Faculty of Computing Health and Science

Research Unit Annual Report

RESEARCH UNIT NAME: Centre for Ecosystem Management

RESEARCH UNIT LEVEL (tick):

- [x] Level II Research Centre
- [ ] Level I Research Group
- [ ] Level III Research Institute
- [ ] Centre of Excellence

REPORTING YEAR: 2012

BRIEF OVERVIEW AND HIGHLIGHTS

CEM members Mark Lund and Clint McCullough co-chaired the International Mine Water Conference (IMW) at the Bunbury campus of ECU. The conference was the first IMW Conference held in Australia since 1988 and attracted over 300 local and international delegates from 26 countries. More than 100 referred papers were published in the proceedings (edited by the co-chairs) and was sponsored by BHP Billiton, Golder Associates, Weir Minerals, Rio Tinto and ECU. The conference included a mid-conference excursion to the Collie Coalfield hosted by CEM members and highlighting research currently being undertaken at ECU.

Other highlights included a full day research symposium on Biodiversity, Sustainability and Ecosystem Health as part of the ECU Research Week held in September 2012. The symposium was opened by the Director, Science Division, Department of Environment and Conservation and involved 12 CEM and 6 external speakers. The symposium covered existing collaborative research as well as fostered the development of new collaborations with industry and external research institutions.

MEMBERSHIP

Director
Professor Will Stock

Management Committee
Associate Professor Ray Froend
Associate Professor Andrea Hinwood
Associate Professor Mark Lund

Academic Staff
Dr Ian Bennett
Dr Mary Boyce
Dr Robert Davis
Associate Professor Rod Giblett
Professor Pierre Horwitz
Dr Annette Koenders
Dr Kristina Lemson
Dr Clint McCullough
Dr Eddie van Etten

**Adjuncts**
Dr Allan Burbidge
Associate Professor Adrianne Kinnear
Emeritus Professor Harry Recher
Dr Esmee Webb

**Post-Doctoral Research Fellows**
Dr Melanie Blanchette
Dr Dimity Boggs
Dr Anna Callan
Dr Xinhua He
Dr Bea Sommer

**Honorary Research Associates**
Professor David Goodall

**Research Staff**
Ms Muriel Davies
Dr Simon Judd
Ms Shireen McGuinness
Ms Michelle Newport
Ms Jennifer Wilson
Ms Lorraine Wyse

**Research Students**
**PhD**
Mr Demetrios Bertzeletos
Mr David Blake
Mr John Bunn
Mr Quinton Burnham
Ms Zoe Car
Mr Jeffry Cargill
Ms Kelly Chapman
Mr Timothy Doherty
Mr Kwasi Frimpong
Mr Chatchai Intatha
Ms Umm Kalsoom
Ms Iris Lee
Mr Christopher Kavazos
Mr Josef Krawiec
Ms Karunia MacDonald
Mr Shaun Molloy
Ms Ana Muler
Mr Craig Pentland
Ms Malarvili Ramlingam
Mr Rylan Shearn
Ms Katesuda Sitthisuntikul
Ms Meenu Vitarana
### NEW GRANTS

<table>
<thead>
<tr>
<th>Chief Investigator</th>
<th>Title of Grant/Project</th>
<th>Value of Grant</th>
<th>Funding Body</th>
<th>Years Funded</th>
<th>Collaborators</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROEND, Ray</td>
<td>The development of operational rules for management of shallow groundwater in water limited ecosystems.</td>
<td>$139,152</td>
<td>Water Corporation</td>
<td>1.5</td>
<td>n/a</td>
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<tr>
<td>FROEND, Ray</td>
<td>Identifying wetlands of significance within the Gnangara pine plantations – Evaluation of general landscape and land-use attributes (Step 1) and habitat attributes and socio-political values (Step 2).</td>
<td>$26,791</td>
<td>Department of Environment and Conservation (DEC) &amp; Emerge Associates</td>
<td>1</td>
<td>n/a</td>
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<tr>
<td>KRAWIEC, Josef</td>
<td>The population genetic structure of <em>Ctenotus fallens</em> in urban habitat fragments.</td>
<td>$8,000</td>
<td>Botanic Gardens and Parks Authority</td>
<td>1</td>
<td>n/a</td>
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<tr>
<td>LUND, Mark</td>
<td>Enhancing ecological values of coal pit lakes with simple nutrient additions and bankside vegetation.</td>
<td>$321,886</td>
<td>Australian Coal Research Association Research Program</td>
<td>2</td>
<td>Premier Coal Ltd</td>
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<tr>
<td>LUND, Mark</td>
<td>Evaluating the performance of &quot;The Water Cleanser&quot; produced by Marine Easy Clean.</td>
<td>$25,000</td>
<td>Marine Easy Clean</td>
<td>2</td>
<td>n/a</td>
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<tr>
<td>LUND, Mark</td>
<td>Midge &amp; water quality desktop audit.</td>
<td>$14,800</td>
<td>City of Cockburn</td>
<td>1</td>
<td>n/a</td>
</tr>
<tr>
<td>Chief Investigator</td>
<td>Title of Grant/Project</td>
<td>Value of Grant</td>
<td>Funding Body</td>
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<tr>
<td>------------------------</td>
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<tr>
<td>LUND, Mark</td>
<td>City of Cockburn: Adult midge identification.</td>
<td>$114</td>
<td>City of Cockburn</td>
<td>1</td>
<td>n/a</td>
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<tr>
<td>LUND, Mark</td>
<td>Rio Tinto Iron Ore pit lake bioremediation (III): Water quality characterisation.</td>
<td>$80,000</td>
<td>Rio Tinto Pty Ltd</td>
<td>1</td>
<td>Rio Tinto Pty Ltd</td>
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<tr>
<td>MCCULLOUGH, Clint</td>
<td>Acid pit lake breach effects on water quality and aquatic biota.</td>
<td>$55,000</td>
<td>Premier Coal Ltd</td>
<td>2</td>
<td>Golder Associates</td>
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<tr>
<td>RADHAKRISHNAN, Naresh</td>
<td>Mulching bioremediation for acidity problems in an urban lake (Spoonbill Lakes) resulting from Acid Sulfate Soils.</td>
<td>$72,330</td>
<td>City of Stirling/ECU Collaborative Grant</td>
<td>1</td>
<td>n/a</td>
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<tr>
<td>VAN ETTEN, Eddie</td>
<td>Topsoil assessment for Roy Hill project area.</td>
<td>$58,834</td>
<td>Roy Hill Iron Ore</td>
<td>1</td>
<td>n/a</td>
</tr>
<tr>
<td>ZUIDDAM, Sharon</td>
<td>The systematics of the harvestman genus Nunciella (Opiliones: Triaenonychidae) in south-western Australia: A morphological and molecular approach.</td>
<td>$10,000</td>
<td>Australian Biological Resources Study (ABRS)</td>
<td>1</td>
<td>Western Australian Museum</td>
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</tbody>
</table>

PUBLICATIONS, REFERRED BOOKS, CHAPTERS, JOURNAL ARTICLES, CONFERENCE PAPERS, REPORTS (CEM members are in bold).

Books


Book Chapters


Journal Articles


**Book Reviews**


**Referred Conference Papers**


**Reports**


**CEM Reports**


Non Refereed Papers / Proceedings


PERFORMANCE AGAINST ANNUAL OBJECTIVES

CEM initiatives according to the Centre Business Plan (ongoing and specific to 2012):

- In association with SoNS and CMER the CEM will continue to organise a weekly seminar series for members, postgraduate students and visitors on topics related to the activities of the CEM.
- The Centre will organise an annual one-day postgraduate seminar for its affiliated postgraduate students.
  - CEM organised the Biodiversity, Sustainability and Ecosystem Health Symposium during research week 2012, which involved a number of postgraduate presenters.
- The CEM will continue to foster post-doctoral appointments to promote early career researchers at ECU.
  - The CEM contributed to ongoing post-doc appointments and provided research funds to support purchase of capital items and travel to conferences.
- The CEM will continue to support visiting scholars and speakers.
  - Support for visiting fellows (in conjunction with Faculty Scheme) was provided through the CEM Member Research Support scheme.
- Members of the CEM will continue to strengthen research links, collaborations and engagement with government agencies, industry and non-governmental organizations active in the environmental field.
  - CEM members achieved ongoing success in securing research funds from nationally competitive grant schemes, government agencies and industry partners.
- The CEM will, funding permitting, initiate a staff small grants scheme to promote the research of early career academic staff.
  - The CEM has established a CEM Member Research Support scheme since 2010 and in 2012 $27,757 was committed to supporting staff applications for capital items, travel, sample analysis costs.
• The CEM will attempt to raise income through the implementation of a levy on all non-competitive research grants to provide supplementary funding for some of the above schemes.
  o The implementation of a levy scheme to supplement CEM funds did not occur in favour of a School-based levy to support PG students.
• The CEM will implement a more equitable cost recovery scheme associated with research equipment usage.
  o This scheme was abandoned in favour of a School-based scheme. CEM members contributed to the development of a scheme to recover costs associated with sample analysis, boat and vehicle usage and equipment maintenance.
• The CEM will contribute to ERA FOR codes (ranks for 2012):
  o 0501 Ecological Applications – Not Assessed.
  o 0502 Environmental Science and Management – Rank 3.
  o 0607 Plant Biology – Rank 3.

COMMERCIAL ACTIVITIES
n/a

HIGHER DEGREE BY RESEARCH LOAD

Sawsan Alawadi – MSc
Demetrios Bertzeletos – PhD
David Blake – PhD
Gemma Broderick – MSc
John Bunn – PhD
Quinton Burnham – PhD
Robert Campbell – MSc
Zoe Car – PhD
Jeffry Cargill – PhD
Kelly Chapman – PhD
Shannon Clohessy – MSc
Julia Coggins – MSc
Belinda Delaney – MSc
Timothy Doherty – PhD
Natasha Dunham – MSc
Kwasi Frimpong – PhD
David Galeotti – MSc
Lauren Hibbird – MSc
Chatchai Intatha – PhD
Teagan Johnston – MSc
Umme Kalsoom – PhD
Christopher Kavazos – PhD
Justin King – MSc
Josef Krawiec – PhD
Megan Ladbroke – MSc
Iris Lee – PhD
Karunia MacDonald – PhD
Shaun Molloy – PhD
Ana Muler – PhD
Craig Pentland – PhD
Michael Pezzaniti – MSc
William Phelps – MSc
Maria Ramirez Caro – MSc
Malarvili Ramalingam – PhD
Justin Reynolds – MSc
Heather Salomons – MSc
Alice Sedgegan – MSc
Rylan Shearn – PhD
Katesuda Sitthisuntikul – PhD
Badin Thornton – MSc
Meenu Vitarana – PhD
Sharon Zuiddam – MSc

HIGHER DEGREE BY RESEARCH COMPLETIONS

HDR Graduations

Zoe Car, PhD, See through others' eyes: Towards a hybrid ecology of marine turtle and dugong in Australia.

Malarvili Ramalingam, PhD, Metal exposure in non-occupationally exposed women of Western Australia and contribution to environmental sources.

HDR Submissions

Iris Lee, PhD, Development of capillary electrophoresis for the analysis of phenolics and glucoraphanin in Brassica oleracea.

Marian Patrick, PhD, Scale and justice in water allocation.

William Phelps, MSc, The physical structure and chemical nature of detrital floc and their role in wetland nutrient dynamics.

Honours Completions

Christian Polson-Brown: The value of remnant and revegetated woodland on Rottnest Island to the red-capped robin and Golden Whistler.

Laura Harris: An investigation into the relationship between plant secondary metabolites and the habitat parameters of the Western Ringtail Possum (Pseudocheirus occidentalis).

VISITORS AND COLLABORATIONS AND OTHER ENGAGED ACTIVITIES

Visitors

Edward Gazzetti – An intern from State University of New York, Oneonta, working with MiWER/CEM on research programs for a period of 6 months as a volunteer. 13th June – 18th December 2012.
Collaborations

Clint McCullough (also of Golder Associates), Mark Lund and Melanie Blanchette are collaborating with the Perth office of Golder Associates Pty Ltd in a long-term project involved with closure of Lake Kepwari in Collie south of Perth. The research involves long-term biological and chemical monitoring and specific studies of the acidic pit lake and associated Collie River to provide scientific understanding of key aquatic processes during a trial period of flow-through of the river through the lake.

Community Engagement Activities and Linkages

Department of Environment and Conservation (DEC) & Annette Koenders – Joint field trip to Pelican Point with SCB3322 Applications in Molecular Biology students and Dr Alan Kendrick from DEC.

West Australian – 5th Jan 2012. ‘Call for mine pit lakes to be community facilities’, Clint McCullough.

North West Telegraph – 11th Jan 2012. South Hedland. ‘Old, disused mine pits could be water parks’, Clint McCullough.

Quaternary Research Association meeting in New Forest, Hampshire, UK, January 2012. Problems of trying to study the Anthropocene in Western Australia, Esme Webb.


Andrea Hinwood & Anna Callan travelled to Kalgoorlie, Albany, Margaret River, Dunsborough, Bunbury and Busselton to present results of the Australian Maternal Exposure to Toxic Substances study to participants and stakeholders (February 23-29th).

Australasian Quaternary Association meeting at Lake Tekapo, South Island, NZ, February 2012. Bedrock geology, landscape evolution and Aboriginal usage of the Western Desert and Murchison Basin, WA, Esme Webb.


Anna Callan - Visit to Montessori School in Kingsley (March 29th) to talk to students about a research study, ‘Children’s Exposure to Dust (PM10) and Metals in Perth and run a science based classroom activity.

Woodvale Secondary College year 12 students visited ECU over a two week period to participate in a genetic transformation experiment with students from SCB2222 Molecular and Cellular Biology, organised by Annette Koenders.

Wetland Worries was the topic of Pierre Horwitz’s talk to Urban Bushland Council members and supporters in April. He talked about possible future scenarios for wetlands of the Swan Coastal Plain and presented case studies on the Yanchep wetland system, Lake Jandabup and Lake Jualbup.

North Perth Primary School students participated in a Chemical Reactions activity – Mary Boyce.

Ellenbrook Secondary College students complete a chemistry activity in the School of Natural Sciences – Nardia Bordas, Mark Bannister and Mary Boyce.
St Stephens High School students complete a chemistry activity in the School of Natural Sciences – Nardia Bordas and Mary Boyce.

The West Australian, 20 April 2012. ‘Heavy metals detected in tests on mums-to-be’, Andrea Hinwood & Anna Callan.

Mix 94.5 Radio (Perth), 20 April 2012. AMETS study mentioned on 07:00 news, Andrea Hinwood.

Channel 10 (Perth), 20 April 2012. AMETS study mentioned on 5pm news, Andrea Hinwood.


Science Network (Western Australia) – 15 May 2012. ‘UV filter residues from personal care products potential aquatic contaminant’, Pierre Horwitz.

The West Australian, 17 May 2012. ‘Coastal wetlands turn toxic’, Pierre Horwitz.

The Kalgoorlie Miner, 17 May 2012. ‘Seminal study on Chemicals’, Andrea Hinwood & Anna Callan.


Avian Conservation in Australasia – two comparative studies. Uppsala University, Sweden, 12 September 2012, Rob Davis.


Lake Kepwari Closure Community Engagement Workshop, 18 – 19 October 2012, Collie, Western Australia, Clint McCullough.


Convened workshop, ‘Conservation priorities for Palau’s threatened birds’, 17 December 2012, Rob Davis.
FINANCIAL REPORT

<table>
<thead>
<tr>
<th>INCOME</th>
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<tbody>
<tr>
<td>FCHS contribution</td>
<td>$40,000</td>
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<tr>
<td>Consulting work contribution</td>
<td>$387</td>
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<td><strong>Total</strong></td>
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</table>

<table>
<thead>
<tr>
<th>EXPENDITURE</th>
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</thead>
<tbody>
<tr>
<td>Salaries and on-costs</td>
<td>$1,699</td>
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<tr>
<td>CEM research day</td>
<td>$490</td>
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<tr>
<td>Journal subscription</td>
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<tr>
<td>Software licences</td>
<td>$597</td>
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<td>Postage and printing</td>
<td>$483</td>
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<tr>
<td>Capital purchases (equipment)</td>
<td>$27,160</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>$30,637</strong></td>
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</tbody>
</table>

Income-Expenditure: +$9,750

PRIORITIES FOR THE FOLLOWING YEAR

- In association with SoNS and CMER the CEM will continue to organise a weekly seminar series for members, postgraduate students and visitors on topics related to the activities of the CEM.
- The Centre will organise an annual one-day symposium for its members and other attendees, proving the opportunity for PG students and staff to communicate the outcomes of their research on themes relevant to the CEM.
- The CEM will continue to support visiting scholars and speakers.
- The CEM will continue to foster, where possible, research links, collaborations and engagement with government agencies, industry and non-governmental organizations active in the environmental field.
- The CEM will continue to maintain a website that promotes the activities of members of the centre and to collate information on member research outcomes.
- The CEM will, funding permitting, continue to implement a staff small grants scheme to foster member research, particularly early career academic staff.
- The CEM will contribute to ERA FOR codes (ranks for 2012):
  - 0501 Ecological Applications – Not Assessed.
  - 0502 Environmental Science and Management – Rank 3.
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