Australia. RIRDC publication 1/161. ISBN 0 642 58380 3, ISSN I 440 6845.

Kramer, H. and James, R.N. 2000. Neuer Wald fur neue stadt. *Forstarchiv* 71:158-164.

Banks, J.C.G., Brack, C.L. and James, R.N. 1999. Modelling changes in dimensions, health status and arboricultural implictions for urban trees. *Urban Ecosystems* 3(1).

James, R.N. 1998. Planted forests - Factors to be considered in planning. In Chan et al. (eds) Proceedings of a conference *Planted forests in Sarawak*. Forest Department Sarawak.

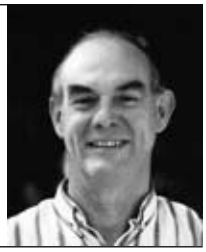
James, R.N. 1998. Evaluation of diameter distribution as a criterion for selecting crop trees in a pulpwood regime. *NZ Journal of Forestry Science* 28(2): 195-201.

Maddern, L. and James, R.N. 1998. The effect of tree breeding on size and utilisation potential of radiata pine in two research trials. *Institute of Foresters of Australia Newsletter* 39: 41-47.

James, R.N. 1997. The effect of thinning regime on production of wood with 'mature' properties in plantation grown radiata pine in NZ. In Népveu, G. (Ed), *Connection between silviculture and wood quality through modelling approaches and simulation softwares*. Conference held under the auspices of IUFRO WP S5. 01-04, South Africa, August 1996.

Turner, B.J. and James, R.N. 1997. *Australian Forest Plantations - How much wood will they produce?* Proceedings of the 4th Joint Conference of the Institute of Foresters of Australia and the NZ Institute of Forestry, April 1997.

Mr Ken Johnson



Geography Honours Convenor

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Career Brief

Ken studied geography and economics at the University of Queensland before moving to a research-teaching position at the University of Glasgow in the Department of Social and Economic Research. During this time his interests focussed on the economics and location of distribution, first of retailing and then wholesaling and intermediate warehousing. As transport systems changed the importance of these activities became paramount. On return to Australia and the Urban Research Unit of the ANU the knowledge gained was extended to research into the processes of urban development, with a particular focus on Melbourne. In this work interests of the research group ranged from the policy and planning of public authorities to processes of residential selection and property markets. Since joining the Department of Geography in 1972 Ken has taught in a wide range of courses from urban geography to the geography of Australia, and, more recently extended to longer term variation in climate as seen in the instrumental record.

Research, Teaching & Professional Activities

Over this wide ranging career my interests have regularly returned to the issues of policy and planning. This involves the institutions and instruments by which our society organises itself. Tracing the changes of policy and planning in both urban and rural areas from the 1950s to the deregulated days of the turn of the century is fascinating. Seeking to interpret and explain the changes for people and the landscapes of the places where we live is a continuing challenge.

Teaching and research have come together from a deep interest in data analysis. Creating information from data has always posed problems and the development of analytical systems has extended the frontiers of teaching and research. My teaching-research program deals with temporal and spatial data. One of the greatest problems facing data analysis is understanding environmental change, and climate in particular. The record is complex and widely applied techniques inflexible and the outcomes not "user friendly," for the wider community. Developing ways of teaching the nonlinear and nonparametric techniques of the 1990s and researching the information the records contain has been a focus of my attention. The challenge of teaching the techniques and the interpretation of the results led to a deep interest in the nature of human intelligence and its development for these ends.

Selected Publications

Johnson, K.M. 1994. Creating place and landscape. Chapter 3 in Stephen Dovers, *Australian environmental history*. Oxford University Press, Melbourne.

Johnson, K.M. 1992. *The AUSMAP atlas of Australia*, Cambridge University Press, Melbourne.

Johnson, K.M. 1991. The long-term variation of seasonal rainfall in the Darling basin. Proceedings of the 2nd Australian conference on agricultural meteorology.

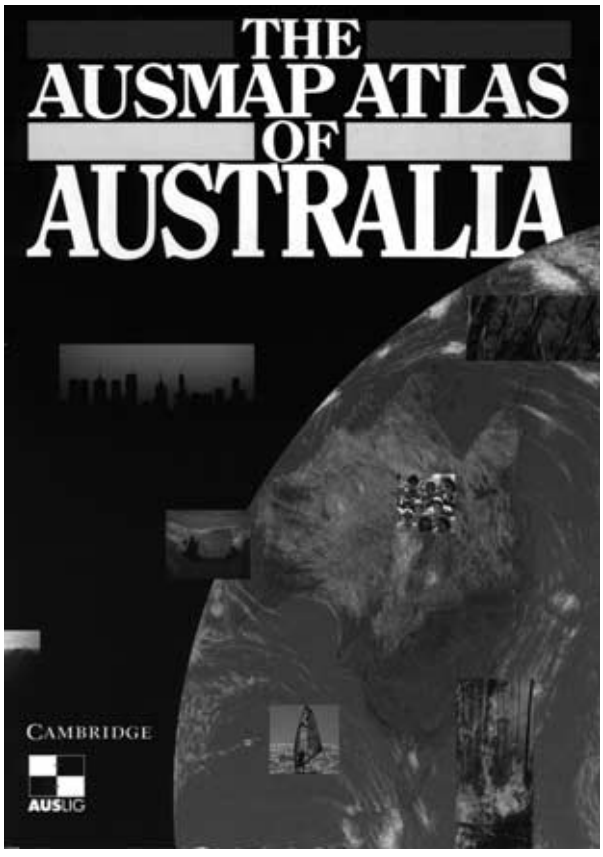
Johnson K.M. and H.C. Garnett. 1970. *The economics of containerisation*. Allen and Unwin, London

Selected Student Theses

Lloyd, A. 1999. Community and environment in the Burra valley of NSW. Honours thesis, Department of Geography, ANU.

Quinn, M.J. 1995. Possessing the west; the public management of the Western Division of NSW. PhD thesis, Australian National University

Lane, R. 1995. Local environmental knowledge and perspectives on change; a case study of the Tumut district. MA thesis, Australian National University



Professor Peter Kanowski

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Career Brief

Peter Kanowski grew up in country Queensland, with a forester father, schoolteacher mother and six siblings - all attributes which helped prepare him for his current role. He was Schlich Medallist at ANU's Department of Forestry and a Rhodes Scholar at Oxford University; his honours and doctoral work were both in forest genetics. Peter worked as both a forest and a research program manager with the Queensland Department of Forestry, before moving to Oxford University's Forestry Institute in 1988, where he lectured in forest policy and forest genetics. He took up the Chair of Forestry at ANU in August 1995, became Head of the Department of Forestry in January 1996, and Head of the School of Resources, Environment and Society in July 2001.

Peter chaired the NSW Southern Regional Forest Forum during its 4-year incarnation and co-facilitated community stakeholder workshops under the NSW Western Regional Assessment process in 2001-2. He is a member of the ACT Bushfire Recovery Taskforce's Steering Committee for the Study into Non-Urban Bushfire Affected Areas.

Research, Teaching & Professional Activities

My research and teaching interests and activities cover both forest policy and forest genetics. My work in policy addresses a range of topics, including plantation and farm forestry, forest conservation and management, and forest policy processes. In association with colleagues in Canberra and elsewhere, I have undertaken reviews of each of these topics – most recently with Jacki Schirmer on plantation privatisation - and attempted to transfer ideas into practice by working with partners in government, industry and non-government and community organisations.

My research in forest genetics began with Honours and Doctoral work in quantitative genetics and its implications for tree breeding strategies. In association with colleagues in Oxford, my interests expanded to cover forest population and conservation genetics; I have written both specific and review papers in each of these topics. As with my work in forest policy, my principal concern is in transferring knowledge and ideas into practice.

Some of my work in both policy and genetics is now part of the research program of the Cooperative Research Centre for Sustainable Production Forestry. My principal current research - with colleagues at ANU, CSIRO, State Forests of NSW, and South Africa's CSIR and University of Stellenbosch, and the support of ACIAR – investigates hybrid eucalypts for marginal farmlands in Australia and South Africa. Other work has been conducted as commissioned studies for agencies such as AFFA, Environment Australia the International Institute for Environment and Development, and the World Bank.

My teaching reflects these diverse interests: I coordinate undergraduate and graduate courses in both forest policy and forest genetics, and contribute to courses in farm forestry. I have also coordinated a series of national and international short courses and workshops in each of these subject areas.

Selected Publications

Kanowski, PJ. 2003. Challenges to enhancing the contributions of planted forests to sustainable forest management. Paper to UNFF Experts Meeting – *Planted Forests*. http://www.maf.govt.nz/mafnet/unff-planted-forestry-meeting/index.htm

Schirmer, J and PJ Kanowski. 2002. Changing ownership and management of State forest plantations: the Australian experience. Paper to DWAF/DfID/FAO/IIED Conference, *Changing ownership and management of state forest plantations*, Capetown, South Africa, 6-8 November 2002. http://www.stateforest.co.za

Kanowski, PJ. 2001. Plantation forestry at the millennium. Chapter 8 in: GM Woodwell (Ed). *Forests in a full world*. Yale. 97-109.

Kanowski, PJ. 2001. Forestry education in a changing landscape. *International Forestry Review* 3: 175-183.

Kanowski, PJ. 2001. Trees: still challenging breeders at the millennium. In: ECR Reeve (Ed). *Encyclopedia of genetics*. Fitzroy Dearborn Publishers. 688-691.

Williams, J. et al. 2001. *The contribution of mid- to low-rainfall forestry and agroforestry to greenhouse and natural resource management outcomes*. AGO and MDBC. 72 p. http://www.greenhouse.gov.au/land/gh_land/pubs/abs_lowrainfall.html

Kanowski, P.J. and Buchy, M. 2001. Advances in research and development - social sciences: context, critique and evaluation. In: M Connell et al (Eds). *Intensive management of regrowth forest for wood production in Australia*. CSIRO. 78-84.

Kanowski, P.J. 2000. Politics, policies and the conservation of genetic diversity. In: AM Young, DH Boshier and TJ Boyle. (Eds). *Forest conservation genetics: principles and practice*. 275-287.

Kanowski, P.J., Sinclair, D. and Freeman, B. 2000. *Establishing comparability and equivalence amongst forest management certification schemes*. AFFA. 46 p. Industry Development and Adjustment > Critical Elements http://www.affa.gov.au/

Dargavel, J., Proctor, W and P. Kanowski. 2000. Conflict and agreement in Australian forests. Ch. 6 in: L. Tacconi (Ed.). *Biodiversity and ecological economics*. Earthscan. 101-115.

Kanowski, P.J. et al. 1999. International forest conservation: protected areas and beyond. Discussion Paper for IFF. Environment Australia. 52pp. http://www.environment.gov.au/library/pubs/pdf/forests.pdf

Kanowski, P.J. 1998. Reflections on forestry and the forest products industries at the millennium. *Commonwealth Forestry Review* 77: 130-135.

Kanowski, P.J. 1997. Regional Forest Agreements and future forest management. In: *Outlook 97*. 1: 225-235.

Kanowski, P.J. and Boshier, D.H. 1997. Conserving the genetic resources of trees in situ. In: N Maxted et al (eds). *Plant conservation: the in situ approach*. Chapman and Hall. Ch 13.

Dr Brian Lees

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Career Brief

Brian was initially commissioned as a regular officer in the RAF, serving in the Middle East, Europe and Africa. After gaining civil commercial pilot's and flight navigator's licences he flew with ADASTRA on mineral exploration and mapping projects. He subsequently took a first-class honours degree in geomorphology from the University of Sydney. From 1977 he worked on a number of joint-venture projects becoming a director of two small exploration companies and the exploration manager of a third. This led to him to form a company to carry out environmental and exploration services for larger organisations. Brian obtained a PhD, also from the University of Sydney, in 1984. He joined the ANU in 1985. Brian has received a number of awards for his work including the Walter Reid Prize, University of Sydney, 1976; the COOK Scholarship, University of Sydney, 1976; the Australasian Institute of Spatial Information Science and Technology (AISIST) Prize in recognition of a "substantial contribution to the study of the science of Urban and Regional Information Systems", 1997; the Land Victoria Fellowship, University of Melbourne, 1999 and the Eminent Individual Award; Australasian Urban and Regional Information Systems Association (AURISA) 1999. He is an editor of the International Journal of Geographic Information Science, is on the editorial board of GEOINFORMATICA and has just completed a term on the editorial board of Transactions in GIS. He is a Member of the International Association of Science and Technology for Development (IASTED) Technical Committee on "Modelling and Simulation", and a member of the International Task Force on Metadata for GIScience Education Materials, part of the Instructional Management System project.

Research, Teaching & Professional Activities

I maintain an active research and teaching program focused on aspects of Global Change. The first phase was the construction of a database of geomorphic evidence for past climate change across northern Australia. The second phase arose from the initial international Global-Biosphere Program (IGBP) meetings where it was clear that a great number of scientists from other disciplines were placing an unwarranted reliance on remote sensing to detect global change. I set up a research program to improve the reliability of change detection techniques. This led to work in adapting inductive and data driven modelling techniques to the predictive mapping of land cover and land degradation. My students and I have built up comprehensive GIS databases based on a range of field sites. These have been used to test, and refine the use of inductive learning, and other artificial intelligence techniques such as neural networks and genetic algorithms, for environmental management. They have been very successful. My research activity continues to be the development and application of tools to carry out integrated analysis of global data. Recently, I have been trying to develop spatial modelling tools which will enable appropriate conservation and management techniques to mitigate some of the crises facing large parts of the globe. I believe that I have made a number of significant conceptual advances in this, including developing the spatial analysis of spectral data. My teaching is intimately linked with his research.

Selected Publications

Roddick, J.F. & Lees, B. 2001. Paradigms for Spatial and Spatio-Temporal Data Mining. Chapter 2 in *Discovering Geographic Knowledge in Data Rich Environments*, Miller, H & J. Han (eds). Taylor & Francis, London. ISBN: 0415233690.

Lees, B.G. 2001. Embedding knowledge in data, Proc, *Geocomputation* 2001, Brisbane, CD. ISBN:1864995637.

Lees, B.G. 2001. Review: Advances in Remote Sensing and GIS analysis, *International Journal of Geographic Information Science*, v15; 197-199.

Lees, B.G. 2002. Australian Geography and GIS. *Australian Geographical Studies*, 40(1); 33-47.

Selected Student Theses

Shawn Laffan BSc (hons)(ANU). 'Data-driven models for predicting mineral grade: Weipa.' (2001).

Simon Benger BSc(hons)(Newcastle),MSc(Toronto). 'Methane budgets for Australian wetland types.' (2001).

Diane Pearson BSc,MSc(Edinburgh). 'The analysis of biodiversity using GIS modelling.' (1998).

Kimberley Patrow van Neil BSc, MSc (Utah). 'Reconciling Geographical and Ecological Paradigms in modelling species distribution.' (2003).

Dr Janette Lindesay

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Career Brief

Janette grew up in Swaziland and South Africa, and obtained her Honours degree, Postgraduate Teaching Diploma and Doctorate from the University of the Witwatersrand in Johannesburg. All her graduate work was in the field of statistical and dynamical climatology. She worked as a research scientist in the Climatology Research Group at Wits, while lecturing in climatology at the same university, and became Deputy Director of the group in 1991. She was instrumental in developing and coordinating the multi-national, multi-disciplinary SAFARI-92 biomass burning research program in southern Africa in 1992.

Janette came to the ANU in 1993 as a Lecturer in the Department of Geography, and was promoted to Senior Lecturer in 1995. She is currently on secondment to the Cooperative Research Centre for Greenhouse Accounting, in the position of Education Manager.

Research, Teaching & Professional Activities

My principal research interests are in climatic variability during the period of instrumental record, characterising the nature and degree of variability and also investigating climate impacts. Much of my research has focussed on the El Niño Southern Oscillation phenomenon; I am currently studying low-frequency fluctuations in ENSO. I am also interested in applications of Global Climate Models in the study of climatic variation and its impacts.

My experience in multi-disciplinary biomass burning research in southern Africa and my interest in climate variability impacts have led to my current involvement in studying climatological aspects of bushfires in Australia. Another area of research interest is thermo-topographic boundary layer effects. My interest in this area began with a study of sea-breeze regimes in the Namib Desert, south-western Africa; a current research project is investigating damaging advective frost events and their impact on viticulture in the Canberra region.

In my undergraduate courses in atmospheric science and climatology, and in my contributions to other undergraduate courses, I aim to develop students' understanding of atmospheric processes, weather and climate, and their impacts and significance for the earth system. I have a particular interest in Greenhouse science and climate change, and the role and impacts of climatic variability in earth system processes and human affairs. The importance of understanding atmospheric and climatic processes and incorporating that understanding in policy formulation and decision making in natural resource management is a theme in much of my teaching and research.

I have coordinated the Geography Honours program for several years, and am also active in supervising postgraduate students. At postgraduate level I teach a Masters course on understanding climatic variability and change. In my role as Education Manager in the Cooperative Research Centre for Greenhouse Accounting I have developed and coordinated a number of professional short courses on aspects of carbon accounting.

I have contributed to the ACT Region State of the Environment reporting process for the last 10 years, and served for two years as President of the Canberra branch of the Australian Meteorological and Oceanographic Society. I am a member of three professional meteorological societies, and am on the editorial boards of two international atmospheric science journals.

Selected Publications

Lindesay, J.A. 2003. Climate and drought in Australia, in *Drought in Australia*: *People*, *Policy and Place*, Botterill, L.C. and Fisher, M. (eds), CSIRO Publishing, Melbourne (in press).

Allan, R.J., Reason, C.J., Lindesay, J.A. and Ansell, T.J. 2003. Protracted ENSO episodes and their impacts in the Indian Ocean region, *Deep-Sea Research II*, 50: 2331-2347.

Mackey, B.G., Lindenmayer, D.B., Gill, A.M., McCarthy, M.A. and Lindesay, J.A. 2002. *Wildlife*, *Fire and Future Climate*: *a Forest Ecosystem Analysis*, CSIRO Publishing, Melbourne, 196pp.

Reason, C.J.C., Allan, R.J., Lindesay, J.A. and Ansell, T.J. 2000. ENSO and climatic signals across the Indian Ocean Basin in the global context: Part I, Interannual composite patterns, *International Journal of Climatology*, 20: 1285-1327.

Hobbs, J.E., Lindesay, J.A. and Bridgman, H.A. (eds). 1998. *Climates of the Southern Continents*: *Present*, *Past and Future*, John Wiley and Sons, Chichester, 297 pp.

Lindesay, J.A. 1998. Present climates of southern Africa, in *Climates of the Southern Continents*: *Present*, *Past and Future*, Hobbs, J.E., Lindesay, J.A. and Bridgman, H.A. (eds), John Wiley and Sons, Chichester, 161-206.

van Wilgen, B., Andreae, M.O., Goldammer, J.G. and Lindesay, J.A. (eds). 1997. *Fire in southern African Savannas*: *Ecological and Atmospheric Perspectives*, Witwatersrand University Press, Johannesburg, 256pp.

Reason, C.J.C., Allan, R.J. and Lindesay, J.A. 1996. Dynamical response of the oceanic circulation and temperature to interdecadal variability in the surface winds over the Indian Ocean, *Journal of Climate*, 9: 97-114.

Allan, R.J., Lindesay, J.A. and Parker, D.E. 1996. *El Niño Southern Oscillation and Climatic Variability*, CSIRO Publishing, Melbourne, 405pp.

Dr Brendan Mackey

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Career Brief

Brendan has a PhD in Plant Ecology from the Australian National University. He has worked as a research scientist with the CSIRO and the Canadian Forest Service.

Research, Teaching & Professional Activities

The overarching theme of my research is *Ecological Integrity*. A major focus involves investigations into human impacts on the terrestrial carbon cycle and the implications for the food chain. I also have a major research interest in biodiversity conservation evaluation and planning, inclusive of continental scale processes. The other significant research area of interest is the development of educational curriculum for sustainable development and studies of peace and security.

I am a member of the CRC for Greenhouse Accounting (www.greenhouse.crc.org.au). I am also involved in a major collaborative research project called "Wild Country" aimed at identifying national priorities for biodiversity conservation and planning. I currently serve as chair of the International Earth Charter Education Advisory Committee. I am a member of the IUCN (World Conservation Union) Environmental Law Commission and co-Chair its Specialist Ethics Group.

Selected Publications

Mackey B.G. and Su W. (in press, 2003). Dynamic Landscape Models for Tropical Rainforests. In. *Tropical Rainforests*: *Past*, *Present*, *and Future*. Edited by Eldredge Bermingham, Christopher Dick, and Craig Moritz. The University of Chicago Press, Chicago.

Mackey B.G., Lindenmayer D.B., Gill A.M., McCarthy A.M. and Lindesay J.A. (2002). *Wildlife, fire and future climate*: *a forest ecosystem analysis*. CSIRO Publishing.

Mackey Brendan G. and David B. Lindenmayer (2001). Towards a hierarchical framework for modelling the spatial distribution of animals. *Journal of Biogeography* 28:1147-1166.

Mackey B.G. and Laffan S. (2002). Case studies in GIS and environmental modeling. Chapter 10 In. *Geographic Information Systems and Environmental Modeling*. Edited by Keith C. Clarke, Brad E. Parks and Michael P. Crane. Prentice Hall.

Mackey B.G. Soulé, H. A. Nix, H. F. Recher, R. L. Lesslie, J. E. Williams, J. C. Z. Woinarski, R. Hobbs, and H. P. Possingham (in review, 2003) Connectivity: its role in conservation at continental scales in Australia. *Pacific Conservation Biology*.

Selected Student Theses

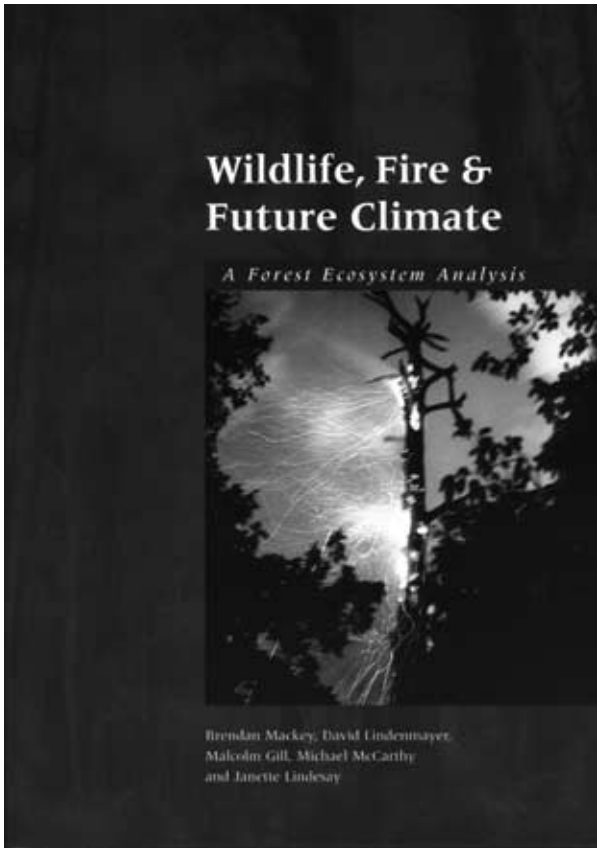
Panghas, Ninna. (under examination). Ecological restoration of Philippine *Diptocarp* forest. (PhD thesis).

Nunan, Donna. 2001. Frogs and farm. (PhD thesis).

Payne, Karen. 1998. Genetic algorithms, remote sensing and vegetation modelling. (PhD thesis).

Lesslie, Robert. 1997. A Spatial Analysis of Human Interference in Terrestrial Enviornments at Landscape Scales. (PhD thesis).

Nelder, John. 1996. Vegetation modelling in Cape York. (PhD thesis).



Dr Mahen S. Mahendrarajah

Senior Lecturer
Natural Resource and Environmental Economics, and Forestry Economics

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Career Brief

As well as being a senior lecturer in the School of Resources Environment and Society, Mahen is also a Research Associate of the Division of Economics of the Research School of Pacific and Asian Studies (RSPAS), ANU. His previous appointments include Research Fellow in Economics, RSPAS, ANU, and Senior Lecturer in Economics at Victoria University of Wellington. His research experience has also included a spell in Sri Lanka. He holds a Masters degree in agricultural development economics and a PhD in economics, both from ANU.

Research, Teaching & Professional Activities

The degradation of natural resources and environment, if unchecked, can be the single most important factor that impinges on the wellbeing of future generations. My research interests over the past few years have been concerned with optimal resource use; resource degradation issues and their mitigation such as land degradation and deforestation; the transfer of village level coconut oil extraction technology invented at the ANU for rural development, mitigation of deforestation and closing the energy cycle in the South Pacific island economies; carbon offset and biomass energy, firewood plantations, non-market valuation; and environmental accounting and environmental macroeconomics. I teach both undergraduate and graduate courses in natural resource economics, and economics of forestry and environment.

Recent supervision of graduate student research has covered areas such as economics of multiple use forest management in Victoria, incentives and mechanisms for promoting forest plantations in Australia, estimating demand for sawn timber, economics of hedgerow planting for reclamation of imperata infested lands in the Philippines, the impact of economic reform on deforestation in Vietnam, bioenergy potential of camphor laurel in New South Wales, and firewood plantation in Nepal.

Selected Publications

Wilman, E. and S. Mahendrarajah. 2002. Carbon Offsets. *Land Economics* 78(3):405-416.

Mahendrarajah, S., Jakeman, A.J. and M. J. McAleer. Eds. 1999. *Modelling Change in Integrated Economic and Environmental Systems*, John Wiley & Sons, Chichester.

Etherington, D.M. and S. Mahendrarajah. 1998. *Economic Benefits of Direct Micro Expelling Coconut oil in the South Pacific*. Proc. of the International Cashew and Coconut Conference Topper, T. et al. (eds). Dar es Salaam, BioHybrids International Ltd, Reading. 457-468.

Townsend, P. and S. Mahendrarajah. 1997. The Economics of P. radiata Farm Forestry. In Bachelard, E.P., Brown, A.G. (eds) *Preparing for the 21st Century*. Proc of the ANZIF Conference 97 Canberra. 277-285.

Thampapillai, D.J. and S. Mahendrarajah. 1997. *Environmental Macroeconomics: Some illustrations with reference to the Indonesian Economy*. Research Report, GSE Publication 9702, Macquarie University, Sydney, 14p.

Mahendrarajah, S., Jakeman, A. J. and P.C. Young. 1996. Water supply in monsoonal Asia: Modelling and predicting small tank storage. *Ecological Modelling* 84: 127-137.

Mahendrarajah, S. 1995. Evolution of Institutions and efficiency in the Management of Common Pool Flux Water Resources. In: Tharun, G., Bautista, M., Calilung, E. and Canillas, D.B. (eds) *Experiences in the Development of Small-Scale Water Resources in Rural Areas*. Carl Duisberg Gesellschaft, South East Asia Program Office, Bangkok. 37-48.

Mahendrarajah, S. and P.G. Warr. 1993. Accounting for Environmental Resources: Land Degradation. In: *Modelling Change in Environmental Systems*. Jakeman, A.J., Beck, M.B. and McAleer, M.J. (eds). John Wiley & Sons, 557- 579.

Mahendrarajah, S., Warr, P.G. and A.J. Jakeman. 1992. Optimal Extraction of Small-Scale Surface Water Storage in Asia. *Water Resources Research*. 28(5):1207-1219.

Dr Chris Tidemann

Senior Lecturer
Wildlife ecology and conservation, conservation through sustainable use, management of feral species, animal welfare, community engagement

Phone: +61 (0)2 6125 2375 E-mail: Chris.Tidemann@anu.edu.au

Career Brief

Chris graduated from Adelaide University with a BSc in 1969 and a Diploma of Education in 1970 and from ANU with a PhD in Zoology in 1987. From 1971-1986 Chris was curator of the Zoology Museum at ANU and he has been on the academic staff of the School since 1987.

Research, Teaching & Professional Activities

Chris has pursued a lifelong interest in wildlife in Indonesia, Papua New Guinea and many parts of Australia. His research in these areas has involved collaboration with rural communities; his most recent work has involved assisting communities and local governments to manage wildlife in urban areas. Chris teaches undergraduate and graduate courses in wildlife monitoring, conservation and and management. Chris is a member of the ACT Flora and Fauna Committee and a member of three of the World Conservation Union's Specialist Groups: Bats; Sustainable Use of Wildlife; Invasive Species.

Selected Publications

Tidemann, C. R. (2002). Sustainable management of the Grey-headed Flying-fox, *Pteropus poliocephalus*. Pp 122-127 In: *Managing the Grey-headed Flying-fox as a Threatened Species in New South Wales*. P. Eby and D. Lunney (eds). Royal Zoological Society of New South Wales: Mosman.

Tidemann, C. R. and M. J. Vardon (2002). Animal welfare v Wildlife Research? *Pacific Conservation Biology* 8: 71-72.

Tidemann, C. R., Vardon, M.J., Loughland, R.A. and Brocklehurst, P.J. (1999). Dry season camps of flying-foxes (*Pteropus* spp.) in Kakadu World Heritage Area, north Australia. *Journal of Zoology* 247, 155-163.

Pell, A.S. and Tidemann, C.R. (1997). The impact of two exotic hollow-nesting birds on two native parrots in savannah and woodland in eastern Australia. *Biological Conservation* 79: 145-153.

Webb, N.J. and C.R. Tidemann. (1996). Mobility of Australian flying-foxes, *Pteropus* spp. (Megachiroptera): evidence from genetic variation. *Proceedings of the Royal Society of London B* 263: 497-502.

Tidemann, C.R., Yorkston, H.D. and A.J. Russack. (1994). The diet of cats, *Felis* catus, on Christmas Island, Indian Ocean. *Wildlife Research* 21: 279-286.

Tidemann, C. R. (1993). Reproduction in the bats *Vespadelus vulturnus*, *V. regulus* and *V. darlingtoni* (Microchiroptera: Vespertilionidae) in coastal south-eastern Australia. *Australian Journal of Zoology* 41: 21-35.

Tidemann, C.R., Kitchener, D.J., Zann, R,B. and Thornton, I.W.B. (1990). Recolonisation of the Krakatau Islands and adjacent areas of West Java, Indonesia, by bats (Chiroptera) 1883-1986. *Philosophical Transactions of the Royal Society of London B* 328: 123-130.

Scheich, H., Langner, G., Tidemann, C., Coles, R. and Guppy, A. (1986). Electroreception and electrolocation in the platypus. *Nature* 319: 401-402.

Dr Peter van Diermen

Geographical Sciences Graduate Program Convenor

Senior Lecturer
Development studies, economic geography, small business policy

Phone: +61 (0)2 6125 3663 E-mail: Peter.vanDiermen@anu.edu.au

Career Brief

Peter's early academic studies were in economics and education at the University of Adelaide. After teaching high school in Australia and New Zealand, Peter went on to complete a Masters degree in development studies from Flinders University and a PhD in economic geography from ANU. From 1989 to 1992 he taught at the Centre for Development Studies at Flinders University and from 1995 to 1998 he was a staff member of the Institute of Development Studies at Massey University. Since 1998, he has been a staff member of the Geography Department at ANU.

Research, Teaching & Professional Activities

My research is in the field of Economic Geography & Development Studies. Major themes include industrial development & employment in Developing Countries. Research topics include the informal sector, small-scale enterprises, local/global economic relations, entrepreneurship, circular migration and rural-urban links. These topics have been primarily explored in Southeast Asia. Most recently I have worked in Indonesia, Thailand, Singapore and Sri Lanka.

My teaching is directly related to my research. I teach a course on population, resources and development. I also coordinate two field schools to Southeast Asia. Every year I teach an intensive three weeks course in Bali for ANU students. Also, every second year I coordinate a four-week fieldwork course in Southeast Asia for ANU students.

I continue to do extensive fieldwork and research on relevant regional issues by doing short-term consultancies for multilateral agencies such as the World Bank and the Asian Development Bank. Recently (2002) I helped re-write Sri Lanka's national policy for SMEs and currently (2003) I am working on an extensive review of all ADBs SME policies since 1990.

Selected Publications

Overton, J. and van Diermen, P. 2003. Using Quantitative Techniques, in Regina Scheyvens and Donovan Storey (eds.), *Development Fieldwork*: *A Practical Guide*, London: Sage Publications. ISBN 0761948902.

van Diermen, P. 2002. SMEs and Regional Labour Markets: major trends Since 1997, in Harvie, C. and Boon-Chye Lee (eds), *Studies of Small and Medium Enterprises in East Asia*, Volume 1: Small and Medium Enterprises in East Asia, Cheltenham, UK, Edward Elgar.

van Diermen, P. and Azmat, G. 2001. Cottage and Small Firm "Presence" in Indonesia manufacturing between 1975-1996, *Small Business Economics*, 16:157-166.

Azmat, G. and van Diermen, P. 2001. Some Determinants of Small Firms 'Presence' in Indonesia, *Applied Economics Letters*, 8: 471-474.

van Diermen, P. (ed.) 2001. SME Policies in Indonesia: Towards a new Agenda. Occasional Paper Series on SME Development No.1, April. Manila: The Asian Development Bank.

Manning, C. and van Diermen, P. (eds.) 2000. *Indonesia in Transition*: *Social Aspects of Reformasi and Crisis*, Singapore: ISEAS/ London: Zed Books.

van Diermen, P. 1998. Global patterns of production and Industrial Organization of Small Family Businesses in Jakarta, in *Malaysia Journal of Tropical Geography*, 29, 1:39-52.

van Diermen, P. 1997. *Small Business in Indonesia*. London: Ashgate.

van Diermen, P. 1997. Labor Remuneration in Jakarta's Small Enterprises: Exploitative or Equitable? *World Development*, 25, 12:2129-2141.

van Diermen, P. 1997. Is Small Beautiful? The Environmental Impact of Small-Scale Production in *Development Bulletin*, Vol. 41, April, pp.28-31.

Dr Jürgen Bauhus

Adjunct Research Fellow
Silviculture, forest dynamics, nutrient cycling

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Career Brief

Jürgen studied Forestry in Freiburg, Vienna, and Göttingen and worked in Germany and Canada before he joined ANU Forestry in 1996. His current research focuses on ecology and silviculture of native forests, carbon and nutrient cycling, dynamics of mixed-species stands, structural diversity and coarse woody debris. Jürgen also takes great interest in the dissemination of scientific knowledge in the wider community and the application of it in management, which is reflected in his work on private native forests. He is a member of the Cooperative Research Centre for Greenhouse Accounting, and member of the editorial board of Australian Forestry. In mid 2003 Jürgen is taking up a professorship and the Chair of Silviculture at Freiburg University, Germany.

Research, Teaching & Professional Activities

My research interests are primarily in the effects of forest management practices on forest ecosystem properties and processes, in particular forest structure and carbon and nutrient cycling.

Current projects investigate the use of soil chemical and biological indicators to assess the sustainability of forest management practices. This research tries to identify parameters that represent important ecological processes, which are relatively easy to determine, and thus can be used in long-term ecosystem monitoring. We have demonstrated that soil organic carbon alone is not a good indicator for Australian forest soils, which contain substantial quantities of charcoal. Two PhD students are involved in this program. Sue Emmett investigates the relationship between native earthworms and soil parameters, and Chris O'Hara researches the relationships between organic matter and phosphorus supply.

Uneven-aged silviculture and the maintenance of structural diversity in managed forests is another research focus. Two PhD students, Chris McElhinny and Eddie Webber, are working on quantifying structural diversity and the dynamics of coarse woody debris, respectively. One MPhil student, Andrew Deane, examines historical changes in stand structures of Cypress pine forests. A substantial proportion of the silvicultural research takes place in the context of forest management on private land. The work on private native forest management is carried out in collaboration with the South East NSW Private Forestry. This work is also supported by an MPhil student, Peter Deane, investigating private forest-owner attitudes and values.

Our research into the dynamics of mixed eucalypt-acacia plantations has demonstrated that mixed stands are more productive and accumulate more soil carbon than mono-specific stands. David Forrester, PhD student, is now investigating how the synergisms between acacias and eucalypts work, and whether there are environmental limits at which competition may be stronger than the synergistic effects.

My teaching covers forest dynamics and silviculture, at undergraduate and postgraduate levels. This includes a distance education course in native forest management.

Selected Publications

Mackensen , J. and Bauhus, J. 2003. Decay of coarse woody debris of Pinus radiata, Eucalyptus regnans and Eucalyptus maculata in south-eastern Australia: Comparing density loss with respiration rates. *Soil Biology and Biochemistry* 35, 177-186

Forrester, D., Bauhus, J. and Connell, M. 2003. Competition in thinned Silvertop Ash (Eucalyptus sieberi L. Johnson) stands from early coppice growth. *Forest Ecology and Management* 174, 459-475

Mackensen, J., Bauhus, J. and Webber, E. 2003. Decomposition rates of coarse woody debris - A review with particular emphasis on Australian tree species. *Australian Journal of Botany* 51, 27-37

Bauhus, J., Khanna ,P.K., Hopmans, P. and Weston, C. 2002. Is soil carbon a useful indicator of sustainable forest management? – A case study from native eucalypt forests of south-eastern Australia. *Forest Ecology and Management* 171, 57-72.

Bauhus, J., McElhinny, C. and Alcorn, P. 2002. Stand structure and tree growth in uneven-aged Spotted Gum (*Corymbia maculata* Hook.) forests: some implications for management. *Forestry* 75, 451-456.

Bartsch, N., Bauhus, J. and Vor, T. 2002. Effects of group selection and liming on nutrient cycling in an European beech forest on acidic soil. In: Dohrenbusch, A. and Bartsch, N. (eds) *Forest Development - Succession, Environmental Stress and Forest Management*. Springer Verlag, Berlin, 109-144.

Ludwig B., Khanna P.K., Bauhus J. and Hopmans P. 2002. Near infrared spectroscopy of forest soils to determine chemical and biological properties related to soil sustainability. *Forest Ecology and Management* 171, 121-132.

Campbell, J. J., Messier, C. and Bauhus, J. 2002. Does soil heterogeneity and compaction in ingrowth-cores affect growth and morphology of black spruce fine-roots? *Communications in Soil Science and Plant Analysis* 33, 1027-1037.

Bauhus, J., Aubin, I., Messier C. and Connell, M. 2001. Composition, structure, light attenuation and nutrient content of understorey vegetation in a Silvertop Ash (*Eucalyptus sieberi*) regrowth stands 6 years after thinning and fertilisation. *Forest Ecology & Management* 144, 275-286.

Selected Student Theses

Winden, A. P. van. 2001. Aboveground interactions and productivity in mixed-species plantations of *Acacia mearnsii* and *Eucalyptus globulus*. (Honours thesis)

Forrester, D. 2000. Early coppice growth in thinned Silvertop ash forests. (Honours thesis)

Professor Philip Evans

Director of Centre for Advanced Wood Processing at UBC

Professor at UBC and Adjunct Professor at ANU
Surface modification of wood, relationships between structure and function and properties of wood and wood composites

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Career Brief

Phil took a first class honours degree in Wood Science from the University of Wales (Bangor). He obtained a PhD, also from the University of Wales, in 1984. He worked as a postdoctoral fellow at Abertay University Dundee, Scotland, before joining the ANU as a Lecturer in 1986. He was promoted to Senior Lecturer in 1992 and Reader in 1998. In 2000 year he was appointed as Director of ANU's Centre for Science and Engineering of Materials. Phil took up his current position as Professor and Director of the Centre for Advanced Wood Processing at UBC (Canada's national centre for education extension and research for advanced wood processing industries) in November 2001. He was appointed as an Adjunct Professor at ANU in 2002.

Mankind faces many significant challenges over the coming century arising from its profligate use of natural resources and unwise choices in the conversion of natural resources into materials or products that are incompatible with or deleterious to natural systems. The development of advanced wood and biobased composites materials that can more effectively compete with plastics, metals and ceramics, materials that cannot be produced on a sustainable basis, can make a positive contribution to rectifying some of the damage to the environment that is now self evident. Developing advanced bio-based materials with similar cost and performance characteristics as plastics, metals and ceramics is, however, a tremendous challenge. Surface modification of wood is a cost effective way of upgrading some characteristics in which wood is deficient, ie UV resistance, and has been one of my major research areas to date. A greater understanding of the relationship between the structure of wood and wood composites and their function and properties could lead to the development of new biocomposites with enhanced mechanical properties, and this is an area I'm currently exploring with colleagues in the Department of Applied Mathematics in RSPhysSE. My research interests and continuing involvement in the teaching of forest products in SRES maintain my link with ANU. At UBC my position as Director of the Centre for Advanced Wood Processing involves a great variety of tasks mainly focussed at assisting the Canadian forest products industry to make the transition from a commodity-based industry to one that concentrates on value and quality.

Selected Publications

Evans, P.D., Donnelly, C., Cunningham, R.B. 2003. Checking of CCA-treated radiate pine decking timber exposed to natural weathering. Forest Products Journal. 53(4):1-6.

Evans, P.D. 2003. Emerging Technologies in Wood Protection. Forest Products Journal. 53(1):14-22.

Cabangon, R. J., Cunningham, R.B., and Evans, P.D. 2002. Manual Strand Orientation as a Means of Improving the Flexural Properties of Wood-Wool Cement Boards in the Philippines. For. Prod. J. 52(4):53-59.

Heady, R.D., Banks, J.G., and Evans, P.D. 2002. Wood Anatomy of Wollemi Pine (Wollemia Nobilis, Araucariaceae). IAWA Journal. 23 (4) 2002: 339-357

Evans, P.D., N.L. Owen, S. Schmid, S. and R.D. Webster. 2002. Weathering and photostability of benzoylated wood. Polymer Degradation and Stability. 76:291-303.

Semple, K.E., Cunningham, R.B., and Evans, P.D. 2002. The Suitablity of Five Western Australian Mallee Eucalypt Species for Wood-Cement Composites. Industrial Crops and Products Journal. 16 (2002) 89-100.

Kiguchi, M., P.D. Evans, J. Ekstedt, R.S. Williams and Y. Kataoka. 2001. Improvement of the durability of clear coatings by grafting of UV-absorbers on to wood. Surface Coatings International Part B: Coatings Transactions. 84(B4):243-336

Evans, P.D. (2001). Wood Products: Weathering. 6pp. In: The Encyclopedia of Materials Science and Technology. Buschow, K.H.T., Cahn, R.W., Flemings, M.C., Iischner, B., Kramer, E.J., Mahajen, S. (Eds.). Elsevier Science, Oxford.

Heady, R.D., Evans, P.D. 2000. Callitroid (callitrisoid) thickening in Callitris. International Association Wood Anatomists Journal 21(3): 293-319.

Evans, P.D., Wingate-Hill, R., Barry, S.C. 2000. The effects of different kerfing and center-boring treatments on the checking of ACQ treated pine posts exposed to the weather. Forest Products Journal 50(2): 59-64.

Semple, K, Evans, P.D. 2000. Adverse effects of heartwood on the mechanical properties of wood-wool cement boards manufactured from radiata pine wood. Wood and Fiber Science 32(1): 37-43.

Evans, P.D., Wallis, A.F.A., Owen, N.L. 2000. Weathering of chemically modified wood surfaces - Natural weathering of Scots pine acetylated to different weight gains. Wood Science and Technology 34(2): 151-165.

Semple, K., Evans, P.D., Cunningham, R.B. 2000. Compatibility of 8 temperate Australian Eucalyptus species with Portland cement. Holz Roh u- Werkstoff 58(5): 315-316.

Evans, P.D., Dimitriades, S., Cunningham, R.B., Donnelly, C.F. 2000. Medium density fibreboard manufactured from blends of white cypress pine and non-durable wood species shows increased resistance to attack by the subterranean termite C. lacteus. Holzforschung 54(6): 585–590.

Selected Student Theses

Ramos, M. 2001. M.Sc. Improving the gluing of eucalypt timber by plasma modification of wood surfaces.

Ximenes, F. 2000. M.Sc. Preservation of wood using oxy-aluminium compounds

Heady, R. 1997. Ph.D. The wood anatomy of *Callitris* Vent. (Cupressaceae): an SEM study

Dr Dominic Kain

Post Doctoral Fellow
Forest Genetics and Tree Breeding

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Career Brief

Dominic completed a forestry degree with honours at the Australian National University in 1997. His honours research investigated the quantitative genetics of wood characteristics, and early selection, in *Pinus radiata*. His PhD research, supported by a Forest and Wood Products R&D Corporation Scholarship at ANU and North Carolina State University, USA, examined the genetics and breeding strategy of wood and growth traits in the *Pinus elliottii* x *Pinus caribaea* hybrid, in collaboration with the Queensland Forestry Research Institute. Dominic completed his PhD in early 2003, and currently holds the position of Geneticist with the CRC for Sustainable Production Forestry in Hobart, but is based at the ANU. Dominic has made teaching contributions to forest genetics courses at the ANU and in South Africa, and attends and presents at conferences in the fields of quantitative genetics, wood quality improvement and hybrid breeding.

Research, Teaching & Professional Activities

My primary responsibility as CRC Geneticist is to produce research papers for publication, sourced from my PhD and current research. My current research involves mathematical modelling of the genetic causes of inter-species forest tree hybrid performance, in collaboration with staff from the ANU Supercomputer Facility.

In October 2003 I begin a 2.25-year collaborative project involving ANU, the CSIRO and its South African equivalent, the CSIR. This project is funded by the Australian Centre for International Agricultural Research (ACIAR), and aims to develop high performance eucalypts and eucalypt hybrids for marginal lands in south and eastern South Africa and south-eastern Australia. Eucalypt hybrids, for example *E.grandis* x *E. camaldulensis*, often outperform both parental species in environments intermediate between those typical of the parents. My role in the project is to analyse data from eucalypt hybrid trials in South Africa – possibly the most extensive set of eucalypt hybrid trials in the world – to develop knowledge of the genetic mechanisms underlying hybrid performance. This knowledge will be used to develop efficient breeding strategies for future improvement of existing hybrids, and of novel hybrids generated by CSIRO and CSIR in another component of the same project. During this project I will have the opportunity to apply some of the analytical methods developed during my PhD research.

Selected Publications

Kain, D.P. (2003). Genetic parameters and improvement strategies for the *Pinus elliottii* var. *elliottii* x *Pinus caribaea* var. *hondurensis* hybrid in Queensland, Australia. PhD thesis, The Australian National University, 460p.

Shepherd, M., Cross, M., Dieters, M.J., Harding, K., Kain, D. and Henry, R. (2003). Genetic architecture of physical wood properties in a tropical pine hybrid from QTL analysis. Canadian Journal of Forest Research (in press.)

Kain, D.P., Dieters, M.J. and Li, B. (2004). Genetic parameters and breeding strategy for wood and growth traits in slash × Caribbean pine F1 hybrids. Silvae Genetica (submitted).

Kain, D., Dieters, M.J. and Harding, K.J. (2004). Early selection and rapid field screening for wood density and spiral grain in subtropical pines. Canadian Journal of Forest Research (submitted).

Dr Andrew Young

Adjunct Senior Lecturer
Population genetics, ecology, conservation biology

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Career Brief

Andrew graduated with BSc and, MSc Hons in Botany from Auckland University in 1988. He taught for a year in the Botany Department at Auckland University before undertaking a PhD in genetics at Carleton University in Ottawa, Canada. After graduating in 1993, Andrew took up a postdoctoral fellowship in population genetics at CSIRO Plant Industry in Canberra, and was appointed as a Research Scientist there in 1996. He is now a Senior Research Scientist and leader of the Conservation Biology Group.

Research, Teaching & Professional Activities

My research addresses plant population genetics and ecology. I am particularly interested in how genetic processes interact with demography to influence population viability, particularly in fragmented populations. Project areas include basic research on effects of genetically controlled self-incompatibility systems on mate availability, the role of inbreeding in determining the viability of fragmented populations, genetics and ecology of rare and endangered species, provenance studies of common shrubs and trees for restoration and ecological risk assessment of GMOs. My research employs a broad range of techniques including the use of molecular genetic markers, demographic monitoring, growth experiments and simulation modeling.

Selected Publications

Young, A., Boyle, T. and Brown, A.H.D. 1996. The population genetic consequences of habitat fragmentation for plants. *Trends in Ecology and Evolution*, 11: 413-418.

Young A.G. and Brown, A.H.D. 1998. Comparative analysis of the mating system of the rare woodland shrub *Daviesia suaveolens* and its common congener *D. mimosoides*. *Heredity*, 80:374-381.

Young, A.G. Brown, A.H.D. and Zich, F.C. 1999.Genetic structure of fragmented populations of the endangered grassland daisy *Rutidosis leptorrhynchoides*. *Conservation Biology*, 13:256-265.

Young, A.G. and Brown, A.H.D. 1999. Paternal bottlenecks in fragmented populations of the endangered grassland daisy *Rutidosis leptorrhynchoides Genetical Research*, 73:111-117.

Young, A.G. and Murray, B.G. 2000. Genetic bottlenecks and dysgenic gene flow in re-established populations of the endangered grassland daisy *Rutidosis leptorrhynchoides*. *Australian Journal of Botany*, 48: 409-416.

Buza L., Young, A. and Thrall. P.H. .2000. Genetic erosion, inbreeding and reduced fitness in fragmented populations of the tetraploid pea *Swainsona recta*. *Biological Conservation*.93: 177-186.

Schmidt-Adam, G. Young, A.G. and Murray, B.G.M. 2000. Low outcrossing rates and shift in pollinators in New Zealand Pohutukawa (*Metrosideros excelsa*) (Myrtaceae). *American Journal of Botany* 87: 1265-1272.

Young, A.G., Millar. C., Gregory, E.A. and Langston, A. 2000. Sporophytic self-incompatibility in diploid and tetraploid races of *Rutidosis leptorrhynchoides*. *Australian Journal of Botany*. 48:667-672.

Young, A.G., Brown, A.H.D., Murray, B.G., Thrall, P.H. and Miller, C.H. 2000. Genetic erosion, restricted mating and reduced viability in fragmented populations of the endangered grassland herb: *Rutidosis leptorrhynchoides*. In: A.G.Young and G.M. Clarke (eds) Genetics, *Demography and Viability of Fragmented Populations*. Cambridge University Press. Pp.335-359.

Brown, A.H.D. and Young, A.G. 2000. Genetic diversity in tetraploid populations of the endangered daisy *Rutidosis leptorrhynchoides* and implications for its conservation. *Heredity*. 85:122-129.

Young, A., Boyle, T. and Boshier, D. (eds) (2000) *Forest Conservation Genetics*: *Principles and Practice*, CSIRO Publishing. Pp352.

Young, A. and Clarke, G. (eds) (2000) *Genetics*, *Demography and the Viability of Fragmented Populations*, Cambridge University Press. Pp421.

Young, A.G., Schmidt-Adam, G, and Murray, B.G. 2001. High genetic variation and limited differentiation in remnant stands of the pohutukawa (*Metrosideros excelsa* Sol. Ex Gaertn., Myrtaceae). *New Zealand Journal of Botany* 39:133-140.

Murray B.G. and Young, A.G. 2001. High cytogenetic variation in the endangered daisy *Rutidosis leptorrhynchoides*. *Annals of Botany* 87:83-90.

B.J. Costin, J.W. Morgan & A.G. Young. 2001. Reproductive success does not decline in fragmented populations of *Leucochrysum albicans* subsp. *albicans* var. *tricolor* (Asteraceae). *Biological Conservation*. 98:273-284

Hoebee, S.E., and Young, A.G. 2001. Low neighbourhood size and high interpopulation differentiation in the endangered shrub *Grevillea iaspicula* McGillivray (Proteaceae). *Heredity* 86:489-496.

Young, A.G., Hill, J.H., Murray, B.G. and Peakall, R. 2002. Mating system, genetic diversity and clonal structure in the alpine herb *Rutidosis leiolepis* F. Muell. (Aasteraceae). *Biological Conservation* 106:71-78.

Wells, G.P. and Young, A.G. In press. Effects of seed dispersal and clonality on spatial genetic structure in four populations of *Rutidosis leptorrhynchoides* with differing levels of correlated paternity. *Genetical Research*.

Dr Barry Croke

Research Fellow (Joint appointment with iCAM and CRES)
Streamflow and water quality modelling, with particular emphasis on predicting flow in ungauged catchments

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Career Brief

Barry Croke has a BSc in Theoretical Physics and a PhD in Astrophysics from UNSW. He was a post-doctoral fellow in the Physics Department at the University of Crete between April 1994 and September 1996. From September 1996 to June 1999, he was a post-doctoral fellow in the Environmental Research Laboratory at the Foundation for Research and Technology – Hellas, working in the fields of hydrology and atmospheric research. In August 1999 he joined iCAM as a visiting fellow, and since October 1999 he has been a joint iCAM/CRES research fellow.

Research, Teaching & Professional Activities

My research interests include development of models for prediction of streamflow and water quality. This includes prediction of flow at ungauged sites, which requires techniques for predicting hydrologic response based on catchment attributes such as topography and land use. This involves development of models suitable for such work, as well as exploring the relationships between model parameters and key catchment attributes. My work on modelling water quality has involved estimation of sediment, nutrient and pathogen exports. A key component of my research is understanding model response to uncertainty in parameter values and input data through sensitivity analysis. This is an important component of model development due to the sparse nature of environmental datasets.

Selected Publications

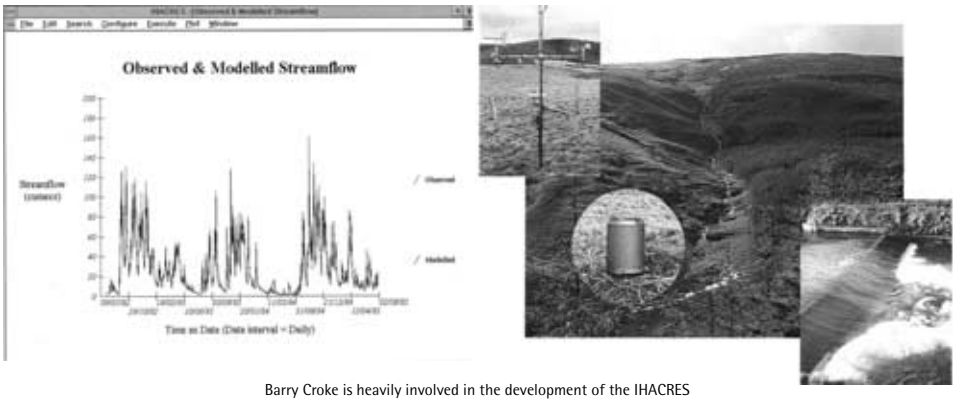
Littlewood, I.G., B.F.W. Croke, A.J. Jakeman and M. Sivapalan, 2003. The role –f top-down modelling for Prediction in Ungauged Basins (PUB), *Hydrological Processes*, 17, 1673-1679.

Littlewood, I.G., Jakeman, A.J., Croke, B.F.W., Kokkonen, T.S. and Post, D.A. 2002. Unit hydrograph characterisation of flow regimes leading to streamflow estimation in ungauged catchments (regionalisation). In: P. Hubert, D. Schertzer, T. Takeuchi and S. Koide (eds), PUB Communications. *Kick-off meeting for the IAHS Decade for Prediction in Ungauged Basins*, *Brasilia*, 20-22 November 2002. Also available at http://www.cig.ensamp.fr/~iahs/index.html .

Croke, B.F.W., A.B. Smith and A.J. Jakeman (2002) A One-Parameter Groundwater Discharge Model Linked to the IHACRES Rainfall-Runoff Model. In: A. Rizzoli and A. Jakeman (eds), *Proceedings of the 1st Biennial Meeting of the International Environmental Modelling and Software Society*, University of Lugano, Switzerland, Vol I, 428-433.

Croke, B.F.W. and A.J. Jakeman, Predictions in Catchment Hydrology: an Australian Perspective, *Marine and Freshwater Research*, 52 (2001), 65-79.

Croke, B., N. Cleridou, A. Kolovos, I. Vardavas and J. Papamastorakis, Water resources in the desertification-threatened Messara-Valley of Crete: estimation of the annual water budget using a rainfall-runoff model, *Environmental Modelling and Software*, 15 (2000), 387-402.



Barry Croke is heavily involved in the development of the IHACRES rainfall-runoff model including the upcoming Java version release.

Dr Roger Heady

School Research Associate
Wood anatomy, electron microscopy

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Career Brief

Roger grew up on a dairy farm in Jarrah-Karri timber country near Margaret River, Western Australia, and left school at 14 years of age. He joined the RAAF and spent the following 12 years on various airforce stations in Australia and south-east Asia. Roger was awarded the Australian Active Service Medal for one year of duties on the US airbase at Ubon during the Vietnam War. After discharge from the RAAF in 1968, he came to Canberra to work as an electronics technician at the Satellite Tracking Station at Orroral Valley. While employed tracking satellites, he studied part-time and obtained a Degree in Applied Science, a Graduate Diploma in Resource Management, and a Graduate Diploma in Electronics from CCAE (now University of Canberra). On the closure of the Tracking Station in 1983, he commenced employment as a Technical Officer at the ANU's SEM Unit which was at that time, located in the Forestry Engineering Wing. In 1991, he began part-time research on the wood anatomy of *Callitris* (cypress pine) using electron microscopy, for which he was awarded a PhD in 1997.

Roger is currently employed full-time as a senior technical officer at the ANU Electron Microscopy Unit, located in the Research School of Biological Sciences.

Research, Teaching & Professional Activities

I am often the first point of contact for ANU staff and postgraduate students wishing to make use of the facilities of the Electron Microscopy Unit for their research. The Unit offers a range of imaging and analysis techniques: transmission and scanning electron microscopy, light microscopy, and x-ray analysis (EDXA). I give assistance to those wishing to use these facilities, provide help with specimen preparation, and initialise and operate equipment for specific tasks. I am conversant with the cryogenic techniques required for EM investigations of delicate biological specimens such as leaves and flowers.

My main interest is in the use of scanning electron microscopy (SEM) for the study of wood anatomy. I find that SEM is ideally suited to this application and there is ample scope for high-resolution microscopy studies of the wood of many Australian species. I am particularly interested in the wood anatomy of Cypress pine and Wollemi pine.

During the past year I conducted the Forest Products (FSTY 3016) practical classes in wood identification. I am currently involved in writing a paper on the wood anatomy of the Western Australian conifer *Actinostrobus*.

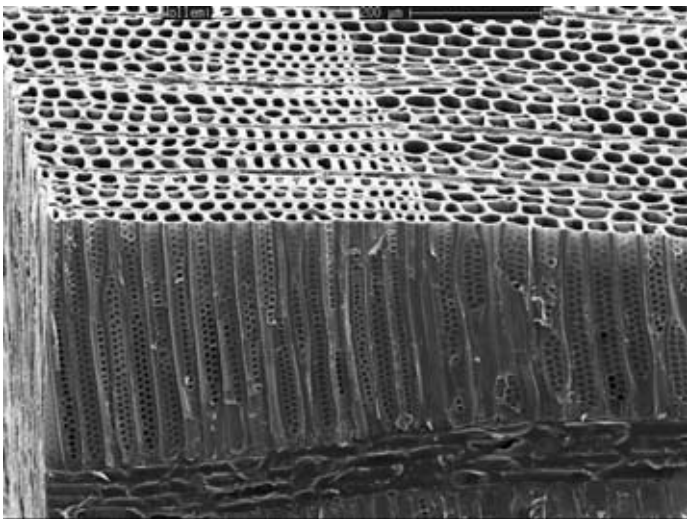
Selected Publications

Heady, R.D., J.G. Banks and P.D. Evans. 2002. Wood Anatomy of Wollemi Pine (*Wollemia nobilis*, Araucariaceae). *IAWA Journal* 23(4): 339-357.

Heady, R.D. and P.D. Evans. 2000. Callitroid thickening in Callitris. *IAWA Journal* 21(3): 293-319.

Ride, W.D.L., Pridmore, P.A., Barwick, R.E., Wells, R.T. and R.D. Heady. 1997. Towards a Biology of *Propleopus oscillans* (Marsupialia: Propleopinae, Hypsiprymnodontidae). *Proc Linn. Soc. NSW*, 117: 243-328.

Heady, R.D., Cunningham, R.B., Donnelly, C.F. and P.D. Evans. 1994. Morphology of warts in the tracheids of cypress pine (Callitris Vent.). *IAWA Journal* 15(3): 265-281.



Scanning Electron Micrograph of the wood of Wollemi Pine

Dr Rebecca Letcher

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Integrated catchment assessment, modelling and decision support

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Career Brief

Rebecca completed undergraduate degrees in Science and Economics at the Australian National University (ANU) in 1998, majoring in economics, econometrics and mathematics. Her honours year in mathematics focused on assessing the impacts of farm dams on stream flow yields in several catchments in the Macquarie River basin, Australia. While completing her undergraduate degrees she also worked as a Research Economist at ACTEW, on water pricing, regulation and forecasting.

She then went on to complete her PhD at the Centre for Resource and Environmental Studies, also at the ANU. Her PhD thesis was entitled 'Issues in Integrated Catchment Assessment and Management'. This work involved the development of an integrated (economic, hydrological) model for assessing water allocation options in the Namoi River Basin, Australia. She has also worked on several other integrated assessment projects, including IWRAM, a water resources project in northern Thailand, and an Environmental Trust funded project in the Ben Chifley Dam Catchment focusing on management of sediments and nutrients to the dam. She is currently working on a three-year project in the Namoi and Gwydir catchments funded by the Cotton Research and Development Corporation. This project will deliver decision support tools for assessing alternative water allocation options for both catchments. She is employed as part of the Integrated Catchment Assessment and Management (iCAM) Centre.

Research, Teaching & Professional Activities

I am currently co-supervising several students at the ANU and one student at Monash University. I also help organise an undergraduate course in environmental modelling which is run through the Mathematics Department at the ANU. I have given lectures in a water resources course run through SRES.

In addition to these activities I am the Secretary of the International Environmental Modelling and Software Society (iEMSs). As part of this commitment I co-organised a session on Integrated Assessment at the first Biennial conference of the Society which was held in Lugano, Switzerland in 2002. I am currently editing Special Issues of the journals Integrated Assessment and Environmental Modelling and Software, featuring papers from this conference and from a separate workshop convened by a European Union research group called MULINO.

In 2002, I completed a scoping report for the CRC for Catchment Hydrology, recommending approaches that the CRC could follow to integrate economic models with commonly available hydrological models for considering water allocation. I also sat on the Technical Advisory Group for Stage 2 of the Sustainable Water Allocation Program in the CRC for Catchment Hydrology.

Selected Publications

Hare, M., Letcher, R. A., and Jakeman, A. J. "Participatory Natural Resource Management: A Comparison of Four Case Studies." *Proceeding of the First Biennial Conference of the International Environmental Modelling and Software Society* (*iEMSs 2002*), A.E. Rizzoli and A.J. Jakeman (eds), Lugano, Switzerland, 73-78.

Jakeman, A. J., and Letcher, R. A. (2003). "Integrated Assessment and Modelling: Features, Principles and Examples for Catchment Management." *Environmental Modelling and Software*, 18, 491-501.

Letcher, R.A. 2001 A tool for the analysis of policy options for off-allocation water in the Namoi River catchment. In *Proceedings International Congress on Modelling and Simulation*, MODSIM2001, F. Ghassemi, M. McAleer, L. Oxley and M. Scoccimarro (eds), The Australian National University, 10-13 December, Canberra, vol. 3, pp. 1171-1176.

Letcher, R. A. (2002). "Issues in Integrated Assessment and Modelling for Catchment Management," PhD, The Australian National University, Canberra.

Letcher, R. A., and Aluwihare, P. "Development of a Decision Support System for the Namoi and Gwydir Valleys." *Proceedings of the International Congress on Modelling and Simulation* (*MODSIM03*), Townsville, QLD.

Letcher, R.A., Croke, B.F.W., Jakeman, A.J., Merritt, W.S. and Perez, P. IWRAM: An integrated modelling toolbox for considering impacts of development and land use change in Northern Thailand. *Proceedings International Environmental Modelling and Software Society* (*iEMSs*) *Conference*, A.E. Rizzoli and A.J. Jakeman (eds), Lugano, Switzerland, 24-27 June 2002, vol. 3, pp. 97-102.

Letcher, R.A., Jakeman, A. J., Calfas, M., Linforth, S. Baginska, B. and Lawrence, I. 2002 A comparison of catchment water quality models and direct estimation techniques. *Environmental Modelling and Software*, 17: 77-85.

Letcher, R.A. and Jakeman, A.J. 2002 Catchment Hydrology, In *Encyclopaedia of Environmetrics*, Volume 1, A.H. El-Shaarawi and W.W. Piergorsch (eds), Wiley, pp. 281-290.

Letcher, R.A. and Jakeman, A.J. (in press). Types of Environmental Models. In: *Encyclopaedia Of Life Support Systems*.

Letcher, R.A. and Jakeman, A.J. 2002 Experiences in an integrated assessment of water allocation issues in the Namoi river catchment, Australia. *Proceedings International Environmental Modelling and Software Society* (*iEMSs*) *Conference*, A.E. Rizzoli and A.J. Jakeman (eds), Lugano, Switzerland, 24-27 June 2002, vol. 3, pp. 85-90.

Letcher, R. A., Jakeman, A. J., Calfas, M., Linforth, S., Baginska, B., and Lawrence, I. (2002). "A comparison of catchment water quality models and direct estimation techniques." *Environmental Modelling and Software*, 17(1), 77-85.

Letcher, R. A., and Jakeman, A. J. (in press). "Application of an Adaptive Method for Integrated Assessment of Water Allocation Issues in the Namoi River Catchment, Australia." *Integrated Assessment*.

Letcher, R. A., Schreider, S. Y., Jakeman, A. J., Neal, B. P., and Nathan, R. J. (2001). "Methods for analysis of trends in streamflow response due to changes in catchment condition." *Environmetrics*, 12, 613-630.

Parker, P., Letcher, R., Jakeman, A., and et al. (2002). "Progress in integrated modelling and assessment." *Environmental Modelling and Software*, 17, 209-217.

Mr Lachlan Newham

Post Doctoral Fellow
Water quality modelling and spatial data analysis

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Career Brief

Lachlan Newham has been employed as a Post Doctoral Fellow at iCAM since completing his PhD at the Centre for Resource and Environmental Studies in 2002. Lachlan's PhD research was focused on developing and assessing modelling tools used to prioritise management for water quality improvement. Prior to undertaking his PhD studies Lachlan completed a BSc (Resource and Environmental Management) degree with Honours at the then School of Resources and Environmental Management.

Research, Teaching & Professional Activities

My research interests are in the broad area of water quality assessment and management. I work on two closely related projects. The first is titled Management of Diffuse Pollutants in the Ben Chifley Dam Catchment, NSW. The aim of the project is to develop a decision support system to aid stakeholders identify and manage critical sources of diffuse nutrient inputs to the Ben Chifley Dam. The project is funded by the New South Wales Government through its Environmental Trust.

The second project is titled Development of a Catchment Contaminant Cycle Model for Stakeholder Use. The aim of this project is to develop a new water quality model for application in large catchments. Various pollutants including sediment, salt and nutrients and their ecological impacts are to be modelled. The project is funded by Land and Water Australia and the Murray-Darling Basin Commission and is being undertaken in collaboration with CSIRO Land and Water.

In addition to my project work I am the Treasurer of the Modelling and Simulation Society of Australia and New Zealand and an elected member of the ANU Sport and Recreation Association Council.

Selected Publications

L.T.H. Newham, J.P. Norton, I.P. Prosser, B.F.W Croke and A.J. Jakeman 2003 'Sensitivity Analysis for Assessing the Behaviour of a Landscape-Based Sediment Source and Transport Model', *Environmental Modelling and Software*, in press.

B.F.W. Croke, L.T.H. Newham and I.P. Prosser 2002 'Improving Hydrologic Parameterisation of a Landscape-Based Sediment Source and Transport Model', Third International Conference on Water Resources and Environment Research, 22-25 July 2002, Dresden University of Technology, Germany, pp 242-246.

L.T.H. Newham, R.A. Letcher, A.J. Jakeman, A.L. Heathwaite, C.J. Smith and D. Large 2002 'Integrated Water Quality Modelling: Ben Chifley Dam Catchment, Australia', In A. E. Rizzoli and A. J. Jakeman (eds.), Integrated Assessment and Decision Support, Proceedings of the First Biennial Meeting of the International Environmental Modelling and Software Society, iEMSs, June 2002. , vol 1, pp. 275-280.

L.T.H. Newham, I.P. Prosser, J.P. Norton, B.F.W. Croke and A.J. Jakeman 2001 'Techniques for Assessing the Performance of a Landscape-Based Sediment Source and Transport Model: Sensitivity Trials and Physical Methods', In F. Ghassemi, D.A. Post, M. Sivapalan, and R. Vertessy (eds), MODSIM 2001 International Congress on Modelling and Simulation, Modelling and Simulation Society of Australia and New Zealand, vol 1, pp. 149-154.

M. Littleboy, G. Piscopo, R. Beecham, P. Barnett and L.T.H. Newham 2001 'Determining Depth to Watertable for the Eastern Murray-Darling Basin, Australia', In F. Ghassemi, P. Whetton, R. Little and M. Littleboy (eds), MODSIM 2001 International Congress on Modelling and Simulation, Modelling and Simulation Society of Australia and New Zealand, vol 2, pp. 639-645.

L.T.H. Newham, B.F.W. Croke and A.J. Jakeman 2001 'Design of Water Quality Monitoring Programs and Automatic Sampling Techniques', Third Australian Streams Management Conference, 27-29 August 2001, Brisbane, pp. 455-460.

L.T.H. Newham, C.D. Buller, P. Barnett and J.B. Field 2001 'Land Use Change: Implications for Australian Capital Territory Water Use', Geospatial Information and Agriculture Conference, 17-19 July, Sydney, pp. 814-827.

L.T.H. Newham and J.B. Field 2001 'GIS - Expensive Toys or Useful Tools? Case Studies in Landcare Resource Assessment and Planning', Geospatial Information and Agriculture Conference, 17-19 July, Sydney, pp. 36-47.

L.T.H. Newham, B.F.W. Croke and A.J. Jakeman 2000 'Water Quantity Modelling within the Integrated Catchment Management System', Hydro 2000, 3rd International Hydrology and Water Resources Symposium of The Institution of Engineers Australia, 20-23 November 2000, Perth, Western Australia, pp. 1069-1074.

B.F.W Croke, L.T.H. Newham and A.J. Jakeman 2000 'Integrated Catchment Management System - Water Quality Module', Hydro 2000, 3rd International Hydrology and Water Resources Symposium of The Institution of Engineers Australia, 20-23 November 2000, Perth, Western Australia, pp.779-784.

Professor John Norton

Dynamic Systems Modeller, iCAM/MSI
Environmental modelling, uncertainty handling and assessment in complex models of dynamical systems, identification and state estimation, postgraduate training

Phone: +61 (0)2 6125 6751 E-mail: j.p.norton@bham.ac.uk (pro tem)

Career Brief

BA in Mechanical Sciences, Cambridge, 1962 (MA 1966); DIC, PhD in Electrical Engineering, Imperial College, London 1967. Research Engineer, English-Electric-Leo Computers, London 1962-63. Research Fellow, UK Civil Service 1967-71. Lecturer/Senior Lecturer, Dept. of Electrical Eng., University of Tasmania 1971-79. Lecturer/Senior Lecturer/Reader/ Professor, Dept. of Electronic, Electrical & Computer Eng., University of Birmingham 1979-present (currently part-time). Dynamic Systems Modeller (Level E), ANU 2003.

Study leave Cambridge 1974, Warwick 1978, Newcastle NSW 1983, ANU 1992, 1997, 2000, 2002. Adjunct Professor, CRES, ANU 2002.

MIREE (Aust.) 1973-77, MIEAust. 1977-79, MIEE 1980, FIEE 1996, CEng.

Research, Teaching & Professional Activities

My research interests span identification of dynamical systems (particularly time-varying systems), state estimation; uncertainty handling, and their applications to environmental modelling, target tracking and guidance, gas-turbine modelling, process industries, automotive control and biomedicine. Current activity is concentrated on aerospace prediction and guidance problems in the UK and sensitivity assessment of simulation models for environmental applications at ANU. I was head of the Estimation and Control Group at Birmingham from its inception in 1985 to its absorption into the Research Centre for Communications and Interactive Systems in 2000. I have supervised over 20 PhD students working on topics in power systems, electric traction, digital communication, identification, target tracking and missile guidance, gas turbine modelling, and a range of environmental modelling areas. My 130 or so publications include An Introduction to Identification, Academic Press, 1986 (reprinted 1988). I have acted as consultant for Ferranti-Thompson Underwater Systems, British Gas, Defence Research Agency, Defford, Jaguar Cars Advanced Engineering,QinetiQ, Malvern and dstl, Farnborough.

I have been Editor for Adaptive Control of Int. J. of Adaptive Control & Signal Processing, and editorial board member of that journal, IMechE J. Systems & Control Eng. and Env. Modelling & Software. I am currently a member of the International Federation of Automatic Control Technical Committee on Modelling, Identification & Signal Processing.

Selected Publications

P. F. Weston and J. P. Norton (2003), Graded set-membership models, *Mathematical & Computer Modelling of Dynamical Systems*, 8, 3, 291-305.

D. G. Maksarov and J. P. Norton (2002), Computationally efficient algorithms for state estimation with ellipsoidal approximations, *Int. J. of Adaptive Control & Signal Processing* 16, 6, 411-434.

R. A. Best and J. P. Norton (2000), Predictive missile guidance, *AIAA J. of Guidance, Control & Dynamics* 23, 3, 539-546.

J. P. Norton (1999) Translation of bounds on time-domain behaviour of dynamical systems into parameter bounds for discrete-time rational transfer-function models, *Maths. & Computers in Simulation* 48, 4-6, 469-478.

P. F. Weston and J. P. Norton (1997) Detection and estimation of abrupt changes in input or state, *Int. J. of Control* 67, 5, 699-711.

D. Maksarov and J. P. Norton (1996) State bounding with ellipsoidal set description of the uncertainty, *Int. J. of Control* 65 5, 847-866.

J. P. Norton (1996) Roles for deterministic bounding in environmental modelling, *Ecological Modelling* 6,157-161.

J. P. Norton, T. Chen and A. J. Jakeman (1995) Estimation of unmodelled behaviour as time-varying model-input correction: application to rainfall evapotranspiration, *Environment International* 5 5,533-537.

S. M. Veres and J. P. Norton (1993) Predictive self-tuning control by parameter bounding and worst-case design, *Automatica* 29, 911-928.

S.M.Veres and J.P.Norton (1991) Structure selection for bounded-parameter models: consistency conditions and selection criterion, *IEEE Trans. on Autom. Control* AC-36, 474-481.

J.P.Norton and S. H. Mo (1990) Parameter bounding for time-varying systems, *Maths. & Computers in Simulation* 32, 527-534.

M.J.Chen and J.P.Norton (1987) Estimation technique for tracking rapid parameter changes, *Int. J. of Control* 45 4, 1387-1398.

J.P.Norton (1987) Identification and application of bounded-parameter models, Automatica 23 4, 497-507.

J.P.Norton (1980) Structural zeros in the modal matrix and its inverse, *IEEE Trans. on Autom. Control* AC-25 5, 980-981.

J.P.Norton (1980) Normal-mode identifiability analysis of linear compartmental systems in linear stages, *Math.Biosci.* 50, 95-115.

J.P.Norton (1975) Optimal smoothing in the identification of linear time-varying systems, *Proc. IEE* 122 6, 663-668.

Dr Digby Race

Lecturer and Research Fellow
Community and Farm forestry

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Career Brief

Digby joined ANU Forestry in January 1998, and has over 12 years of community and farm forestry experience in Australia and internationally. His current research focus is analysing the social and economic outcomes of farm forestry for regional Australia, as a partner of the CRC for Sustainable Production Forestry. In addition, Digby has current (or recent) research contracts with the Commonwealth's Agriculture, Fisheries & Forestry - Australia (AFFA), Australian Greenhouse Office, Environment Australia, Greening Australia Ltd., Joint Venture Agroforestry Program, and the United Nation's Food & Agriculture Organisation (FAO).

Digby is a member of the National Farm Forestry Forum, and is regularly invited to speak at regional, national and international forums on various aspects of community and farm forestry development. He has published over 55 research reports, refereed and conference papers, and other texts on various aspects of community and farm forestry. He also contributes to course development, post-graduate teaching, and supervision of post-graduate research at SRES.

Research, Teaching & Professional Activities

My main teaching contribution is as coordinator of two post-graduate courses:

Farm Forestry: *Policy and practice* (FSTY 8002) - which explores the policy environment for the conservation, sustainable management and restoration of farm trees and forests. This course also examines the on-farm options for delivering these outcomes. This course is delivered in partnership with Dr John Field and Prof Peter Kanowski, as part of the new National Graduate Program in Farm Forestry - launched in February 2001.

Social Forestry (FSTY 8037) - which explores the theoretical concepts and practical applications to enrich the social dimension of forestry, particularly when forestry is pursued for community development. This course is delivered in partnership with Ms Jacki Schirmer and guest lecturers.

Some of my recent research and consulting projects have included:

Project Manager – '*Monitoring and Evaluation of Farm Forestry Support*', conducted with Dr Martin Andrew, URS Corporation, Feb.2000-Mar.2003. Commissioned by Greening Australia Ltd. and AFFA;

Project Manager – '*Farm Forestry*: *Linking biodiversity to business solutions*', conducted with Dr David Freudenberger, CSIRO Sustainable Ecosystems, Sept.2001-Oct.2002. Commissioned by Environment Australia;

Consultant – '*Evaluation of Bushcare Support*', conducted with Dr Jenny Andrew, RPM Pty. Ltd. and Dr Anna Carr, Mar.-Jun.2002. Commissioned by Environment Australia;

Principal Researcher – '*Innovative use of farm vegetation*: *Australian experiences of making farm vegetation pay*'. Jun.2001-Mar.2002. RIRDC Project ANU-49A, final report available at the Rural Industries R&D Corporation's website www.rirdc.gov.au. Commissioned by the Joint Venture Agroforestry Program;

Co-Project Manager - 'Development *of Evaluation Skills at the Regional Level for Commercial Farm* Forestry', conducted with URS Corporation, Jul.1999 - Jun.2000. Commissioned by AFFA's Farm Forestry Program;

Project Manager - 'Global *review of small-scale grower* & *forestry industry* partnerships', Sept.1999 - Feb.2000. Commissioned by United Nation's FAO;

Project Manager - 'Development *of strategies to optimise farm forestry in regional* Australia', Mar.1995 - Jun.1997. Commissioned by Joint Venture Agroforestry Program;

Project Manager - 'Market, *economic and social assessment of low rainfall carob agroforestry in the Murray* Valley', Aug.1996-May 1997. Commissioned by Joint Venture Agroforestry Program;

Selected Publications

Race, D. (2002) Has extension changed to match Australia's dynamic forestry landscape? *Rural Society*, 12 (2): 148-159.

Race, D. (2002) Forestry extension: Ideas for a learning and growing sector. *Australian Forest Grower*, 24 (summer): 1-6.

Race, D. and Desmond, H. (2002) Forestry out-grower schemes: A review from selected countries. *Journal of Sustainable Forestry*, 15 (4): 79-98.

Buchy, M. and Race, D. 2001. The twists and turns of community participation in natural resource management in Australia: What is missing? *Journal of Environmental Planning and Management*, 44 (3): 293-308.

Race, D. 2000. *Farm Forestry in Europe and the United States*: *Synopsis of Field Research*. Technical Report No.30, Cooperative Research Centre for Sustainable Production Forestry: Hobart, 13 pp.

Desmond, H. and Race, D. 2000. *Global survey and analytical framework for forestry out-grower arrangements*. Final Report submitted to the Food and Agricultural Organisation (FAO) of the United Nations, Rome, Italy. ANU Forestry: Canberra, ACT. 54 pp. (PDF version - 238kb).

Race, D. and Buchy, M. 1999. A role for community participation in Australian forest management? *Rural Society*, 9 (2): 405-419.

Race, D. 1999. Regional farm forestry industries: Potential dimensions and possible outcomes. *Australian Forestry*, 62 (2): 182-192.

Race, D. and Curtis, A. 1999. Farm forestry in Australia: Improving links between small-scale growers and industry. *Journal of Sustainable Agriculture*, 13 (4): 67-86.

Race, D., Curtis, A. and Booth, B. 1999. Carob agroforestry industry: An assessment of its potential for the low-medium rainfall Murray Valley region. *Australian Journal of Experimental Agriculture*, 39 (3): 325-334.

Race, D. and Robins, L. 1998. *Farm forestry in Australia*: *Research and policy update*. Report for National Research Working Group 11 (Farm Forestry) and Rural Industries Research and Development Corporation: Canberra, ACT. 38 pp.

Curtis, A., Robertson, A. and Race, D. 1998 Lessons from recent evaluations of natural resource management programs in Australia. *Australian Journal of Environmental Management*, 5 (2): 109-119.

Dr U.N. Bhati

Visiting Fellow
Economics and marketing

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Career Brief

U.N. Bhati's formal education is in agriculture and economics, and he has taught and carried out research in these subjects in India, Malaysia and Australia.

About fourteen years ago, while at the Australian Bureau of Agricultural and Resource Economics (ABARE), he had a chance encounter with forestry economics and marketing. He quickly found them to be professionally both challenging and satisfying subjects. Since then, U.N. has become hooked on these topics. He has done some teaching but most of his time has gone into research on subjects such as forestry market outlook, forest plantations and farm forestry. He has written articles, conference papers, consultancy reports, inquiry submissions and monographs.

Research, Teaching & Professional Activities

Currently, I am devoting most of my time to the ANU Forestry Market Report project, which started in June 1997. It has the objectives of preparing and disseminating nationally quarterly market reports on forest products and inputs for Australian forest growers. The market reports are primary for small-scale growers.

By June 2003, twenty-four market reports have been completed. They covered topics such as: cabinet timbers; exports of Australian forest products; trends in log prices in Tasmania; stumpage prices over the next 10, 20, 30... years; consumption of sawnwood and wood based panels; salinity credits; stumpage trends in South Australia; Japanese woodchip import market; carbon credited markets; market trends in the 1990s; market for forest products in South Korea; trends in sawnwood market; cost of log transport; log exports; cost of tree seedlings and cuttings; log and agricultural product prices beyond 2000; structural timber prices.

Forestry and agricultural newsletters, magazines and web sites have published these reports. They are available on the ANU Forestry web site: http://sres.anu.edu.au/associated/marketreport/index.html.

Selected Publications

Bhati, U.N., Kanowski, P. and Ragg, W. 2002. ANU Forestry Market Report Project: Looking to the Future. In Wettenhall, D. (ed.), *Private Forestry – Sustainable, Accountable and Profitable*, Proceedings of Australian Forest Growers 2002 National Conference, 13–16 October 2002, Albany, Western Australia, stream session paper number 271.

Bhati, U.N. 2001. The ANU Market Report Project. In Herbohn, J., Harrison, S., Herbohn, K. and Smorfitt, D. (eds) *Developing Policies to Encourage Small-Scale Forestry*, IUFRO Research Group, Proceedings from International Symposium, Kuranda, Australia, 9–13 January 2000, pp. 27–29.

Dargavel, J., Conley, K., Proctor, W., Ferguson, I. and Bhati, U.N. 1999. *Direct and Indirect Employment in the Forest Sector and Forest Sector Employment as a Proportion of Total Employment*, Montreal Process Project 6.5a, Final Report, School of Forestry and Resource Conservation, The University of Melbourne, January.

Bhati, U.N., Mahendrarajah, S. and Evans, P.D. 1998. Australian woodchip export markets. In Dyason, R., Dyason, L. and Garsden, R. (eds), *Plantation and Regrowth Forestry: A Diversity of Opportunity*, Australian Forest Growers Biennial Conference Proceedings, 6-9 July, Lismore NSW, pp. 177–88.

Shand, R. and Bhati, U.N. 1997. *Pakistan: Economic Profiles in South Asia*, Australia South Asia Research Centre, Research School of Pacific and Asian Studies, Australian National University, Canberra, March.

Shand, R. and Bhati, U.N. 1997. *Nepal: Economic Profiles in South Asia*, Australia South Asia Research Centre, Research School of Pacific and Asian Studies, Australian National University, Canberra, July.

Bhati, U.N., Hafi, A., Hooper, S., and Stanford, L. 1996. *Papaya Fruit Fly: Cost-benefit Analysis of the Proposed Eradication Campaign*, ABARE project 1380, an ABARE consultancy report to the Australian Quarantine and Inspection Service, Canberra, February.

Wilson, S., Whitham, J., Bhati, U.N. and Tran, Y. 1995. *Trees on Farms: Survey of Trees on Australian Farms, 1993-94*, ABARE Research Report 95.7, Canberra.

Bhati, U.N. and J. Whitham. 1994. Farm forestry in Australia. In ABARE, *Quarterly Forest Products Statistics*, September quarter, 1–3.

Bhati, U.N. and Rose, R. 1992. Prospects for Australia's wood based industry: Effects of some microeconomic policy reforms. ABARE Conference Paper 92.22 presented at 'Australia's Timber and Forest Industry: A Strategy for the Future' Conference, Sydney, 28–29 May.

Bhati, U.N., Klijn, N., Curtotti, R., Dean, M. and Stephens, M. 1991. *Financial Mechanisms for and Structural Impediments to the Development of Commercial Plantations*. ABARE consultancy report to the National Plantations Advisory Committee, Canberra, May.

O'Regan, M. and Bhati, U.N. 1991. *Pricing and Allocation of Logs in Australia*, ABARE Discussion Paper 91.7, AGPS, Canberra.

Emeritus Professor Valerie A. Brown

Visiting Fellow, SRES and CRES (jointly)
Local sustainability, sustainability decision-making, sustainability indicators, sustainability and health

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Career Brief

Val Brown holds an undergraduate degree in Ecology from Queensland University, a Graduate Diploma in Adult Learning from the University of Canberra, a Master of Education Degree in Integrative Studies from Endicott College, USA and the inaugural PhD in ANU's Human Sciences Program, thesis topic "Holism in the University Curriculum". During 1979-84 she helped established the B.App.Sc.(Health Education) now B.Ed (Community Development) at the University of Canberra. From1984-89 she established and directed the Health Advancement Services of the ACT, and has since worked in projects to link public health and environmental governance in Australia, Malaysia, Fiji, and China, including the National Local Government Environmental Research Network at CRES 1989-95. She has introduced teaching programs linking Environment and Health to the Tribhuvan University, Nepal, and the University of Western Sydney. Foundation Professor of Environmental Health at the University of Western Sydney 1996-2002, she is now Emeritus Professor from that University and Visiting Fellow and Director, Local Sustainability Project, at the School of Resources, Environment and Society, Australian National University. In 1999 she was appointed an Officer of the Order of Australia for international and national contributions to public health and environmental health, and advocacy for and contributions to, sustainable development.

Research, Teaching & Professional Activities

My research applies integrative methods to exploring the construction of knowledge in generating locally sustainable responses to global social and environmental pressures. Past research programs have addressed the capacity for achieving integrative decision-making in the Local Government sector, the community sector, public health, and the environmental sciences, respectively. My current projects include principles for collaborative engagement for the Murray-Darling Basin; an interactive knowledge management framework for sustainable development in the local government sector; the introduction of sustainable development principles into the national Public Health post-graduate curriculum; and Indigenous communities' environmental health workforce development.

Lawrence Issa

Selected Publications

Brown, Valerie A Thinking globally and acting locally: Environmental health practice and climate change. *Environmental Health* 4. 1 2002, p5-13

Nicholson, R., Stephenson. P., Brown, Valerie. A. and Mitchell, K. 2002. *Common Ground and Common Sense*: *a commmunity-based environmental health action handbook*. Department of Health and Ageing, Canberra 220pp.

Brown, Valerie A. Planners and the Planet: Reshaping the people/planet relationship: do planners have a role? *Australian Planner* 38 3 2001 67- 73

Brown, Valerie A Monitoring Changing Environments in Environmental Health in *Environmental Health*, 1.1 2001, p21-34

Brown, Valerie A. Stephenson. P., Nicholson, R., and Smith, J. 2001. *Grass Roots and Common Ground*: *community-based environmental health action planning*. Department of Health and Aged Care, Canberra 106pp.

Brown, Valerie A., Love, D., Griffiths, R., Powell, J., Murphy, A., and Walsmley, A. 2000. *Western Sydney Regional State of the Environment Report 2000*. Western Sydney Regional Organisation of Councils, Blacktown, 250pp.

Brown, Valerie A. 1996. *Managing for Local Sustainability*: *policies, problem solving, people and place*. National Office of Local Government, Canberra. 314pp.

Brown, Valerie A., Smith, D.I., Weissman, R., and Handmer, J. 1995. *Risks and Opportunities*: *managing environmental conflict and change*. Earthscan, London . 213pp.

Brown, Valerie A. 1995. *Landcare languages*: *talking to each other about living with the land*. National Landcare Program, Department of Primary Industry. Canberra. 215pp.

Brown, Valerie A. 1995. *Turning the tide*: *integrated local area management for Australia's coastal zone*. Department of Environment, Sport and Territories, Canberra, 175pp (second printing).

Brown, Valerie A. 1994. *Acting Globally*: *the environmental management needs of local government*. National Office of Local Government, Canberra 90pp.

Brown, V.A., Orr, L., and Smith, D.I. 1992. *Acting locally*: *meeting the environmental information needs of Local Government*. Department of the Arts, Sport, the Environment and Territories, Canberra, 95 pp.

Group of Experts on Environmental Concerns (V.A. Brown, Australian member) 1991 *Sustainable Development. An imperative for environmental protection*. Commonwealth Secretariat, London. 136 pp.

Brown, V.A. (ed.) 1989 *A sustainable healthy future*: *towards an ecology of health*. Commission For the Future and Latrobe University, Melbourne. 115 pp.

Dr John Dargavel

Visiting Fellow
Forest history & forest policy

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Career Brief

John has degrees from the Universities of Edinburgh and Melbourne and from the Australian National University. He has worked in the forest service in South Australia and for twenty years in Victoria as an industrial forester mainly concerned with management planning. He has lectured on forest economics, resource and management planning in the Department of Forestry, and has researched issues of forest policy as a Fellow in the Centre for Resource and Environmental Studies. On retirement, he was appointed a Visiting Fellow, first in the Research School of Social Sciences, and currently jointly in the Department of Forestry and the Centre for Resource and Environmental Studies. He is President of the Australian Forest History Society.

Research, Teaching & Professional Activities

My research interests lie in forest history and in the political economy of the forest sector. I have written extensively and critically on forest policy, the Regional Forest Agreement process, environmental conflicts and employment. A large part of my academic life has been concerned with convening groups of people with different perspectives and disciplines concerned with policy and history.

A consortium of people at ANU, Macquarie University and the Australian Forest History Society arranged the Perfumed Pineries conference on the history of the white pine (*Callitris*) region in NSW and Queensland. It covered themes of Indigenous use, fire and biodiversity, climatic and other events, public history and heritage, ecological science, use, abuse and management, and values and social identification.

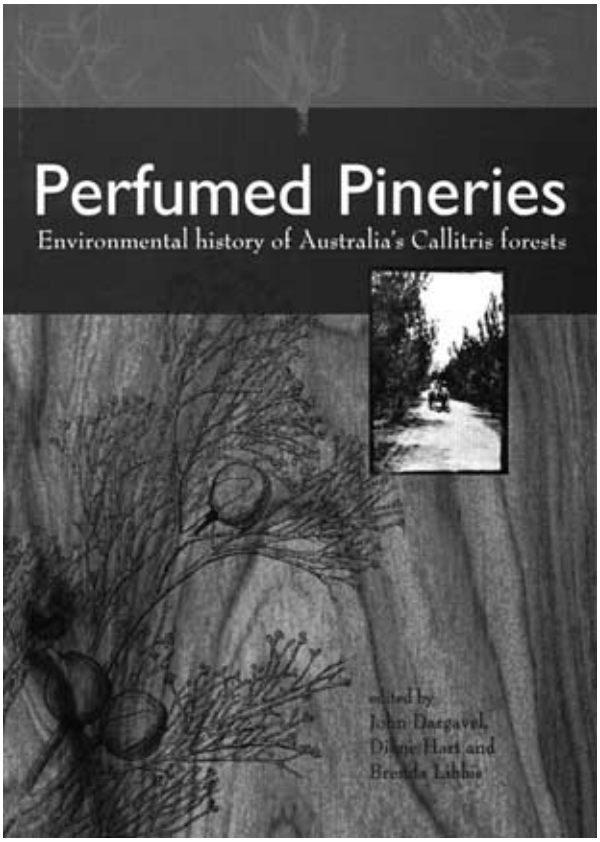
The national forest history conference was held in Tasmania in February 2002. I wrote a play for this, which was performed by local people in Geeveston. It is called 'Hard work to starve' and covers labour dispute in southern Tasmanian sawmills in 1921-22.

Selected Publications

Dargavel, J., Hart, D. and Libbis, B. (eds) 2001. *Perfumed pineries: environmental history of Australia's Callitris forests*. Canberra: Centre for Resource and Environmental Studies, the Australian National University.

Dargavel, J., Proctor, W. and Kanowski, P. 2000. Conflict and agreement in Australian forests. in Luca Tacconi (ed) *Biodiversity and Ecological Economics: Participation, Values, and Resource* Management. Earthscan Publications, UK and USA: 101-15.

Dargavel, J. 2000. More to grief than granite: arboreal remembrance in Australia. *Journal of Australian Studies* 64: 187-95.



Dr Ross Florence

Visiting Fellow
Ecology & silviculture of eucalypt forests; forest policy & planning

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Career Brief

Ross graduated in 1952 (Queensland University, Australian Forestry School) and joined the Queensland Department of Forestry as a research forester, concerned mainly with native forest silviculture. He was appointed to the Department of Forestry, ANU in 1965 where his main teaching and research interests have been in the ecology and silviculture of eucalypt forests, and forest policy and planning. Ross retired in 1995 and was appointed a Visiting Fellow.

Research, Teaching & Professional Activities

I am the author of Ecology and Silviculture of Eucalypt Forests. I see the eucalypt forests and woodlands as a fascinating response to environmental stresses associated with continental drift. Present-day species and community patterns are seen in terms of the progressive adaptation of the eucalypt progenitor(s) to declining soil nutrient and water status. Adaptation to a dry environment is particularly remarkable given that the eucalypt remains a mesophyte - albeit a drought tolerant mesophyte. An appreciation of the evolutionary history and physiological attributes of the eucalypt should provide a salutory lesson for the forester: ecologically sustainable forest management must be based on an appreciation of natural community patterns and structures, and the consequences for stand dynamics and health of departing too far from these patterns and structures.

My teaching in areas of policy and planning, and many submissions on these matters to conferences and inquiries, have long focused on the essential need for Australian forestry to adapt to changing social circumstances, and particularly, to develop more environmentally sensitive approaches to native forest management. We are seeing movement in the direction but there remains quite some way to go.

Selected Publications

Florence, R.G. 1996. Ecology and Silviculture of Eucalypt Forests. CSIRO Australia 413pp.

Florence, R.G. 1994. The ecological basis of forest fire management in NSW. In The Burning Continent: Forest Ecosystems and Fire Management. Current Issues. Institute of Public Affairs, Perth. pp.15-33

Florence, R.G. 1993. Forestry in transition in Australia: from the primacy of wood production to ecologically sustainable development. Commonwealth Forestry Review 72: 321-337.

Florence, R.G. 1991 Planning for sustainable development. In Directions in Forestry: Costs and Benefits of Change Whyte, A. and Allen, J. (eds), ANZIF Conference, Christchurch, N.Z. pp.173-181.

Dr Madan K Gautam

Visiting Fellow
Silviculture, ecology and plant diversity of agroforestry, mixed species forest and non-timber forest products
Improving rural livelihoods and alleviating poverty through community forestry

Phone: +61 (0)2 61252623 E-mail: Madan.Gautam@anu.edu.au

Career Brief

Madan completed his BSc (Tropical Forest Management) with ectomycorrhizal behaviour research as an honours project. He was rewarded a British Council Scholar and completed a Masters in Environmental Forestry from University of Wales, UK specialising in Indigenous Ecological and Silvicultural Knowledge in Community Forest Management. As a Vice-Chancellor Scholar, he completed a PhD at Lincoln University, NZ, specialising in ecological aspects of tree and understorey management. His study has focused on the effects of soil moisture and temperature on above and below ground (root) interactions for tree and understorey growth. In addition during his study, he was also involved as a teaching assistant in ecophysiology.

In his natural resource management career, he acquired first-hand experiences initially from his parents' farm in Nepal where eco-farming was practiced in harmony with forest resource management. As a professional, he has worked with the Nepal-UK Research Project, Nepal-Australia Community Forestry Project, USAID/Nepal, and with Agricultural Extension and Rural Development Department, Reading University, UK. After completion of his PhD, he was working as a postgraduate tutor in Soil, Plant and Ecological Sciences Division, Lincoln University, NZ.

As an international consultant with IFAD, he studied community based leasehold agroforestry management in improving rural livelihoods. With South Asia Poverty Alleviation Programme/UNDP he was the pioneer in developing methodology and conducting pilot studies for social impact assessment in the rural poverty alleviation program for six countries in the South Asia. In addition, he has worked as a consultant for FAO, USAID and UNICEF.

Research, Teaching & Professional Activities

My current research project s focus on problems which have been encountered in managing farm forestry in Australia. I am involved in on-going research on (a) Effect of magnesium in *Pinus radiata*, (b) Effect of tree roots on soil properties (c) Alteration of soil pH and *Pinus radiata* growth, and (d) Management of tree lucerne (*Chamaecytisus proliferus* subsp. *palmensis*) for farm forestry.

Recently, as part of a team, I completed a research assignment, under ANU Faculty Research Grant, in studying international community forestry experience with reference to its applicability for Australia. Being a member of the Southern Tablelands Farm Forestry Network, NSW I have regular direct interactions with farmers and tree growers. In addition to the above, I have extensive experience and interests in community forestry, the methodology of development of project management, i.e. participatory planning, social impact assessment, indigenous forest management, and RRA/PRA (rapid/participatory rural appraisals) in poverty alleviation and rural development.

Selected Publications

(a) Scientific publications

Gautam MK, Mead D, Clinton P and Chang S: 2003 Biomass and morphology of *pinus radiata* coarse root components under silvopastoral system. *Forest Ecology and Management*, vol 177 1-3, 387-397.

Gautam M, Mead D, Clinton P and Frampton C: 2003 Pinus radiata in a sub-humid temperate silvopastoral system: modelling of seasonal root growth. *Forest Ecology and Management*, (in press).

Gautam MK, Mead D, Chang S and Clinton P: 2002 Spatial variation and understorey competition effect of *Pinus radiata* fine roots in a silvopastoral system in New Zealand. *Agroforestry Systems* 2: 89-98

Gautam MK, Mead, D, Frampton, C, and Chang S: 1999 Coarse root system characteristics and toppling of clonal and seedling trees of *Pinus radiata* on Canterbury Plains. *New Zealand Journal of Forestry* 44 (1):15-18.

(b) Submitted scientific papers:

Gautam M, Mead D, Clinton P and Frampton C, 2003. Topsoil moisture and temperature as influenced by genetic variation of *Pinus radiata*.). *Forest Ecology and Management*. 177: 387-397.

Roberts EH and Gautam MK, Indigenous Knowledge on Silvicultural Practices and Forest product Use in the Hills of Nepal: case study (submitted to *Society and Natural Resources*).

(c) Technical and development consultant reports

Roberts EH and Gautam MK, 2003 Community forestry lessons for Australia: a review of international case studies. Research Report presented to The Faculties Research Grant Scheme 2002-2003, The Australian National University, (http://sres.anu.edu.au/publications/Aus_Comfor_final1.pdf).

Gautam MK, 2000 Social impact assessment of South Asia Poverty Alleviation Programme: Nepal Syanja a pilot study .Impact Assessment Technical Report. SAPAP/UNDP/ UNOPS / RAS – 96-600 United Nations Office for Project Services, PO Box 13673, Kuala Lumpur – 50818, Malaysia, September 2000, (consultant report).

Gill K, Gautam MK and Suwal B: 1999 Technical review, 23 June 1999 to 3 July 1999, Hills Leasehold Forestry and Fodder Development Project, Nepal, United Nations Office for Project Services, PO Box 13673, Kuala Lumpur – 50818, Malaysia (consultant report).

Gautam MK, 2000. Root system variation in *Pinus radiata* clones: experimental study under semi-dry temperate sylvopastoral ecosystem in New Zealand. Forest and Farm Plantation Management Cooperative, New Zealand Forest Research Institute/Industry Research Cooperatives, Technical Report pp34.

Gautam, MK, 1996. Review of tree root studies. Forest and Farm Plantation Management Cooperative, New Zealand Forest Research Institute/Industry Research Cooperatives, Review paper No. 30.

Bajracharya S, Lama K and Gautam MK, 1994 Gender planning for Shivepuri Wildlife and Watershed Project, Kathmandu, Nepal, FAO publication no 17, (consultant report).

(d) Conference papers

Gautam MK, Roberts EH and Singh BK, 2003. Community based leasehold approach and Agroforestry technology for Restoring Degraded Hill Forests and Improving Rural Livelihoods in Nepal. Rural Livelihoods, Forest and Biodiversity Conference, 19-23 May 2003 Bonn, Germany, (http://sres.anu.edu.au/publications/madan03.pdf).

Roberts, EH and Gautam MK, 2003 International experiences of community forestry and its potential in forest management for Australia and New Zealand. Australasia Forestry Conference, Queenstown, New Zealand, April 2003 (peer reviewed), (http://sres.anu.edu.au/publications/madan02.pdf).

Roberts EH. and Gautam MK, 2003 Promotion of the sustainable cultivation of non-timber forest products by forest owners. Australasia Forestry Conference, Queenstown, New Zealand. April 2003.

Gautam MK, Chang SX, Mead DJ Clinton PW, and Roberts EH, 2003 First order lateral root characteristics reflect the competitiveness of radiata pine genotypes in agroforestry systems. Australasia Forestry Conference, Queenstown, New Zealand. April 2003 (peer reviewed), (http://sres.anu.edu.au/publications/madan01.pdf).

Selected Student Theses

Peer reviewer and Master thesis examiner: In 2002, Madan peer reviewed two articles for The Geography Magazine, and was examiner of two Masters thesis

Shrestha S. 2002 Conflict management for sustainable development of community forestry in Nepal. Masters thesis, The Australian National University.

Maihua M. 2002 Blending forestry and tourism (ecotourism): can this be a socially sustainable development option to commercial logging in Papua New Guinea. Masters thesis, The Australian National University.

Mr Adam Gerrand

Visiting Fellow
Forest policy development, planning and implementation

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Career Brief

Adam Gerrand began his forestry career with a NSW Forestry Commission traineeship in 1982 while undertaking his undergraduate degree in forestry at ANU. After completing his degree Adam worked for two years with the NSW Forestry Commission on native forest and pine plantation operations. In 1988 Adam moved to Tasmania to undertake plantation research, including a 5 year project to develop thinning and pruning regimes aimed at developing appropriate silvicultural and management prescriptions for eucalypt plantations. In 1994 Adam completed an MSc. at Oxford University with a thesis on community forestry that led to work on the Nepal – Australia Community Forestry Project in 1996. Returning to Tasmania, Adam had responsibility for preparation of policy prescriptions and management plans for State forest.

From 1997 to 2001 Adam worked as the Principal Forest Officer for the Department of Forests in Vanuatu where he was involved in both national policy development and practical implementation. He enjoyed the challenges of finalising the draft Code of Logging Practice and new national forestry legislation and supporting field foresters with its implementation. Since returning to Australia Adam has been a part-time Visiting Fellow at ANU providing assistance with students thesis and work programs. In 2002 Adam started work with the Bureau of Rural Sciences and was on the organising committee for the joint ANU-BRS national conference on forestry plantations held in August 2002 and now manages the National Plantation inventory.

Research, Teaching & Professional Activities

My main research interests follow my interest in improving forestry's contribution to national development. This spans the range from local action such as community forestry through to national forest policy. In recent years my work overseas has focussed on forest policy implementation through planning, legislative development and enforcement. I was involved in a comprehensive review of Vanuatu's forestry legislation leading to a new Forestry Act in 2001. I am currently involved in an ACIAR funded project team developing improved planning methods for sustainable management of timber stocks in PNG forests. At BRS my work involves scientific analysis and advice to support forest policy and Ministerial responsibilities. I am currently engaged in plantation forest inventory and planning, and am interested in developing approaches to evaluating the effects of plantations on water use and salinity mitigation.

Selected Publications

Gerrand, A.M., Keenan, R.J., Kanowski, P. Stanton, R. (2003) Australian forest plantations: Australian forest plantations: an overview of industry, environmental and community issues and benefits. *Australian Forestry* 66: 1-8.

Ferguson, I.F., Spencer, R., Wood, M. and Gerrand, A. (2002) *Australian supply and demand for plantation products*. In Gerrand, A.M. (ed.), Proceedings of the Prospects for Australian Forest Plantations 2002 conference, 20-21 August 2002 Canberra, Australia. Bureau of Rural Sciences. pp 29-40. (http://www.brs.gov.au/plantationconference)

Gerrand, A. M., Miller, R., Catton, C., Joseline, A. Stephens, M. Wood, M. (2002). *Incentives for forest plantations in Australia*. Country report, part of a 9 country study presented to FAO Asia-Pacific Forestry Commission in Mongolia – Aug 2002.

Brack, C., Bragg, C., Frakes, I., Gerrand, A., Keenan, R., Vanclay, J., (2002). *Review of forest inventory and mapping systems for forest planning in PNG*. ACIAR Project FST 98-118, Planning methods for sustainable management of PNG forests.

Gerrand, A. M. and Bartlett, A.B. (2001). *Managing change*: *Lessons learned from the development and implementation of Vanuatu's National Forest Policy*. 16th Commonwealth Forestry Conference, "*Forests in a changing landscape*", 18-25 April 2001, Fremantle, Western Australia, Commonwealth Forestry Association.

Gerrand, A. M. and W. A. Neilsen (2000). *Comparing square and rectangular spacings in Eucalyptus nitens using a Scotch Plaid design*. Forest Ecology and Management 129: 1-6.

Neilsen, W. A. and Gerrand, A. M. (1999). *Growth and branching habit of Eucalyptus nitens at different spacing and the effect on final crop selection*. Forest Ecology and Management 123: 217-229.

Orr, S. and Gerrand, A. M. (1998). *Management Decision Classification*: *a system for zoning land managed by Forestry Tasmania*. Tasforests 10: 1-14.

Gerrand, A.M., Medhurst, J. and Neilsen, W.A. (1997) *Thinning and pruning eucalypt plantations for sawlog production in Tasmania*. Tasforests 9: 15-34.

Dr Ann Gibson

Visiting Fellow
Tree physiology

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Career Brief

Ann joined the Botany Department, ANU, as part-time demonstrator in 1961, after graduating BSc(Agr) Hons from the University of Sydney, and obtained her Dip.Ed. in Tertiary Method there before moving to the Secondary level. Through the 70s she was invoved in school-based curriculum development and in the writing of science for children. She returned to the ANU in 1982 as a PhD student interested in the adaptations of eucalypts to difficult situations. She has contributed to ACIAR projects concerning the use of eucalypts and acacias, acting as a project scientist and project reviewer.

Research, Teaching & Professional Activities

The aim of my research is to identify and understand the physiological mechanisms by which different provenances of River Red Gum and Coolibah survive and grow in the wide range of conditions in which both these wide spread, fast-growing riverine species have evolved. My particular interest is in their water-use efficiency. I have taught botany, dendrology and tree physiology to undergraduates and become a mentor to some of those in need of special care and I have provided study skills support to graduate students, particularly those from non English speaking backgrounds, as well as supervising research students in physiology - work I now relinquish in order to return to research.

Selected Publications

Tuomela, K, Koskela, J. and Gibson, A. 2002. Relationships between growth, specific leaf area and water use in six populations of *Eucalyptus microtheca* from two climates grown in controlled conditions. *Australian Forestry* 4:75-79

Gibson, A., Bachelard, E.P. and Hubick, K.T. 1995. Relationship between climatic and provenance variation in *Eucalyptus camaldulensis* Dehnh. *Australian Journal of Plant Physiology* 22:453-60.

Franks, P.J., Gibson, A. and Bachelard, E.P. 1995 Xylem permeability and embolism susceptibility in seedlings of *Eucalyptus camaldulensis* Dehnh. from two different climatic zones. *Australian Journal of Plant Physiology* 22:15-21.

Selected Student Theses

Sardabi, H. 1998. An investigation of the relationship between penetration resistance, soil physical properties and the growth of selected tree species (PhD thesis).

Egerton,J.J.G. 1999. Effect of reduced light during autumn and winter on snow gum seedling establishment (MSc thesis).

Ochieng, E. O. 2001. Comparative responses to drought and salinity in three provenances of *Acacia holosericea* (MPhil thesis).

Tough trees: River Redgum, Tennant Creek

Dr A Malcolm Gill

Visiting Fellow
Fire ecology, fire weather, fire behaviour and fire management

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Career Brief

After an undergraduate degree in Agriculture Dr Gill completed MSc and PhD degrees in forest ecology at the same university, the University of Melbourne. Two years were then spent at the Harvard Forest of Harvard University in USA, studying North temperate tree growth, and a further two and a half years at Fairchild Tropical Botanical Garden in Miami, Florida studying tropical tree growth. Appointed in 1971 to the staff of CSIRO Plant Industry, he has spent over 30 years on matters relating to bushfires in the Australian landscape.

Research, Teaching & Professional Activities

My research interests have largely concerned the inter-related topics of fire ecology, fire weather, fire behaviour and fire management. Over the past few years my research has been mainly concerned with point-based, and patch-based, models of fire occurrence. These models relate nicely to ecological effects of fires in the landscape including biodiversity. Supplementing this has been an involvement with the ACT Bush Fire Council.

Selected Publications

Gill, A.M. (2000). Fire-pulses in the heart of Australia: fire regimes and fire management in Central Australia. Report to Environment Australia, August 2000, 50p.

Bradstock, R.A. and Gill, A.M. (2001). Living with fire and biodiversity at the urban edge: in search of a sustainable solution to the human protection problem in southern Australia. Journal of Mediterranean Ecology 2, 179-195.

Gill, A.M. (2001). A transdisciplinary view of fire occurrence and behaviour. In: G. Pearce and L. Lester (eds) Bushfire 2001. Proceedings of the Australasian Bushfire Conference, Christchurch, New Zealand. Pp. 1-12. Rotorua, New Zealand.

Gill, A.M. (2001). Economically destructive fires and biodiversity conservation: an Australian perspective. Biological Conservation 15, 1558-1560.

McCarthy, M.A., Gill, A.M. and Bradstock, R.A. (2001). Theoretical fire interval distributions. Int. J. Wildland Fire 10, 73-77.

McCarthy, M.A., Possingham, H.P. and Gill, A.M. (2001). Using stochastic dynamic programming to determine optimal fire management of Banksia ornata. J.Appl. Ecol. 38, 585-592.

Bradstock,R.A., Williams, J.E. and Gill, A.M. (eds) (2002) Flammable Australia: The Fire Regimes and Biodiversity of a Continent. Cambridge University Press.

Mackey, B., Lindenmayer, D.B., Gill, A.M., McCarthy, M.A. and Lindesay, J. (2002). Wildlife, Fire and Future Climates. CSIRO Publishing, Melbourne.

Dr Nigel Hall

Visiting Fellow iCAM
Integrated assessment, bioeconomic modelling, environmental economics and policy

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Career Brief

Dr Hall is a natural resource economist specialising in natural resource issues with 30 years' experience as a researcher and research manager, in ABARE, as a Consultant and at ANU. He has experience in research planning and management, policy analysis and in the modelling of bio-economic systems in collaboration with agronomists, hydrologists and other scientists.

Dr Hall grew up on a farm in Northumberland and studied agricultural science before specialising in economics at Newcastle University. He followed this with a postgraduate year at Oxford studying Agricultural Economics under Colin Clark. After working some years with the Bureau of Agricultural Economics, he was awarded a Public Service Board Scholarship to undertake a PhD at Newcastle University. On completion of the doctorate, he returned to Australia and the BAE. BAE and its successor ABARE have been key government research institutions influencing Australian Federal Government policies in agriculture and natural resources.

Research, Teaching & Professional Activities

My research interests include modelling the economics of water and salt management in Australia and overseas and the economics of greenhouse gas abatement through agricultural change. Current projects include providing the socio-economic modelling input to a study of salinity and land use in NSW. Thailand and Laos with the University of Technology, Sydney and working as part of an iCAM team with the New South Wales Department of Land and Water Conservation; in the development of farm, catchment and regional profiles, long term modelling and data management, for control of salinity in New South Wales.

Recent work includes:

Subcontracted as an expert on the Murray-Darling Basin Commission as an example of successful inter-jurisdictional water and salinity management to estimate costs of salinity for Haskoning BV acting for the International Fund for Saving the Aral Seal (IFAS).

Preparing a report on water institutions and use in each state of Australia for CSIRO Division of Sustainable Ecosystems (Dunlop, Hall, Watson, Gordon and Foran 2001)

Estimating water demand from irrigation for the Murray-Darling Basin Commission (Hall 1998).

Co-author of the study of the 'Impact of water on the Australian Economy' for the Australian Academy of Applied Science and Engineering (AATSE 1999).

Selected Publications

Hall, N., Greiner, R. and Yongvanit, S. 2003. 'Adapting Modelling Systems for Salinity Management of Farms and Catchments in Australia and Thailand, ' *Mathematics and Computers in Simulation*, (forthcoming).

Hall, N. and Watson, W. 2001. 'A conceptual framework for integrated catchment management of salinity', *Proceedings of MODSIM2001*, Canberra, 10-13 December.

Hall, N.H., 2001. 'Linear and quadratic models of the southern Murray-Darling basin', *Environment International*, 27, 219-23.

Dunlop, M., Hall, N., Watson, W., Gordon, L. and Foran, B. 2001. Water use in Australia, CSIRO Sustainable Ecosystems, Canberra.

Barr, N., Ridges, S., Anderson, N., Gray, I., Crockett, J., Watson, W. and Hall, N. 2000. Adjusting for catchment management, Murray-Darling Basin Commission, Dryland Technical Report No.2, Canberra.

White, N., Sutherst, R., Hall, N. and Whish-Wilson, P. 2001. "The vulnerability of the Australian beef industry to impacts of the cattle tick (Boophilus microplus) under climate change." (Accepted for publication) Abdalla, A. and Hall, N. 1999. Using management practices to reduce greenhouse gas emissions from Australian agriculture, ABARE Report to the Rural Industries Research and Development Corporation, Canberra.

AATSE.1999. Water and the Australian Economy, Australian Academy of Technological Sciences and Engineering, Melbourne.

Watson, W., Hall, N. and Hamblin, A. 1999. The costs of soil acidity, sodicity and salinity for Australia: preliminary estimates, CRC for Soils and Land Management, CRCSLM/CTT2/6/99, Adelaide.

Hall, N., Poulter, D. and Curtotti, R. 1994. ABARE Model of Irrigation Farming in the Southern Murray-Darling Basin, ABARE Research Report 94.4, Canberra.

Forthcoming completed reports for the TARGET project

Oliver, M., Hall, N. and Watson, W. 2002, Farm Economic Analysis: Little River Catchment, Integrated Catchment Assessment and Management (iCAM) Centre report prepared for the TARGET project, Australian National University, Canberra.

Oliver, M., Hall, N. and Watson, W. 2002, Farm Economic Analysis: Mid-Macquarie Landcare, Consultancy report prepared for Mid-Macquarie Landcare, Watson Agriculture Resources & Environmental Consulting, Canberra.

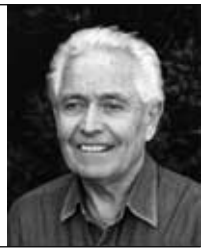
Oliver, M., Hall, N. and Watson, W. 2002, Farm Economic Analysis: Mid-Talbragar Catchment, Integrated Catchment Assessment and Management (iCAM) Centre report prepared for the TARGET project, Australian National University, Canberra.

Oliver, M., Hall, N. and Watson, W. 2002, Farm Economic Analysis: Warrangong Catchment, Integrated Catchment Assessment and Management (iCAM) Centre report prepared for the TARGET project, Australian National University, Canberra.

Hall, N. (2002) Plantation Forestry Economics for the Lachlan and Macquarie Catchments, Integrated Catchment Assessment and Management (iCAM) Centre report prepared for the TARGET project, Australian National University, Canberra.

Hall, N., Oliver, M. (2001) Scoping Report, Integrated Catchment Assessment and Management (iCAM) Centre report prepared for the TARGET project, Australian National University, Canberra.

Mr Neil Humphreys



Visiting Fellow
Management systems, forest operations and farm-based plantations

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Career Brief

Neil's (Curly) career started in 1950 as a forestry trainee with the Forestry Commission of NSW. Following graduation from the University of Sydney he worked on the North Coast of NSW and later in the Marketing Division in Sydney. His interest centred on forest harvesting. In 1979 he was employed by Australian Newsprint Mills (ANM) at Albury to manage the greenfield newsprint mill's wood supply which used fully mechanised harvesting systems. He later managed the Forest Management Division of ANM in Tasmania before moving to Malaysia to develop forest plantations for Fletcher Challenge. Since 1999 he has been program director of the Forest Technology Program and Senior Fellow at the University of Melbourne. He also became Visiting Fellow at the Australian National University where he now lectures in Forest Operations.

Research, Teaching & Professional Activities

My experience has centred on forest operations and during the last twenty-five years I have concentrated on industrial forestry.

Thus my involvement at ANU as a Visiting Fellow brings with it a culture which is commercial rather than academic. This juxtaposes two cultures - one that emphasises the importance of money and management structures with one that emphasises research and teaching.

Universally, the interface of cultures generates a hive of activity, mostly for the good. Where the various cultures have mutual understanding and respect, the interaction is positive and exciting.

I accepted the School's invitation to be a visiting fellow because I believe that forestry and society gain considerably through the positive interaction of academia and business.

Dr Robert Coutts, a highly respected wood scientist who, until recently was with CSIRO, put it so well when he said, "In this day and age of information technology, facts are easy to come by, but real knowledge is gained only from exposure and experience." My contribution to forestry is now directed to transferring some of my experience to those studying at ANU.

Dr Edward Linacre

Visiting Fellow
Climatology

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Career Brief

Edward Linacre obtained physics degrees from Edinburgh (M.A) & London (B.Sc., M.Sc., PhD.) and had an early career in UK involving physics applied to radar and problems of the steel, coal and chemical-engineering industries. He joined CSIRO in 1960 and became a Principal Research Scientist, studying physics aspects of irrigation agriculture, especially water evaporation rates. They depend on the climate, and climate estimation became a preoccupation. In 1969 he was appointed inaugural Associate Professor of Climatology at the new Macquarie University. There followed 17 years of research and teaching, pioneering distance-teaching of the subject. There were lecture tours in several countries, notably Brazil, Bali, the Philippines and China. Retired in 1986 to complete his second book, which was eventually published in 1992. That year he escaped Sydney to Canberra and became a Visiting Fellow in the then Geography Department at ANU. There he has given numerous lectures in the introductory climatology course etc, revised his first book, a textbook on climatology, and published more research papers, as well as being consulted by other researchers.

Research, Teaching & Professional Activities

Climate has many aspects, as indicated in the following list of my more significant publications. On my starting in Sydney, there was an initial interest in the meteorology of air pollution, and also in the newly emerging field of environmental studies (the latter involved being a member of the team which carried out the first Environmental Impact Study in Australia.) However, the main emphasis subsequently has been on the estimation of key climatic variables such as temperature, radiation, winds and evaporation rates, using the minimum of input data. Lack of direct measurements in practice means that such estimates are often needed in building computer models of climate change, air pollution patterns, agricultural productivity, past environments, and so on.

Selected Publications

Linacre, E. and Geerts, B. 2002. Estimating the annual mean screen temperature empirically. *Journal of Theoretical and Applied Climatology*. 71: 43-61.

Linacre, E. and. Geerts, B. 1997. "Climates & Weather Explained" (Routledge, London) 432pp.

Linacre, E. 1994. Estimating US Class A pan evaporation from few climate data. *Water International* 19: 5-14.

Linacre, E. 1993. A three-resistance model of crop and forest evaporation. *Journal of Theoretical. And Applied Climatology* 48: 41-8.

Linacre, E. 1992. Data-sparse estimation of lake evaporation using a simplified Penman equation. *Agriculture & Forestry Meteorology*. 64, 237-56.

Linacre, E. 1992. *Climate Data & Resources*. (Routledge, London) 366pp.

Linacre, E. 1990. The effect of rain on attendance at Sydney's Easter Show. *Australian Meteorological* Magazine38: 65-7.

Dr Gary Richards

Visiting Fellow
Greenhouse

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Career Brief

After completing his bachelor's degree in 1983 Gary was a founding partner in a small silvicultural business, later joining the ACT Parks and Conservation Service where he remained until 1991. Over this time he also completed both a Graduate Diploma in Outdoor Recreation and a Master of Applied Science in Resource Management at the University of Canberra. In 1990 Gary commenced his PhD in the Forestry Department, while also joining the ACT Planning Authority to assist in developing the legislation and administration for environmental impact assessment.

On completing his PhD in 1993 Gary joined the National Capital Planning Authority and worked as a consultant to the Department of Housing and Regional Development in developing multi-disciplinary regional planning strategies. In his time with the Authority Gary co-authored the national evaluation of the Commonwealth Government's Better Cities Program.

In 1996 Gary left the Commonwealth Government to join local government, taking charge of planning for a small Southern Tablelands Council. During this time Gary was active on the Steering Committee for the SE Region State of the Environment Report. 1998 saw Gary rejoin the Commonwealth Government service, taking a role as Senior Scientific Adviser to the Australian Greenhouse Office in regard to carbon accounting for land based sources and sinks. Gary is currently the Manager and Principal Scientist for the development of the National Carbon Accounting System

Research, Teaching & Professional Activities

My research interests have moved away from an initial focus on the social aspects of resource planning and management and resource planning systems. My work within government saw a developing interest in multi-disciplinary planning and policy related issues. Work within local government also saw the development of interests in the application of GIS systems to land use and infrastructure decision making and as a spatially based land information system. Current research interests focus on the development of GIS-based carbon budget models to both inventory and assess of carbon budget implications of given forest management and planning scenarios.

Selected Publications

Richards, G.P. (ed.) 2001. *Biomass Estimation: Approaches for Assessment of Stocks and Stock Change*. National Carbon Accounting System Technical Report No. 27. 160pp.

Richards, G.P. and Evans, D.W. 2000. *CAMFor User Manual v 3.35*. National Carbon Accounting System Technical Report No. 26. 47pp.

Richards, G.P. (ed.) 2001. *Biomass Estimation: Approaches for Assessment of Stocks and Change*. National Carbon Accounting System Technical Report No. 27. Australian Greenhouse Office, Canberra.

Richards, G. P. 2001. *The FullCAM Carbon Accounting Model: Development, Calibration and Implementation for the National Carbon Accounting System*. National Carbon Accounting System Technical Report No. 28 (50pp), Australian Greenhouse Office, Canberra.

Richards, G.P. and Evans, D.W. 2000. *CAMFor User Manual v 3.35*. National Carbon Accounting System Technical Report No. 26 (47pp), Australian Greenhouse Office, Canberra.

Richards, G.P. and Evans, D.W. 2000. *CAMAg* National Carbon Accounting System (electronic model) Australian Greenhouse Office, Canberra.

Richards, G.P. and Evans, D.W. 2000. *GRC3* National Carbon Accounting System (electronic model) Australian Greenhouse Office, Canberra.

Dr Mike Slee

Visiting Fellow
Tree breeding, plantation silviculture, tropical forestry, new crops

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Career Brief

Mike graduated in Forestry from Oxford in 1960. He worked for eight years with the Queensland Department of Forestry as a tree breeding officer, specialising in the development and introduction of the tropical plantation species *Pinus caribaea* and the *elliotti x caribaea* hybrid.

Mike joined the ANU in 1968 and completed his PhD which showed that tropical climatic conditions caused malformations in the growth of *Pinus caribaea*. His major teaching has been in tree breeding and plantation silviculture. He has also specialised in plantation consultancy work in various Asian countries. He has supervised 28 postgraduate students from 19 different countries and was convenor of the graduate program in environmental science at ANU for the four years up to 1995. He retired from full time teaching in 1997 but retains research and departmental interests.

Research, Teaching & Professional Activities

Recently, Mike has been working on the development of new crops especially the oil producing eucalypts including low cost breeding procedures for the blue mallee *Eucalyptus polybractea*.

Selected Publications

Kalinganire, A., Harwood, C.E., Slee, M. and Simons, A.J. 2001. Pollination and fruit-set of *Grevillea robusta* in western Kenya. *Austral Ecology* 26: 637-648.

Slee, M.U. 1997. *Study of Flowering and Hybridization in Blue Mallee*. Final report. Project ANU 19A. Rural Industries Research and Development Corporation, Canberra.

Slee, M.U. 1996. *Eucalypt Oil Production - Establishment of a Breeding Program*. Final report Project ANU 10A, Rural Industries Research and Development Corporation, Canberra.

Slee, M.U. 1995. *Genetic Variation in Oil Production and Quality in Tea Tree*. Final report. Project ANU 11A. Rural Industries Research and Development Corporation, Canberra.

Harrison, D. L. and Slee, M.U. 1992. Long shoot terminal bud development and the differentiation of pollen and seed cone buds in *Pinus caribaea* varhondurensis. *Canadian Journal of Forest Research*. 22(11): 1656-1668.

Slee M.U. 1991. Twenty five years of postgraduate education at the Department of Forestry, Australian National University. *Commonwealth Forestry Review*. 70(4): 200-212.

Euclyptus polbractea plantation, West Wyalong, NSW

Dr Robin Tennant-Wood

Visiting Fellow
Environmental politics and philosophy; waste management; sustainability; socio-political constructs of ecology; bioethics

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Career Brief

Coming from a professional background in education as a secondary teacher, and a long-time involvement in politics and environmentalism, Robin joined the ANU in 1999 – the year she also won a seat as a Councillor on the Snowy River Shire Council on a platform of issues relating to sustainable local development, including restoring environmental flows to the Snowy River. She was appointed Chair of the South East Waste Board at the end of 1999, a position she held until the end of 2001 and during that same period was a member of the NSW Waste Policy Body. Now resident in Canberra, Robin is currently a member of the ACT Chief Minister's Sustainability Expert Reference Group and is Secretary of the Canberra and South East Region Environment Centre Management Committee. Having completed her PhD in political science, she joined SRES as a Visiting Fellow this year to research waste management policy and sustainability in the context of political ecology.

Research, Teaching & Professional Activities

My research work is largely influenced by my practical involvement in policy development at local level, with a specific focus on waste management. This necessitates a strongly interdisciplinary approach, combining the social sciences with ecology in analysing specific aspects of eco-governance. I maintain that such industry terms as 'zero waste' and 'waste hierarchy' are 2-dimensional and have no sustainable basis for application until and unless they are grounded in sound, empirical research and to that end I am involved in plans to establish a centre for Australian waste-related research. My doctoral research examined the relationship between green politics and the environment movement, and the dynamics that drive paradigmatic change in eco-political thought. Having held a seat in local government and chaired a statutory government authority, my working knowledge of environmental issues in the south-east region, and the socio-political and economic influences on the management of these issues, provides an added dimension to my academic work. As well as pursuing my research at SRES, I also currently teach in the School of Social Sciences (Political Science) and provide research work for the Democratic Audit of Australia project at RSSS.

Selected Publications

Tennant-Wood, R. 2003. "Going for Zero: a comparative critical analysis of zero waste events in southern New South Wales", *Australasian Journal of Environmental Management* Vol.10 No.1

Tennant-Wood, R. 2002. "Social sustainability through local environment policy", paper presented to Resource NSW Soils and Sustainability Forum, February 2002

Tennant-Wood, R. 2002. "Local Green Governance: the value of community leadership and a sense of place" *Ecopolitics Journal*, Vol.1, No.3

Beavis, S.G. & Tennant-Wood, R. 2001. "Waste minimisation in schools: mapping successful pathways" – paper presented to Waste Educate 2001 Conference, Brisbane, Nov.2001, *Waste Educate 2001: Maintaining the Momentum* pp 33-37

Beavis, S.G. & Tennant-Wood, R. 2001. *Waste minimisation in schools: a report on Mumbulla School, Rutherglen Primary School, Penola College and Cobden Technical School: a report to the South East Waste Board*. Research report, South East Waste Board, September 2001

Tennant-Wood, R. 2001, "Taking out the garbage: waste as a social construct", paper presented to Wastebusters and Organics Conferences, Ashburton NZ, May 2001

Tennant-Wood, R. 2001. "The sociology of waste", Keynote address to *mêtis* Symposium, Australian Academy of Science, Canberra, May 2001

Robin Tennant-Wood is a member of the ACT Chief Minister's Sustainability Expert Reference Group (along with - among others - fellow SRES academic Val Brown and CRES Director Bob Wasson)

Dr Brian J Turner

Visiting Fellow
Native forest management, remote sensing

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Career Brief

Brian's career in forestry started with the NSW Forestry Commission on the North Coast and in Sydney. During that period, he went to Yale University in the USA to gain Master and Doctor of Forestry degrees. In 1969, he started teaching and research at the Pennsylvania State University, and returned to Australia in 1984 to take up the position of Reader in Forest Management. He retired at the end of 2002 but remains an active member of the staff, supervising honours and graduate students, and conducting research and consultancies.

Research, Teaching & Professional Activities

My interests range over the broad field of forest management planning, including models for prediction of future production of goods and services from managed native forests to techniques for collecting and analysing GIS and remotely sensed data.

I am currently involved in an RIRDC-funded project to determine the extent and condition of privately-owned dry schlerophyll forests on the tablelands of eastern Australia and develop a decision support system to help owners enhance their value.

I am also a Lead Author in the production of a manual, entitled *Good Practice Guidance for Land-Use, Land-use Change and Forestry*, to assist countries in the estimation of national carbon stocks and their change, as directed by the Intergovernmental Panel on Climate Change.

Selected Publications

Turner, B.J. 2003. Why sustainable yield can be anything you want it to be (almost): good practice in its calculation. In: Mason, E.G. and Perley, C.J. (Eds.) *Joint Australia and New Zealand Institute of Forestry Conference Proceedings April-May 2003, Queenstown, NZ.* Ministry of Agriculture & Forestry, Wellington, NZ: 157-165.

Turner, B.J., Chikumbo, O., and Davey, S.M. 2002. Optimization modeling of sustainable forest management at the regional level: an Australian example. *Ecological Modelling* 153(1-2): 157-179.

Huang, Z., Jia, X., Turner, B.J. and Foley, W.J. 2002. Use of HYMAP data to estimate sideroxylonal-A concentration of eucalypt foliage. *Proc., 2002 IEEE International Geoscience and Remote Sensing Conf., Sydney.* On CD. Vol III:1652-1654.

Dury, S J, Turner, B. and Foley, W J. 2002. The use of high spectral resolution remote sensing to determine leaf palatability of eucalypt trees for arboreal marsupials. *International Journal of Applied Earth Observation and Geoinformation.* Vol 3 (4) 327-335.

Chikumbo, O., Spencer, R.D., Turner, B.J. and Davey, S. 2001. Planning and monitoring of forest sustainability: an Australian perspective. *Australian Forestry* 64(1): 1-7.

Dury, S.J. and Turner, B.J. 2001. Nutrient estimation of eucalypt foliage from hyperspectral data. Proc., 2001 IEEE International Geoscience and Remote Sensing Conf., Sydney. On CD. Vol II: 774-776.

Dury, S.J., Turner, B.J. and Foley, W.J. 2001. Can hyperspectral data be used to map koala and possum habitat? *Proc., 2001 IEEE International Geoscience and Remote Sensing Conf.*, Sydney. On CD. Vol IV:1648-1650.

Dury, S.J., Jia, X. and Turner, B.J. 2000. From leaf to canopy: determination of nitrogen concentration of eucalypt tree foliage using HyMap image data. *Proceedings of 10th Australasian Remote Sensing and Photogrammetry Conference, Adelaide, Australia*, CD, Paper No.5, pp. 875-891.

Chikumbo, O., Mareels, I. M. Y. and Turner, B.J. 2000. A stand optimization model developed from dynamical models for determining thinning strategies. In: Vasievich,, J.M., Fried, J.S., Leefers, L.A. (eds.) *Seventh Symposium on Systems Analysis in Forest Resources*; 1997; Traverse City, MI. USDA For. Serv. Gen. Tech. Rep. NC-205. Pp. 355-360.

Wood, G.B., Turner, B.J. and Brack, C.L. (eds). 1999. *Code of Forest Mensuration Practice.* Aust. Forestry Council Research Working Group #2. 62 pp.

Turner, B., Wells, K., Bauhus, J., Carey, G., Brack, C. and Kanowski, P. 1999. *Woody Biomass: Methods for Estimating Change.* National Carbon Accounting System (Aust. Greenhouse Office) Tech. Report 3. 38pp.

Selected Student Theses

Ingwesen, F. 2000. "Sundry Nameless Ranges": the Landscape Ecology of the Naas-Gudgenby Catchment. (PhD thesis)

Chikumbo, O. 1997. Applicability of Dynamical Modelling and Theoretical Control Methods in Tree Growth Prediction and Planning. (PhD thesis).

Avila, R.B.A. 1996. Transformative Contest: the State, Civil Society and the Environment. (PhD thesis).

Alimohammadi, A. 1995. Probabilistic Modelling of Stability and Resolution of Thematic Classes from Remotely Sensed and Digital Terrain Data. (PhD thesis).

Mr Piers Bairstow

Field Services Manager

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Career Brief

Piers joined the ANU in 1995 as a technical officer in the field services unit.

His main roles are to provide logistical and technical support for undergraduate fieldwork and laboratory based practical classes. Liaison and advice on methodology for project and postgraduate research is also part of his role. Maintenance and purchasing of field equipment, laboratory equipment and vehicle requirements is also included in Piers' duties. Piers is also the first aid officer for field services and the Geography Building.

Ms Debbie Claridge

Senior Technical Officer
Forest ecology & wildlife, GIS, Web & Design

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Career Brief

Debbie supports teaching and research in a range of areas within the School. Debbie has a Bachelor's degree in Applied Science, majoring in Vegetation/Wildlife Management and Biometry (University of Canberra) and she also completed a course in Herpetology at the Sydney Technical College in order to further her interest in forest-dwelling frogs. Part of her work has included research on bats and ecological surveys for ground-dwelling forest mammals and herpetofauna (reptiles and amphibians). In addition, she has worked on the genetic improvement of forest products such as *Eucalyptus* and *Melaleuca* (tea-tree) oils, and have been involved in experimental design of glasshouse-based experiments.

Debbie's research skills were further enhanced, when she took a 12 month-posting to the United States (in the Pacific Northwest), where she participated in a study examining the distribution and abundance of frogs, newts and salamanders in Douglas Fir forests. She also had substantial involvement in research on the ecology of Douglas Fir Beetles. Her other research involvement included work on mycophagy (fungus-eating) Flying Squirrels, the primary prey of the Northern Spotted Owl. Since returning from the United States, and beyond her role at SRES, she continues to pursue diverse interests in the ecology/ diversity of Australian mammals and mycophagy and of hypogeous fungal species distribution.

As a result of these interests, Debbie provides teaching assistance to students in the course *Biodiversity Assessment* including implementation of this course's on-line teaching. She's involved in class preparation and teaching of students the operation and practical application of Geographic Information Systems (GIS) using ArcGIS in other courses.

Debbie's other major contribution is to the School's Public Relations. Aside from being the School's principal photographer, she designs many scientific posters, pamphlets, brochures and displays, (eg. ANZIF, Science Festival, Careers exhibitions and ANU Open Day), as well as the School's in-house Yearbook. She also takes part as support webmaster in the design and development of our on-line Web site, and design of many of our restricted on-line teaching sites.

Selected Publications

Jumponnen, A.M., Claridge, A.W., Trappe, J.M., Lebel, T. and Claridge, D.L. (submitted). Ecological relationships among hypogeous fungi and trees: Inferences from associations analysis integrated with habitat modelling. *Mycologia*.

Claridge, A.W., Trappe, J.M. and Claridge, D.L. 2001. Mycophagy by the swamp wallaby (*Wallabia bicolor*). *Wildlife Research* 28, 643-645.

Claridge, A.W., Trappe, J.M., Cork, S.J. and Claridge, D.L. 1999. Mycophagy by small mammals in the coniferous forests of North America: nutritional value of sporocarps of *Rhizopogon vinicolor*, a common hypogeous fungus. *Journal of Comparative Physiology B* 169, 172-178.

Claridge, D.L. and Tidemann, C.R. 2001. *Biodiversity Survey of Jindalee State Forest, NSW 20th - 23rd September 2000. Report on the spotlighting of Arboreal Gliders and Possums for NSW National Parks & Wildlife Service, Threatened Species Unit, Southern Directorate*. School of Resources, Environment and Society, Australian National University. (Unpub.)

Chick, R.R., Morris, B., Claridge, D.L. and Tidemann, C.R. 1997. *The Flora and Fauna of Big Bush Nature Reserve, Temora, NSW. A Biodiversity Survey Report to the NSW National Parks and Wildlife Service*. School of Resource Management and Environmental Science, Australian National University. (Unpub.)

Brookhouse, M., Tidemann, C.R., Tanton, M.T. and Claridge, D.L. 1996. *Flora and Fauna of Ingalba Nature Reserve, NSW. An Ecological Survey Report to the NSW National Parks and Wildlife Service*. School of Resource Management and Environmental Science, Australian National University. (Unpub).

Ms Susan Cuddy

iCAM Projects Manager

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Career Brief

Susan Cuddy is Projects Manager in iCAM. She has a Bachelor of Arts from Queensland University in1973, with majors in pure mathematics and German literature. Sue also has a Graduate Diploma in Secretarial Studies from Canberra College of Advanced Education (CCAE) in1974 and a Graduate Diploma in Computing Studies, CCAE, 1984, with an emphasis on systems analysis and design, structured programming.

Sue has a background in project management, applications programming, GIS and database design. She has many years of experience in developing integrated modelling solutions for catchment land and water resource managers in Australia and near neighbours. Research interests/capabilities are in the meaningful translation of science and research results for managers and community groups via design of appropriate computer interfaces.

Mr Mauro Davanzo

Technical Officer

Field Services
Transport, Field Equipment, Technical Support

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Career Brief

Mauro joined the Department of Forestry in August1991, after working for the Australian Defence Force Academy in supplies and transport. He has over 18 years' experience in vehicle management and supply related services.

He has also completed several courses that allow him to teach a number of selected training programs such as, the safe use of 4wds, chain saws and workshop safety. Mauro also maintain a senior first aid certificate.

Ms Kathryn Edwards

Research Assistant

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Career Brief

After completing her science degree with honours in geography at the ANU in 2002, Kathryn began working as a research assistant at SRES. In this position Kathryn assists Dr Brendan Mackey with research on the WildCountry project. This project aims to create a new, integrated approach for conserving biological diversity in Australia at a continental scale, with a particular focus on ecological connectivity and off-reserve management. Kathryn contributes to this project by using ArcGIS and ANUCLIM, as well as her familiarity with various spatial data directories to compile and analyse the digital GIS data sets used in the study.

Mr Clive Hilliker

Senior Drafting Officer
Cartography & Design

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Career Brief

After 14 years' experience in the fields of botany, forestry, ceramics, microbiology, analytical chemistry, plant physiology, graphic design, instructional design, web design, and as a Technical Coordinator, Clive became Faculties Cartographer in August 1999.

Clive's qualifications include a Bachelor of Science (Botany) completed in 1984 and a Graduate Diploma (Management/Administration) completed in 1993. More recent courses include AutoCad, Graphic Design, University Teaching & Learning, 3D Studio Max, Multimedia Development and GIS/ Environmental Modelling.

Prior to 1997 much of his time was spent demonstrating aspects of plant physiology and web design. Concurrently he was supporting research by developing and implementing protocols for the quantitative analysis of leaf oils using gas chromatography. Most effort during this period went into establishing methods of visual communication for use in teaching. This information proved popular within ANU and was presented to educators and others at the following seminars; ACTEIN, National Science & Technology Centre, Canberra, 1995 "Low Cost Animations for Graphically Illustrating Information"; Otago University, New Zealand, 1995, "Low Budget Multimedia in University Teaching".

Now his focus is on visual communication in print media, primarily cartographic illustration as well as photography and creating graphics for publication. This also includes the design, layout and production of reports for publication, posters and promotional materials.

Selected Publications

Trevitt, C., Brack C.L., Ryan M., Hilliker, C. and Hedenstroem, S. 1995. Forestry education and information technology at ANU: tools, toys or a turn-up for the books? Proceedings of IFA Conference *Applications of New Technologies in Forestry*. Ballarat, Victoria, 18-21 April 1995, Bren and IFA Inc, Canberra. p 169 - 178.

Production & Layout

Mackey, B., Nix, H., Hitchcock, P. 2001. *The Natural Heritage Significance of Cape York Peninsula*, *ANUTECH Pty Ltd*, Commissioned by the Queensland Environmental Protection Agency.
Full Report ISBN 0-7315-3336-4
Executive Summary ISBN 0-7315-3338-0
Compact Disk (Executive Summary and Full report) ISBN 0-7315-3337-2
http://www.env.qld.gov.au/environment/environment/capeyork/

Maps & Illustrations

Lindenmayer, D., Claridge, A., Hazell, D., Michael, D., Crane, M., MacGregor, C., Cunningham, R. 2003, *Wildlife on Farms*, CSIRO Publishing, ISBN 0-643-06866-X.

Dovers, S. & Wild River, S. (Eds), 2003. *Managing Australia's Environment*, The Federation Press, ISBN 1 86287 447 6

Campbell, J. 2002. *Invisible Invaders*: Smallpox *and Other Diseases in Aboriginal Australia 1780-1880*, Melbourne University Press, ISBN: 0-522-84939-3

Kleinert, S. and Neale, M(Eds). 2001. *The Oxford Companion to Aboriginal Art and Culture*, Oxford University Press, ISBN: 0195506499

Mackey, B., Lindenmayer, D., Gill, M., McCarthy, M. & Lindesay, J. 2002. *Wildlife*, *Fire and Future Climate: A Forest Ecosystem Analysis*, CSIRO Publishing, ISBN: 0643067566.

Dr Susanne Holzknecht

Academic Skills Adviser

Phone: +61 (02) 6125 2541 E-mail: Sue.Holzknecht@anu.edu.au

Career Brief

Sue trained in Anthropology and Sociology (University of Qld), Linguistics, and Teaching English as a Second Language (UPNG) and her PhD is in Linguistics (ANU). For 12 years Sue lectured at the Papua New Guinea University of Technology, Lae in Language and Communication Studies, specialising in teaching English for Accountancy, Forestry, Land Management, Agriculture and Engineering. From 1993 to 1998, she worked in the National Centre for Development Studies, ANU, as lecturer in Academic and Research Skills in the EMD Program. Then she spent 3 years in the ANU's Study Skills Centre (now Academic Skills and Learning Centre), and in 2001, re-joined NCDS part-time, and began in SRES as part-time Academic Skills Adviser to graduate students. From mid-2003 onwards Sue will be located in SRES.

Research, Teaching & Professional Activities

In SRES, I assist graduate students to further their skills in academic reading, writing, doing research, and giving presentations at a graduate level. I hold weekly classes in academic skills topics, and am available for individual consultations with students about matters of concern to them, in relation to their academic work.

My research interests include communicating effectively in environment, development and natural resource areas, and discovering new and better ways of motivating students to express themselves more effectively, and take ownership of their own work. I am also involved in recording and publishing the stories of migrants and refugees now living in Australia, with the aim of helping to break down the barriers being set up between people of different cultures and backgrounds.

Selected Publications

Bourke, M., Holzknecht, S. and Bartlett, A. (eds). 2002. *Weaving a Double Cloth. Stories of Women from the Asia Pacific in Australia*, Pandanus Press, Canberra.

Bartlett, A., Holzknecht, S, and Cumming Thom, A., 1999. *To Hit the Ground Running. Preparing Students for Graduate Study*, Asia Pacific Press, Canberra (Teachers' Manual and Student Workbook).

Ms Susan Kelo

iCAM Administrator

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Career Brief

I have been working for the Australian National University for 11 years. My current position is the administrative officer for the Integrated Catchment Assessment and Management Centre. I ensure the routine operation of the Centre, support the Projects Manager on budgetary matters and provide administrative assistance to the Director. My nominal position is with the Centre for Resource and Environmental Studies where my duties contribute to the public face of CRES including service to the Modelling and Simulation Society of Australia and New Zealand Inc., the International Environmental Modelling and Software Society and the Environmental Modelling and Software journal.

Mr Steve Leahy

IT Sponsor (Faculty of Science) & Programmer
SRES Information Services

Phone: +61 (0)2 6125 8014 E-mail: Steve.Leahy@anu.edu.au

Career Brief

Steve is one of those scary computer-literate environmental scientists who would have taken over the world, if they hadn't objected to living in a new concrete bunker somewhere off the northern coast of Spitzbergen (the bunker beneath Lake Geneva flooded last Christmas). He'd already spent enough time in a concrete bunker while working for BRS.

His only interest is improving the IT literacy of SRES staff and students, thereby freeing time for other things like making sure the IT infrastructure actually *works*. And making computers do what he expects...

Amongst his interests are ensuring people learn how to use their computers properly; forcing said computers into behaving themselves; non-linear editing of digital video; fairly distributing the administration of the ever-growing series of SRES web-sites; occasionally making the acquaintance of a thesaurus; paraphrasing Monty Python where-ever it seems appropriate; boldly splitting infinitives where no-one has split them before; recycling most of his previous yearbook entry; and writing about himself somewhat facetiously in the third-person. *tlhIngan vIbe'*

Ms Amanda Letcher

Administrator, iCAM

Phone: +61 (0) 2 6125 56749 E-mail: Amanda.Letcher@anu.edu.au

Career Brief

I am a casual administrative assistant for the Integrated Catchment Assessment and Management Centre. I develop promotional material for the Centre for use on the iCAM website and elsewhere. I also assist Susan Kelo as required.

Mr Mark Lewis

Finance Manager

Phone: +61 (0)2 6125 0545 E-mail: Mark.Lewis@anu.edu.au

Career Brief

Mark joined the School in May 2001 as a finance officer after working in the Faculty of Science since September 2000. Mark's main roles include budget analysis and all financial transactions for the School. He has a degree in accounting from the University of Canberra and is currently studying the CPA Australia Program.

Mr John Marsh

Senior Technical Officer
Soil Chemistry

Phone: +61 (0)2 6125 2645 E-mail: John.Marsh@anu.edu.au

Career Brief

John joined ANU Forestry Department in 1974 and currently occupies the position of Analyst in Charge of the Soil and Plant Analytical Facility. As Analyst in Charge he is responsible for servicing the needs of Academic, Graduate and Undergraduate demands for elemental analysis of soil water and plant material. He is also responsible for hands-on technical training associated with analytical chemistry and instrumentation. His other main role is associated with matters concerning OH&S, having completed the relevant training courses.

Selected Publications

Marsh,J 1988. Analytical Methods Developed and Used by ANU Forestry.

Mr Karl Nissen

IT Support & Programmer

Phone: +61 (0)2 6125 4613 E-mail: Karl.Nissen@anu.edu.au

Career Brief

GIS Consultant in CRES (Tuesdays and Thursdays): http://cres.anu.edu.au/people/nissen.html

Karl has a Bachelor of Engineering Degree from the University of Auckland. He has worked at The Australian National University since 1996, with a two year absence in Japan. Prior to joining the University he worked at the Australian Centre for Remote Sensing at Fern Hill Park in Belconnen as both a production engineer and project engineer.

After graduating from University he was lucky enough to receive a two year scholarship at the University of Wisconsin Physical Sciences Laboratory, which is a research engineering laboratory. Work done there included the development of a long distance Ethernet bridge, digital frequency synthesiser design and the development of a programmable environmental chamber controller.

Current duties include the day to day operation of SRES PC and UNIX computers, management of IT purchasing, set-up and the operation of the SRES undergraduate laboratories.

Ms Zosha Smith

School Administrator

Phone: +61 (0)2 6125 3709 E-mail: Zosha.Smith@anu.edu.au

Career Brief

Zosha has a Bachelor of Arts (Modern Languages).
She has worked and lived in the Middle East, Africa and Europe.

Ms Panit Thamsongsana

Student Programs Administrator

Phone: +61 (0)2 6125 4499 E-mail: Panit.Thamsongsana@anu.edu.au

Career Brief

Panit graduated from Middle Tennessee State University, U.S.A. in 1981, majoring in general stenography. Since then she has worked continuously in a variety of administrative areas. Her longest post (from 1984-2002) has been in the School of Chemistry at Australian Defence Force Academy, University of New South Wales.

Panit joined School of Resources Environment and Society in April 2002 as the Student Programs Administrator. She is responsible for the administration of the School's graduate, undergraduate and non-degree programs. She provides support to staff, program convenors and students and also manages the School front office.

Mr Tim Wilson

IT Support

Phone: +61 (0)2 6125 4473 E-mail: tim.wilson@anu.edu.au

Career Brief

Tim Wilson provides IT services for SRES.

His first position at the ANU was in 1998 as IT Support Officer for the (then) Department of Geography.

Prior to coming to SRES in 2002 Tim was the IT Manager for the Legal Workshop (A graduate arm of the ANU's Law Faculty) where he helped pioneer the implementation of WebCT, developed and maintained their website and created and managed their online booking system and student databases.

Tim studied Computer Systems Engineering at the Royal Melbourne Institute of Technology and Computer Science at Melbourne University specialising in Artificial Intelligence.

He has a varied background in electronics engineering and IT support having worked both in industry and various academic IT roles at Melbourne University and the Australian National University.

Mr Eugene Wallensky

Executive Officer
Kioloa Coastal Campus

Phone: +61 (0)2 6125 9753 E-mail: Eugene.Wallensky@anu.edu.au Web: http://ejlf.anu.edu.au

Career Brief

Eugene is currently responsible for administrative oversight and day-to-day management of the ANU field station at Kioloa on the south coast of NSW.

His background is in Environmental Science and he completed his Masters Degree in *Coastal Geomorphology* at Kioloa in 1980. Subsequently he held positions as Head Technical Officer in Biogeography and Geomorphology in the Research School of Pacific and Asian Studies before taking over as Operations Manager in the Research School of Biological Sciences. His long-term association with the ANU provides him with a wide range of knowledge and contacts that enables him to carry out his present job effectively.

Eugene has been in his current position for over 18 months now and the field station is undergoing a renaissance. A new dormitory and 2 new self-contained cabins are nearing completion and a comprehensive master plan has been prepared for the development of the Kioloa Coastal Campus.

SRES have provided a main campus base for Eugene and he is located in Room 104 of the Geography Building. Please feel free to visit him and to find out more about the Kioloa campus and the opportunities it can provide for you.

Selected Publications

Chappell, J.M., Rhodes, E.G., Thom, B.G., and Wallensky, E.P. (1982) Hydro-isostasy sea-level isobase for 5500 B.P. in North Queensland. *Marine Geology*, 49: 81-90.

Chappell, J.M., Chivas, A., Wallensky, E.P., Polach, H.A., and Aharon, P. (1983). Holocene palaeo-environmental changes, central to North Great Barrier Reef inner zone. *Journal of Australian Geology and Geophysics*, 8: 223-235.

Woodroffe, C.D., Chappell, J.M., Thom, B.G., and Wallensky, E.P. (1985). Geomorphology of the South Alligator tidal river and plains. In *Coastal and tidal wetlands of the Australian Monsoon region*. N.A.R.U. Mangrove Monograph No. 1, 3-15.

Woodroffe, C.D., Chappell, J.M., Thom, B.G., and Wallensky, E.P. (1985). Stratigraphy of the South Alligator River, Northern Territory. In *Coastal and tidal wetlands of the Australian Monsoon region*. N.A.R.U. Mangrove Monograph No. 1, 17-30.

Woodroffe, C.D., Chappell, J.M., Thom, B.G., and Wallensky, E.P. (1986). *Geomorphological dynamics and evolution of the South Alligator River and Plains, Northern Territory*. N.A.R.U. Monography No. 3.

Woodroffe, C.D., Thom, B.G., Chappell, J.M., Wallensky, E.P., Grindrod, J., and Head, J. (1987). Relative sea-level in the South Alligator River Region, North Australia, during the Holocene. *Search*, 18: 4, 198-200.

Woodroffe, C.D., Chappell, J.M., Thom, B.G., and Wallensky, E.P. (1989). Depositional model of a macro-tidal estuary ad floodplain, South Alligator River, Northern Australia. *Sedimentology*, 36: 737-756.

Woodroffe, C.D., McLean, R., Polach, H., and Wallensky, E.P. (1990). Sea-level and coral atolls: Late Holocene emergence in the Indian Ocean. *Geology*, 18: 1, 62-67.

Woodroffe, C.D., McLean, R., Polach, H., and Wallensky, E.P. (1990). Darwin's coral atoll: Geomorphology and recent development of the Cocos (Keeling) Islands, Indian Ocean. *National Geographic Research*, 6: 3, 262-275.

Woodroffe, C.D., Veeh, H., Falkland, A., McLean, R., and Wallensky, E.P. (1991). Last Interglacial reef and subsidence in the Cocos (Keeling) Islands, Indian Ocean. *Marine Geology*, 96: 137-143.

Smithers, S.G., Woodroffe, C.D., McLean, R.F. and Wallensky, E.P. (1993) Lagoonal sedimentation in the Cocos (Keeling) Islands, Indian Ocean. *Proceedings of the 7th International Coral Reef Symposium*, 1: 273-288.

Woodroffe, C.D., McLean, R., and Wallensky, E.P. (1994). Geomorphology of the Cocos (Keeling) Islands. Chapter 4: *Atoll. Research Bulletin*, No. 402. 33p.

Matsuda, S., Chappell, J.M., and Wallensky, E.P. (1995). Nonarticulated Coraline Algal Flora of present day coral reefs on Huon Peninsula. *Journal of Geography*, Tokyo, 104: 5, 719-724.

Nakomori, T., Chappell, J.M., and Wallensky, E.P. (1995). Living hermatypic coral assemblages at Huon peninsula, P.N.G. *Journal of Geography*, Tokyo, 104: 5, 743-754.

Croke, J.C., Magee, J.M., and Wallensky, E.P. (1999). The role of the Australian Monsoon in the western catchment of Lake Eyre, central Australia during the Last Interglacial. *Quaternary International*. 57/58, 71-80.

Panorama of Shelly Beach to the left and, Avenue Beach and Kioloa township to the right.
(http://kioloa-vfa.anu.edu.au/index.html)

Hidayat Alhamid

PhD Scholar
Indigenous forest management in West Papua: a comparative study

E-mail: Hidayat.Alhamid@anu.edu.au

Research Description

This study aims to answer questions of how decisions about forest management are made at the indigenous community level and how these decisions impact on both the forest and forest management. It will focus mainly on two aspects if indigenous forest management, namely management practices and social construction behind these practices. This study will also examine the impact of external influences in indigenous forest management and the forest in a case study site near Manokwari, of West Papua. This work is supported by AusAID.

Auro Campi de Almeida

PhD Scholar
Application of a process-based model for predicting and explaining growth in *eucalyptus* plantations

E-mail: aca@aracruz.com.br

Research Description

The 3-PG forest growth model has been calibrated for Eucaluptus grandis plantations in Aracruz, Brazil. The model will be used to explore sensitivity of stand growth and as a tool in assisting forest management decision making.

Matthew Brookhouse

PhD Scholar
Dendrochronological reconstruction of climate and streamflow in the Cotter River catchment

E-mail: Matthew.Brookhouse@anu.edu.au

Research Description

For the first time in history Canberrans are living with water restrictions. While not unusual throughout the remainder of the country, the failure of Canberra's water supply system to meet one of its design criteria during drought raises questions about our understanding of local climate and our concept of climate variability. For example, why were the current conditions not foreseen during the establishment of the Corin, Bendora and Cotter dams? How frequent are severe drought events and are there precedents in the local climate history? Are the current conditions, in fact, the product of natural climate variability or anthropogenic climate change? To attempt to answer questions of medium to long-term climate variability we must have access to climate data spanning several centuries. The local instrument record is insufficient for this purpose. Tree rings can provide a source of proxy data to extend the instrument record.

The aim of this project is to develop pre-instrument proxy climate and streamflow records for the Cotter River catchment from tree rings. The project will be comprised of studies focused upon developing preliminary relationships between climate and annual growth in localised catchment units through to reconstruction of dendrohydrological records for the entire catchment. Suitable sample sites will be located through a combination of geographic information system analysis and field surveys. Critical elements in the location of sample sites include the presence of species capable of producing distinct annual rings, in this case *Eucalyptus pauciflora* and *E. stellulata*, and the identification of sites on which climate signals are maximised.

Once sites have been identified, samples will be collected from stems killed during or prior to January 2003. Analyses will be based upon standardised annual ring widths and densitometry. Isotopic analyses may also present opportunities for validation of reconstructed climate data.

Nicolette Burford de Oliveira

PhD Scholar
Enviro-political identities expressed in the talk of young people from riverine forest communities in Par·, Brazil, and their relevance to forest and land reform processes

E-mail: Nicolette.Burford@anu.edu.au

Research Description

This research examines how dialogue on land and environmental, when conceived as a social learning process, integrates the development of the self with broader spheres of development within local, national and international communities. Through an analysis of Brazilian caboclo youthsí talk, I investigate how participation in the creation and validation of discourses on subjects central to local livelihoods, can promote self-development, community development and environmental sustainability. I explore how the individualís participation in policy and law reform processes can help ensure these processes will result in more equitable, socially just and environmentally sound outcomes. The research hopes to inform on the scope for designing policies that will promote development processes (e.g. forest and land-use policy processes) that are participatory, inter-active, and steered by dialogue.

Rico Cabangon

PhD Scholar
Flexural viscoelastic properties of wood-wool cement board

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Research Description

Wood-wool cement board (WWCB) is being increasingly used in the Philippines as a construction material. However, we have observed that in certain applications, WWCB exhibit flexural creep. The aim of this project is to gain a greater understanding of the flexural viscoelastic behaviour of WWCB. We propose to examine the effect of board composition, structure, and environmental factors on the creep properties of WWCB and develop models to predict its strength and creep behaviour. Ultimately, we aim to develop practical solutions that will improve the strength and minimise the creep of WWCB used in buildings in the Philippines.

Major findings so far have shown that, board constituents, structure, and environment influence the creep and physical properties of WWCB. In terms of the effect of board constituents, Portland cement showed superior strength and creep properties than Pozzolan cement but irrespective of cement type, boards containing a high wood/cement ratio exhibited a high modulus of rupture (MOR). On the other hand, boards containing low amounts of wood exhibited high modulus of elasticity (MOE) and creep resistance. The addition of calcium chloride significantly improved strength but was not effective in reducing creep.

The strength and creep properties of WWCBs can be radically improved by manually aligning cement-coated strands within boards. This result could have a significant impact because it would extend the uses of WWCB into structural purposes and/or provide cost-effectiveness in terms of material requirement to make boards of a certain strength. More importantly, this strand orientation technique appears to be technically feasible for commercial adoption in WWCB plants in the Philippines because they mat-form strands by hand and therefore, it is possible to manipulate board structure in a production situation.

Relative humidity (RH) and temperature also play an important role in the strength and creep properties of WWCBs. At constant RH and temperature, MOE and MOR of boards were adversely affected by temperature to a greater extent than RH, while the negative affect of RH on creep was more pronounced than the effect of temperature. The creep resistance of boards was further reduced under cyclic RH and temperature but the former induced greater creep than the latter. In order to minimise creep in WWCBs under changing RH, different kinds of surface coatings were used to protect the board from adsorbing moisture. Surface coatings improved the physical and mechano-sorptive creep behaviour of the boards. A good linear relationship (r2=0.84) was found between the moisture excluding efficiency (MEE) of the various coatings and relative creep. Such relationship indicates that coatings with a MEE value of about 30 percent can reduce relative creep of boards to less than 2. Moreover, the relationship is a simple method of choosing a type of coat in improving creep properties under adsorption rather than undergoing the tedious and time demanding creep test. It therefore appears that the application of moisture excluding finishes to WWCBs is a practical solution to the problem of creep of this type of panel product when used in load-bearing situations.

This study is supported by a John Allwright Fellowship of the Australian Centre for International Agricultural Research (ACIAR). Detailed information on the WWCB industry in the Philippines is available at the ANU Forestry web site: http://sres.anu.edu.au/associated/fpt/nwfp/woodwool/woodwoolphil.html.

Recent Publications

Cabangon, R.J., R.B. Cunningham and P.D. Evans. 2002. Manual strand orientation as a means of improving the flexural properties of WWCBs in the Philippines. Forest Products Journal 52(4):53-59.

Cabangon, R.J., R.B. Cunningham and P.D. Evans. 2002. Reducing moisture sorption through the use of surface coatings improves the physical and mechano-sorptive creep behaviour of wood-wool cement boards. Proceeding of the Trans Tasman 3 SCAA/SCANZ Joint Conference. Hobart, Australia. August 29-31, 2002.

Cabangon, R.J. and P.D. Evans. 2001. Manipulation of board structure significantly improves the physical and creep properties of wood-wool cement boards. Proceedings of the First International Conference on

Forestry and Forest Products Research. Kuala Lumpur, Malaysia. October 1-3, 2001.

Cabangon, R.J., D.A. Eusebio, F.P.Soriano, R.B. Cunningham and P.D. Evans. 2000. The effect of post-harvest storage on the suitability of Acacia mangium for wood-wool cement board manufacture. Proceedings of the Fifth PacificñRim Bio-Based Composites Symposium. pp. 48-56.

Cabangon, R.J., D.A. Eusebio, F.P. Soriano, R.B. Cunningham and P.D. Evans. Acacia mangium and Eucalyptus pellita differ in their response to the accelerator used in the manufacture of wood-wool cement boards. FPRDI Journal. In press.

Paul Carlile

PhD Scholar

Surface and sub-surface modeling of hydrology and salt distribution within the Little River catchment, NSW

E-mail: Paul.Carlile@anu.edu.au

Research Description

This study looks at improved prediction of catchment hydrology by appropriately disaggregating and connecting surface and sub-surface components. It specifically involves the development of a rainfall-runoff, recharge-discharge model that operates at the management scale in an ungauged catchment. Regionalisation and scale are also being investigated with the aim of using catchment attributes to parameterize a conceptual rainfall runoff model. Disaggregation of large catchments at the surface and sub-surface prior to parameterisation is suggested as a way to describe spatially the recharge-discharge characteristics of a catchment.

This work is being done with the aim of producing a catchment hydrology model, which uses available physical data, and has been shown to accurately conceptualize the hydrological processes present in the catchment. The final model will be significant for a number of reasons. Firstly the model aims to provide effective management options for salinity through distribution at the management scale. Secondly the use of catchment attributes to structure conceptual models and parameterise them over appropriate spatial scales reduces our reliance on calibrated parameter values. Finally a combined physical-conceptual approach will allow the model to be applied in ungauged catchments. Paul has previously conducted research in hydrology, remote sensing and GIS.

This doctoral research is supported by the Department of Land and Water Conservation and the Integrated Catchment Assessment and Management Centre, ANU.

David Carpenter

PhD Scholar

A human ecological investigation into the dynamics of post-green revolution agricultural change: a case of resource poor farmers from the Philippine island of Bohol

E-mail: David.Carpenter@anu.edu.au

Research Description

While the green revolution undoubtedly raised aggregate production levels across Asia, the benefits of its technology were mainly felt in favourable rice producing areas. In marginal areas like the limestone plateau of south central Bohol green revolution technology was not widely available until the mid 1980s and its acceptance by resource poor farmers has been partial. This thesis documents an attempt by an NGO (SEARICE) to introduce post-green revolution technologies into the village of Campagao in south central Bohol using a human ecological framework influenced by the concept of social capital to investigate this transition and its successes and failures. In particular the thesis focuses on the economic, political, social, ecological, and cultural barriers to the adoption of post-green revolution rice farming technologies at the individual and village level. A preliminary analysis of the data points to a critical disjunction between the modernisation policies of the Philippine National Government, and the policies of the myriad of NGO's that are active in Bohol and elsewhere in the Philippines. The former hope to increase production at the national level through the modernisation of agriculture coupled with weak land reform measures, while the latter focus on increasing agricultural biodiversity, empowering farmers and increasing food security: in the middle are the farmers.

Andrew Deane

Master of Philosophy Scholar
Changing stand structures and the consequences of silviculture in White Cypress forests

E-mail: andrewde@sf.nsw.gov.au

Research Description

This study is investigating the effects of silviculture on stand structures in White Cypress forests in NSW. It uses current forest strip assessments in combination with a retrospective analysis of past strip assessments (circa 1919, 1932 and 1949, and re-sampling the same strips), to characterize stand structures at particular points in time. Results from these assessments will be collated to quantify progressive changes in stand structure since forest management commenced.

Structural changes and stand development will be aligned with records of silvicultural treatments, and analysed to determine the separate and cumulative effects of various treatments on stand structures.

Peter Deane

Master of Philosophy Scholar
The weakest link: environmental value and its influence over private forest use in South-East New South Wales, Australia

E-mail: Peter.Deane@anu.edu.au

Research Description

This research investigates the inter-relationship between private (family) landowners and the native forest on their properties, in the Bega Valley and Bombala Local Government areas of south-eastern New South Wales. Research funding was provided by SE NSW Private Forestry, an organisation promoting forest management on private property in that region. Consequently, this research had two goals; one for SE NSW Private Forestry and one for the MPhil candidature.

The research component that was conducted for SE NSW Private Forestry focused on obtaining an idea of just what landowners had been doing and were planning to do with their native forest. This research has been completed. Data was collected via a self-administered mail-questionnaire directed through a sample-survey framework and basic statistical analysis was conducted on the responses. The primary result found that recreational and aesthetic uses were consistently the most common and important that had been undertaken and/or planned for in the future by landowners who responded to the survey. The full results from this part of the research are available in a report, the reference for which can be found below.

Entwined with the sponsored research above but producing a separate outcome, is the research component relating to the MPhil candidature. This part of the research investigates three specific questions: (1) what effect environmental and forest values have on how private forest landowners in south-eastern New South Wales use their native forests; (2) what are the methodological implications of framing question one within a transcendental-realist ontology (or colloquially, critical realism) as compared to (a form of) epistemological positivism, the latter generally being the most common approach used for research on landowners and their use of forest; and, (3) can it be argued that critical realism assists in creating a more complex account of forest use by landowners than does using (a form of) epistemological positivism?

The evidence utilised in this research is drawn from the same self-administered mail-questionnaire as for the funded part detailed above, but uses two differing research strategies to approach the data; inductive-statistical and retrodictive. This research is ongoing.

Details on report funded by South-East New South Wales Private Forestry:

Deane, P., Schirmer, J. and Bauhus, J. (2003). *How private landowners use and value the native forest that they own*. Unpublished report, School of Resources, Environment and Society, Australian National University: Canberra, Australia.

Bruce Doran

PhD Scholar
An investigation into the spatio-temporal nature of the fear of crime

E-mail: Bruce.Doran@anu.edu.au

Research Description

Since becoming an issue of concern in the late 1960s, the fear of crime has continued to receive attention as a serious social problem. Fear of crime impacts upon society by causing individuals to avoid areas they perceive as dangerous or to adopt protective measures. This reduces people's quality of life and incurs a significant cost to the individual and to society.

The aim of this project is to investigate where and when people are afraid of crime, which is a critical component of any program designed to reduce the fear of crime. The study will also investigate the spatio-temporal relationship between people's fear of crime and the actual occurrence of crime. An area that has received little attention prior to this project is the overlap between areas or times where people's fear of crime is low but actual crime rates are high. The relevance of investigating this overlap lies in the potential for people in such situations to be more susceptible to victimization.

The proposed modeling approach is to use Geographic Information Systems (GIS) to investigate the fear of crime in a manner relevant to people's daily routines. The study area is Wollongong, NSW. I have completed the fieldwork component of my project. This involved conducting surveys and social disorder assessments in the Central Business District (CBD) of Wollongong. Preliminary results indicate that there are links between the public's fear of crime, social disorder and the actual occurrence of crime. I have made a number of links with members of the Wollongong City Council, the NSW Police Service and members of the business community in the CBD. These links will hopefully prove useful in terms of implementing the research.

John Dore

PhD scholar
Mekong Regionalisms and Governance: A critical political analysis of 'environment and development' governance in the Mekong Region

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Research Description

John is a political economy and governance researcher focusing on "environment and development" governance in the Mekong Region from a base at Chiang Mai University in northern Thailand. His work is highlighting many deficiencies in regional state-led governance and the importance of critical civil society in contesting water resources and other "development" interventions in an era of complex new regionalisms.

Rory Eames

PhD Scholar
Is coming together enough? Promise, roles and limitations of community involvement in water quality management in the Swan-Canning Catchment, Western Australia

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Research Description

In the Swan-Canning Catchment of Western Australia, non-point source water pollution is a factor affecting public and environmental health, and is a contributing cause to significant blue-green algae blooms. The diffuse nature of non-point source water pollution in urban and near urban catchments means that community involvement in environmental management is an important aspect to managing environmental health. In the Swan-Canning Catchment, Integrated Catchment Management (ICM) has been the principal model for incorporating the community into complex environmental management programs. This thesis draws a theoretical synthesis from the environmental management and environmental governance literature to assess the practical and theoretical strength of the ICM model for community involvement in water quality management in the Swan-Canning Catchment.

Susan Emmett

PhD Scholar
The effects of soil properties and management disturbance on native earthworms in wet eucalypt forest ecosystems

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Research Description

Forest management practices such as clearcutting, burning and soil disturbance, greatly impact on soil quality and soil fertility by the alteration of organic matter inputs, by changes to the soil physical structure and by changing the soil biological and chemical composition. Prescribed burning, thinning and clearcutting removes the forest understorey and energy rich forest floor and impacts on soil biological communities, such as earthworms, dependent on this food source.

This ARC funded project investigates the relationships between vegetation, soil properties (chemical, physical and biological) and native earthworms at several tall eucalypt sites in south-eastern Australia. In addition, the effects of disturbance from forest management operations on native earthworms are being examined. Preliminary findings from the *Eucalyptus regnans* site suggests that at ten years post-harvesting, probability of native earthworm occurrence is strongly related to soil organic carbon (SOC) content. Such a finding suggests that the proposed Montreal soil indicator, changes in SOC, is representative of important soil biological properties.

Houshang Farabi

PhD Scholar
Planning for minimising impact of forest operation on soil erosion and water quality

E-mail: Houshang.Farabi@anu.edu.au

Research Description

Harvesting and road construction in forests have impacts on abiotic and biotic parts of the ecosystem. In this research, various methods of forest exploitation with regard to their consequent impacts on soil and water quality will be studied. Are view of the available methodologies will be done. A suitable method will then be chosen based on the characteristics of the area of study and the needs and facilities available. Following this, a data-base will be constructed in a GIS and the impacts of various harvesting methods will be evaluated through changing model parameters. Samples will be taken in the field to validate the results. The best model will be offered using the results of field sampling and GIS evaluation.

Karen Fisher

PhD Scholar
Development, equity and the environment: the case of water in the Philippines

E-mail: Karen.Fisher@anu.edu.au

Research Description

This research is concerned with the implementation of development policy and the effects of policy on places in the Philippines and contributes to research concerned with ensuring access to safe water in urban and rural areas in developing countries. I will use water resource management in the Philippines as a case study to explore the conflicts and tensions that emerge when development policy is put into practice. The research considers the effects that development and urbanisation has had on water resources in the Philippines and proposed methods to address future water demand.

This research will be situated in the Central Visayas Region of the Philippines. I intend to look at what policies are in place and what institutions exist to mediate development, urbanisation, urban growth and the corresponding pressure on water resources. I intend to focus on inter-basin transfers as one method that is being proposed in the Central Visayas to meet increasing demand for water. I intend to look at how the four Provincial capitals within the region are proposing to address increasing water demand, specifically inter-basin transfers/water imported or transferred from another place.

I intend to explore how water resources are managed and inter-basin transfers are negotiated between the places of origin (rural places) and the destinations (urban places). By choosing to focus on inter-basin transfers I intend to investigate property rights and equity issues that arise when water is diverted from one hydrologic system to another. I am interested in investigating how inter-basin transfers can be executed so that stakeholders in the origin and destination can both benefit.

David Forrester

PhD scholar
Dynamics of mixed species plantations

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Research Description

Despite the potential benefits of mixed species plantations, their current establishment in Australia is very restricted, possibly due to a perceived risk of failure in mixed species plantations. The success of mixed species plantations in improving productivity depends on a number of factors including species interactions, species composition, proportions of species and the extent to which the interactions might be influenced by growth limiting resources.

The aim of this project is to (1) identify the growth habits and physiological characteristics in tree species that will allow an assessment of the likely competition between species; and, (2) to determine how the ecological interactions between nitrogen-fixing and non-nitrogen-fixing species change with resource limitations, in particular water and phosphorus limitations, which are very common in the Australian environment.

This project is being carried out in collaboration with CSIRO FFP and SF NSW. Financial assistance from the Forest and Wood Products Research and Development Corporation and the CRC for Greenhouse Accounting is gratefully acknowledged.

Martin Golman

PhD Scholar
Determining the optimum landuse option in the context of April Salumei forest area, Papua New Guinea

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Research Description

In Papua New Guinea (PNG), forest resource is managed on behalf of the landowners by the Government, though the resource is communally owned by the local tribes and clans. Management of these forests by the Government does at times lack the capacity for proper planning, strategically, tactically and operationally. In addition, planning to integrate resource owners' social and environmental values of their forests is not well accounted for. As PNG's forest assets are presently managed mostly for timber production, future managers of the forests will be forced to adopt alternative, multiple-use strategies in the face of a burgeoning population and environmental pressures as well as for sustainable forest management (SFM) requirements.

This research project has been developed to address the above issues and therefore will investigate the nature of the surrounding social, environmental and management aspects in the April Salumei forest context. At the same time, tools available for multiple use planning such as Geographical Information Systems (GIS), as a spatial analytical tool and multiple use planning models will be reviewed. Information gathering on biophysical, social and cultural impacts, bio diversity and forest growth will be undertaken and will be the basis for integration and determination of an optimum landuse option.

The result at the end of this research, will provide a holistic systems-management philosophy that is more vigorous and compelling in PNG Forest Management than the narrow orientations of the past.

This doctoral research is supported by the John Allwright Fellowship of the Australian Centre for International Agricultural Research (ACIAR).

Simon Gordon

PhD Scholar
Design and evaluation of economic instruments for environmental management of the Swan River System

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Research Description

The Swan River system in Western Australia faces a considerable number of environmental challenges. Most significant of these is the continued decline in water quality within the system as a result of increasing pollution from urban, industrial and agricultural sources.

This study aims to design and evaluate a number of economic instruments that could be potentially used in harmony with regulatory instruments to reduce the level of water pollution in the Swan River system.

It is intended that particular focus will be placed on economic instruments that are capable of addressing both point source and diffuse source pollutants.

This study will contribute to the outputs of a larger ARC funded project to be undertaken by SRES in collaboration with a number of Western Australian environmental agencies.

Quintin Gravatt

PhD Scholar
Phosphorus management in potato soils

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Research Description

The aim of this project is to develop cover crop practices for the heavily fertilised potato cropping soils of the Robertson district that will minimise erosion and runoff of water, potentially rich in phosphorus (P), thereby resulting in significant improvements in the environmental management of this sensitive catchment area. The cover crops will: (i) improve infiltration, decrease erosion, and off-site transport of P; (ii) increase access to accumulated soil P, making it available to a subsequent potato crop, thus decreasing the P loading of the soil; and (iii) have a biofumigation effect that will reduce the use of soil fumigants.

Ingo Heinrich

PhD Scholar
Dendroclimatology of the Australian Red Cedar in Eastern Australian Rainforests

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Research Description

Whilst a number of annually resolved long-term climatic proxydata records exists in the tropics and subtropics elsewhere, comparable sources for Australia are still lacking.

Therefore, several tree-species of Eastern Australia were examined in the past. The most promising genera were *Toona*, *Melia*, *Araucaria* and *Callitris* all of them exhibiting distinct growth rings.

This study will concentrate on the most promising species *Toona ciliata* M. Roemer. The Australian Red Cedar occurs naturally in eastern Australian subtropical and tropical rain forests ranging from Cape York Peninsula to just south of Sydney. Trees were sampled at several sites along this latitudinal range.

The analysis revealed distinct tree rings but asymmetric growth. False rings, which can be distinguished through crossdating, seem to be more common in the tropics than further south. Anatomically, the annual tree ring follows a sequence of parenchyma cells appearing as a white band. This is directly followed by the large vessels early in the year, which then decrease in size and number as the season progresses.

The analysis also indicates that rainfall and temperature are the most important factors influencing tree growth.

Further information about my previous research can be found at: http://www.jcu.edu.au/~x-geih/ingos.html

Leah Horowitz

PhD Scholar
The relationship between cultural identity and environmental conservation in New Caledonia's Loyalty Islands

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Research Description

According to conservationists, New Caledonia is home to one of the world's top priority ecosystems, the highly endemic dry sclerophyllic forest of the main island. However, to date very little effort has been directed at conserving this ecosystem, which is severely threatened by cattle ranching, careless burning, and perhaps most importantly by mining. Meanwhile, the nation's primary social justice issue is the desire of a percentage of the local population, mainly Kanak, for political independence from metropolitan France. Toward this end, leaders of pro-independence groups are searching for means of achieving economic autonomy, which leads them to embrace multi-national mining companies, promises of employment and equal shares in revenues.

Kanak have historically been marginalised by the colonial administration, deprived of any power to make decisions concerning the use of their lands or other natural resources. However, in a contemporary world increasingly intolerant of human rights abuses, metropolitan France can no longer repress protests with violence. Instead, they have been steadily providing more financial aid, thus creating an 'assisted economy' and encouraging dependency, but have simultaneously been granting greater autonomy to the provinces and the territory. Kanak leaders now have the power to negotiate with mining companies and to choose whether or not to accept the projects. At the local level, residents can and often do organise strikes or block roads in order to make their voices heard.

I chose to investigate the environmental impact of this gradual drive towards greater economic equality and local autonomy. I wanted to determine whether any members of local communities express an interest in conservation (and/or an opposition to the environmentally destructive aspects of development) and if so, what this concept means to them, why they believe it to be important, and how if at all it translates into action. On the other hand, I wanted to examine the motivations and decisions of those who embrace forms of development that lead to pollution and habitat destruction, especially when they do so in the attempt to lay the economic foundations of a future independence. Therefore, I decided to study Kanak reactions to and discourses on environmental degradation and the resource exploitation activities that cause it, focusing on a potential mining project on the Koniambo massif but also collecting data from other places around New Caledonia for comparative context.

Here are my specific questions:

Who within the community is in favour of the mining project, and why (what reasons do they give, and what other motives do I infer)?

Who is opposed to it, and why?

What conflicts are generated by these tensions (pro- and anti-mining)?

- between community members and outsiders

- among community members

- within individuals

Through examining these questions, I aim to achieve a better understanding of the links between habitat conservation and social justice issues in New Caledonia. In other words, when people oppose mining projects (and other manifestations of Western forms of development) in the name of environmental conservation, or when they support such projects in the name of economic development and financial independence from metropolitan France, what motives and interests lie behind these discourses and actions, and what conflicts do they generate? What does this tell us about the potential for conservation and/or social justice in New Caledonia?

This thesis is currently being examined.

Zhi Huang

PhD Scholar
Combining Artificial Intelligence models for multisource predictive forest mapping

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Research Description

Artificial Intelligence models such as Artificial Neural Networks and Decision Trees have demonstrated their better performance on application of complex forest mapping than traditional parametric-based models. However, there is great concern about the limitations of these models, and the instability of their modeling outcomes. Artificial Intelligence models usually require much time spent on finding an optimal solution. They are more sensitive to sample size and sample representation, and more resource demanding. Moreover, each of them has certain iblind spotsî, and there is not a best single model. On the other hand, there are great uncertainties associated with the process of forest mapping from sampling, data collecting, to modeling and displaying of results. Using single model cannot reduce these uncertainties. To improve the mapping performance, and to provide the measurement of confidence, a combination approach is suggested.

In the project, three models including a backpropagation neural network, a Decision Tree, and a model of Dempester-Shaferís Theory of Evidence are combined into an integrated system-Flight System. Fuzzy set theory is applied in the combining process, and a fuzzy-based expert system is eventually developed on the base of Flight System.

Stuart Johnston

PhD Scholar
Soil characteristics and processes critical to the sustainability of alpine grasslands

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Research Description

The tall alpine herb field community in the alpine area of Kosciuszko National Park NSW, is a limited and biologically significant climatic climax ecosystem. However, past grazing practices and the current impacts of tourism, exacerbated by the harsh climate, have resulted in extensive vegetation degradation and subsequent soil erosion of the alpine humus soils. These phenomena have occurred over large areas of the tall alpine herb fields. These disturbances have also produced ecosystem states different from that of the natural climax state. The objective of this study is to provide a framework for determining the soil and vegetation characteristics and processes, which determine the inherent ecological stability of alpine herb fields. From this, a state transition model for alpine herb field ecosystems is to be developed to help in the understanding of ecosystem function and help management.

Bandara Kangane

Master of Philosophy Scholar
Genetic improvement of *E. grandis* to increase the solid wood product value

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Research Description

E. grandis is one the most commercialized *Eucalyptus* species grown throughout the tropics and sub-tropics. *E. grandis* has been favoured because of its fast growth, superior form and the wood properties suitable for a variety of products. Currently, the majority of the *E. grandis* plantations are being established for wood pulp and fuel wood production. However, it has proved that *E. grandis* wood can be used for higher value solid wood products such as, construction timber and appearance wood products.

This project aims to evaluate the genetic variation of the wood (wood density, density gradient, shrinkage, collapse and end splitting) and growth traits of two *E. grandis* breeding populations (provenance-family trials) in Sri Lanka and Australia, estimate the genetic parameters and then develop the appropriate breeding strategies for value added solid wood products.

I have completed the assessment and analysis of the Sri Lankan trial, which shows a significant variation among provenances and families within provenances. The genetic parameter estimates reveal that considerable improvement of solid wood traits can be gained through genetic selection of the Sri Lankan breeding population. The Australian trial was sampled and laboratory analysis is in progress.

The project is in collaboration with CSIRO Forestry and Forestry Products and funded by Australian Center for International Agricultural Research (ACIAR).

Dana Kelly

PhD Scholar
Community participation in government rangeland management programs - the role of power

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Research Description

This research examines the reasons why community participation by government in rangeland natural resource management issues is successful in some instances and not in others. In the Australian rangelands, the trend in policy and government guidelines has been to promote participatory approaches for a variety of reasons. The use of local knowledge and diverse perspectives in developing land management solutions is recognised as essential.

Preliminary results indicate that a large range of approaches are used to involve local communities. The factors that enhance or hinder participation include existing institutional arrangements and the different perspectives of government staff and landholders, particularly about the level of power sharing in decision-making. A model has been developed to highlight the complexities of participation processes.

Ernst Kemmerer

PhD Scholar
Optimal thinning sequences for solidwood production in eucalypt stands

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Research Description

This study investigates the use of dynamical models and optimal control theory to determine the thinning schedule that maximises the volume of large dimension timber that can be harvested over a rotation. Central to finding a theoretically optimal thinning regime is developing a system of equations that describe the growth response following thinning. The system of equations becomes the basis for any dynamic optimisation routine, and therefore the output of the system needs to be responsive to changes in the control variable of stand density.

One approach is to use a state-space representation of the growth model, where the current state is determined only by the previous state, and is independent of past history (so called Markov independence). However, eucalypts are relatively intolerant to intra-stand competition and the past history of the stand is known to affect the thinning response. A state-space representation is therefore unsuitable since it violates the assumption of Markov independence. To overcome this problem 'forest analysts' have (with varying degrees of success) introduced additional state variables such as age, elapsed time since thinning, and other density/time related explanatory variables to ensure that the state variables provide a sufficient description of system behaviour.

Conventional forest growth models use regression analysis to find the average expected response from a set of sub-optimal thinning schedules. If the effect of past thinning treatments is not captured in the model, then the thinning response is underestimated for well-managed stands, and overestimated for poorly managed stands, and the variance is attributed to random errors. Effectively these models attempt to find the optimal thinning sequence based on the results from a set of sub-optimal thinning sequences. Furthermore, these sequences are derived from thinning experiments that are more than often limited in terms of plots size, number of plots and number of replications.

An alternative approach is therefore required to develop models that are responsive to thinning, and to develop a method of finding the optimum sequence for sawlog production from measurements of sub-optimal thinning schedules. This study uses the concept of a production possibility frontier to find the maximum possible sawlog production at each time-step. This was done by applying the objective function to each measurement age to develop an optimal response surface over time and with changes to stand density. The result is a wood production model that is responsive to changes in stocking and age and shows the optimum path for maximising the volume of large dimension timber over a rotation. The results of the model were verified using dynamic optimisation and further modified for different site qualities.

Karen King

PhD Scholar
Simulating the effects of anthropogenic burning on patterns of biodiversity in landscapes

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Research Description

Historical fire regimes dictate the current mosaics of vegetation within landscapes. Contributions by both natural and anthropogenic ignitions determine such fire regimes. Simulation models can provide an insight into how historical fire regimes produced present day landscape vegetation mosaics, and as such they can be used to devise appropriate fire management strategies. Such models incorporate a sound understanding of fire – vegetation interactions into a simulation model capable of depicting fire regimes over heterogeneous landscapes and large temporal and spatial scales. FIRESCAPE-SWTAS is a process-based landscape simulation model devised for simulating natural and anthropogenic burning patterns within the World Heritage Area in the south west of Tasmania. The frequencies and locations of lightning, arson and management ignitions can be varied to identify key long term principles in fire regimes responsible for creating and maintaining current vegetation distributions. FIRESCAPE-SWTAS demonstrates that the current mosaic of vegetation is unlikely to have resulted solely from lightning fires, suggesting long-term anthropogenic manipulation of the landscape with fire. Within multiple century investigations, changing the anthropogenic ignition regime has a direct impact on the resultant mosaic of vegetation and overall fire regime dynamics. Such findings have implications for current fire management strategies.

Alex Lee

PhD Scholar
Redefining structural diversity measures of Australian native forest using Airborne Scanning Laser and high resolution imagery

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Research Description

To fulfil national and international reporting agreements, Australia must accurately and comprehensively survey an estimated 160 million hectares of forest and woodland. New methods are required to cost-effectively collect detailed spatial forest information. In particular, new, optimal sampling strategies must be defined that adequately capture the variability in forested landscapes.

To address these issues, a major remote sensing based sampling program was initiated in 2000 between the CRC for Greenhouse Accounting, ARC SPIRT and the Department of Agriculture, Fisheries, and Forestry Australia. This program sought to integrate and calibrate coarse scaled data with fine scaled remotely sensed data or field data, to estimate a range of forest attributes relating to biomass, structural diversity and species/community composition in south-central Queensland. Subsequent to this study, in 2003 the National Forest Inventory initiated a pilot study in north-east Victoria to test the implementation of a Continental Forest Monitoring Framework, seeking to further extend some of the remote sensing developments undertaken in Queensland.

This PhD will build on the research undertaken in both these studies, utilising the range of remotely sensed data acquired in both Queensland and in NE Victorian forests. Existing lidar data may also be utilised for the tropical savannahs of the Northern Territory, south-east Queensland, the Blue Mountains and Hunter Valley. During this research, new methods will be developed to enhance classifications of tree structure to estimate biomass and species composition using three-dimensional analysis of lidar, combined with other forms of remote sensing data. Species/growth stage maps will be used to better understand lidar interactions and the retrieval of structure from trees of different forms. A secondary component of the research concerns how the forests arrived at their current state by developing land use/management history and maps using available time-series of remote sensed data and historical records.

Objectives of Study:

Focusing on forests in central Queensland and north east Victoria, the primary aim of the research is to develop methods for improved measurement of structural properties of vegetation with lidar and high resolution imagery to quantify:

(a) leaf area, biomass and vertical/horizontal distribution of tree components (leaves and woody material)

(b) stand attributes including height, forest extent, canopy cover and foliage projected cover.

Enhanced techniques for scaling-up such attributes to the landscape and region using a combination of RADAR and optical (e.g., Landsat and MODIS) data, with time-series analysis to better understand dynamics of vegetation change.

Rassoul Mahiny

PhD Scholar
Cumulative impact assessment for mitigating and prioritising enhancement measures in remnants of vegetation

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Research Description

Most areas of every country, except in remote parts, have undergone some kind of human-induced changes. Amongst those changes, vegetation clearance has been a major component, destroying the habitat of fauna and hence decreasing biodiversity. As well as determining the possible effects of newly proposed development plans on the remnant vegetation patches, a major task is to compensate for the changes that have been brought about by past development. Within the environmental impact analysis context, this can be done through various ways, one of which is rehabilitation of the patches. For this to be effective, there needs to be a sound appreciation of the degree, magnitude and significance of impacts on the remnant patches in the past. Based on this, the direction of change could be reasonably identified and mitigation practices can be suggested.

The research project will be carried out in two stages. The study area is to the north of Boorowa, NSW. First, changes in remnant patches over nearly 25 years will be studied and parameters involved modelled through remote sensing and GIS. Then the model will be used to predict the changes for a reasonable time in the future. For assessing cumulative impacts in the patches, landscape metrics and physiognomic aspects will be integrated. Scoring of the cumulative impacts will be done using the integrated change calculations for the past 25 years and what is actually predicted to occur in the near future. The impact scores will show the degree of change as well as vulnerability of the patches and hence their priority for mitigation. Also the relationship between the impact score and landscape parameters will be explored. In the second stage, priority areas for mitigation will be compared to potential and actual land-use planning and the best scenario for incorporation of patch rehabilitation into the process of multi objective land allocation will be determined.

Chris McElhinny

PhD Scholar
Forest and woodland structure as an index of biodiversity

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Research Description

This project examines the nexus between biodiversity and forest and woodland structure at the scale of a stand or patch of vegetation. An important output from this study will be the development of an index of structural complexity to provide managers with a practical tool for assessing biodiversity and vegetation condition, and for monitoring the impact of management decisions in woodland and dry sclerophyll forests. Following an extensive literature review a system for quantifying 130 structural attributes at a stand or patch scale has been developed. This system is currently being used to collect data from more than 180 plots in 60 study sites across the Murrumbidgee and Lachlan Catchments. Sites have been chosen to provide a representative sample of some key dry sclerophyll and woodland communities across a range of conditions and tenure. Data collection is nearing completion. It is anticipated that multivariate analysis of this data will provide an objective basis for identifying the key structural attributes that should be included in an index of structural complexity.

Tom Measham

PhD Scholar
Learning and change in rural Australia: understanding influences on sense of place

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Research Description

Recent interest in the concept of 'place' has led to a research agenda for exploring how this concept can play a greater role in resource management (Cantrill and Senecah 2001). Central to this research agenda are questions of how attachments to place are influenced and how sense of place changes over time. In response to the emerging role of sense of place in natural resource management and the research agenda for exploring this concept, this thesis is concerned with 3 questions: what are the key influences on sense of place?; what is the relationship between sense of place and activities in practice?; and how do people learn about place and respond to change? To explore these questions, the thesis presents findings from interviews with 40 participants in case studies of the Atherton Tablelands and Woodstock, north Queensland. The thesis shows how sense of place for research participants was influenced strongly by childhood experiences, both for people who grew up in the case study locations and for people who grew up elsewhere. Other strong influences on place involved living in a similar environment overseas, seeking profit and having a sense of self focussed on agricultural production. Of particular interest is that for many participants who moved to the case study locations, their sense of the Atherton Tablelands or Woodstock was well developed prior to arriving there. These findings are discussed in response to a post-productivist transition in rural regions of Australia. Expected submission timeframe for thesis is mid-late 2003.

Angela Newey

PhD Scholar
Organic Matter Decomposition as a Function of Depth in the Soil Profile

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Research Description

Soil organic matter is a critical component of the biosphere with direct links to atmospheric composition and to agricultural production and sustainability. Much of the work on soil organic matter to date has focussed on the top 10-20cm of soil, and while this is typically the zone of greatest organic matter concentration per unit of soil mass, a considerable amount of organic matter (and consequently carbon) can lie below 20cm. For example, at least 50% of carbon in the top meter of soil typically lies below 20cm. As carbon stocks and fluxes from deep soil layers can be significant, and most plant roots extend well below 20cm depth, an understanding of the processes controlling organic matter breakdown and nutrient cycling in the sub-surface soil layers is important from both an agricultural production perspective and that of a greenhouse accounting perspective. In fact there is some evidence to suggest that the processes controlling organic matter cycling at depth may differ from those at the surface, making extrapolations from existing information about surface soils to deeper layers of limited value. For example, in a recent analysis of >2,700 soil profiles in 3 global databases, Jobbagy and Jackson (2000) found surface soil carbon stocks to be well correlated with climatic variables, but the deeper soil stocks were not. Further, researchers in the area of carbon dating have found that deep soil carbon is consistently older than carbon residing at the surface, indicating organic matter may be more stable at depth. This PhD research will comprise a number of interrelated experiments designed to study the processes controlling the decomposition of organic matter in the soil, and how these may vary with depth in the profile.

Chris O'Hara

PhD Scholar
The availability of P associated with different fractions of organic matter with Australian forest soils

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Research Description

This project utilises a combination of novel and conventional methods to investigate the availability of phosphorus (P) associated with different physical fraction of forest soils, with an emphasis on the soil organic matter (SOM). The role of soil physical fraction in the cycling of P is being examined.

The thesis is currently being examined.

Kate Park

PhD Scholar
The influence of land management factors on bird assemblages using riparian land in an agricultural system: a scale analysis

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Research Description

Increasingly within Australian agricultural landscapes, the important role of streamside vegetation as habitat for terrestrial wildlife is being recognised. However, maintenance of riparian habitat has focused on land management at the local scale, with little attention to the influence of management practices within adjacent upland ecosystems. This research aims to investigate the influence on bird assemblages of land management factors across multiple spatial scales. Bird species utilising riparian land within farmland on the Southern Tablelands of NSW will be investigated. The influence of a variety of land management practices operating at scales ranging from the riparian vegetation itself, to the entire catchment will be explored. It is anticipated that these results will provide a greater understanding of the relationship between riparian and terrestrial ecosystems, and thus provide recommendations regarding the conservation of riparian habitat for birds within agricultural systems.

Ida Aju (Daju) Resosudarmo

PhD Scholar
The politics of forest management in decentralizing Indonesia: will power sharing work?

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Research Description

Many countries around the world are devolving political, fiscal, and administrative powers to sub-national governments; at least sixty countries have embarked on some kind of decentralized natural resource or forest control. However, so far, there is limited evidence that decentralization has benefited forests and the people who depend on them.

This research attempts to examine the outcomes of Indonesia's recent decentralization process in the context of forest use and management. It will observe the dynamics of forestry or forestry-related decision making processes and their implementation. It will explore elements such as the actors and their role, locus and distribution of power, and accountability mechanisms. Research will involve investigation at the national, sub-national, and local levels.

Jeewook (Jason) Rim

PhD Scholar
Exclusive Bus Lane and its Impacts on the Urban Transport System: A case of City of Seoul

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Research Description

In the process of rapid urbanization, the transport system has been a backbone of urban development in Seoul. In particular, the passenger demand on transport often exceeds the capacity of system. The excessive transport demand generates a series of transport-related problems including traffic congestion, pollution and accidents. In particular, the strong preference on private vehicle extensively reduces the public transport use and worsens the problem. The decrease is closely related to the inferiority of conventional public transport in terms of trip time and convenience. The improvement in service of public transport mode is able to compete with private vehicles.

As the attempt to alleviate the problem with additional road construction failed, a number of approaches including transport system management (TSM) and transport demand management (TDM) are adopted in transport planning. Recent researches reveal the implication of exclusive bus lane (EBL) in both TSM and TDM. This study will highlight the potential of EBL in urban transport management. To evaluate the effectiveness of EBL as a management tool, the case of Seoul, South Korea will be used. In the process of evaluation, this study will be dealt with policy framework and user response in the case of Seoul. By doing this, the study will test of the need of the diversity in transport mode to sustain urban development.

This thesis is currently being examined.

Jacqui Russell

PhD Scholar
Development of critical human ecology as a research methodology

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Research Description

Concerns about environmental degradation are increasingly being linked to the ways in which humans interact with their environments. While human ecology is often described as being the study of the interactions between humans, their culture and their environments, to date, it has lacked the capacity to comprehend the ways in which maladaptive cultures have been created and are perpetuated. In order to redress this failing of human ecology, I propose the development of a new methodological framework which would combine the understandings of human ecology with those of the critical social sciences. The transdisciplinary approach being developed has been entitled 'critical human ecology'.

Karim Sabetraftar

PhD Scholar
The hydrological flux of organic carbon and how it can be spatially analysed using environmental modelling and GIS

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Research Description

Terrestrial carbon accounting to date has largely ignored the hydrological flux of organic carbon. However, recent studies have suggested that this is an important lateral process that may constitute a significant stock and flux of organic carbon at the catchment scale.

The major objectives of this study are to (1) investigate the hydrological flux of organic carbon in the river environment of the Cotter River Catchment and (2) evaluate the contribution of this flux to terrestrial carbon accounts. To do this, the research focuses on sampling organic carbon in streams and tributaries from upper catchment that can then be analysed using a hydrological simulation model (IHACRES). Potential inputs of organic carbon across the catchment will be estimated using the CASS terrestrial carbon accounting model developed by the CRC for Greenhouse Accounting. The relationship will then be investigated between the hydrological organic carbon data and predicted terrestrial productivity in the catchment.

Jacki Schirmer

PhD Scholar
Transforming conflict: case studies of conflict over the establishment of new plantations in Western Australia, the Republic of Ireland and Scotland

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Research Description

The study is evaluating the reasons why attempts to transform conflict over the expansion of tree plantations have varying levels of success. To do this, three case studies are being examined and compared, investigating community reactions to plantation expansion in the Great Southern region of Western Australia, County Leitrim in the Republic of Ireland, and Dumfries and Galloway in southern Scotland. A wide range of processes used to transform conflict – including regulatory, legislative, participatory and planning processes – are being examined. The work is supported by the Cooperative Research Centre for Sustainable Production Forestry in Hobart.

Sunil K. Sharma

PhD Scholar
A comparison of combinatory methods within GIS -based multi-objective land assessment

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Research Description

A land unit offers several land use options and produces its own impacts on the health and sustainability of the surrounding land in a catchment. Inevitably, the growing demand of the land for fulfilling the developmental needs of the human beings coupled with a greater awareness of environmental, economic and social issues has led to increasing complexity in decision-making on land assessment. This research will address this problem through applying simulated annealing and genetic algorithms within GIS-based multi-objective land assessment of Ulladalla-Milton areas of New South Wales (NSW) and compare their performance and applicability.

Danny T. Siegenthaler

PhD Scholar
Transitional vegetation response to global warming: implications for carbon sequestration

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Research Description

The landscape of south-eastern New South Wales, particularly around the Canberra region has historically been under considerable pressure from settlers clearing native eucalypt woodlands and forests to accommodate grazing of sheep and cattle. Broad scale clearing leaves only scattered remnants of the original vegetation, resulting in the conversion of relatively continuous ecosystems, such as forests, into islands of natural habitat surrounded by a matrix of agriculture and urban development. Impacts of such clearing are usually considered in terms of local species, environmental degradation such as soil erosion and salinity problems and these factors in turn impact carbon stocks. Vegetation loss, fragmentation and degradation alter microclimatic regimes thus influencing vegetation regeneration processes and adversely affecting carbon sequestration.

Impacts of land clearing on Carbon Carrying Capacity (CCC) and Net Biome Productivity (NBP) are calculated over time periods of ten to hundreds of years. The accelerated greenhouse effect is predicted to significantly alter climatic regimes such that ecosystem response is in disequilibrium. Thus, in calculating CCC and NBP in response to greenhouse forced climate change it will be necessary to simulate the transitional (non-equilibrium) response of vegetation systems to changing climatic regimes. This requires the capacity to model potential plant response on a species-by-species and spatially explicit basis. In landscapes that have been subject to vegetation loss, fragmentation and degradation, the transitional vegetation responses will reflect the altered micro climatic regimes and how these influence regeneration processes.

This project aims to investigate the effects of forest fragmentation on vegetation regeneration processes and to integrate these relationships into a landscape-based, vegetation succession model. This vegetation model will in turn be coupled to a carbon accounting model.

There will be three main studies:

(i) Analysis of existing forest fragments to determine spatial patterns in regeneration.

(ii) Experimental analysis of seedling growth in relation to microclimatic conditions caused by forest fragmentation and how these processes relate to patterns in vegetation.

(iii) Development of a simulation model, calibrated with existing and newly generated field data, to explore potential expansion of fragments given certain micro-, meso- and macro-climatic conditions. The model will enable changes in carbon stocks to be estimated on a landscape-wide basis.

Catherine Simpson

PhD Scholar
Relating the spatial patterning, structure and biological diversity of dry sclerophyll forest using remote sensing

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Research Description

Whilst extensive in eastern Australia, native dry sclerophyll forests (DSF) largely occur as patches of remnant regrowth that emerged following the abandonment of unproductive agriculture on private lands. These forests have generally been overlooked by systematic assessments in favour of the taller, wet sclerophyll public forests. As a result, conservation priorities and management strategies on a landscape scale are poorly developed. However, LWA and other research have recognized the potential biodiversity conservation and economic value of DSF.

Recent research at ANU suggests that advances in remote sensing technologies (particularly hyperspectral imagery) have the potential to characterise relevant spatial patterning and structure attributes of DSF. Related work in conjunction with CSIRO Sustainable Ecosystems suggests this data can be related to biodiversity elements at scales sufficient to be useful for assessment of conservation priorities and management strategies.

This project will investigate the extent to which the relationship between the spatial patterning, stand structure and health, and biodiversity of a representative sample of remnant DSF in SE Australia can be established using remote sensing. Knowledge on the relationship between these attributes of DSF will be used to assess the impact of past management history, to enable recommendations on future management strategies to enhance the biodiversity conservation and economic values of DSF to be made.

In addition to the ANU, the research is also being supported by the Rural Industries Research and Development Corporation (RIRDC) and CSIRO Sustainable Ecosystems.

Doug Somerville

PhD Scholar
Availability, distribution and quality of floral resources used by honeybees in NSW

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Research Description

This study aims at defining the availability, distribution and quality of foraging resources used by commercial honeybees in NSW. The first part of the study has been a survey through apiaries using state forest documentation of resources assessed in relation to climatic variables, principally rainfall. The second part of the study is a field and biochemical investigation of pollen yield and quality of foraging resources. The outcomes of the project will be used to inform management of the honeybee industry. Mr Somerville is an apiarist with NSW Agriculture. These relationships on soil conditions will also be determined. As a means of achieving these aims, three areas within Australia with distinctly different sodic soil types and management regimes have been selected.

This thesis is currently being examined.

Sanjeev Kumar Srivastava

PhD Scholar
Testing spatial model for predicting fish abundance and distribution

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Research Description

The proposed work for the PhD will compare different conventional and knowledge-based models for the prediction of fish distribution and abundance using ad hoc or bad datasets. Natural history collections across the world hold useful information on fish occurrence over a wide temporal range; this information can be used to predict the distribution pattern of fish and to identify changes in their distribution patterns at different spatial scales. Since the information in natural history collections and other such databases are not the result of well designed sampling, and are collected opportunistically, to extrapolate such data using multivariate analysis is regarded as unreliable and a knowledge-based system is found more useful. The applicability of knowledge-based models will be tested at different spatial scales in the Murray-Darling river basin, which is one of the largest and driest catchments of the world.

Before joining the PhD program at SRES, Sanjeev was working as a Scientist at the National Bureau of Fish Genetic Resources, Lucknow India under the Indian Council of Agricultural Research. In addition, Sanjeev is among the collaborators for the FishBase project of the World Fish Center at Malaysia.

Recent Publications

Srivastava, Sanjeev K., Reyes, R., Fabres, B., Ponniah, A.G. and D. Kapoor, D. Mapping Indian inland fish diversity using historical occurrence data in FishBase. *Proceeding of International Symposium of Application of GIS/Spatial Analyses in Fisheries and Aquatic Sciences*, held at University of Sussex, Brighton, UK, 3-6th September 2002. (Communicated)

Srivastava, Sanjeev Kr, U. K. Sarkar and R.S. Patiyal 2002. Method of Fishing in the stream of Kumaon Himalayan Region of India. *Journal of Asian Fisheries Science* 15(4), Philippines.

Srivastava, Sanjeev Kr., U.K. Sarkar and A.G. Ponniah. 2001. "Arrangement of Habitat Inventory Information on GIS Platform to Identity Optimum and Degraded Areas of Endangered Fish *Tor putitora* Habitat". *Proceeding of First International Symposium on GIS in Fishery Sciences*. Tom Nishida, Patricia J Kailola and Chuck E. Hollingworth Eds. (Seattle, Washington, USA; 02-04 March 1999) pp 302-314.

Hery Suhartoyo

PhD Scholar
Carbon sequestration in *Acacia mangium* plantation established on degraded sites in south Sumatra, Indonesia

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Research Description

Nitrogen-fixing plants have been widely used for reafforestation of degraded lands in tropical regions. Recent research has shown that soil organic carbon (SOC) sequestration in plantations of N-fixing tree species is substantially higher than beneath non-N-fixing trees. Two explanations have been provided for this. Firstly N-fixing species may produce more above- and belowground litter or litter that produces more recalcitrant, less decomposable organic matter (OM). Secondly, N-fixing species may inhibit the decomposition of older SOC through the reaction of N with the OM or the inhibition of soil enzymes responsible for the mineralisation of OM. However, the underlying mechanisms of these processes are still poorly understood.

This study, which will investigate SOC sequestration under *Acacia mangium* plantations following afforestations of *Imperata cylindrica* grasslands, is aimed, first, to contribute to the understanding of the effects of N addition through atmospheric fixation on the short and long-term decomposition of SOM, and second, to assess the potential of afforestation of *Imperata* grasslands with N-fixing tree species to qualify for the Clean Development Mechanism of the Kyoto Protocol.

Geraldine Teakle

PhD Scholar
Managing cyclone prone human-ecological communities for resilience and sustainability

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Research Description

Tropical cyclones impacting human and ecological communities present a real and current threat to lives, livelihoods and the environment across most tropical and some mid latitude regions of the world. Australia is not immune to this threat. Recent investigations that determine the intensity and frequency of pre-historic tropical cyclones from coral, shell and alluvial fan deposits, have suggested that "super-cyclones" occur in an order of magnitude higher (once every 100-200 years) than previously estimated (once every several 1000 years). Previous estimates, which are based on the short-term historical record beginning in Australia around 1906, are used to guide contemporary disaster management of the tropical cyclone hazard in Australia. Hence, it is likely that community vulnerability, exposure, and risk to tropical cyclone hazards are much higher that originally estimated. In addition, risk to the impacts of tropical cyclones across the world and in Australia is also increasing. The reasons for this include increased population pressure in built up and rural areas, inappropriate development, increasing tourist visitor numbers, marginalization of remote communities, and possibly human induced climate change (such as global warming).

It is for these pressing reasons that this study proposes to characterize the emergent phenomena and dynamics of human-ecological communities that are at risk from tropical cyclones for several cases in the Northern Territory that have distinct geographic, biophysical and demographic properties. These could include remote communities (Tiwi Islands), city communities (Darwin), and National Park communities (Kakadu). To fill knowledge gaps and gain a better understanding of the complex community interactions occurring in each case, ecological and social resilience assessments will be undertaken. This data will be used to identify, model and analyse the system's emergent properties and dynamics. Through comparing the emergent phenomena and dynamics across case studies it is proposed that novel management options, processes and possible pathways for resilience enhancement and sustainability will be presented.

Kimberly Patraw Van Niel

PhD Scholar
Reconciling Geographical and Ecological Paradigms: Modelling Multi-Layered Species Distribution and Abundance for Dynamic Mapping of Vegetation

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Research Description

This study examines the conflicts between ecological theory and geographic process and methods and seeks to reconcile them through new geographic processes and data constructs. While accepted ecological theory maintains that individual species vary individually, geography has been dominated by methods of mapping communities or dominant species. In order to advance understanding of the spatial aspects of species distributions, geographic methods and processes must relate specifically to current ecological knowledge. This includes the use of proper statistical methods, error analysis, data design and storage, and data combination analysis, while still considering the needs of environmental managers and other third party data users. Kimberly is supported by both ANU and OPRS scholarships, and also conducts research in remote sensing and the uses of pseudorandom number generators in GIS.

This thesis is currently being examined.

Robert Waterworth

PhD Scholar
The distribution of carbon and nutrients in the stemwood of *Pinus radiata* (D. Don.) under differing environmental conditions.

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Research Description

The way trees grow and in the process store carbon and nutrients in the stemwood is related to site and climatic conditions. This research aims to determine distribution of carbon, carbon isotopes and nutrients (primarily nitrogen) at a sub-annual level within the stem of *Pinus radiata* (D. Don) under differing environmental conditions. This will provide a better understanding of the relationships between carbon storage, stem volume increment and environment.

The research is based on historical data and recently collected samples from CSIRO's Biology of Forest Growth experiment, a long-term research trial terminated by the 2003 Canberra bushfires. The trial consisted of combinations of irrigated and fertilised treatments, representing a diverse range of growing conditions. The initial phase of the research involves full stem analysis of sample trees to determine the stem volumes and changes in stem form between the treatments. This information will then be used in combination with historical measurements, x-ray densitometry and carbon analysis to develop sub-annual estimates to carbon accumulation in the stem. Further analysis into the effects of climate on stemwood properties, such as carbon isotopic ratios and microfibril, are also planned.

Nutrient analysis will focus on the C:N ratio of heartwood rings laid down during major treatments to determine if this varies with increased nutrient availability. This heartwood C:N ratio is important when considering the potential changes to forest biomass stocks under changing site and climatic conditions.

The research is being carried out with assistance from CSIRO Forestry and Forest Products. I would like to acknowledge the importance of the support and in-kind assistance provided by friends, CSIRO staff and ANU staff and students during the sampling phase of the study, without which the sampling could not have been completed. Funding from the CRC for Greenhouse Accounting is gratefully acknowledged.

Eddie Webber

PhD Scholar
The dynamics of carbon sequestration in coarse woody debris of eastern Australian forests

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Research Description

This study is aimed at defining the decay dynamics of coarse woody debris (CWD) in different forest types along a latitudinal gradient. The quantity of carbon (C) stored in different decay classes, and the movement of the CWD between the different decay classes is of major importance when accounting the sequestered C in these forests. Modelling of this pool of sequestered C will lead to the formulation of management strategies of the CWD in these forest types, which is lacking at present. This work is supported by the Australian National University, the Co-operative Research Centre for Greenhouse Accounting, and Forestry Tasmania.

Vanessa Wong

PhD Scholar
The effect of salinity and sodicity on soil carbon stocks and fluxes

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Research Description

Whilst salinity and carbon accounting have traditionally been considered as separate issues, preliminary results indicate that saline soils play a role in the dynamics of below-ground carbon. The soil organic carbon pool is currently the world's largest terrestrial carbon sink, and therefore interest is rising in the effects of land use practices in mitigating greenhouse gases.

Saline and sodic soils currently affect a large portion of arable land in Australia, with the area affected likely to increase from 4 Mha in 2000 affected by salinity alone, to an estimated 20 Mha by 2020, representing 40% of all agricultural land in Australia. Soil salinity and sodicity affect both the physical and chemical properties of soils, leading to a decline in agricultural productivity and can, in extreme cases result in the loss of soil cover and the development of salt pans. Consequently, the area of land subjected to salinity has the potential to change the C input from vegetation and microbial processes associated with soil carbon. By investigating the microbiological and environmental processes which govern the breakdown of soil organic matter in saline environments, and cycling of N linked to organic carbon, the fate of organic carbon after its incorporation into the soil as organic matter and means of reclamation of saline soils for crop production in this setting can be determined. Management options that are currently in practice are a combination of engineering and biological approaches, however, the effect of rehabilitation on carbon dynamics at a landscape level, particularly where salinity is a major management issue, is unknown. In addition, carbon data sets that cover different ecosystems and different types of land use histories across a landscape are also lacking.

In conjunction with the Research School of Biological Sciences and the CRC for Greenhouse Accounting this project aims to determine the rate of C fluxes and incorporation of the added C3 and C4 plant C into soil at different salinity and sodicity levels; determine soil C pools and N cycling using d13C and d15N tracer techniques, and simulate C and N stocks and fluxes at different salinity and sodicity gradients. The results from this study will undoubtedly provide a broader understanding of issues associated with salinity, carbon and nitrogen and has the potential to be applied towards changing land management practices to reduce C loss and enhance C sequestration.

Wiene Andriyana

Master of Forestry Scholar
Using sampling techniques to facilitate management of forests by improving the data collection process

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Research Description

My particular interest is in the forest biometrics area (forest inventory and modelling), and, as I'm from Indonesia, its application to tropical rain forests.

Measuring every single tree is just not worth doing for some forest management objectives. Doing a census (100% inventory) in certain forest areas is a time -consuming and costly process. Despite this practicality issue, due to some technical government policy, 100% forest inventory is still (and should be) applied in some countries with tropical rain forest, including Indonesia. Applying appropriate sampling techniques for certain forest management objectives is more practical in the field, while still potentially resulting in considerable good precision and accurate estimation. Therefore, it is necessary to examine whether or not doing sampling can achieve the objective of doing a 100% census.

My future research will be looking at some sampling techniques that are going to be useful for the application in the tropical rainforest areas for a particular forest management objective; particularly for the forest context in Indonesia.

Simon T Angombe

Master of Environmental Science Scholar
Improving volume functions of common species in Namibia, by looking at factors that influence tree growth

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Research Description

I worked in the Directorate of Forestry in Namibia. My main task was to coordinate forest measurement, information dissemination and working on volume functions as well as growth models.

The current volume functions use only the diameter at breast height to estimate the volume and ignores others factors and location. The growth of the tree depends much on the surrounding environment, e.g. site quality. Hence this open up a new way to develop volume functions that uses the site indexes as one of the parameters to better estimate the volume.

Narendra Bahadur Chand

Master of Environmental Science Scholar
Property rights and sustainable forest management: a case of community forestry management in Nepal

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Research Description

I am currently undertaking a Master of Environmental Science. I completed the Graduate Diploma in Environmental Management and Development (EMD) from NCDS in 2002.

Community forestry is the main forest policy of the government of Nepal. The policy is mainly focused on poverty alleviation and sustainable forest management. With regards to my professional experience, I have worked for the Ministry for Forest and Soil Conservation, Government of Nepal, in the capacity of community forester. I worked for six years in different districts ranging from the Himalayan Mountains to the plain (Terai). Working in these districts I have seen poverty from very near.

My research interest is in forest management and livelihoods in the community forests of Nepal. I believe that community forestry is one of the most effective means to alleviate poverty and enable sustainable management of forests in Nepal. I will rejoin my department after completion of my study at ANU and I am very optimistic that I can use the knowledge for the betterment of communities.

Junqi Chen

Master of Forestry Scholar
Degraded rangelands rehabilitation and related assessment

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Research Description

Soil degradation and desertification, due to irrational land use and unsustainable farming practices, are the major environmental problems in Northern China. My Master of Forestry work aims to improve my understanding of the theories of pedology, agroecology and farm forestry, which will lay a solid foundation for my future work in China. I am not only interested in the technical aspects of addressing the above environmental problems, including degraded land rehabilitation, organic agriculture and agroforestry system, but also in the relevant policies.

Cheryl Edridge

Master of Environmental Science Scholar
Protected areas as cultural landscapes

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Research Description

For my final paper I look at the meanings and motivations behind the establishment of protected areas. In the case of national parks, the practice of excluding human use and habitation can be seen to marginalise indigenous people who have vested their own meanings in the landscape and have a different world view. In this paper I look at national parks in New Zealand and Australia that have been declared World Heritage sites to find out what other meanings are vested in the landscape and how different world views affect management practice. I propose that the distinction between natural and cultural landscapes is an artificial one since all landscapes are layered with human meaning, and that land management is also a cultural practice.

Dinuka Govinnage-Wijesekera

Master of Geographical Science Scholar
Geographical sciences

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Research Description

I have a wide range of study interests in the field of resource and environmental management. I possess an Honours degree in Applied Geography from the University of New South Wales (2001). My honours research being an investigation on the impacts of acid sulphate soils on shrimp farms in southeast Queensland. Since completing my degree I have worked as an Environmental Officer with the Roads and Traffic Authority (RTA) of NSW in western NSW. My work involved assessing and providing advice on the preparation of environmental impact assessments for road based development projects.

I am currently completing a Master of Geographical Sciences by coursework at the Australian National University. As part of my degree I am conducting research into the impacts of the January 2003 Canberra bushfires on the water quality of Bendora dam and its implications for Canberra's water supply.

Larysa Halas

Master of Geographical Sciences Scholar
Multidimensional spatial modeling of geoprocesses using virtual GIS

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Research Description

The application of virtual environment technology as a medium for geographic visualization poses both significant potential - in geospatial data representation, manipulation, and analysis - and several challenges associated with specific kinds of information depicted, the methods of representation of this information, and the problems to which this information is applied.

Geovisualization facilitates tasks in urban planning, natural resource management, geosciences education, and environment exploration, including for military actions. It makes possible representation, exploration and analysis of non-visible, abstract geospatial data. Involvement of virtual environment and geovisualization in GIScience enables to transfer its current focus from individual information analysis to group research and collaborative decision-making.

The essential base of successful visual representation methods is full involvement of human sensory and cognitive systems developed for interaction with the real world. Emphasis of geospatial information representation methods development is on creating multidimensional dynamic navigable displays with balanced realistic and abstract features.

Multidimensional surface processes modeling enables not only modelsí better perception and understanding but also helps to evaluate them, represent uncertainty areas and modelsí reliability. There are many GIS programs that incorporate 3 D geospatial data modeling, among them - GRASS 5.0 (Geographic Resources Analysis Support System) ñ free experimental software that comprises of 350 programs and tools for data representation, manipulation, analysis and image processing and offers significant potential in surface and hydrologic processes modelling and analysis.

This thesis is currently being examined.

Ngoc Son Ho

Master of Forestry Scholar
Plantation management for the forest product industry in Vietnam

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Research Description

I am from Vietnam. I worked at the University of Agriculture and Forestry in Vietnam. I did a graduate diploma on Environmental Management and Development in NCDS before joining SRES in 2003 to undertake the Master of Forestry.

My areas of research interest include plantation management and biodiversity conservation. The forest product industry increasingly plays an important role in Vietnam's economy in terms of providing jobs for people and export earnings. Today, the plantation forest is seen as a key solution to the industrial wood supply deficit in Vietnam. However, plantations in Vietnam are mainly run by small farm owners, resulting from the land allocation program. It has been argued that the plantation forest industry for wood and timber production benefits significantly from economies of scale. Yet, this is not the case in Vietnam. Also, it is believed that basing production on many small farm owners does not provide resource security for forest industries, especially the pulp and paper industry, without careful and proper management and planning. Thus, my research will look at how to manage plantation forests effectively in order to meet the increasing demand for industrial wood by the forest industries in Vietnam.

Van Chieu Hoang

Master of Forestry Scholar
Involvement of rural people in reforestation in Vietnam

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Research Description

I worked for 4 years as a teacher in the Central Forestry Vocational Technical School No.1 in Vietnam. As I come from a remote village of the Nung minority people in the North of Vietnam, my main interest is to examine the roles of rural people in reforestation and forest management since they depend heavily on forest resources for their basic needs.

Under the forestland allocation policy, rural people in Vietnam have been allocated forestland for reforestation and forest management. However, the hesitation of forestland receivers to invest in forest production is a remaining shortcoming that limits development of the forestry sector. Analysing the causes of and proposing some solutions for this shortcoming will be the key foci of my thesis this year.

Harigampitage W.K. Jayatilake

Master of Forestry Scholar
Stakeholder analysis for forestry in Sri Lanka

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Research Description

I secured my Bachelors in Agricultural Science including the optional subject Agri-silviculture and completed a dissertation on its potential in the Sri Lankan context. Subsequently, I joined the State Timber Corporation to cater to my forestry interests. I participated in forestry inventory and harvesting of state forests and plantations for several years. As the State Timber Corporation was not concerned about forest management I changed my mind and joined the Forest Department to engage in both management and sustainable utilization of the forest resources.

The natural forests of my country are declining in area and quality. In 1992 these forests covered approximately 23% of the land area. In the meantime the population of my country has increased to 18.7 million in 2001. In 1990, the Government realised the value of these remaining forests and introduced a complete ban on commercial timber harvesting in natural forests. However, ignoring this moratorium, forestry stakeholders are still practicing illegal logging, shifting cultivation farming and encroachment in almost all natural forests.

From time to time, the forest policy makers of the Government have prepared forest policies, forest laws and forest management plans and implemented them to curb the above activities without strong public involvement. As a result, most of these forestry initiatives have failed to provide reasonable benefits to the majority of forestry stakeholders. Therefore, I believe that inappropriate forestry stakeholder analysis can often be a primary reason for the failure of forestry projects in my country.

Hence, I decided to do my research to examine the stakeholder analysis adopted in forestry in Sri Lanka in the planning and implementation process of forestry development and to use these lessons to develop a more appropriate stakeholder analytical method for future forestry projects. Hence, in my research I would like to find out the differences among stakeholder groups affected by forestry, the extent of influence by them on forestry decision-making process and interactions among them in future forestry development. Further, I would like to investigate how to improve the limited options of sustainable forestry development in lowland rainforests with the involvement of small-scale tea growers in forest encroachments.

Farzaneh Kazemi

Master of Science Scholar

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Research Description

Farzaneh Kazemi has a B.A degree from University of Mashad, Iran. Farzaneh has initially enrolled in a Masters of Geomatics Engineering at the School of Geoinformatics, Planning & Building, University of South Australia in September 2001. Later she transferred to ANU when her family moved to Canberra. Farzaneh has worked in the Government agencies and the private sector as a GIS specialist since 1998 to present. In February 2001, Farzaneh took up an appointment with Geoscience National Mapping Division; Australia where she was responsible to maintain road database and update road networks from satellite imagery and other ancillary sources. This opportunity gave her an in-depth knowledge and experience of cartographic generalisation principles in a production environment that is now being fed into her Masters research. She has published a number of research papers. Her recent publication at the International Symposium on GeoSpatioal Theory, Processing and Applications, 9-12 July 2002, in Canada, reflect her ability to publish at an international level. Farzaneh is currently is developing a framework for data abstraction/generalisation for multi-scale seamless environment using ArcGIS, ArcIMS, ArcSDE and ERDAS Imagine tools to be used for derivative mapping application. She is familiar with HTML and XML programming and is learning ORACLE and Visual Basic through ESRI Virtual Campus courses.

Meena Kunwar

Master of Environmental Science Scholar
A GIS application to community forest management in the Nepalese context

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Research Description

Nepal is a pioneer in adopting community forestry strategies as a national policy for forest management. By 2002, 910,370 ha of national forests had been handed over to 11,586 community forest user groups. Many studies claim that this strategy is successful in achieving community participation and reviving the forest through strict and effective protection. Community forests can also play a vital role in improving the livelihood of rural people. To achieve this broader goal, any barrier at the operational level should be addressed by timely amendments of policy and program. However, the Ministry for Forest and Soil Conservation is lacking an effective and efficient information system to foster the community forestry program. On the other hand, a management plan for a community forest is the real instrument to deliver livelihood benefits to the people. Therefore, the quality and implementation of a management plan are essential elements for ensuring sustainable benefits from these scarce resources. However, the classical methods of data collection are not adequate for acquiring accurate biophysical data on hilly terrain. Moreover, insufficient staff at the Department of Forests inhibits provision of required support to forest user groups in preparing a realistic management plan based on resource condition and needs of users. Therefore, most management plans are prepared for the sake of meeting the basic requirement for the community forest handing-over process. As a result there is concern whether community forests can provide sustainable livelihood benefits to the people.

In my study I aim to address the issues mentioned above through exploring the potential of Geographic Information Systems to improve the existing information system as a tool in preparing a realistic management plan for community forests in Nepal.

Khac Lam Nguyen

Master of Forestry Scholar
Approaching a comprehensive economic analysis for afforestation projects

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Research Description

People often claim that forest resources are valuable while others accept the perception of "low profitability" in forest businesses. The latter viewpoint could be questionable since every valuable good and service has a higher comparative price. A fundamental reason for this situation is either the "under valuation" of many forest values, or that they are not taken into account in conventional economic analyses. To deal with this situation, a number of assessment methods have been studied and used to quantify non-market goods and services like hedonic pricing, travel cost and contingent regression. However, the effectiveness of these methods is controversial.

This research will first examine the philosophies and application of the above methods. The examination will demonstrate that each of these methods is only suitable for a certain component of forest businesses, and that the assumptions in these methods are debatable. Hence, the study will discuss the feasibility for applying a more comprehensive method of economic analysis for forestry projects, in which values of forests are calculated from the possible "economic loss avoidance" values, which might result from deforestation. This method is a development on the combination of "opportunity cost approach" and "damage costs avoided valuation". One of its ambitions is to use bio-economics models to develop theoretical causal relationships between forest status factors and its component values.

Rebecca Pagan

Master of Forestry Scholar
Exploring principles and approaches for developing community forestry in Australia: a regional case study

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Research Description

Forestry generally is being redefined to meet a broad range of economic, environmental and social expectations. Important to this is the increasing need for an approach to forestry which contributes to the social capital of surrounding communities through the participation of the community in helping to shape its development. Previously in Australia, forestry development has tended to occur in a relatively fragmented way with the many approaches to forestry - industrial plantations, public native forests, private farm forestry, being viewed as independent entities. Community Forestry, as being developed in other countries, offers a potential framework for integrating the many approaches to forestry in Australia within a regional setting that also ensures a strong focus on social capital building.

This study is part of a wider project to provide foundation research for developing community forestry in Australia. Drawing on an international review of the 'key ingredients' needed for successful community forests, this study will explore the potential for development of these ingredients in a selected case study region. This will involve initial consultation with community 'leaders' to assess both the level of interest in, and capacity to develop community forests. Following from this a small workshop will be conducted to explore the principles and practicalities of developing a community forest within the specific regional setting.

Julia Pickworth

Master of Environmental Science Scholar

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Research Description

My background is in political economics and social policy - so environmental studies seemed to be a missing piece of the trilogy. Hence, my coursework studies have been integrated in approach and focused on policy and management issues. My main area of research thus far has been exploring the effectiveness of community environmental monitoring, including looking more broadly at community science and community participation in natural resource management. I intend to study similar concepts and themes in the rest of my Masters, but I am still refining the topic of my research.

Michael F. Ryan

Master of Forestry Scholar
Natural expansion of native forests onto cleared agricultural land

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Research Description

During the 20th-century the Southern United States of America, much of Central Europe and parts of Australia have undergone significant natural forest expansion onto abandoned agricultural land. These new forests have had major environmental and economic implication and in many instances have far exceeded the area of active reforestation.

The aim of this study is to use existing literature, historic photographs and artwork to identify the nature of the landscape at that time of agricultural abandonment that has resulted in the expansion of natural forests. It will look at two overseas case studies of Alabama in the Southern USA and Italy and explore the economic and environmental consequences and will then investigate areas in Australia where large-scale forest expansion has occurred.

These case studies will explore the causal factors and conditions under which forests can expand onto agricultural land. The outcomes have potential implications for Australia's current requirement to retire large areas of marginal agricultural land.

Karma Thinley

Master of Forestry Scholar
Role of institutions in sustainable forest management

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Research Description

The process of sustainable natural resource management is often entangled in the complex web of social, political and economic threads that run through a society. Bio-physical problems of resource degradation can be seen as inadvertent symptoms of the weaknesses in the socio-economic and political institutions. Therefore, a rational approach to sustainable natural resource management has to be premised on:

an understanding of the complexity and the dynamism of the various socio-economic and political factors; and

an appreciation of the relationship between those elements and the ways in which they influence the nature of human-environment relationships.

Based on the above proposition, I intend to investigate the role of institutions in NRM. The emphasis will be on exploring the key aspects of institutions in fostering people's participation in NRM, specifically in forestry. The discussions will be carried out in the context of Bhutan.

Damian Woods

Master of Environmental Science Scholar
Environmental education in Australian secondary schools

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Research Description

Environmental education has a long history in Australia. Before and after European settlement, Australian societies have adopted a range of methods designed to educate young people about the environment on which their existence depends. In recent times as pressure on our environment and natural resources has increased, it is becoming apparent that our society is confronting a growing crisis. For Australian society to operate in greater harmony with our limited environmental resources, young Australians need to be informed of these issues and empowered to affect change in the future.

This project asks the question; what role can Australian secondary schools play in assisting the achievement of a more ecologically sustainable society? To address this question, this project is in two parts. Firstly, a history of the development of environmental education policy in Australia is examined. Particular emphasis is placed on policies that have directly influenced the secondary school curriculum and the delivery of environmental education programs in schools. Resulting from this analysis, it is demonstrated that secondary schools have achieved mixed success in delivering educational outcomes that have flowed on to positively influence the attitudes and behaviours of students towards their environment. Many examples of innovative and highly effective environmental education programs exist. However, it will be argued that across Australia, our secondary schools are failing to deliver the educational outcomes necessary to initiate behavioural change on the scale that is required to have significant long term environmental benefits.

The second part of the project examines recent initiatives to re-invigorate environmental education in Australia. Particular emphasis is placed on the Commonwealth's National Action Plan for Environmental Education and associated initiatives. Through the National Action Plan, mechanisms to facilitate a nationally coordinated approach to environmental education have been established and the importance of this development is analysed. To assess whether these developments will assist secondary schools in delivering environmental education outcomes, the crowding of the modern school curriculum and the difficulties associated with affecting attitudinal changes are also addressed. To support this analysis a case study of a group of year eight student's attitudes and behaviours towards their environment is included.

Don Bakat

Graduate Diploma in Resource and Environmental Management Scholar
Silvicultural systems for native forest management in Papua New Guinea

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Research Description

Having completed my first degree in Forestry at University of Technology in Papua New Guinea, my work experiences involved working with the logging companies and making my way into the Papua New Guinea National Forest Service, in which I got involved in forest working plans, monitoring of logging operations, forest plantation establishment and management, and rehabilitation of logged-out native forest in Papua New Guinea.

I am really concerned with the imbalance between resource exploitation and resource replacement. As a Divisional Manager for the Forest Management Division in the Papua New Guinea National Forest Service, I have a responsibility to ensure sound and sustainable forest management practices in Papua New Guinea, especially to design a silvicultural system for both plantations and native forest.

My research will concentrate on designing an integrated silvicultural system that will address commercial wood production, while maintaining the environmental and other ecological services provided by tropical rainforest.

Baihua Fu

Graduate Diploma in Resource and Environmental Management Scholar

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Research Description

I am currently undertaking the Graduate Diploma in Resource and Environmental Management hoping to roll this into the Master degree focused on water resource management. I did my bachelor degree in biotechnology in South China Agricultural University and graduated in July, 2002. I switched my major to environment not only because of interest but also because I believe that resource management and environmental science, with their application in economics, are particularly important in sustainable development in China. My future research will focus mainly on water resource management, especially water quality control and issues related to environmental economics.

Luke Ingram

Graduate Diploma in Resource and Environmental Management Scholar

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Research Description

I am currently doing my Graduate Diploma in Resource and Environmental Management. My background includes a Graduate Certificate in Sustainable Agriculture through the University of New England. This led me to run an organic farm in Tasmania for four years. In SRES, I want to principally focus upon urban stormwater management systems through initiatives such as water sensitive urban design and aquifer storage and recovery. I will also focus on the role of wetlands in the natural environment to establish their viability in improving water quality in the Murray Darling Basin.

Jeremy James

Graduate Diploma in Resource and Environmental Management Scholar

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Research Description

I graduated from Imperial College Royal School of Mines (RSM), London with a BSc (Hons) Mining Geology in 1980. Since then, I have been actively involved in various minerals and petroleum exploration-oriented projects throughout Scandinavia, Europe, UK, South America, West Africa, SE Asia and Australia. Much of my experience in this field has focused on analysis and geological interpretation of remotely-sensed imagery and geophysical data. This included a five year RTZ-scholarship funded period of post-graduate research into multitemporal remote sensing applied to mapping and prospecting within heavily cultivated terrain of the SW England Sn-W-Cu orefield. I have been employed for the last twelve years as a senior geologist in a Canberra-based consulting company. I am currently a Director of an outfit specialising in geological mapping services for the exploration industry. By undertaking a one year period of coursework study at the ANU, I hope to broaden my experience base to include GIS and environmental issues. I am particularly interested in the mapping and management of soils as well as various aspects of environmental geoscience and landscape ecology.

William Marthy

Graduate Diploma in Resource and Environmental Management Scholar

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Research Description

I'm a new member of SRES, joined in 2003 first semester. I'm currently doing my Graduate Diploma in Resource and Environmental Management for this year, leading to Master in Environmental Science in the following year.

I'm a biologist with my major interest in bird conservation, both as a hobby and a career. In the past I worked with a bird conservation NGO trying to identified the important conservation area in Indonesia using birds as an indicator. As a birdwatcher this was a good opportunity to expand my bird list and see many beautiful and amazing birds in Indonesia's remaining forest.

Despite my background, I'm now interested in forest conservation focusing on how to integrate biology-ecology information with economics, especially in the current forest situation in Indonesia where 'small' blocks rather than big blocks of forest dominate the landscape.

Kala Perkins

Graduate Diploma in Resource and Environmental Management Scholar
Cosmic Ecology

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Research Description

What I call the field of my exploration is "Cosmic Ecology". It is exploring the interface between the newly awakening understandings of our universal origins and environment with the global, social and human ecosystems. Each of these complex systems constitutes an interactive evolving synergy with all the others. Together these constitute the living cosmic organism, within which we and the Earth are integral expressions. At the nexus of these converging fields we are engaged in actualising a new identity and bio-philosophy.

Michael Poesi

Graduate Diploma Science Scholar

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Research Description

I am currently doing the Graduate Diploma in Science leading to the Master of Forestry. In 1995 to 2002, I worked as a forest researcher with the Papua New Guinea Forest Research Institute, a research division of the Papua New Guinea Forest Authority. My research interest has been focused on tree improvement (domestication) of Papua New Guinea's indigenous species. It involves basically the assessment of the quantitative traits of the indigenous species as potential crop for plantation development. During the course of my study at ANU, I am anticipating to enhance my knowledge and skills in the field of conservation and production genetics.

Semy JM Siakimotu

Graduate Diploma in Resource and Environmental Management Scholar
Climate Change

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Research Description

Upon completion of my Forestry degree in 2001, finding a job in Canberra proved a bit difficult. I knew I'd have too much time to myself so continuing with further studies was the better option. I am now employed by CSIRO at Black Mountain as a Technical Assistant in the field of climate change research.

I am currently undertaking a REM Graduate Diploma by coursework (part-time) with the aim of gaining entrance into the Masters Program to do research in the field of climate change. My heritage is from the Pacific Islands of Niue and Samoa and I believe that these two islands are part of a group of islands under the umbrella of 'highly vulnerable' to the physical impacts of climate change.

Emma Soraya

Graduate Diploma Science Scholar
Optimization model of non-timber forest product management

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Research Description

My interest is in the quantitative approach to forest management, particularly in biometrics (forest modelling). Therefore, my future research will look at models of forest management, mainly in optimization of a model of non-timber forest product utilization. Since I am from Indonesia, my research will be in the Indonesia forest management context.

As forests not only consist of timber, but also other products that have values and can be utilized, management of forests should not disregard these other products. Additionally, by utilizing non-timber forest products optimally, the problem of forest degradation because of excess logging activities can be mitigated. By modeling/ simulating actual non-timber forest product utilization, followed by optimization for specific criteria, the optimum strategies of forest management that still conserve forest resources can be found. However, because non-timber forest products have not yet been managed professionally in Indonesia, data availability will become the main constraint in this study. Therefore, it is necessary to examine which management model can be used to suit the specific condition of the Indonesian forest.

Georgina Usher

Graduate Diploma in Resource and Environmental Management Scholar

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Research Description

Units I have undertaken to fulfil the coursework component of the Graduate Diploma are Environmental Policy and Planning, Introduction to GIS and Remote Sensing and Economics for the Environment. For the research component of this degree I am looking at the use of economic instruments to achieve conservation of biodiversity. I am particularly interested in the role of the impacter pays and beneficiary pays principles in determining the balance between public and private funding of biodiversity conservation.

Stephanie Weidemann

Graduate Diploma Resource and Environmental Management Scholar
The impact of fire on biodiversity

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Research Description

Since a Bachelor's degree in the States takes four years, I did my first three years at Purdue University, USA in freshwater ecology and then I completed the degree at the University of Queensland with a specialisation in marine ecology. Currently I'm doing a Graduate Diploma in Resource and Environmental Management. My current interests are in fire ecology, particularly fire and biodiversity. I'm hoping to utilise my existing knowledge on the subject and apply it to further studies in water quality, hydrology and catchment management. I plan on taking up a masters degree in environmental science next year commencing 2004.

Simon Baird

Developing host cities (of the Olympic Games) have more potential for environmental benefit than developed host cities

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Research Description

This paper looks at the potential for positive environmental outcomes for Beijing as the host city for the 2008 Olympic Games. The basic premise states that a developing host city has more potential for useful, lasting environmental impact than a developed city. As such, two cities shall represent a developed and developing host city, namely Sydney and Beijing, to illustrate that a developed host city can at best achieve minimal positive environmental impact, whilst a developing host city stands to undergo much deeper systemic social and environmental change.

The Olympic Games, as a 'mega-event', has recently incorporated the environment as its third pillar, alongside sport and culture. This integration gives impetus to the global environmental movement, raising the profile, and incorporating environmental concerns into mainstream social and economic institutions. Further, China is undergoing radical socio-economic change, and it is critical that the environment is not left out of this event of significant national importance. Therefore, this paper will also analyze the role of the Olympic Games and the environment as a social concern in a developing nation.

Yvette Bettini

Using local ecological knowledge

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Research Description

Over the last two decades there has been an increasing awareness of the value local ecological knowledge can bring to managing ecosystems at the local or regional scale. Management at this level has also been recognised as the unit at which theoretical strategies such as sustainable development will ultimately be realised, placing growing responsibility on local government for environmental leadership. The information required to both integrate management and manage environments effectively, to move towards sustainability have been identified as inadequate, particularly localised data of all types of information relevant to management. The need to generate datasets becomes a greater economic burden at smaller spatial scales, but existing knowledge may have the potential to address some of the information needs of local government.

Studies investigating the contribution of local ecological knowledge (LEK) focus on knowledge in traditional cultures and the developing world. The study of LEK in developed countries has received less attention, and focus tends to be on knowledge at the species/resource scale. Little has been done to understand the LEK of industrial societies in order to uncover its potential contribution to management regimes.

This study aims to identify the potential of LEK to fill the ecological information needs of local government in their global role of implementing environmental sustainability. A coastal community and its estuarine ecosystem will be used as a case study to explore this potential contribution. By using qualitative research to elicit local knowledge, the information relevant to the coastal management needs of government will be identified, and the potential contribution of LEK to this cause recognised.

Lee Blessington

Using retrospective sampling to develop growth trends for *Pinus radiata* and *Eucalyptus globulus* on low-rainfall sites in South Australia

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Research Description

With the ratification of the Plantations 2020 Vision, which is a policy aimed at increasing Australia's plantation resource threefold by the year 2020, it has been accepted that a proportion of plantation expansion will flow into dry areas, those often considered marginal for commercial plantation forestry. As dry areas were previously considered unfeasible for commercial plantation forestry, little is known about the growth trends of *Pinus radiata* and *Eucalyptus globulus* growing on sites that receive less than 600mm mean annual rainfall.

This study will use "retrospective sampling" to determine past growth trends for tree height, stand basal area and stem form for *P. radiata* and *E. globulus*, growing on low-rainfall sites in north-eastern South Australia. It is important to understand tree and stand growth in forest plantations as they are integral in the development of suitable yield models and hence appropriate silvicultural regimes for *P. radiata* and *E. globulus* growing on low rainfall sites.

Gabrielle Breen

Local community responses to global warming

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Research Description

Climate change poses a significant sustainability challenge - a great deal is at risk, many aspects of our knowledge remain uncertain, and effective responses require substantial changes in how humans relate to each other and the environment. The nature of the problem calls for integrated approaches to research and policy that can negotiate multiple time and space scales, cross-sectoral approaches, human-environment interactions and overlapping problems and solutions. However, such approaches are only recently emerging. There is also a lack of attention to the role of local communities in mitigating climate change.

This research aims to contribute to integrated approaches to and understanding of how local communities deal with climate change mitigation. The residential sector in the Australian Capital Territory (ACT), Australia offers an excellent case study to explore the complex issues and processes involved - housing is responsible for approximately 25% of the ACT's greenhouse gas emissions, concerns all members of the community, and involves a variety of policy approaches and tools. The case study exploration and analysis is guided by an integrated conceptual framework.

Melissa Griffin

Management implications of behavioural responses of small mammals to supplementary feeding in an off-reserve conservation site

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Research Description

Clearing, habitat fragmentation, introduction of exotic pests and weeds and subsequent loss of flora and fauna that are reliant upon such habitats, is becoming more and more widespread and common throughout Australia. Species, that were once widespread may now be facing these threatening processes and therefore may begin to decline in numbers. It is necessary to understand species ecology and behaviour in order to properly and effectively manage the species and the habitat it relies upon. Even species, which do not face immediate extinction, such as the antechinus (*Antechinus agilis*, focused on within this study), should be studied in order for understanding to occur. This will not only ensure long-term species management but will assist in preventing threatening processes occurring on land, especially private land, from conscientious landholders or community groups, thus creating a secure environment for residing species.

The aim of this project is to investigate the response of antechinus to supplementary feeding for a period of seven weeks in relation to behavioural changes that may occur in terms of microhabitat use. To determine if indeed there are changes in microhabitat use, a technique called fluorescent pigment tracking is utilised. The data obtained from this technique assists in determining how the animals utilise microhabitat. The pigment tracking will occur before and during supplementary feeding to ascertain if supplying supplementary food changes the way in which antechinus behave. Expected changes in behaviour may include more intense utilisation of microhabitat (the animals strongly utilising cover or becoming more arboreal in order to reduce predation), immigration from sites without supplementary food to those with treatment stations. Physical changes expected are weight gain and improved body conditions such as less physical signs of stress and scarring.

Theoretical advancements gained in this project from viewing changes in antechinus behaviour may have practical management implications for not only antechinus but the results may be applicable to other small to medium sized mammals or insectivorous animals.

New management strategies suggested from experiment results may include retention of fallen and standing timber (coarse woody debris), shrubs and grass tussocks, which provide a complex habitat structure and the inclusion of a suitable burning regime to increase understorey/shrubs. Habitat complexity offers protection for small mammals from the risk of predation or provides resources such as food and nesting sites.

Dayani Gunawardana

Patterns in the diversity and abundance of litter invertebrates in the Kioloa study area

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Research Description

One of the main aims of ecological research is to find patterns in the distribution and abundance of living organisms. Understanding such patterns is essential to predict the response of natural systems to global environmental change.

The relationship between net primary productivity (NPP) and diversity has been explored in the literature for over 40 years but theory is still far from robust. The biomass of different groups of animals has also been related to NPP in a number of studies. Climate change and continued increases in atmospheric CO2 are predicted to substantially affect NPP but the implications of such changes in NPP, in regards to biodiversity, ecosystem functioning and carbon accounting are still uncertain.

My thesis will investigate the relationship between NPP and the diversity and abundance of litter invertebrates at a local scale in the Kioloa study area. Litter invertebrates play an important role in ecosystem processes such as decomposition and are also part of the complex detritus based food web yet they, along with most invertebrates, are poorly represented in the scientific literature.

This study takes advantage of previous research that predicted NPP for a number of forested sites in Murramarang National Park. Litter will be collected from ten sites ranging from high to low NPP and the invertebrates extracted in modified Berlese funnels. The relationship between site variables, including NPP, and the diversity and abundance of litter invertebrates will be analysed.

Tony Hunn

Using remotely sensed and ancillary data to map private dry sclerophyll forest, Southern Tablelands, NSW

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Research Description

Dry sclerophyll forest is distributed widely across the Southern Tablelands of New South Wales, mostly occurring on private property and on relatively low productivity sites. In comparison to more productive forest types, dry sclerophyll forest is not well represented in public forest reserves for biodiversity conservation or commercial values, and relatively little research has been performed on the values of this forest type. In order to learn more about the conservation and commercial values of this forest type it is necessary to gain an understanding of the distribution and extent of dry sclerophyll forest on private property.

The distribution and extent of dry sclerophyll forest has remained largely unquantified. This study aims to develop a method for producing accurate thematic maps by classifying dry sclerophyll forest using remotely sensed and ancillary data such as digital terrain models, aerial photograph interpretation, forest ecosystem classification data, and other ground-sourced data. This method aims to distinguish dry sclerophyll forest from woodland and wet sclerophyll forest types, between species associations, and between relatively undisturbed forests and degraded regrowth forests.

Mark Imber

Floristic response of a *Danthonia* grassland community with a heterogeneous fire history in the Australian Capital Territory

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Research Description

Over 95% of Australia's original lowland temperate grasslands have been destroyed since European contact. The remaining five percent are fragmented into small isolated remnants, which are often only in semi-natural condition, making native grasslands one of the most threatened ecosystems in Australia (Kirkpatrick, Gilfedder and Fensham, 1988; Kirkpatrick, McDougall and Hyde, 1995). Indeed the extent to which natural temperate grasslands are threatened is recognised by policy makers with the ecosystem being protected under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) and in the Australian Capital Territory (ACT) under the *Nature Conservation Act 1980* (ACT).

My research looks at the effects of prescribed burning on a *Danthonia* dominated natural temperate grassland in the Australian Capital Territory with a heterogeneous fire history. Prescribed burning is often touted as a suitable and beneficial disturbance tool for the conservation management of grasslands. There is, however, little written in relation to the influences of managed fire regimes on *Danthonia* dominated grasslands, especially regards successful conservation management. My research therefore, is aimed at contributing to the ongoing effort to better understand the ecological processes within natural temperate grasslands, particularly in regard to responses to fire as a management tool.

This project specifically aims to:

- describe and compare the floristic composition of an area of *Danthonia* dominated natural temperate grasslands on the Majura Training Area with a heterogeneous fire history;
- examine the effects on floristic diversity of prescribed burning during different seasons within the grasslands;
- identify rare species;
- provide recommendations for future management of *Danthonia* dominated grasslands.

Julia Kyle

Canberra as a garden city- an investigation of landscape legacies

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Research Description

Cities are dynamic entities that change over time to reflect current social, political and economic conditions. City planners are constantly faced with the issue of accommodating these changes, and as a consequence, the built environment and tree cover within a city is impacted on. Increasingly over time, these two aspects of the urban landscape become important learning tools in providing the necessary information to base future planning and development decisions on. The current physical appearance and character of a city is a legacy of historical events, which illustrate the past successes and failures contributing to the landscape. Canberra is one example of this, although pre-planned, has a landscape full of legacies relating to past decisions made to create a garden city.

For Canberra to continue as a garden city in the future, further planning and development decisions, including the greening of the city, need to be based on the knowledge of Canberra's evolution into a garden city and the implications this has had on the urban landscape. For this to occur, a mechanism needs to be devised that can offer future city planners an effective way of planning and development, which incorporates knowing the outcome of decisions on urban landscape legacies, before they occur. In this study the information needed to create this mechanism, has been obtained through quantifying land use area over time in a representative suburb of Canberra.

Robert McWilliam

Investigating the suitability of a semi mechanised pruner for Australian forest plantations

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Research Description

One of the many silvicultural operations performed on plantation stands is pruning. Pruning is fundamentally the removal of any branch using a cutting tool to meet predetermined objectives. Although pruning is rarely considered an essential silvicultural operation it provides many benefits for plantations and has been identified as one of the greatest value increasing silvicultural treatments.

Pruning has been traditionally carried out manually with a variety of saws and long handled shears. This is physically demanding work and has usually required a fit, strong and skilled workforce. Attempts have been made to mechanise pruning to increase efficiency, reduce the work effort, reduce costs, and improve safety. However, a number of factors that contribute to successful pruning have resulted in the limited success of mechanical pruning.

The aim of this study is to determine through work-study whether power assisted pruning shears improve on current manual pruning techniques. Specifically, the Electrocoup F3002 will be trialed to test whether it has the ability to increase the productivity occurring in Australian plantations. It is also perceived that the Electrocoup will reduce physical fatigue, widen the current workforce involved in forest pruning, and increase safety aspects, especially high pruning. All these factors will be considered to determine the suitability of the Electrocoup for forest pruning in Australia.

Lisa Petheram

What is a good forest? Forest worker perspectives from the Wombat State Forest

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Research Description

This study has arisen from my interest in the trend towards participatory approaches in forest management. In recent years, community-based forestry has spread to many industrial countries and now appears to be gaining momentum in parts of Australia. At the initial stages in initiating or supporting more participatory forestry, it is important that participating groups develop an understanding of the way that the various stakeholders use and view the forest. This starting point is an essential step because without it, some stakeholders may be excluded, or their interests misunderstood.

One forest area in which 'community management' is being considered is the Wombat State Forest in Central Victoria. As in all communities, there are various stakeholders with different interests in the Wombat Forest. One interest group that has had relatively little input into recent debate on forest management and practises are ex-forest workers. Many ex-forest workers are elderly but have remained as residents in and around the Wombat forest. Despite the wealth of information and experience of various eras of forest management that these older forest workers may possess, their voices largely go unheard nowadays.

This research will explore the views and concerns of forest workers in the Wombat State Forest, on their experiences and on past, present and future forest management issues. Qualitative data will be gathered though in-depth interviews, and will be analysed using a grounded theory approach. My contention is that the views of this older generation of forest workers may be valuable and should be recorded, whatever future mode of forest management is adopted.

Louisa Roberts

Use of high resolution gamma ray spectrometry and electro-magnetics to predict soil properties

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Research Description

An analysis of the relationship between on-ground gamma ray spectrometry (GR320) and ground electro-magnetics (EM31 and 38) to asses their ability for mapping soil /regolith properties. The gamma data will be compared to soil samples to infer properties such as parent material/mineralogy, texture and weathering properties to a depth of 60 cms. EM 31 and 38 data will be compared with soil electrical conductivity for any correlation up to 6 metres. Any relationships found will be correlated to assess the ability of the combination as an accurate predictor of soil properties and will result in a high resolution soil property map. How this compares with information that can be gained from soil pits, point gamma ray data and airborne GRS will also be looked at as well as the use of this combination of tools in identifying areas of present and potential land degradation.

Sarah Scroope

Indigenous interests in protected areas: how the IPA Program is working for Indigenous people

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Research Description

My research will explore the lessons that can be learnt from studying past relationships between Indigenous people and protected areas, and how these lessons can direct future approaches to protected area management. Australia's Indigenous Protected Area (IPA) Program is a recent approach to protected area management that addresses national conservation goals and the aspirations of Indigenous land managers.

A case study approach is being used to determine the land management aspirations of the Traditional Custodians at Deen Maar IPA, and also the community's attitudes towards the IPA Program. I will compare the community's responses with the Government's objectives for the IPA Program.

From this research I will be able to recommend changes that will potentially enhance IPA Program effectiveness and direct future approaches to protected area management that accommodate Indigenous interests in country.

Matthew Swift

Terrorism and tourism: responses of the Balinese community

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Research Description

The purpose of this research is to understand how the Balinese community has responded to the terrorist event 12th October 2002. The study will ascertain the long term economic and social changes within the community and the tourist industry as a consequence of the bombings, and the responses to these changes. The vulnerability of the community, and more importantly the tourist industry, to disaster, terrorist or otherwise, will also be assessed.

I will be conducting fieldwork in Bali and observing how community groups and local community leaders have reacted and co-ordinated responses to the disaster situation. I wish to see what mechanisms the various levels of community have implemented to cope with this economic and social upheaval and what development strategies are being adopted now and for the future.

Susan Elizabeth Tate

Characterisation of regolith material in the Girilambone Region, North-Western Lachlan Fold Belt, NSW

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Research Description

Regolith materials in the Girilambone Region of NSW contain significant proportions of transported material that adversely affect mineral exploration techniques, e.g. radiometrics. This research will involve a detailed study of the characteristics of the regolith materials found at the study area with particular emphasis on determining how much of the material is residual and how much is transported/introduced. Of the transported component, the aeolian contributions will receive the main emphasis, in particular the issue of where they have been transported from (local or distant).

The research will involve:

(i) studies of aeolian materials from different regolith landforms e.g. erosional versus depositional and surfaces of elevated basalt flows, in the Hermidale area of NSW,

(ii) comparison of the above aeolian materials with aeolian materials from different regions of Australia: e.g. material collected from a dune/swale land system in western NSW, and source bordering dunes in northern Victorania,

(iii) the use of a variety of different laboratory techniques, including: scanning electron microscopy (SEM), particle-size analysis using the Coulter Counter, thin section micromorphology, X-ray diffraction (XRD), and a variety of geochemical procedures (determination of exchangeable cations and soluble cations/anions)

It is intended that the outcomes of this research will aid the regolith landform mapping of the Girilambone Belt which is the objective of a current Cooperative Research Centre for Landscape Evolution and Mineral Exploration (CRC LEME) project titled: "Girilambone Belt (Cobar-Bourke). Improving exploration in the western Lachlan Fold Belt, NSW, by understanding regolith processes"

Matthew Walker

Intangible benefits of farm forestry: The potential value of environmental credits and capital gains for Southern Tablelands landowners

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Research Description

Extensive clearing of native vegetation is often blamed for the serious land degradation issues confronting agriculture in Australia. Farm forestry is an important mechanism for reintroducing deep-rooted woody plants into the landscape. To promote farm forestry on the Southern Tablelands, revenue generated from "tangible" benefits, such as timber, shade and shelter could be supplemented with payments for "intangible" benefits.

The focus of this study is to explore frameworks for quantifying and valuing three "intangible" benefits of farm forestry: carbon sequestration, biodiversity conservation and capital gains. Firstly, the "Bush for Greenhouse" framework and "CAMFor" model will be used for the carbon sequestration section. Secondly, the biodiversity value of rural property remnant vegetation will be quantified using a "BushTender" style framework. The third part of this study will be the development of a method to assess how the presence of trees in a rural setting can influence land value. Five case study properties on the Southern Tablelands will form an integral part of the thesis, displaying the practical application the intangible valuation frameworks.

Cressida Wilson

Assisting landowners to conserve woodland birds

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Research Description

Woodland in the wheat-sheep belt of Australia has been extensively cleared for agriculture and now persists mainly in small remnants, many of which are on private land. Many birds that depend on woodland habitat are declining, apparently because of ongoing habitat loss and degradation. To assist landowners to conserve woodland birds I investigated the relationship between bird diversity and the characteristics of woodland remnants in Cowra Shire, central-western NSW.

The research was made possible by collaboration between the local community of Cowra Shire, Birds Australia and the Australian National University. The study found that site attributes, such as tree association, shrub cover, litter and logs had a greater influence on bird species richness and community composition than remnant size. The main conclusion for conserving woodland birds in Cowra Shire is that increasing the heterogeneity of remnants can be as important as increasing their size - an objective that may be easier to achieve in a landscape where there is little "unused" land.

Alyson Wright

Roads out of Poverty: Comparisons of villages in PNG

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Research Description

The "god forsaken" Kokoda Track is famous for its trials of mateship, bloody battles and loss of life. The area it occupies in PNG is also home to the "fuzzy wuzzy angels", those "native blokes" who carried the packs of Australian soldiers to battles and wounded troops to safety (Paul 1958: 43). However, the new generation and relatives of the angel carriers, more precisely known as the Koiari people, are caught between two contrasting livelihood ideals. The first of these seeks to maintain traditional, cultural values and practises. In comparison, the other seeks to influence the modernisation of the village. It is the latter of these two ideals that has made visible to village members the importance of generating income. The divide between these two livelihood systems and particularly, the increased interest in monetary activities has meant that poverty is more apparent within the region. That is, the rural Koiari people struggle on a daily basis to secure income for extra food supplies, to obtain an education for their children and to access health care for their family. The remoteness and isolation of many Koiari villages accentuates the problems faced, in which many community members idealise and dream of having access to the outside services, markets and information through regular and inexpensive forms of transport. It is the deficiency in transport systems that many village members describe as the greatest inhibiting factor to overcoming the poverty that is rife in the area. Explorations of these ideas form the basis of my thesis.

Peter Francis Ellis (PhD)

The Aerodynamic and combustion characteristics of eucalypt bark – a firebrand study

The process of spotting whereby burning firebrands are transported by convection and wind to ignite new fires ahead of the source fire is significant both economically and in terms of exposure of fire crews to dangerous situations. Spotting behaviour recorded in Australia is the worst in the world in terms of spotfire distance and concentration and this has been attributed to features of eucalypt bark types. This thesis is the first comprehensive firebrand investigation of any bark and examines the aerodynamic and combustion characteristics and the fuel bed ignition potential of Eucalyptus obliqua. the findings are as follows:

The terminal velocities of shed bark flakes of Eucalyptus diversicolor and E. marginata were shown to be a linear function of sample surface density, species and the characteristic of spin

The burnout times of shed bark cylinder of Eucalyptus bicostata, at their terminal velocities, were a linear function of sample surface density, itself dependent on bark thickness and the amount of internal convolution. The low rate of mass loss at terminal velocity indicates that long bark cylinders would lose only a small fraction of their length during extended combusting flight and hence have a constant terminal velocity.

At fine fuel moisture contents (FFMC) of 8% or less and with no wind the ignition probability by small flaming stringbark (E. obliqua) samples was 100%. Under the same conditions the ignition probability by glowing samples was zero. However with a wind velocity over the fuel bed of about 1 m s^{-1} the ignition probability increased from about 20% at 8% FFMC to about 60% at about 4% FFMC. Glowing samples of stringybark as small as 0.1 g ignited fine fuel.

Prepared samples of the weathered outer bark of E. obliqua were burnt at ambient conditions and untethered at their terminal velocity in a tapered vertical wind tunnel. Combustion behaviour varied for a particular sample size and ignition time due to variation in the amount of structural weakness in the samples. The effect of ignition time on combustion pattern is demonstrated and shown to be significant to potential spotting behaviour.

Combustion patterns were characterised by their flaming time and burnout time, the incidence of reflaming during the extended glowing phase, the completeness of combustion and the changes in terminal velocity and sample mass during flight. The combustion pattern was dependent on sample size and ignition time.

Index ignition time, the time required for full and uniform flaming ignition and used by previous workers for wood samples, was shown to be a linear function of sample initial V:S.

The phenomenon of reflaming during glowing flight has not been previously described. Reflaming occurred most frequently at ignition times slightly less than index ignition time. The maximum time during flight at which reflaming occurred increased with sample initial V:S and one sample reflamed after 350 seconds. This phenomenon is supposed to be significant to ignition probability by a firebrand.

Two combustion patterns were selected as most relevant to spotting potential:

The normal pattern occurred at index ignition time and was characterised by a high combustion rate, maximum flaming time in flight, uniformly long burnout times and a large and an exponential loss of terminal velocity and mass during flight. It is supposed that such samples would be easily lofted and have a high probability of igniting the fuel bed, particularly during the flaming phase. Hence firebrands with a normal combustion pattern are supposed to be the likely agents for relatively short distance spotting under light lofting conditions or in the absence of any convection process.

The extreme pattern occurred at ignition times less than index ignition time and was characterised by a low combustion rate, relatively short flaming time in flight, burnout times which could be greater than those for the normal pattern by a factor f more than two, a small and a linear loss of sample terminal velocity and mass during flight and a high incidence of reflaming during glowing flight. Such a combustion pattern is supposed to be ideal for relatively long distance spotting under strong lofting conditions.

The flaming time, burnout time, terminal velocity and mass were modelled as functions of time and parameters of initial sample size for both the normal and extreme combustion pattern. Models describing this behaviour were combined with a model of the plume for a line fire (Raupach 1990) to show trajectories of the samples. Samples of the same initial size but with different combustion patterns (viz. normal or extreme) were shown to have different trajectories under the same conditions of updraft velocity and ambient wind.

An iterative method was derived and used to determine the optimum sample size and combustion pattern which would result in the greatest spotting distance for given ambient wind and up draught velocities. This method accurately predicted the measured spotting distance for a documented bushfire.

This is the first laboratory study of the firebrand behaviour of eucalypt bark and is expected to aid the development of a method to accurately predict the maximum likely spotting distance of fires in stringybark forest types. This would be invaluable information not only for the control and management of bushfires and prescribed burning but in the assessment of the potential hazard from spotting in both urban and rural situations.

Dominic Kain

Genetic parameters and breeding strategy for the Pinus elliottii var. elliottii × Pinus caribaea var. hondurensis hybrid in queensland, australia

Conventional and novel quantitative genetic methods were used to examine the genetic basis of variation in wood and growth properties in a progeny test of Pinus elliottii var. elliottii (PEE), Pinus caribaea var. hondurensis (PCH) and their F_1 and F_2 hybrids (PEE×PCH). Progeny originated from four NCII mating designs: 6×6-parent designs in PEE and PCH, a 12×12-parent design in the F_1 hybrid using the same set of PEE and PCH parents, and an unrelated 6×6-parent design in the F_2 hybrid. Wood density and tree basal area at each tree age were measured using x-ray densitometry of radial samples taken at breast height from an 11-year-old trial of the four taxa planted at two sites in South-East Queensland, Australia. Spiral grain angle was measured on a ring-by-ring basis in the F_1 hybrid. Based on the results, comparisons were made among candidate hybrid breeding strategies for the genetic improvement of PEE×PCH.

The PEE population was characterised by a relatively low stem volume and high wood density, and PCH and PEE×PCH by the opposite. Economic pressures are leading Queensland plantation managers of PEE×PCH to seek to reduce rotation lengths, but this is dependent on maintaining wood quality comparable to current mature plantations. This study found that low wood density and moderate spiral grain angles in the inner growth rings of the F_1 hybrid will require improvement in order to meet this quality criterion.

Wood density and spiral grain were more strongly heritable than stem volume in PEE, PCH and the F_1 hybrid. Economically significant improvements in all three traits could be achieved by family selection, though strong positive genetic correlations between wood density and measures of density variability suggested that the economic significance of the latter should be investigated. Concurrent improvement of wood density and stem volume in PCH is complicated by a strong adverse genetic correlation between these traits (r_A=-0.84).

A comparison of genetic gains indicated that selection of parents for pure species progeny performance at tree age 12 was nearly as efficient as direct selection of parents for F_1 hybrid progeny performance at age 12, for both stem volume and wood density. Given its shorter breeding cycle interval, pure species selection is likely to be an efficient alternative breeding strategy to direct selection for these traits in PEE×PCH F_1 hybrids. Under any type of breeding strategy, density and spiral grain at age 12 could be efficiently improved by selection on field screening measurements using the Pilodyn and Bubble Protractor, respectively, and on direct single-ring measurements of these traits from age 4 onwards; tree basal area could be selected from age 6 onwards in the F_1 hybrid, and age 4 onwards in PEE and PCH.

The genetic basis of F_1 hybrid heterosis in stem volume and wood density was investigated using the quantitative genetic model of Li and Wu (1996). Overdominance or pseudo-overdominance did not contribute to better-parent heterosis in stem volume or to negative mid-parent heterosis in wood density. Alleles contributed by PEE conferred increased wood density, and alleles contributed by PCH conferred increased stem volume, providing evidence for the genetic basis of "complementarity" in the PEE×PCH hybrid. The primary importance of additive gene action in both traits in the F_1 hybrid is consistent with results from the genetic gain analysis, but further suggests that direct forward selection in a composite hybrid population may be an efficient alternative to pure species selection, for PEE×PCH hybrid improvement; the results hence do not support Shelbourne's hypothesis that interspecific tree hybrids are "genetic dead ends". This study corroborates scattered evidence from previous studies that advanced generation hybridisation may provide a powerful future tool for tree breeders in 'complementary' interspecific hybrid tree taxa.

Shawn Laffan

Inferring the Spatial Distribution of Regolith Properties Using Surface easurable Features.

The aim of this research is to determine to what extent properties of the regolith may be inferred using only features easily measured from the surface. To address this research question, a set of regolith properties from Weipa, Queensland, Australia, are analysed. The set contains five variables, oxides of Aluminium, Iron, Silica and Titanium, as well as Depth to Ironstone. This last represents the depth of the layer from which the oxides are sampled.

The research question is addressed in two ways. First, locations where the properties are related to modern surface hydrology are assessed using spatially explicit analyses. This is done by comparing the results of spatial association statistics using geometric and watershed-based spatial samples. Second, correlations are sought for between the regolith properties and geomorphometric indices of land surface morphology and Landsat Thematic Mapper spectral response. This is done using spatially implicit Artificial Neural Networks (ANN) and spatially explicit Geographically Weighted Regression (GWR). The results indicate that the degree to which regolith properties are related to surface measurable features is limited and spatially variable.

Most locations in the Weipa landscape exhibit some degree of modern hydrological control of the oxide variables at lateral distances of 120 m. This control rarely extends beyond 300 m laterally, although such locations occupy distinct positions in the landscape. Conversely, there is an extensive part of the landscape where Depth to Ironstone is under hydrological control. This occupies most of the lower elevations in the study area. Depth to Ironstone represents the depth to the redox front where iron is precipitated, but may in some parts of the landscape control the distribution of the watertable by being impermeable.

For the correlation analyses, the highest correlations are found with those oxides most mobile in solution. The spatially local GWR results also consistently outperform the spatially global ANN results, commonly having accuracies 40% higher at the error tolerance used. Much of this can be attributed to the localised effects of landscape evolution. Comparison of the GWR results against the local sample mean indicate that there is a relationship between regolith properties and surface measurable features at 10-15% of sample locations for the oxide variables, and 22% for Depth to Ironstone.

The implications of these results are significant for anyone intending to generate spatial datasets of regolith properties. If there is a low spatial density of sample data, then the effects of landscape evolution can reduce the utility of any analysis results. Instead, spatially dense, direct measurements of subsurface regolith properties are needed. While these may not be a direct measurement of the property of interest, they may provide useful additional information by which these may be inferred.

Lorrae Van Kerkhoff

Making a difference: science, action, and integrated environmental research

One of the great paradoxes of modern-day science is that the credibility it relies on to gain authority is derived in part from its independence from decision-makers. Yet that independence is also impotence: to make a difference in the world, scientists must work with those who can bring about changes in action. In environmental and natural resource management research there is growing awareness that distance between science and society comes at a cost, as demand for scientific input into decisions increases and public scepticism of science increases.

Consequently new models of science are emerging, many of which are based around the concept of 'integration'. Integrated approaches include interdisciplinary research, and research that seeks to engage 'action takers'—government, industry, and community—in the research process. The idea of integrated research has brought the paradox between independence and action to the forefront of environmental research. Conflicting arguments for integration amid burgeoning 'integrated' research models, combined with the constraints of conventional research, have fuelled ambiguity and uncertainty in attempts to negotiate the role of science in this milieu. This study has sought to reduce the ambiguity and uncertainty by investigating how integrated environmental research is implemented in practice.

Using a novel methodology based on social communication and social practice, this dissertation reports on two qualitative case studies of Australian environmental Cooperative Research Centres. These Centres are quasi-virtual research organisations, which are required to 'integrate' their research across disciplinary, organisational and institutional boundaries. While dominant research methodologies in science studies tend to focus on critique, the approach developed in this study was based on principles of appreciation and mutual learning between the participants and researcher. Using in-depth interviews, participant observation and document analysis over a period of 18 months, the study examined how researchers and non-research stakeholders understood and articulated integration, as a basis for theoretical development of the concept.

The study showed that integrated research was predominantly categorised by participants as a technical activity of combining and manipulating information flows. This was based on the assumption that research needs to be more complete to be a basis for action. However, the participants' descriptions of their experiences of integrated research suggested that social and political factors were also crucial to achieving change in action. These factors were often viewed as exogenous, but even where participants recognised their centrality, they had few conceptual structures they could use to articulate an alternative to the classic social–technical dichotomy.

Consequently, this study turned analytical attention to events where social and technical factors were interwoven in practice. Synthesis across a range of events suggested that participants made sense of their 'integrative' relationships by negotiating the ways in which their work related to various future contexts of action. Their understandings of how their research could make a difference in the future formed the basis for their relationships in the present.

Despite its centrality as an integrating structure, the temporal aspect of integrated research was often regarded by participants either as background or as a series of largely disconnected external factors. Thus participants often saw themselves as reacting to disparate forces beyond their control. To bring the temporal dimension to the fore, and to provide a way of connecting the disparate factors, the concepts of infrastructures and trajectories were introduced. As different partners have different abilities to bring about change, anticipating the future directions and capacities of change is thus an important, yet underestimated, dimension of integrated research. Deliberate, strategic assessment of different partners' capacities to implement change along future trajectories may help the planning, management and practice of integrated environmental research.

Integrated research is often perceived to conflict with traditional science, especially as socio-political factors 'impinge' on research. However, this study indicates that such conflict is a legacy of the perceived dichotomy between the 'independence' of technical scientific activity and the 'action' of socio-political context, a dichotomy that dissolves when research is considered as a trajectory that shapes and is shaped by various future action contexts. To conclude, this thesis posits the concept of four-dimensional research as an alternative way of understanding the relationship between integrated research and conventional science that overcomes the paradox between independence and action. Four-dimensional research builds on conventional science, and emphasises dynamic relationships between research and the changing contexts in which it can influence action. The better that society as a whole—including, of course, scientists—can articulate, understand and negotiate the dynamics of these relationships, the better equipped we will be to work out how we might achieve the futures we desire.

Annabel Kater

Master of Environmental Science

Managing the privately owned dry coastal eucalypt forests of the Hunter Valley

The privately owned Dry Coastal Eucalypt forests of the Hunter Region are a significant resource for timber production, the production of non-timber products and for the conservation of biodiversity. While these forests are an important community asset, they have often been managed poorly in the past.

Today, these forests vary greatly in both structure and composition as a result of the imposition of a wide variety of logging, clearing and grazing regimes over the years. In addition, there is a great diversity in the objectives of the landholders who manage these forests. this variation ultimately precludes the application f generic silvicultural systems for the Dry Coastal Eucalypt forests. In addition, there is a paucity of information on appropriate management regimes available to private forest owners. This thesis attempts to provide some of the tools to guide private forest owners in the development of site-specific silvicultural solutions for their forests.

Ecologically sustainable forest management (ESFM) principles are used in this thesis as the basis for developing appropriate systems for harvesting, regenerating and managing the Dry coastal Eucalypt forests. Uneven-aged silvicultural systems, and particularly group selection systems, are proposed as a suitable means of harvesting in these forest types. If applied properly, group selection systems can maintain diverse, uneven-aged forest structures essential for both production and biodiversity conservation outcomes.

This thesis explores many of the issues fundamental to achieving ESFM in the Dry Coastal Eucalypt forests. Methods of obtaining an adequate stocking and composition of regeneration following logging are outlined and natural regeneration systems are proposed as the most successful way of doing this. Intermediate treatments such as thinning, which can be carried out in conjunction with harvesting activities, are described here as a means of maintaining the growth potential of the forest.

The conservation of biodiversity in the forest is an important objective of ESFM. this thesis suggests how forest owners can move towards better outcomes for biodiversity conservation through the maintenance of structural diversity in their forest rather than relying on conservation reserves or narrowly focused harvesting prescriptions. The maintenance of a diversity of age classes and species in the forest as well as the protection of structural components such as understorey, hollow bearing trees and ground habitat are suggested as means to achieve structural diversity.

The concept of creating and maintaining an 'ideal' forest structure where optimal growing space is allocated to the different 'cohorts' or age classes in the forest is discussed. While managing a forest according to these concepts may provide benefits for both biodiversity conservation and forest productivity, it is suggested that this level of planning may be currently unrealistic given the low level of skills, interest and resources typically applied to managing native forests on private land.

Ultimately, this thesis suggests appropriate systems for harvesting, regenerating and tending the Dry Coastal Eucalypt forests that take into account the structure, dynamics and current condition of these forests. Landholders can use this information to develop site-specific silvicultural regimes that properly reflect the inherent nature of these forests as well as their own management objective as means to maintaining or enhancing forest values for future generations.

Felicity Maher

Master of Environmental Science

Can business effectively contribute to the challenge of moving toward environmental sustainability

My thesis examined the potential for business to contribute to sustainable development. Business is a substantial consumer of resources and the largest producer of pollution and degradation in the global equation. Therefore the need for a substantial response to the world wide environmental crisis from business is urgent. Simply, sustainable development as a process and sustainability as an outcome cannot be achieved without major adjustments to the way business conducts its activities.

Drawing from thinking over the last few years which argues that business can improve environmental performance without jeopardising corporate objectives, the thesis examined business responses to environmental concerns ranging from sustainability promoting, opportunity seekers, new and developing companies and sustainability resistant companies. The key findings were that the business transition to sustainable development is complex and will take time. The easier steps must be taken first with a view to long term change in the way business is conducted. Such a transition will need to be supported with appropriate incentives and other support and pressure from consumers, governments and lobby groups. As environmental issues become core business rather than a fringe issue for corporations, the necessary changes will come about and force non-compliants to follow suit or exit the business domain. Whether these changes are sufficient and timely enough to deliver relief to already over-stretched ecosystems will be a key determinant in whether sustainable development can be realistically achieved.

John Huasinjo Mosoro

Master of Environmental Science

Auditing logging operations to promote sustainable forest management in Papua New Guinea

This is a pioneering study which addresses the auditing of logging operations to promote Sustainable Forest Management (SFM) in Papua New Guinea (PNG). PNG has globally unique biodiversity values that require conservation, and a population who largely depend on forests for their livelihood, but its forests are currently being over-exploited through intensive logging operations. While the PNG Forest Authority (PNGFA) and the Department of Environment and Conservation (DEC) monitor logging operations under their respective legislation, current monitoring practice are on an ad hoc basis and widely recognised to be inadequate and unsatisfactory.

On the basis of experience in other countries, this study proposes introduction of an auditing system for logging operations in PNG, to promote SFM. Part of the purpose of the study was to inform forestry and environmental managers of the relevance of auditing to forest operations, analogous to its applications in financial management. The proposal is based on the framework of conventional auditing principles sanctioned by the International Standards Organisation (ISO) under its 14001 Environmental Management System, and associated auditing principles and guidelines. Auditing has been traditionally applied as a policy instrument in both private and public sectors.

This study identifies four principal areas of concern associated with logging operations in PNG that auditing could address: (i) governance issues associated with logging; (ii) forest resource security; (iii) environmental issues, and; (iv) social and cultural issues.

This study has drawn on the development of auditing systems and protocols for forestry, such as in British Columbia, Canada, and Tasmania, Australia, to demonstrate that logging operations can be an object of auditing. The proposed auditing system can be implemented based on the existing legislative framework governing the forestry sector in PNG. However, effective implementation of the proposed auditing system would be assisted by changes to the existing institutional arrangements and operational procedures in PNG. Principal among these is the establishment of a PNG Forest Practices Board (FPB) that is independent from the current National Forest Board (NFB). It will also be necessary to coordinate the roles of the PNGFA and the DEC under the FPB and with the authority of the NFB, and to draw in the expertise of the private sector to conduct auditing in the field. Implementation of the proposed auditing system will improve both governance of the forestry sector and enhance the sustainability of forest management in PNG.

Kazushi Suzuki

Master of Geographical Sciences

Selection of a landfill site using geographic information system: A manager's perspective

Selecting a suitable site for a landfill is hard to do since it is almost impossible to find the ONE best place that satisfies all parties involved. There is rarely one "perfect place" for every one. In addition to that, landfill causes several types of environmental damages. One of the most crucial damage is leachate, the contaminated water going into the ground water. As discussed in Chapter two, it is impossible to eliminate this problem. Advanced technologies such as a liner system using a form of plastic, can stop the leachate from reaching the groundwater. However, its effectiveness in the long run is still uncertain since the technique has only been used for thirty years.

Because of the possibility of environmental damage, opposition to a landfill project from the neighbours can easily occur. This leads to the "Not In My Backyard" (NIMBY) syndrome. A policy-maker then has to find an alternative where all the parties can compromise while considering all of these factors.

Geographic Information System (GIS) can compare and simulate a wide range of outcomes, presenting them in the form of maps. This is one of the reasons why GIS is used in many areas including land assessment. However, it has to be managed properly in a way that extracts the best result. A GIS manager has to know how to approach the problem and how to conduct the project with the best use of GIS.

One of the most important factors for proper GIS management is handling data. It is essential to have timely, suitable data. However, this is in many cases difficult mainly due to time and money constraints.

The purpose of this paper is to find out how to determine what criteria a GIS manager would consider when involved in a landfill project. The Smithfield waste management facility, 30 kilometres from Adelaide, South Australia was used as a case study. It was found that, in this case, economic and political perspectives were weighted more than environmental and social perspectives.

Phillip Alcorn

The effects of light availability, canopy gap size and within gap position on the growth of eucalyptus obliqua seedlings

Alternatives to clearfelling have been proposed to increase the social acceptability of native forest harvesting. The introduction of alternative silvicultural systems requires sound information on tree regeneration under different environmental conditions. This study assessed the effects of group selection silviculture on regeneration of Eucalyptus obliqua (L' Herit.) in an old-growth E. obliqua mixed forest in southern Tasmania. For this purpose, the importance of light availability and the effects of gap size and within gap position on the growth and morphology of seedlings were investigated in canopy gaps of 15, 30, and 45 m diameter, as well as in a clearfell and beneath closed canopy.

Average total light availability and its variability along the north-south axis increased with increasing gap size. Relative light intensity within gaps at 2 m above ground was highest at the centre, increasing from 25%, 52% to 67% across the increasing gap size continuum. Relative light intensity declined with increasing distance from the gap centre. In addition to the horizontal light variation, vertical light gradients were examined. This revealed that, on average, 5% more diffuse light was received at 2 m than at ground level and 7% more at 6 m than 2 m. Whereas the eucalypt overstorey surrounding the gaps had little influence on light transmission within gaps, the dense secondary rainforest tree stratum surrounding gaps strongly influenced light transmission.

Seedlings of E. obliqua displayed high plasticity in carbon allocation. Light availability significantly influenced diameter growth, height to diameter ratio, crown architecture, leaf area, specific leaf area (SLA), leaf area ratio (LAR), light compensation point (LCP) and above- and below-ground biomass of seedlings planted in the north, centre and south positions of gaps and in a clearfell treatment and beneath a closed canopy. Higher quantities of light increased seedling stem diameter, crown width, leaf area, LCP and leaf, branch, stem and root mass. Height to diameter ratio, specific leaf area (SLA) and leaf area ratio (LAR) decreased with increasing light availability. Strong relationships were found between diffuse light availability and seedling crown width and shoot and total seedling biomass. Light compensation points (LCP) of E. obliqua were lower than in many other shade-intolerant species. These changes in morphology and physiology with light climate suggest that E. obliqua is moderately shade tolerant in the seedling stage.

To assess whether the light climate in gaps would also be suitable to later growth stages with less shade-tolerant foliage, the relative light intensity at the base of sapling crowns with intermediate foliage was determined at a nearby site. Minimum relative light intensity for intermediate E. obliqua foliage was 27%. The area of the 30 m and 45 m diameter gaps with relative light intensities above 27% at 2m above the ground were 93 and 97% respectively. However, the entire area of the 15 m diameter gap had relative light intensities below 27% which will not provide sufficient light levels to sustain intermediate sapling foliage. Thus a minimum gap size requirement of 30 m diameter in old-growth E. obliqua mixed forest was recommended for the initial regeneration phase.

This study indicates that seedling biomass was reduced in gaps compared to the clearfell treatment. However, adequate seedling growth and survival in all gaps suggests gaps can provide suitable conditions for the early growth of planted E. obliqua seedlings. Care must be taken to extrapolate results from this study to natural regeneration or later growth stages of this species.

Tom Chevalier

Partnerships for Sustainability? An Urban Development Case Study: City Edge, A.C.T.

This research explores the potential and limitations of multi-party environmental partnerships in enabling the implementation of sustainable urban development.

Much research on sustainable urban development focuses either on technical issues of materials and design or the broader issues of policy and regulation. Less attention has been given to developing an understanding of the relationships between organisations that may enable the achievement of design or policy objectives. The notion of partnerships between actors from different sectors of society has emerged as an increasingly popular model for conceptualising these relationships. Given the widespread advocacy of environmental partnerships, their effectiveness needs to be evaluated.

Two sets of orienting concepts were derived from the partnership literature to evaluate the process and outcomes of a local development partnership, City Edge, O'Connor, ACT. Three qualitative methods were used to develop a rich, detailed understanding of the case study partnership: interviews, observation and document analysis.

Community sector partners and the Government were found to be the clearest beneficiaries of the partnership. Private sector partners were ambivalent regarding both process and outcomes. While the case study partnership did not deliver sustainability, it has facilitated the implementation of environmental initiatives that place it at the 'green edge' of what is conceptualised in this research as a 'quality renewal' paradigm. Moreover, the case study partnership has stimulated the formation of new partnerships.

The case study illustrates that partnerships need to be understood as complex, multi-layered and evolving sets of relationships and processes, if their potential as enabling structures is to be realised. Understood in this way, underpinned by core ecological values and supported by policy, it is concluded that partnerships can serve as effective enabling structures in the incremental process of moving from quality renewal to sustainable urban development.

Ruth Doran

Simulating an outbreak of Foot and Mouth Disease via feral pigs, Sus scrofa, in Queensland using Cellular Automata.

As Australia is Foot and Mouth Disease free there is concern regarding the impact that an outbreak may have on the National economy. Little is known about the role that feral pigs may play in the instance of an outbreak. It is therefore important to have an understanding of how an epidemic may spread amongst feral pig populations and the potential risk posed to livestock.

A Susceptible - Infected - Recovered model was implemented as a Cellular Automata to mimic the behaviour of Foot and Mouth Disease. By adopting this methodology different scenarios could be considered and thereby the spread of the disease through time and space examined.

The analysis revealed that using a Cellular Automata to simulate the spread of Foot and Mouth Disease highlighted spatio-temporal patterns, something that previous attempts to model the disease in Australia have lacked. The main patterns that emerged were that the season an outbreak occurs in, the primary location of infection and the involvement of livestock would be important in determining the severity of an epidemic. The risk of Foot and Mouth Disease Virus being spread by the wind is likely to be low to moderate in Cape York Peninsula and minimal near Winton.

The simulations may have better represented the spread of Foot and Mouth Disease in space than through time. Undertaking sensitivity analysis revealed that the model was highly adaptable. So, the model could be easily manipulated to use different rates of spread and also to consider many other factors that were not included in the analysis.

Both the findings of this project and the model should be used to inform contingency plans.

Kathryn Edwards

Atmospheric Factors Affecting Fire Season Severity in South-Eastern Australia

Accurate predictions of weather conditions are required for effective fire management on several different timescales ranging from hours to months. This thesis has focused on understanding the complex, regionally specific relationships between atmospheric variability and fire season severity in south-eastern Australia. Such an understanding would increase the effectiveness of medium to long range forecasting of severe fire events.

Four study locations were selected. These were Richmond, NSW; Canberra, ACT; Mt Gambier, South Australia; and Hobart, Tasmania. Time series of seasonal Forest Fire Danger Index (FFDI) for each of these locations were developed and the inter-annual variability was analysed. This variability, and the circulation anomalies associated with them were then put into the context of the larger-scale atmospheric oscillations that influence climate variability in Australia. These included the Southern Oscillation Index (SOI), the Pacific Decadal Oscillation (PDO), the Indian Ocean Dipole Mode Index (DMI), and atmospheric variables associated with the propagation of the Antarctic Circumpolar Wave (ACW) in the Southern Ocean. Relationships between each of these atmospheric oscillations and fire season severity varied between each of the study locations investigated, giving some insight into where the climatic influence of each of these oscillations was most prominent.

Using the identified relationships between the above modes of atmospheric variability and fire season severity in south-eastern Australia, predictive tests were developed for fire season severity at each of the study locations. These tests, although preliminary in nature, were able to isolate, with an impressive level of accuracy, seasons where the average fire severity, as defined by the FFDI was greater than 0.4 standard deviations above the mean.

The research conducted in this thesis was therefore able to prove the hypothesis that different scales of atmospheric circulation have regionally specific effects on the severity of fire seasons in south-eastern Australia, and that these factors can be used to make predictions of fire season severity at a regional level.

Reagan Field

Public participation in planning: A case study of a local area planning advisory committee

The importance of effective public participation processes is a feature of sustainability and planning theory. This research evaluates a case study of public participation in the planning sector in the ACT: an inner Canberra Local Area Planning Advisory Committee (LAPAC).

Data was collected using three qualitative methods: interviews, observation and document analysis. Data analysis was based first, on a set of criteria for effective participation derived from the literature; and, second, on characteristics of social processes.

A mutual lack of trust and respect was found to undermine the relationship between LAPAC members and government and is identified as a critical barrier to effective public participation in the ACT planning sector. Public participation is also argued to be a crucial part of integrative processes between government, the private sector and citizens. Achieving this integration is a core challenge in planning for sustainability.

Tomoko Hara

Small-Footprint Airborne Lidar Remote Sensing: Investigation of the Vertical Distribution of Lidar Returning Signals on an Individual Tree Basis

Lidar (light detection and ranging) is an active remote sensing technique using laser light and measures the round-trip time for a pulse of laser energy to travel between a sensor and a target. This technology has recently become largely available for use in forestry and ecological applications and has shown great promise in providing remotely sensed information describing forest structural attributes. Unlike conventional microwave and optical sensors, lidar sensors directly measure the distribution of vegetation material along the vertical axis and can be used to provide three-dimensional characterizations of vegetation structure.

Having access to data derived from a multiple-return small-footprint lidar system, this study focused on (1) the examination of the vertical distribution pattern of lidar return signals intercepted by tree components on a individual tree basis; and (2) the investigation of physiognomic factors of individual tree architecture which may influence the distribution of lidar return signals. Upon starting the study, it was anticipated that a large number of the lidar returns would be those reflected from the canopy surface as suggested by previous studies. However, with the use of the multiple-return device, it was also expected that additional information on a tree's vertical structure, such as a tree component distribution, could be detected. Five Eucalyptus pilularis trees were originally selected so as to roughly span their living developmental stages: young, early-mature, mature, late-mature and over-mature, although the mature tree was excluded from the analyses due to low accuracy attained during the analytical procedure. In order to examine the vertical distribution of lidar return signals intercepted by tree elements within individual trees, ground reference data of corresponding trees were collected in the field, employing a photogrammetric method. Then, tree components appearing in the captured images were classified into trunk, branches and foliage, respectively, and the resultant vertical profiles were compared to the lidar return distribution.

The most significant outcome of this study was that height, crown widths and tree component distribution down through a tree are the most significant factors in explaining the variation in the lidar return distribution, with R^2 values of approximately 0.7 or more. Against the expected returns from this study, the used multiple-return lidar system oversampled tree canopy surface and its ability to detect full vertical tree profiles could not be determined. Because of the small number of observations due to the time constraints on the project, the results of the current study are indicative only. Nonetheless, even the physiognomic variations of trees appearing in these few observations drew attention to necessary considerations when lidar data collected over diverse Australian forests are utilised to quantify forest structural attributes.

Margaret Ann Hill

Diverse Economies in Place: A study of economic subjects and practices in the Wingecarribee Shire of New South Wales

This geographical investigation is situated within 'the cultural turn' from which the dominance of both political economy and capitalism is being challenged. It contributes to a growing movement of post-capitalist thought and demonstrates that undoing capitalist assumptions and rethinking the economic-social divisions created by these assumptions, shifts the power base from the global capitalist realm, to a more inclusive and economically diverse array of local spaces. The Wingecarribee Shire is one such local space. This study of the geography of the diverse economy of the Wingecarribee Shire of NSW, empirically tests the validity of the Gibson-Graham Diverse Economy Framework. It examines ways in which residents are inhabiting and maintaining a diverse economy and the implications of their situation in a diverse economy for local and regional planning and development.

The study involved participant observation over a 12 month period within the community economies of the Wingecarribee Shire. Several in-depth interviews with shire residents were also conducted.

The Wingecarribee study reveals a dynamic diverse economy that is as asserted by Gibson-Graham a complex matrix of different kinds of transactions, different forms of labour and different modes of economic organization. It also suggests that there is a strong relationship between the geography of a place and the nature of the diverse economy that exists there. Few geographers have to date examined spatial differences in the diverse economy. This study provides a springboard for further examination in this regard.

Two key lessons for local and regional economic development and planning seem to emerge from this research. By promoting the diverse economy framework and incorporating it into policies planners and developers can:

1) Formally recognise the significance and value of non-capitalist economic initiatives and their role in building and maintaining cohesive social spaces, and

2) Formally recognise the interdependence of the capitalist and community economies and the embeddedness of both in place-specific cultural and social practices.

Amy Ho

Particulate Pollution Capture and Retention by Eucalyptus elata Denhn. in the A.C.T.

Interest and recognition in the ability of tree leaves to remove pollutants from the air has grown considerably in recent times. There are presently little quantitative studies on particulate pollution capture by trees in Australia, and both the river peppermint (Eucalyptus elata Denhn.) and Canberra's urban trees have not been researched before. The objectives of this research were to critically analyse the relevant literature and to quantify the relative amount of soot particles captured on the surface of the leaves of mature river peppermints planted in the nature strip along a section of Northbourne Ave.

This study examined the spatial aspects of soot particle capture by urban trees via the study of Canberra's urban trees. Spatial aspects include regions within an individual leaf and trees along a major thoroughfare of different proximities to traffic lights, and major and minor intersections; and the temporal aspect examined was differences between recent and older leaves on each tree.

This research provides an insight into the potential of the river peppermint to capture particulate pollution and also points towards the most efficient street tree arrangement, which will maximise particulate pollution capture.

There was no standard approach that could have been followed so the chosen method integrated aspects from the literature, and results from a pilot study. A sampling structure which accounted for variation within and between leaves and trees was developed, and the appropriate number of samples determined. A light microscope attached to a digital camera and computer was used to take images of leaf sections so that soot particle counts could be made. Subsets of these samples were used in Cryo Scanning Electron Microscopy (Cryo-SEM) in order to better describe the form of soot particles. The detection of particulates other than soot was carried out to provide an insight into the range of particulates captured and involved the use of Energy Dispersive X-ray Analysis (EDXA).

The results show that differences between soot particle capture on the base, centre and tip of leaves; and recent and older leaves were significant at the 0.1% level for both the Rudd Street and Gould Street Blocks. Differences between soot particle capture for Position and Growth according to Tree number were significant at the 5% level for the Gould Street Block but were non-significant for the Rudd Street Block.

It is clear that the river peppermint and other urban trees can act as biological filters. The total soot particle capture for Canberra's planted trees has been estimated to be approximately between 2 to 4 trillion particles over a period of two months without heavy rainfall. Different regions within a river peppermint leaf have differing abilities to hold soot particles once they are captured, older leaves will usually bear more soot particles, and the principal filtration of particulates is carried out by the trees closest to the source of pollution.

Carolyn Anne King

Evaluating the tangible and intangible values of privately owned dry sclerophyll forests, Southern Tablelands, New South Wales

There are well over one million hectares of dry sclerophyll forest under private management in eastern Australia, stretching from southern Queensland to South Australia. Management techniques presently range from a combination of neglect, exclusion of major disturbance, and haphazard grazing to very infrequent utilisation of wood resources. The values of dry sclerophyll forests were assessed in two forms, those of a tangible nature and those considered intangible. Tangible values are defined as those currently able to provide the landholder with a financial return, intangible values as those that capture the environmental and ecological characteristics of the forest.

Dry sclerophyll forests of the Southern Tablelands were defined as open forests (Specht et al., 1974) and eucalypt vegetation alliances were identified. The prominence of the Eucalyptus macrorhyncha – E.rossii alliance was recognised although species composition changed markedly with climatic and topographic influences. Field studies were used to assess biophysical, floristic and wood value characteristics of 37 field sites across seven locations. Structural characteristics were surveyed by trialling the Catling and Freudenberger 92002) Habitat Complexity Score (HCS). Three techniques were used, two estimation (HCS 25 and HCS 5) and one measurement transect (HCS McElhinny) with time and accuracy evaluated. the HCS McElhinny measurement technique was shown to be less efficient with time frames twice to four times that of HCS 5 and six times that of HCS 25.

The forest structures on the sites tended to have a dominant canopy cover (30-70% for open-forest) and an understorey of grass or shrub species. Log and litter debris was prominent, reflecting the high levels of litter accumulation in dry sclerophyll forest. The latter factor meant that most sites had above average scores. The statistical analysis of the techniques indicated that HCS 5 was the more accurate with a variance of 57 percent and a standard error of 1.27. Parameters used to assess the response of scores to landscape attributes included slope %, private tenure, rock outcropping and logging/clearing. The response of the score to these attributes was either negative (logging present, rock outcropping present and private tenure) or positive (slope % increase, fungal mat present, termites present, grazing present and soil invertebrates present). Although the times to produce a HCS varied between 10 minutes and 80 minutes the time saved corresponded to an over estimation by HCS 25 for shrub and mid-storey attributes. Thus HCS 5 was found to be the favoured technique.

The wood survey followed simple inventory techniques and incorporated evaluation standards being established for carbon accounting by the Australian Greenhouse Office (2002). The tangible products analysis identified the strong species dependency for timber production and highlighted the poor form of dry sclerophyll forests. Non-wood tangible products are also limited by the species mix of the stand.

The assessment of tangible and intangible values of dry sclerophyll forest and the evaluation of survey techniques to describe these on private landholdings has produced a base of information on this landuse type and this will allow ongoing research.

Fiona Mckenzie

A social perspective of decision in farm management: Implications for integrated catchment management

Best Management Practices (BMP) are recommended by scientists and agency professionals in order to achieve sustainable land use. Yet, despite improved levels of environmental awareness and the provision of monetary incentives, the adoption of such practices is not widespread. This thesis explores the nature of decision in farm management. This is done in the context of catchment management outcomes. Information exchange and communication between farmers and extension officers is explored. Best management practices and catchment management are considered in terms of this interaction. Perception, interpretation and judgement are also examined as key components of decision making. To do this in detail, case studies of primary producers in the Little River Catchment are used. It is a social perspective of the nature of farming. The complexity of farming systems and the diversity among individual farmers are highlighted.

Outcomes include the demonstrated importance of incremental innovation and experimentation in farm management. The findings show ways of improving the communication between landholders and catchment managers as well as to inform relevant policy. Ultimately, there is a need for a shift in the emphasis of catchment management from information provision and adoption, to on-farm learning and unlearning, information networks and post adoption support.

Radhika Murti

Effects of environmental factors on rooting of mini-cuttings of selected eucalypt hybrids

Conventionally, cutting propagation fro eucalypts utilizes the technique of macro-cuttings. A new technique, mini-cutting propagation, has recently been developed in Brazil. This study investigated effects of environmental factors on rooting of mini-cuttings to inform protocol establishment, using 10 eucalypt hybrids. the effects of bed temperature, potting mix composition, concentration levels of essential nutrients and application of rooting hormone were examined. Untested hybrids of E.grandis x E.globulus (six clones) and E.grandis x E.pellita (four clones) were propagated over a series of six experiments. Three rooting parameters-rooting success (percentage), number of primary roots (count) and root quality (scale of 1-4) were used to assess the root production of cuttings.

Investigation of two bed temperatures (23°C and 27°C) indicated that the higher temperature led to desiccation of cuttings. Despite this, certain clones performed well at 27°C and a median temperature of 25°C was used for the following experiments. Hormone effects were insignificant at 5% level in most experiments. However, significant clone x hormone interactions indicated that some clones formed better roots without hormone while some were unaffected.

Potting mix had a significant impact on root quality, with clones performing better in potting mix 2 (40% fine vermiculite, 40% sieved perlite, 10% charcoal, 10% peat moss and 2 kg/m^3min ozmocote). Experiments on nutrient solution were inconclusive due to dysfunctional sprinklers in the fog house.

Clonal variation was the most significant factor affecting rooting success. Together with environmental factors, careful selection of genetic material is critical for successful mini-cutting propagation. Further research on a larger scale is required to establish the role of specific environmental factors in mini-cutting propagation, but initial indications are promising.

Michael Nguyen

The effects of fire on hydrological processes in the upper Cotter River catchment, A.C.T.

The Upper Cotter Catchment is an important source of water for the ACT. This project was developed to determine the effects of fire management under the four management regimes of no fire, prescribed fire, wildfire and a combination of prescribed fire and wildfire.

The project was carried out by modelling and used a hydrological model known as IHACRES-CMD, which was developed at ICAM, CRES, ANU. A further module was developed that incorporated vegetation changes due to fire management.

This project found that fire management did not significantly affect water yield for the Licking Hole Creek sub-catchment. The bias of the model was 16% and changes to streamflow due to the management regimes ranged between 1% and 14%. This was not considered to be significant. A sensitivity analysis was also conducted and it was found that the Combination regime, which most closely resembles current fire management (although not in the sub-catchment), was most sensitive to changes in the litter decomposition constant (used to determine litter accumulation) and the upper limit of the effect of evaporation on evapotranspiration following a wildfire event.

Further work needs to be performed on this topic, particularly aspects of water quality need to he explored. This model could be used in other catchments with appropriate parameterisation. Implementation of this model and the associated vegetation module could be implemented in the Central Highland catchments in Victoria. Similar studies have been carried out in the area and a comparison of results would be a good test for the developed vegetation module.

Lucy Schapel

A Spatial Hazard Model for Ross River Fever

Ross River virus is the cause of Australia's most prominent vector borne disease Ross River fever. The geographical distribution and number of cases of Ross River fever is increasing.

This thesis describes the use of geographical information system (GIS) and remote sensing technologies to develop a practical, low cost, Ross River virus hazard model. The model defines the spatial distribution of larval habitat for four potential Ross River virus vectors. The only environmental factors used are fuzzy slope and vegetation associated with larval breeding.

The model verification process refers to a field study conducted in the study area. The predictive accuracy of this simple model is better than 70%, sufficient for management purposes.

Integrating GIS and remote sensing technologies enables the model to refine the definition of potential breeding habitat. This then allows for local vector agencies to direct limited resources effectively, leading to disease minimisation and improved public health.

Celina Smith

Gully Erosion in the Ben Chifley Dam Catchment: A study of gully characteristics and management implications

Limiting sediment attached nutrient delivery through improved gully erosion management is an important control option to reduce sediment and nutrient concentration in receiving waters. It may also be useful to reduce the occurrence of blue-green algal blooms. Active gullies are those gullies that are supplying sediment to streams. The identification of specific, readily discernable catchment characteristics is required to identify and predict active gully erosion and allow more efficient and effective targeting of management resources to be used for the remediation of active gullies.

This thesis uses the Ben Chifley Dam Catchment (BCDC) as a case study to identify and predict active gully erosion. This thesis investigates gully erosion at two distinct scales, a broad catchment scale and a smaller plot scale. The broad catchment scale used published and readily available spatial data to discern landscape factors such as landuse, elevation, slope, geology and soil to determine gully presence, density and severity in the catchment. This investigation found that specific classes of landuse, elevation, geology and soil predicted gully presence and density. This substantially narrowed down the area of the catchment that needed to be used to target gully erosion management.

The smaller plot scale analysis of gullies investigated the soil and geochemical properties that occurred in ungullied and gullied drainage lines in the targeted region of the catchment, as determined by the catchment landscape factors. Firstly, a pilot study of active gullies revealed that an increase in erosional features in an active gully coincided with an increase in texture contrast between the A and B horizon, a higher dispersion index, higher ratios of concentrations of exchangeable sodium (Na^+) to calcium (Ca^{2+}) and sodium (Na^+) to magnesium (Mg^{2+}) cations and a higher Exchangeable Sodium Percentage (ESP). The pilot study led on to a larger comparative study of soil and geochemical properties between inactive gullied and active gullied drainage lines.

The identification of active gullies was based on the presence of exposed bare soil in the gullies. This study found considerable differences in the soil and geochemical properties between the gullied inactive and the gullied active drainage lines. The active gullied drainage lines contained dispersive soil horizons combined with high ratios of exchangeable Na^+ to Ca^{2+} and Na^+ to Mg^{2+} cation concentrations when compared to the higher exchangeable Ca^{2+} and Mg^{2+} concentrations and lower ESP in the inactive drainage lines. These results substantiate the pilot study findings that active gullies are found in unstable soils (identified by the presence of bare exposed soil and erosional features). The difference in soil and geochemical properties between ungullied and gullied drainage lines was inconclusive, suggesting that other factors may be responsible for initiating gullying.

The geochemical properties of the sites revealed that the chemistry of the soil was related to the geochemistry of the parent material in the drainage lines. The geochemical results also revealed that a high Na^+ to Ca^{2+} ratio in the rock and soil chemistry was associated with active gullies. Thus the geochemistry of rocks, presented in readily available mapped geology, could be used to refine and target active gully erosion.

The interaction of the findings from these two scales enhances both our understanding of the underlying processes of gully erosion and the way in which active gully erosion can be identified and predicted. These investigations have allowed simple and effective methods, based on readily available data, to be used as a predictive tool to target actively eroding gullies in the BCDC. The implementation of such GIS-based predictions and field-based rock and soil chemistry analysis allows managers to target resources efficiently and effectively in the remediation of gully erosion and its off site impacts in the BCDC. Further work in other catchments seems warranted to assess the wider application of the understanding and methods developed in the case study.

Jodie Smith

Wasteful Behaviours: The ACT's No Waste by 2010 Policy

In 1996 the ACT Government released the No Waste by 2010 policy which aimed to have zero waste going to landfill by the year 2010. This research investigates this waste policy (No Waste by 2010) and waste behaviour in the ACT in relation to the major waste policy changes of 2002. The change of most importance was the closure of landfills to the public and the opening of two waste transfer stations in their place. The change is examined in terms of public awareness of the change and the policy in general and how (or if) the change has affected the waste behaviours of the landfill-using public. Waste behaviours at the landfills and transfer stations were observed and waste diaries were completed by a number of university students to help determine some of the factors influencing people's waste behaviours.

The research found that the change from landfills to transfer stations did not alter people's waste behaviours. The lack of behaviour change was probably because the move to transfer stations only indirectly encouraged people to change their waste behaviours. The new waste pricing strategy targets people's waste behaviours more directly by charging lower tipping fees for smaller amounts of waste and so could change people's waste behaviours in the near future.

While 70-80 per cent of people in the Canberra community had heard of the No Waste by 2010 policy, understanding of the policy was limited. Understanding needs to be increased so that Canberrans have an idea of how their waste behaviours can influence the policy's success.

The study also found that different types of people visit the tip each with different potentials for waste behaviour change. Policy needs to understand people's waste behaviour before it can change people's waste behaviours. Policy also needs to determine the factors that influence people's waste behaviours because, as the waste diaries demonstrated, situational factors such as convenience can have a major impact on waste behaviour.

Samantha Titheradge

Tree crown dieback of Fraxinus oxycarpa cv Raywood in Canberra's urban forest

Claret Ash, Fraxinus oxvcarpa cv Raywood is a popular ornamental tree widely planted in Canberra for its exquisite red autumn foliage. Many trees are today exhibiting crown dieback which takes several seasons to become apparent and eventually ends in tree death. The cause(s) of this dieback are unknown. Dieback could be caused by environmental factors, an unidentified pathogen, be related to site conditions or simply old age.

This study aims to identify any links between tree crown dieback and other environmental factors such as tree age, the level of tree maintenance, inherent site parameters, and site disturbance. It also aims to provide data on the speed with which the dieback advances through the tree crown and the timing of the onset of dieback.

The project focuses on dieback in Claret Ash street trees from four suburbs of the Australian Capital Territory, Ainslie (established in 1944), Narrabundah (est. in 1947), Weetangera (est. in 1970) and Gowrie (est. in 1981).

Dieback in these four suburbs is rapidly increasing and there is therefore a need for an appropriate management strategy. In 1997-2000 the percentage of trees suffering dieback ranged between 5 to 11 %. In 2002 the percentage of tree suffering dieback increased to a range of between 29 to 54%.

The average diameter at breast height (dbh) of trees varies across the four suburbs from 15cm to 39cm. Results suggest that large diameter trees are more likely to suffer from dieback than small diameter trees. Tree diameter is not age related.

Trees were also more likely to suffer from dieback if their roots were not visible. Trees growing on slopes appeared more likely to suffer from dieback than those growing on level ground, however the maintenance applied to the tree and the ground cover surrounding the tree did not appear to have any significant impact.

As the second part of this project, the duration, timing and severity of dieback was examined through a study of annual growth rings. The timing of decline could not be identified as crown decline did not become apparent in the bole until the dieback became quite severe. Once dieback has become apparent in the tree bole the tree was able to survive for a long period before eventual tree death. Rainfall did not have a significant impact on tree growth in this study.

Further investigation into the dieback of Claret Ash is necessary to investigate the possibility of a graft incompatibility or the presence of a pathogen associated with tree crown dieback.

Daniel Wilkins

The Timing and Rate of Channel Change in the Numeralla River: Implications For Fluvial Response to Internal System thresholds

This thesis addresses the rate and timing of channel change in the Numeralla River, a large (1,480 km2) tributary of the Murrumbidgee River. It has been hypothesised that the Numeralla River underwent dramatic channel change soon after European settlement. In order to test the hypothesis, a 2 km reach of the River was selected for further study. Field studies of the geomorphology and stratigraphy of the study reach were complimented by OSL dating of selected stratigraphic units.

The results revealed that at the study reach, the Numeralla River was a narrow, pool-riffle channel at the time of European settlement (circa 1834 Common Era). Between 1840 and 1870 CE, the Numeralla River became a wide, sand filled channel that incised 3 to 4 m through its alluvium. Since its inception, the incised channel has eroded up to 11% of the valley fill in the study reach. Event-driven meander migration and bank erosion continues to deliver sediment to the Numeralla River channel.

Studies of the stratigraphy of the study reach suggest that the Numeralla Valley was stripped of sediment by a large incision event prior to 16.6 $\pm$ 1.9 kya. Between 16.6 $\pm$ 1.9 and 14.6 $\pm$ 1.7 kya, the Numeralla Valley had begun to aggrade with fine-grained sediment. Another incision event between 14.6 $\pm$ 1.7 and 12 – 8 kya stripped the majority of the valley fill in the study reach. By 6.4 $\pm$ 0.65 kya, over 2 metres of sediment had aggraded in the valley. This Holocene valley fill is believed to have aggraded throughout the late Holocene without incising until European settlement.

This study hypothesises that the river responded to a warmer and wetter climate after the Last Glacial Maximum (16 – 14 kya) by aggrading. The later incision and reaggradation of the river in the early Holocene is synchronous with dated periods of incision and aggradation in the Shoalhaven River (Nott et al. 2002). Hypothesised periods of Late Holocene climate-driven fluvial incision identified in headwater catchments in the Southern Tablelands did not occur in the larger Numeralla River catchment. Based on these results, it is concluded that intrinsic geomorphic variables such as catchment area and channel slope are important system drivers in determining fluvial response in southeast Australia.

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