

# Environmental Systems



Recent PhD student Andrew Hughes inspecting the gully erosion from the granitic-based headwaters of the Fitzroy River. Andrew completed his thesis "An assessment of recent changes in catchment sediment sources and sinks, central Queensland, Australia" during 2009.

The Environmental Systems Research Group within PEMS seeks to advance scientific understanding of landscape systems and the practical application of this knowledge. It broadly, although not exclusively, encompasses the work of physical geographers within the School of PEMS. Although staff interests vary widely, particular research strengths of the group involve:

- Biogeography, wildlife ecology and ecosystem modelling
- Environmental change in arid and semi-arid Australia
- Evolution of coastal beaches, barriers and islands
- Floodplain storage and modelling
- Fluvial geomorphology, including sediment transport in bedload rivers, hydraulic geometry
- Modelling of overlandflow, erosion and sediment delivery
- Policy advice in relation to environmental hazards, pollution, catchment problems.

## Members

### Academic Staff:

**Prof. Brian Lees** (b.lees@adfa.edu.au) BA, PhD Syd.

**Assoc. Prof. Stuart Pearson** (stuart.pearson@adfa.edu.au) BA (Hons), DipEd, PhD UNSW (commenced July 2009)

**Dr David Paull** (d.paull@adfa.edu.au) MA Adel, PhD UNSW

**Dr Jiashu Shen** (j.shen@adfa.edu.au) BSc East China, PhD W'gong

**Assoc. Prof. Jacky Croke** (resigned from UNSW@ADFA in 2008)

**Dr Ingrid Takken** (resigned from UNSW@ADFA in 2008)

### Emeritus Professor:

**Emeritus Prof. Roger McLean** (r.mclean@adfa.edu.au) MA N.Z., PhD McGill

### Visiting Fellow:

**Dr Andrew Claridge** (andrew.claridge@environment.nsw.gov.au) BSc, PhD ANU

### Research Associate:

**Dr Chris Thompson** (c.thompson@adfa.edu.au) PhD UNSW@ADFA (project transferred to ANU in 2009).

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Nationally endangered southern brown bandicoot visiting a truffle oil bait station in East Gippsland.

## Research Students:

**Dylan Horne** - Research Topic - The development of the Princess Charlotte Bay chenier plain.

**Vijai Joseph** - Research Topic - Sea level rise and human vulnerability: Developing a systems approach and perspective.

**Haijing Shi** - Research Topic – The effect of climate change on Mountain Pygmy-possum.

**Elsbeth Rae** - Research Topic - Climatic changes as the cause behind cessation in beach progradation throughout the late Holocene.

**Peter Walsh** - Research Topic - Hydrological connectivity in managed forests (project transferred to ANU in 2009).

## Recent Graduate Students:

**Andrew Hughes** - An assessment of recent changes in catchment sediment sources and sinks, central Queensland, Australia, PhD thesis 2009.

**Dr Takeshi Kawakami** - Speciation and chromosomal rearrangements in the Australian Morabine Grasshopper *Vandiemena viatica* species group, PhD thesis 2008.

## Research Collaborators:

### Coastal Research

**Dr R. Brander** (BEES, UNSW)

**Assoc. Prof. P. Cowell** (University of Sydney)

**Assoc. Prof. P. Kench & Dr Peter Hosking** (University of Auckland)

**Prof. N. Mimura** (Ibaraki University, Japan)

**Dr S. Nicol** (Geoscience Australia – formerly University of Auckland)

**Dr L. Nurse** (University of the West Indies, Barbados)

**Dr S. Smithers & Assoc. Prof. Kevin Parnell** (James Cook University)

**Prof. C. Woodroffe** (University of Wollongong)

**Assoc. Prof. Poh Poh Wong** (National University of Singapore)

## Soil Erosion and Sediment Delivery Research

**Dr K. Amos** (Post-doctoral fellow, PEMS, UNSW@ADFA until August 2007)

**Dr S. Barry** (PEMS, UNSW@ADFA)

**Dr L. Gladkis** (PEMS, UNSW@ADFA)

**Dr H. Timmers** (PEMS, UNSW@ADFA)

**Dr M. Bourke** (Planetary Science Institute, Arizona, USA)

**Dr L. Bracken** (University of Durham, UK)

**Dr P. Hairsine** (CSIRO Land and Water)

**Dr P. Lane** (University of Melbourne)

**Prof. M. Kirkby** (University of Leeds, UK)

**Assoc. Prof. P. Owens** (University of Northern British Columbia, Canada)

**Dr G. Sheridan** (University of Melbourne)

**Dr B. Wimple** (University of Vermont, USA)

## External collaborators – ARC Linkage partners:

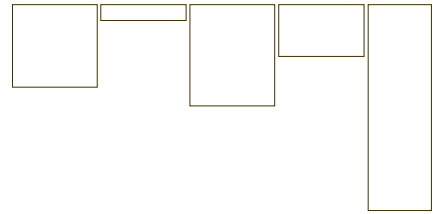
Department of Territory and Municipal Services; Parks, Conservation and Lands Branch Forests NSW  
Eurobodalla Shire Council

NSW Dept of Environment and Climate Change; Environment Protection and Regulation Division (ACT)

NSW Dept of Environment and Climate Change; Parks and Wildlife Division

Southern Rivers Catchment Management Authority

Victorian Department of Sustainability and Environment



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## Genetics and Molecular Ecology

**Mr T. Kawakami** (PEMS, UNSW@ADFA)

**Mr M. Adams** (Evolutionary Biology Unit, South Australian Museum)

**Prof. R. Butlin** (University of Sheffield)

**Dr S. Cooper** (Evolutionary Biology Unit, South Australian Museum and Australian Centre for Evolutionary Biology and Biodiversity, University of Adelaide)

**Dr P. Johnston** (Macquarie University)

## Wildlife Research

**Dr M. Rees** (PEMS, UNSW@ADFA)

**Dr A. Claridge** (NSW Dept of Environment and Climate Change, DECC)

**Dr S. Carthew** (Adelaide University)

**Ms K. Long** (Department for Environment and Heritage, DEH)

**Dr D. Mills** (DECC)

**Ms J. Packer** (Adelaide University)

## Current Research

### Infrared digital cameras and olfactory attractants for monitoring wildlife

#### Dr David Paull & Dr Andrew Claridge

This project aims to develop a humane and cost-effective method for detecting rare and threatened wildlife. In biogeography, one great problem lies in obtaining reliable field data on the distribution of animals that are of conservation concern. In south-eastern Australia this is particularly the case for small mammals such as bandicoots and rat kangaroos. Traditional methods used to detect these species are trapping and hair tubing, which are distressing to the captured individuals, costly in terms of labour, or simply ineffective when populations exist in low density. Therefore, alternative approaches are needed. The aim of our research is to determine whether automated digital surveillance cameras are a viable option for detecting small mammals in south-eastern Australia. The methodology involves deploying digital infrared cameras across large areas of habitat in south-eastern Australia to determine the distribution of species of small mammals such as the southern brown bandicoot. We use small quantities of scent attractant, for example truffle oil, in front of each camera to encourage animals to enter the field of view and 'pose' while photographs are automatically taken. This research is greatly improving the tool kit we currently have for detecting elusive animals in the wild.

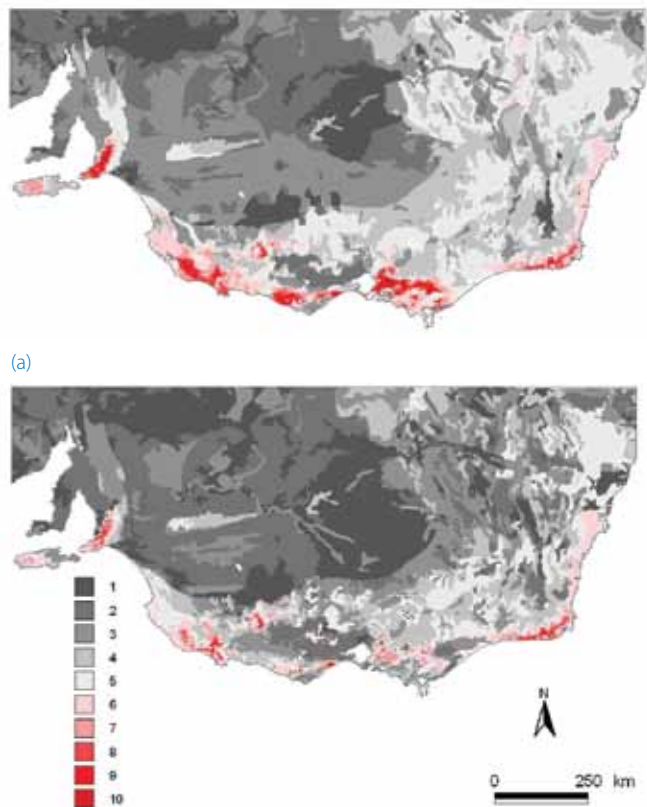
Funded by an ADFA Special Research Grant, **David Paull** and visiting fellow **Andrew Claridge** (NSW Dept of Environment and Climate Change) have been investigating the use of infrared surveillance cameras and olfactory attractants for detecting rare and endangered mammals. Traditional wildlife survey methods have normally relied on cage traps and baits like peanut butter, but the results have never been good. It is surprising that practically no research has been conducted on optimal bait types for detecting rare species. Media reports have highlighted David and Andrew's exciting results with black truffle oil, which has attracted a range of threatened fauna including the nationally endangered southern brown bandicoot. 'Bush truffles' are an important part of the bandicoot's natural diet, so perhaps it is not too surprising that the famous French Black Truffle (*Tuber melanosporum*) also captures their attention. Truffle oil can

be obtained readily from quality delicatessens, whereas bush truffles are hard to find in useable quantities, even for experienced wildlife researchers. David and Andrew are now in close discussion with the Australian Truffle Growers Association with the aim of developing further research collaborations.

### The southern brown bandicoot in south-eastern Australia: Its distribution, habitat use and conservation

#### Dr David Paull, Dr Andrew Claridge, Dr Michael Rees

The objective of this long-term project is to locate and map all remaining populations of the southern brown bandicoot *Isoodon obesulus* in south eastern Australia. Commencing in 1986, extensive field investigations for this rare marsupial have been ongoing in South Australia, Victoria and New South Wales, with much of the historical distribution already having been surveyed. At sites where the species has been found, detailed habitat descriptions are made of vegetation, soils, climate and topography. This information is compiled as a baseline against which future changes to the species' distribution and habitat can be measured. The data are also used for predictive spatial modeling using Geographical Information Systems to uncover new areas of potential habitat and estimate the extent of the species' former distribution circa 1788. The research has been playing a vital role in the development of conservation plans. One outcome of the work to date has been a successful nomination by the principal investigator to have the species listed as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.



(b)

Habitat suitability models for the southern brown bandicoot (*Isoodon obesulus*) in (a) 1788 and (b) 1988. The index (1-10) is based on suitability of climate, geology and vegetation for the species.

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**Assoc. Prof. Stuart Pearson**, uses plant and animal fossil preserved in stick-nest rat middens and weather signals recorded in tree rings to record evidence of environmental change in arid and semi-arid Australia. He currently is a collaborator with Dr Michael Bunce (Murdoch University) using fossil DNA to uncover ancient population changes and with Dr Quan Hua and Prof. David Bowman on cross-dating tree rings from *Callitris* pines using the tree ring counts and changing carbon isotope concentrations in the rings caused by atmospheric bomb testing.

Stuart, in his previous role as a research investor for the government agency Land & Water Australia, provided research leadership and support on issues such as Stewardship, Citizen Science, Periurban Issues, Endocrine Disrupting Chemicals, Pesticides risk on the Reef and Resilience. He has an ongoing interest in achieving the transition of research into action. He is also drawing on his experience in monitoring and evaluation to coauthor a paper on the triple bottom line analysis of impact of investing in research in natural resource management. Tracking research impact and learning how to improve the outcomes of science investment is fundamental to environmental science's multidisciplinary and integrated approach to significant issues.

## Long-term coastal monitoring project

### Jiashu Shen and Emeritus Professor Roger McLean

A long-term coastal monitoring project on beach morphology, sediment transport and underground water level at Moruya, NSW has been carried out in the last three decades. Fore-dune, beach and surfzone profile surveys have provided the landform change and sand volume variation along this sandy coastline since 1972. This data have been analysed together with the climate, wave, sea level and underground water level data and the preliminary results shows coastal accretion and erosion are closely related to the wave regime, sea level and underground water level fluctuation, and rainfall along this part of the coast. This research will help us to understand the coastal processes which are responsible for modifying the coastal landforms.



Dr Jiashu Shen and Jack Doyle conducting a beach survey at Moruya in June-July 2007. The seaward scarp was cut by high waves during those months, the vegetated scarp behind is a relic of the 1996 erosional event, and that in the extreme right is the result of the 1974 May-June storms, which were the most devastating along the NSW coast in the last 50 years.

## Recent Achievements

**Andrew Claridge** (PEMS visitor and colleague of **Dave Paull**) "recently played a leading role in one of Australia's biggest temperature forest fire research programs, studying the recovery of native plants and animals after fire in Ben Boyd National Park on the NSW southeast coast. Last winter, parks staff conducted a prescribed burn across 1900 ha of the park, after a 12-year research program led by Claridge showed populations of southern brown bandicoots, long-nosed bandicoots and long-nosed potoroos were in decline." A survey showed that a loss of habitat contributed to the decline in population numbers. The understory plants such as banksias, hakeas and acacias need fire to regenerate. Claridge spent months of careful planning to map and design the prescribed burn which, if well managed, "can be used successfully to regenerate habitat and revive declining populations".

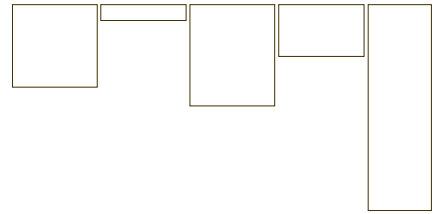
**Roger McLean** attended the IPCC scoping meeting on *Extreme Events and Disasters: Managing the Risks* which was held in Oslo, Norway. IPCC Working Group II (Impacts, Vulnerability and Adaptation) organized the meeting and the Norwegian Pollution Control Authority provided significant support as well as the venue.

Seventy countries and fifteen observer organizations such as the International Red Cross nominated about 375 experts as meeting participants, including 115 nominated experts from developing countries and countries with economies in transition. The three communities whose expertise was needed to scope a possible Special Report: climate scientists, experts on the impacts of climate change and adaptation policies to address extreme events and extreme impacts, and experts on disaster risk reduction. These communities are reflected in the four Australians who attended the meeting: Acting Director of the Bureau of Meteorology (Neville Smith); Director-General of Emergency Management Australia (Tony Pearce); climate scientist (Neville Nicholls, Monash University) and **Roger McLean** (UNSW@ADFA).

Only fifteen presentations were given at the meeting. **Roger McLean's** presentation was titled: *Impacts of Weather, Climate and Sea level-Related Extremes on Coastal Systems and Low-Lying Islands*, and dealt primarily with reporting our research results from the atoll island states of the Maldives in the Indian Ocean and Tuvalu in the Pacific.



One of the several drill sites on reefs in the Maldives, that resulted in a paper published in "Geology" and a new Holocene sea level history for the central Indian Ocean. Kench, P., Smithers, S., **McLean, R.F.**, Nichol S., 2009, Holocene reef growth in the Maldives: Evidence of a mid-Holocene sea-level highstand in the central Indian Ocean, *Geology*, 37(5), 455-458, doi: 10.1130/G25590A.1.



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## Research Award

The Institute of Australian Geographers (IAG) will honour **Professor Emeritus Roger Fairburn McLean** with the award of *Distinguished Fellowship of the Institute of Australian Geographers for 2009*. Professor Emeritus McLean is a Physical Geographer with an international reputation for his work on the geomorphology of coastlines and coral reefs. The award is to be presented at the *Institute of Australian Geographers Conference* to be held in Cairns, 28 September-1 October 2009.



UNSW@ADFA student and Professor Emeritus Roger McLean in the field, Kosciuszko National Park.

## Student Research

### An assessment of recent changes in catchment sediment sources and sinks, central Queensland, Australia.

**Andrew Hughes** (a.hughes@niwa.co.nz)

**Field of Study: Geography (Fluvial Geomorphology)**

Spatial and temporal information on catchment sediment sources and sinks can provide an improved understanding of catchment response to human-induced disturbances. This information is essential for the implementation of well-targeted catchment-management decisions. This study investigated the nature and timing of catchment response to human activities by examining changes in sediment sources and sinks in a dry-tropical subcatchment of the Great Barrier Reef (GBR) catchment area, in northeastern Australia. Changes in catchment sediment sources, both in terms of spatial provenance and erosion type, were determined using sediment tracing techniques. Optically stimulated luminescence and caesium-137 dating were used to determine pre- and post-European settlement (ca. 1850) alluvial sedimentation rates. The spatially distributed erosion/sediment yield model *SedNet* was applied, both with generic input parameters and locally-derived data. Outputs were evaluated against available empirically-derived data.



Andrew Hughes using the school's RTK GPS to survey channel cross-sections within the Fitzroy River Basin, central Queensland.

### Climatic changes as the cause behind cessation in beach progradation throughout the late Holocene

**Elsbeth Rae** (e.rae@student.adfa.edu.au) PhD

**Field of Study: Coastal Geomorphology**

Previous studies have shown several breaks in progradation along Bengello Beach ridge plain, southeast NSW. Using ground penetrating radar, thermoluminescent dating, and detailed sedimentary, topographic, and vegetation surveys, the cause of these breaks is being investigated. To validate methods, the results for the Holocene sequence are cross-referenced with time-series topographic survey data of the present day beach, dating back to the early 1970s. Preliminary results indicate climatic shifts analogous to those recently proposed across Eastern Australia.

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PhD student Ellie Rae accompanying Year 1 Geography students during the High Country Field Trip, Kosciuszko National Park, NSW.

## The development of the Princess Charlotte Bay chenier plain

**Dylan Horne** (d.horne@student.adfa.edu.au) PhD

### Field of Study: Coastal Geomorphology

Chenier plains record changes in the mode of coastal progradation between periods of mudflat progradation, and periods of beach ridge formation. There are potentially a number of environmental force(s) responsible for controlling these changes. A history of chenier research worldwide has led to a great understanding of these force(s) in some settings. In Australia however, despite a long history of chenier research the causes of these changes are still not well understood. Several conflicting theories have been proposed in the past to explain the evolution of a chenier plain in Princess Charlotte Bay on the eastern coast of northern Queensland, Australia. These include climate fluctuations, variations in shellfish populations, and storm activity. Since these were introduced, both methods and understanding of Holocene environmental processes have been improved. Improvements to methods include the replacement of radiocarbon dating with thermoluminescence techniques. Improvements to knowledge include a new body of research regarding the existence of (minor) sea level oscillations following the (major) transgression that occurred ~6000 B.P. These have allowed a reexamination of the mode of evolution of the Princess Charlotte Bay chenier plain. Some cheniers in the bay appear to have formed up to ~400K B.P., meaning the plain may have recorded changes occurring over several glacial cycles. Although the dating error associated with such old cheniers would be too large to link to known processes, a Holocene sequence is being examined and appears to be linked to sea level oscillations.

## The effect of climate change on Mountain Pygmy-possum

**Haijing Shi** (h.shi@student.adfa.edu.au) PhD

### Field of Study: Biogeography

My research focuses on a study of the microclimate and thermal properties of a range of the boulderfield habitats that support the endangered Mountain Pygmy-possum. Boulderfield sites across the range of Mountain pygmy-possum distribution will be monitored. The data loggers will be positioned in various areas of the habitat to collect thermal data from below the boulders at standardized depths, and one to be positioned above the general area of habitat to monitor air temperature. A camera recorder placed at each site will record the presence and depth of snow.

This study proposes to investigate: (1) the thermal properties of boulderfield habitats in relation to aspect, elevation and snow cover that support the endangered Mountain Pygmy-possum; (2) the snow cover and snow duration, to what extent, bring thermal stress to Mountain Pygmy-possum and (3) predicting range shifts in Mountain Pygmy-possum distributions and identification of refugia with ongoing climate change.

## Sea level rise and human vulnerability: Developing a systems approach and perspective

**Vijai Joseph** (v.joseph@student.adfa.edu.au) PhD

### Field of Study: Geography

Across the globe, the water level of the sea was on the rise last century. This research aims at assessing the vulnerability of different occupational groups such as traditional fishermen, brackish pond farmers and industrial labourers to the phenomenon of sea level rise, taking tidal floods as a proxy for the impending hazard. This research tries to holistically analyze the Livelihood-Environment Systems of these occupational groups and the mutual interplay between factors in this system that influence the vulnerability of the people to sea level rise through a System Dynamics approach. The comprehensive understanding of the nature of the Livelihood-Environment Systems of these groups will be helpful to model the system behaviour determining the vulnerability status of these groups in different socio-economic scenarios. This kind of comprehensive understanding of the Livelihood-Environment Systems and the interplay of the influential factors will help planners to plug holes in the system in order to adopt an efficient adaptive capacity improvement mechanism for the people to combat disasters like sea level rise. The whole exercise is contextualized on the coastal inundation model developed for different sea level rise scenarios using Geo-information tools and integration of this model with the System Dynamics model, which depicts vulnerability, is also part of the research aims.

## PhD Opportunities and Scholarships

There are several opportunities available for postgraduate research within the Environmental Systems Research group.

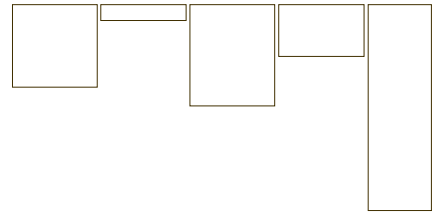
### For further information about postgraduate research within the Environmental Systems Research group contact:

**Prof. Brian Lees** (b.lees@adfa.edu.au)

**Assoc. Prof. Stuart Pearson** (stuart.pearson@adfa.edu.au)

**Dr David Paull** (d.paull@adfa.edu.au)

**Dr Jiashu Shen** (j.shen@adfa.edu.au)



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## Major Facilities

The School is well equipped with facilities to undertake remote area field work including 4WD trailers, water storage tanks, UVF radios, ATV quad bike. We possess mechanically operated drilling units for sedimentological sampling including fixtures for Optically Stimulated Luminescence (OSL) dating.

Laboratories are equipped with routine sediment analyzer equipment for particle size determination, organic matter, and pollen analysis. We also avail of facilities in Civil Engineering which include a large flume suitable for sediment transport modelling and calibration of bedload transport measurement devices. The School is equipped with several water quality, sediment transport flumes and data loggers and specialised equipment and modifications are catered for by the mechanical and electronic workshop facilities.

The School also possesses a Thales T Real Time Kinematic (RTK) Differential Global Positioning System which is used in field work to obtain digital terrain data to cm accuracy. We are also equipped with a full suite of surveying (total Station) and hand-held GPS devices. This equipment complements the extensive range of GIS and remote sensing software packages available in the School including ENVI, Definiens, ERDAS Imagine, and ArcGIS.

## Publications

### In Press

#### Book - Chapter

**Rae, E.**, in press, Coastal erosion and deposition, in *Encyclopedia of Geography*, B. Warf (ed), SAGE, California.

**Hughes, A.O., Croke, J.C., Pietsch, T. & Olley, J.M.**, in press, Changes in the rates of floodplain and in-channel bench accretion in response to catchment disturbance, central Queensland, Australia, *Geomorphology*, doi:10.1016/j.geomorph.2009.07.016.

### 2009 publications

#### Journal - Refereed

**Amos, K.J., Croke, J.C., Timmers, H., Thompson, C. & Owens, P.N.**, 2009, The application of caesium-137 measurements to investigate floodplain deposition in a large semi-arid catchment in Queensland, Australia: A low-fallout environment, *Earth Surface Processes and Landforms*, 34(4), 515-529, doi: 10.1002/esp.1749.

**Claridge, A.W., Trappe, J.M. & Hansen, K.**, 2009, Do fungi have a role as soil stabilizers and remediators after forest fire?, *Forest Ecology and Management*, 257(3), 1063-1069, doi:10.1016/j.foreco.2008.11.011.

**Hughes, A.O., Olley, J.M., Croke, J.C. & McKergow, L.A.**, 2009, Sediment source changes over the last 250 years in a dry-tropical catchment, central Queensland, Australia, *Geomorphology*, 104(3-4), 262-275, doi: 10.1016/j.geomorph.2008.09.003.

**Hughes, A.O., Olley, J.M., Croke, J.C. & Webster, I.** 2009, Determining floodplain sedimentation rates using <sup>137</sup>Cs in a low fallout, subsurface erosion dominated environment, central Queensland, Australia, *Journal of Environmental Radioactivity*, 100(10), 858-865, doi 10.1016/j.jenvrad.2009.06.011.

**Kawakami, T., Butlin, R.K., Adams, M., Paull, D.J. & Cooper, S.J.B.**, 2009, Genetic analysis of a chromosomal hybrid zone in the Australian morabine grasshoppers (*Vandiemenella, viatica* species group), *Evolution*, 63(1), 139-152, doi:10.1111/j.1558-5646.2008.00526.x.

**Kawakami, T., Butlin, R.K., Adams, M., Saint, K.M., Paull, D.J. & Cooper, S.J.B.**, 2009, Re-examination of a proposed case of stasipatric speciation: phylogeography of the Australian morabine grasshoppers (*Vandiemenella viatica* species group), *Molecular Ecology*, 18(16), 3429-3442, doi: 10.1111/j.1365-294X.2009.04277.x.

**Kench, P., Smithers, S., McLean, R.F. & Nichol, S.**, 2009, Holocene reef growth in the Maldives: Evidence of a mid-Holocene sea-level highstand in the central Indian Ocean, *Geology*, 37(5), 455-458, doi: 10.1130/G25590A.1.

**Robinson, T. & Paull, D.**, 2009, Comparative evaluation of suburban bushland as foraging habitat for the Glossy Black Cockatoo, *Corella*, 33, 7-12.

#### Journal - Letter or note

**McLean R.**, 2009, Book Review: The Geomorphology of the Great Barrier Reef: Development, Diversity and Change, D. Hopley, S.G. Smithers & K.E. Parnell, *Geographical Research*, 47(1), 87-89, doi: 10.1111/j.1745-5871.2008.00566.x.

#### Conference - Poster

**Packer, J., Carthew, S. & Paull, D.**, 2009, The effect of an exotic weed (*Rubus sp.*) on habitat use by small mammals in South Australia, *10th INTECOL (10th International Congress of Ecology)*, hosted by the Ecological Society of Australia in partnership with the New Zealand Ecological Society, 16-21 August 2009, Brisbane, Australia.

#### Thesis

**Hughes, A.**, 2009, An assessment of recent changes in catchment sediment sources and sinks, central Queensland, Australia, School of Physical, Environmental & Mathematical Sciences, Australian Defence Force Academy, UNSW, PhD Thesis.

### 2008 publications

#### Book - Chapter

**Mimura, N., Nurse, L., McLean, R.F., Agard, J., Briguglio, L., Lefale, P., Payet, R. & Sem, G.**, 2008, Small islands, in *Climate Change 2007 - Impacts, Adaptation and Vulnerability. Working Group II Contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, M.L. Parry, O.F. Canziani, J.P. Palutikof, P. van der Linden, C.E. Hanson (eds), Cambridge University Press, UK, pp. 687-716.

**Nicholls, R.J., Wong, P.P., Burkett, V., Codignotto, J., Hay, J., McLean, R.F., Ragoonaden, S. & Woodroffe, C.D.**, 2008, Coastal systems and low-lying areas, in *Climate Change 2007 - Impacts, Adaptation and Vulnerability. Working Group II Contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, M.L. Parry, O.F. Canziani, J.P. Palutikof, P. van der Linden, C.E. Hanson (eds), Cambridge University Press, UK. pp. 315-356.

**Paull, D.J.**, 2008, Revisions and introductions to Order Peramelemorphia: Bandicoots and Bilbies, p. 169; Superfamily Perameloidia, pp. 169-171; Family Chaeropodidae: Pig-footed Bandicoot, p. 172; Family Peramelidae: Typical Bandicoots, p. 174; Subfamily Echymiperinae, p. 174; Subfamily Peramelinae, p. 176; Family Thylacomidae: Bilbies, p. 191, in *Mammals of Australia*, 3rd Edition, S. van Dyke & R. Strahan (eds), Reed New Holland Publishing, Sydney, ISBN: 9781877069253.

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**Paull, D.J.**, 2008, Southern Brown Bandicoot, in *Mammals of Australia*, 3rd Edition, pp. 180-182, S. van Dyke & R. Strahan (eds), Reed New Holland Publishing, Sydney, ISBN: 9781877069253.

Spencer, T., Stoddart, D.R. & **McLean, R.F.**, 2008, Coral reefs, in *The History of the Study of Landforms*, T.P. Burt, R.J. Chorley, D. Brunnsden, N.J. Cox, A.S. Goudie (eds), The Geological Society, London, pp. 863-922.

## Journal - Refereed

**Amos, K.J., Croke, J.C., Hughes, A.O., Chapman, J.S., Takken, I.** & Lymburner, L., 2008, A catchment-scale assessment of anabranching in the 143 000 km<sup>2</sup> Fitzroy River catchment, north-eastern Australia, *Earth Surface Processes and Landforms*, 33(8), 1222-1241, doi: 10.1002/esp.1609.

**Claridge, A.W.** & Hunt, R., 2008, Evaluating the role of the dingo as a trophic regulator: Additional practical suggestions, *Ecological Management & Restoration*, 9(2), 116-119, doi: 10.1111/j.1442-8903.2008.00402.x.

**Claridge, A.W.**, Tennant, P., Chick, R. & Barry, S.C., 2008, Factors influencing the occurrence of small ground-dwelling mammals in southeastern mainland Australia, *Journal of Mammalogy*, 89(4), 916-923, doi: 10.1644/07-MAMM-A-209.1.

Corney, R.K., Peakall, J., Parsons, D.R., Elliott, L., Best, J., Thomas, R., Keevil, G.M., Ingham, D.B. & **Amos, K.J.**, 2008, Reply to discussion of Imran et al. on "The orientation of helical flow in curved channels" by Corney et al., *Sedimentology*, 53, 249-257, *Sedimentology*, 55(1), 241-247, doi: 10.1111/j.1365-3091.2007.00925.x.

Kench, P., Nichol, S., Smithers, S.G., **McLean, R.F.** & Brander, R., 2008, Tsunami as agents of geomorphic change in mid-ocean reef islands, *Geomorphology*, 95(3-4), 361-383, doi:10.1016/j.geomorph.2007.06.012.

**Takken, I., Croke, J.C.** & Lane, P., 2008, A methodology to assess the delivery of road runoff in forestry environments, *Hydrological Processes*, 22(2), 254-264, doi: 10.1002/hyp.6581.

**Takken, I., Croke, J.C.** & Lane, P., 2008, Thresholds for channel initiation at road drain outlets, *Catena*, 75(3), 257-267, doi:10.1016/j.catena.2008.07.001.

**Thompson, C.J., Croke, J.C.** & **Takken, I.**, 2008, A catchment-scale model of mountain stream channel morphologies in southeast Australia, *Geomorphology*, 95(3-4), 119-144, doi:10.1016/j.geomorph.2007.05.015.

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Trappe, J.M., Bougher, N.L., Castellano, M.A., **Claridge, A.W.**, Gates, G.M., Lebel, T. & Ratkowsky, D.A., 2008, A preliminary census of the macrofungi of Mt Wellington Tasmania - the sequestrate species, *Papers and Proceedings of the Royal Society of Tasmania*, 142(2), 85-95.

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## Conference - Full paper refereed

**Croke, J.C., Purvis-Smith, D., Thompson, C.J.** & Lymburner, L., 2008, The effect of local-scale valley constrictions on flood inundation and catchment-scale sediment delivery in the Fitzroy River Basin, Australia, *Sediment Dynamics in Changing Environments; 2008 Symposium of the International Commission on Continental Erosion (ICCE)*, Christchurch, New Zealand, J. Schmidt, T. Cochrane, C. Phillips, S. Elliott, T. Davies & L. Basher (eds), IAHS Publ. 325, IAHS Press, Wallingford, UK, pp. 200-207.

**Hughes, A.O.**, Olley, J.M., **Croke, J.C.** & McKergow, L.A., 2008, Sediment sources in a dry-tropical catchment: central Queensland, Australia. *Sediment Dynamics in Changing Environments; 2008 Symposium of the International Commission on Continental Erosion (ICCE)*, Christchurch, New Zealand, J. Schmidt, T. Cochrane, C. Phillips, S. Elliott, T. Davies & L. Basher (eds), IAHS Publ. 325, IAHS Press, Wallingford, UK, pp. 351-358.

**Thompson, C.J., Takken, I. & Croke, J.C.**, 2008, Hydrological and sedimentological connectivity of unsealed roads, *Sediment Dynamics in Changing Environments; 2008 Symposium of the International Commission on Continental Erosion (ICCE)*, Christchurch, New Zealand, J. Schmidt, T. Cochrane, C. Phillips, S. Elliott, T. Davies & L. Basher (eds), IAHS Publ. 325, IAHS Press, Wallingford, UK, pp. 524-531.

## Conference - Abstract

**Horne, D.**, 2008, Chenier Plain formation in Princess Charlotte Bay, Australia, *Proceedings of Association of American Geographers 2008 Annual Meeting*, April 15-19, Boston, MA, USA, Abstract available at: [http://communicate.aag.org/eseries/aag\\_org/program/AbstractDetail.cfm?AbstractID=15919](http://communicate.aag.org/eseries/aag_org/program/AbstractDetail.cfm?AbstractID=15919).

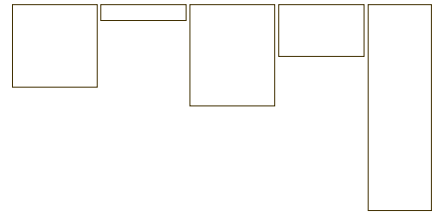
**Rae, E.**, 2008, Modelling beach ridge responses to small sea level fluctuations, *Proceedings of Association of American Geographers 2008 Annual Meeting*, April 15-19, Boston, MA, USA, Abstract available at: [http://communicate.aag.org/eseries/aag\\_org/program/AbstractDetail.cfm?AbstractID=17151](http://communicate.aag.org/eseries/aag_org/program/AbstractDetail.cfm?AbstractID=17151).

## Conference - Poster

Packer, J., Carthew, S., Long, K. & **Paull, D.**, 2008, Adapting to altered landscapes: the effect of blackberry on population persistence of the endangered Southern Brown Bandicoot (*Isodon obesulus obesulus*), *Ecological Society of Australia*, 1-5 December 2008, Sydney.

## Thesis

**Kawakami, Takeshi**, 2008, Speciation and chromosomal rearrangements in the Australian Morabine Grasshopper *Vandiemena viatica* species group, School of Physical, Environmental & Mathematical Sciences, Australian Defence Force Academy, UNSW, PhD Thesis, Available at: <http://handle.unsw.edu.au/1959.4/38716>.



# Environmental Systems

## Grants

### External Grants

**J. Croke**, M. Kirkby, P. Owens, **I. Takken**, K. Fryirs, & R. Bartley, Modelling catchment connectivity for water quality protection, Australian Research Council Discovery project, DP0878020, 2008: \$146,000; 2009: \$188,000; 2010: \$146,000.

**I. Takken, J. Croke**, P. Lane, G. Sheridan, & A. Webb, Developing a decision support system for the management of road runoff for water quality protection, ARC Linkage Grant, LP0881993, Total \$290,000, 2008: \$110,000; 2009: \$100,000; 2010, \$80,000.

### UNSW Grants

**D. Paull**, Indirect methods in wildlife research. A question of detection: are infrared cameras better than hair-tunnels for monitoring cryptic animals?, Early Career Researcher Grant, UNSW@ADFA, 2009: \$31,250.

**J. Croke, I. Takken, & C. Thompson**, Modelling catchment connectivity for water quality protection, UNSW@ADFA, Silverstar Award, 2008: \$20,000.

**D. Paull**, Infrared digital surveillance cameras and olfactory attractants for monitoring endangered species, UNSW@ADFA Special Research Grant, 2008: \$3,720.

## Conference Participation

### Andrew Hughes

- *ICCE IAHS International Symposium on Sediment Dynamics in Changing Environments*, 1-5 December 2008, Christchurch, New Zealand.

### David Paull

- Mapping truffles in Australia, *2009 Conference of the Institute of Australian Geographers*, 28 September-1 October 2009, Cairns, Australia.

## Service

### Assoc. Prof. Stuart Pearson

- Co-convenor of the *Australian Association for Environmental Education Conference* to be held 26-30 September 2010 in Canberra.

### Emeritus Prof. Roger McLean

- Member, Technical Advisory Group, South Pacific Sea Level and Climate Monitoring Project (For AusAID), 2004-2009.



PhD students Ellie Rae and Dylan Horne in the field.