

## What's happening in water research at the University of Adelaide

In 2006, the Water Research Cluster will have a strong focus on developing new international collaboration, and consolidating its existing linkages in South Australia.

Along with update of current activities, this Newsletter features articles on the emerging worldwide concern about sustainability issues, with water and energy at the top of the list of priorities.

### In this issue:

- **Water Research Cluster News**
- **Who is the Water Research Cluster**
- **Management Panel Profile: David Lewis**
- **Cluster Profile: Ecoinformatics and Watershed Ecology Laboratory**
- **Water Conference Diary**
- **Major Announcements and Policy Releases Relating to Water**
- **Water Research Cluster Postgraduate Corner**
- **Water Information Links**
- **Water Research Links – Funding Opportunities, Grants, Tenders**



*Pipeclay Lagoon watered as part of the Living Murray Initiative, using water savings from irrigators. Photo Anne Jensen*

# Water Cluster News

by Dr Paul Dalby, Water Research Cluster Coordinator

The last few months have been busier than ever for the Water Research Cluster.

In December, a delegation from the Chinese Academy of Sciences visited South Australia. The Water Research Cluster spent a day discussing potential areas for collaboration. The Chinese Academy of Sciences have already formed a joint laboratory in Soil Science with the University of Adelaide, being lead by Professor Sally Smith and Professor Yongguan Zhu. There is strong interest by the Academy to expand this linkage to other research topics, in particular water, and to other institutions. The International Centre of Excellence in Water Resource Management, ICE WaRM, is visiting China in late February to continue the discussions about expanding collaboration between South Australia and China in the water research area.

The Water Research Cluster has recently organized a series of workshops on fostering collaboration with overseas collaborators. These workshops have explored opportunities available through FEAST (Forum for European-Australia Science and Technology Collaboration) and for funding travel to China. The discussions will continue, and Neil Hamilton from FEAST is visiting Adelaide in March to meet with a number of researchers to discuss specific proposals for building upon existing linkages they have in Europe.

A workshop was held in February with the major water utilities in South Australia to discuss tools for optimising the management of water distribution, use and re-use. The Forum generated significant interest and new ideas which will be developed further between the University of Adelaide and industry partners.

Andrew Coyle and Peter Gell from the University of Adelaide are working with Qifeng Ye and her team from SARDI to develop and test a predictive management model for Drain M and Lake George in the South East. This project is funded by the Centre for Natural Resource Management and will support the development of the South East Regional Flow Management Strategy. A computer-based model will be created and tested to understand the impact of different flow regimes on the hydrological processes in the Drain M/Lake George system. In addition, a semi-quantitative conceptual model will be developed, which will predict the response of the biota of Lake George to changes in salinity and underwater light climate brought about by different flow regimes and environmental flow scenarios.

The Water Research Cluster provides support for academics within the University to prepare ARC Linkage applications. Recently the Cluster provided support, in the form of \$1,000 grant to help prepare the following applications:

- Michael Tuebner (Uni Adelaide), A. Barton (CSIRO), John Nixon and Stephanie Rinck-Pfeiffer (United Water), for a project: "Modelling aquifer storage, transfer and recovery of treated surface water"
- Holger Maier, Peter Gell, Marcus Lane, Graeme Dandy (Uni Adelaide), Craig Simmons (Flinders), C de Koning (SARDI) and DWLBC, for a project titled "Upper South East Water Resource Optimisation Framework"

## Who is the Water Cluster?

The Water Research Cluster coordinates water research across the University of Adelaide. The Water Research Cluster has a strong culture of collaboration and support of teams, and has a particular focus on supporting early career researchers.

### Management Panel

A Panel of academics from across the disciplines and schools of the University provide strategic direction and management of the Cluster. The members of the Management Panel are:

- Graeme Dandy (Civil and Environmental Engineering) - Champion
- Angus Simpson (Civil and Environmental Engineering)
- David Chittleborough (Geology and Geophysics) - Champion
- Marcus Lane (Geography)
- David Jones (Architecture)
- Peng Bi (Health)
- David Lewis (Chemical Engineering)
- Mike Geddes (Environmental Biology).

The Water Research Cluster has specific strengths in the following fields of research:

- Integrated Catchment Management
- Managing Water in Arid Areas
- Managing Wetlands and Rivers
- Sustainable Irrigation
- Wastewater Treatment and Management
- Water Management in Urban Areas

### Cluster Coordinator Dr Paul Dalby

If you would like to advertise or send material for the Newsletter of the University of Adelaide Water Research Cluster, please contact Paul Dalby on 0401 122 204 or [pdalby@internode.on.net](mailto:pdalby@internode.on.net)

# Management Panel Profile: Introducing David Lewis

**Position:** Member of Water Research Cluster Management Panel

**Research field:** Algal biotechnology, Water quality

David Lewis is an enthusiastic member of the Water Research Cluster and has been involved in many of the workshops and initiatives the Cluster has organized. As a result, David has been able to be part of a number of new initiatives that were facilitated through the Cluster.

The Cluster introduced David Lewis to the Alinytjara Willulura Natural Resource Management Board. The Board and Aboriginal communities in the Maralinga Tjarutja Lands are now working with David and Justin Brookes from the University of Adelaide to identify gaps in the knowledge of water resources on their lands. The project involves mapping important water resources such as rock-holes and creeks, identifying threats to water quality and working with the local communities to develop monitoring strategies for their water resources.

The Water Research Cluster also helped facilitate a project that involves David Lewis, the River Murray Catchment Water Management Board, SA Water and the Environment Protection Agency to undertake a detailed baseline nutrient analysis for the Lower Murray region.

David also has a strong research interest in the areas of micro-algal biotechnology, limnology and fluid mechanics, with a particular emphasis on one-dimensional modeling of artificial mixing for destratification and control of cyanobacteria growth in lakes and reservoirs. He has a current research interest in the School of Chemical Engineering with exploiting the growth of micro-algae for high value products.



# PROFILE: Introducing Water Researchers within the Ecoinformatics and



Figure 1. Prototype graphical user interface and output results for the SALMO-00 simulation library

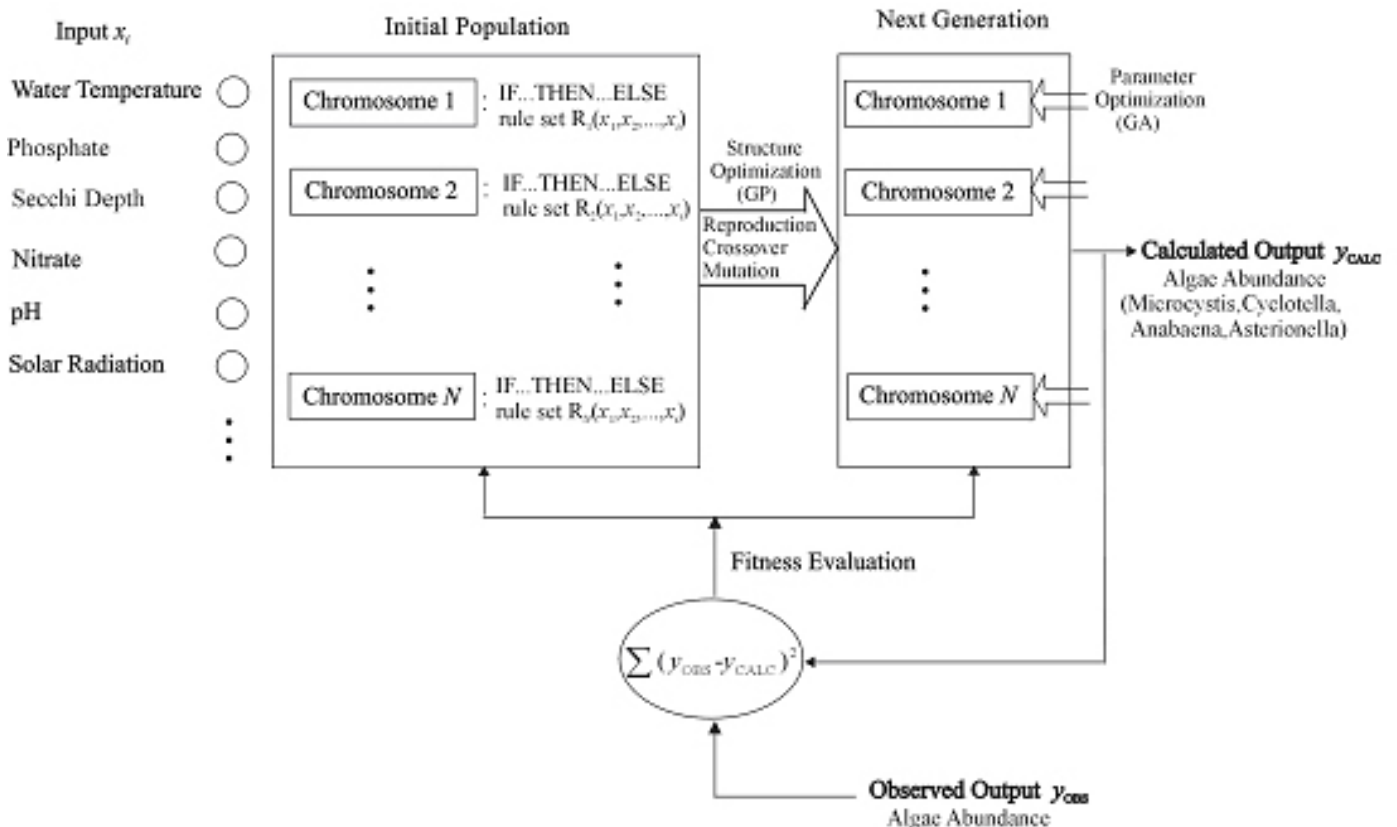


Figure 2. Conceptual diagram of a hybrid evolutionary algorithm for rule-based prediction and explanation of population dynamics in fresh water systems

The Ecoinformatics and Watershed Ecology Laboratory, in the Discipline of Environmental Biology, focuses on four research areas:

- 1) Ecosystem analysis by bio-inspired computation
- 2) Hybrid ecosystem modelling
- 3) Ecological data warehousing
- 4) Watershed ecology

Their main research interests in the field of ecoinformatics are broad, ranging from developing new modelling techniques to applying current computational methods to the analysis of complex ecological data. Current research by their members include the development of an object-oriented, hybrid ecosystem model (SALMO-OO), into a decision support system for lakes/reservoir management (see Figure 1 & 2); application of neural network models and evolutionary algorithms to the analysis and forecasting of water quality problems in lake systems; the development of ecological data warehouses: the Lake and River Data Warehouse and the Watershed Data Warehouse, which are being used to archive both historical and on-line monitoring data for lakes, reservoirs, and rivers in Australia and overseas.



Figure 3. Reed bed inlet site at the Parafield constructed wetlands, Salisbury (Photo from Young-Kil Kim).



Figure 4. Reed bed outlet site at the Parafield constructed wetlands, Salisbury (Photo from Young-Kil Kim).

The group's current research in watershed ecology focuses on investigating the dynamics of natural and constructed wetlands of the lower River Murray and the treatment of agricultural drainage water through plant harvesting and drying/wetting cycles of the Parafield constructed wetland system located in the Salisbury council. Comparative studies of several wetlands in the lower River Murray have been completed with much of the data used to construct the AQUALINK landscape model in order to investigate the effect of management on these wetlands.

## Staff

### *Assoc Prof Friedrich Recknagel*

Research interests include process-based modelling of freshwater systems, real-time monitoring and forecasting of ecosystem dynamics by hybrid modelling, neural and evolutionary computation, and ecological restoration of aquatic systems.

## Post Doctoral Fellows

*Dr Hongqing Cao* Adaptive agents simulation of freshwater ecosystems: Artificial intelligence framework to discover and forecast emergent ecosystem structures and behaviours in response to environmental changes.

## PhD Students

*Lydia Cetin* Development and implementation of an object-oriented, process-based simulation library for lake ecosystems (the SALMO-OO model)

*Young-Kil Kim* Sources and pathways of plant nutrients and dissolved organic carbon (DOC) in the Parafield wetlands, and implications for water quality control

*Cheng Shao* Intelligent data warehousing for real-time data acquisition and archiving and early warning of algal blooms in fresh water lakes and reservoirs

*Anita Talib* Predictive modelling, ordination and clustering of two Dutch shallow lakes by neural and evolutionary Computation.

*Amber Welk* Real-time forecasting of algal blooms in drinking water reservoirs by means of artificial neural networks and evolutionary algorithms.

*Hailin Zhang* Ecological informatics by artificial neural networks

## MSc Students

*Byron He Zhang* Object-oriented development of the simulation library SALMO-OO by Java

## Honours Students

*Wai Sum Chan (Grace)* Modelling of Microcystis and Microcystin dynamics in Lake Suwa (Japan) by bio-inspired computation, and implications on Torrens Lake (South Australia)

Further information on the Ecoinformatics and Watershed Ecology Laboratory, contact Assoc. Prof. Friedrich Recknagel on 8303 3953 or email [friedrich.recknagel@adelaide.edu.au](mailto:friedrich.recknagel@adelaide.edu.au). Visit their website <http://www.ees.adelaide.edu.au/research/enviro/ecoinformatics/index.html>

Thanks to Lydia Cetin for providing this article

## Conference Diary

### **WATER 06 -- Institutional reform, cultural change and integrated water resource management**

1-3 March 2006

Brisbane Convention Centre

For more information or to register please contact Hannah Pipe on 02 9969 6167 or email [register@water06.com.au](mailto:register@water06.com.au) or visit [www.water06.com.au](http://www.water06.com.au)

### **World Water Forum**

March 2006, Mexico City

For more details, go to: <http://www.worldwaterforum4.org.mx/home>

### **Australian Water Summit**

13th-14th March 2006

Sydney Convention & Exhibition Centre

[www.acevents.com.au/water2006](http://www.acevents.com.au/water2006)

Updated conference and booking details are available at [www.acevents.com.au/water2006](http://www.acevents.com.au/water2006) Tel (02) 8920 2547

### **Australian Water Association's Water Education Network**

18-21 April 2006

Alice Springs Convention Centre, Northern Territory

presents the 2nd National Water Education Conference 'From the Waters Edge to the Red Centre'

### **Coast to Coast 2006 'Australia's National Coastal Conference'**

22-25 May 2006, Melbourne Exhibition Centre, Australia

COAST TO COAST 2006 is Australia's biennial national coastal conference. It will focus debate across the full range of coastal and marine issues being considered at national, state, regional and local levels.

Register online before 20 March 2006 to receive the Early Bird Rate.

Conference website: [www.iceaustralia.com/coasttocoast2006](http://www.iceaustralia.com/coasttocoast2006)

For more information please contact the Conference Organisers on (03) 9681 6288 or email: [coasttocoast@iceaustralia.com](mailto:coasttocoast@iceaustralia.com)

### **Veg Futures 2006: The conference in the field**

19 - 23 March 2006, Albury-Wodonga

Convened by Greening Australia and Land & Water Australia, Veg Futures 2006 is a national conference that will share information for regions to manage native vegetation in productive landscapes.

The provisional program can be viewed on the conference website [www.greeningaustralia.org.au](http://www.greeningaustralia.org.au) (click on the Veg Futures icon).

### **Sustainable Landscapes: Future Dilemmas and Opportunities**

4 April 2006, Perth

One day seminar presented by CSIRO Australian Research Centre for Water in Society and Land & Water Australia

Email enquiries [arcwis-enquiries@csiro.au](mailto:arcwis-enquiries@csiro.au)

### **Australian Water Association One Day Seminar Series**

Adelaide March 15, 2006

Sediment Water Quality Assessment Sediments, Sediment Chemistry, Ecotoxicology

Much of the work of environmental scientists & consultants involves assessing water quality in dams, streams, rivers, estuaries and waterways. The National Water Quality Guidelines (2000) is the principal reference document for their monitoring & reporting. Sediment water quality monitoring is one aspect of the guidelines which is often poorly understood and subject to errors in procedures, analysis and application of the data.

This One Day Seminar is designed to meet the needs of water quality scientists and professionals involved in writing environmental assessments, undertaking site appraisals, monitoring & analysing activities in sediments and water bodies. The Seminar also updates attendees on updates to sediment quality procedures & reporting undertaking work associated with the water quality guidelines (2000).

## Major Announcements and Policies Relating to Water

The Water Research Cluster website has a section on major announcements and policies relating to water management and conservation. Currently the website includes information on the following recent items of interest:

### **First project under Living Murray Initiative signed off**

The Federal Government has signed off on the first deal to return water to the Murray River from Victoria, under the Living Murray Initiative. This is the first contribution to the 500 Gegalitre (GL) 'first step' environmental water allocation.

### **Tackling Climate Change Strategy Released for Comment**

A draft of Tackling Climate Change: South Australia's Greenhouse Strategy has just been released by the South Australian Government.

### **A Sustainable Planet – a future for Australia**

Annual Hawke Lecture by Mr Greg Bourne, CEO, WWF Australia

### **Millenium Ecosystem Assessment**

The Millenium Ecosystem Assessment Synthesis Report published under the United Nations Environment Program in 2005 gives a stark wake-up call to the world that time is running out to address the issue of sustainability.

### **World Wetlands Day**

World Wetlands Day is celebrated every 2 February on the anniversary of the signing of the Ramsar Convention to protect the world's wetlands.

### **SA appoints independent expert to Murray-Darling Basin Commission**

John Scanlon, a leading environmental law and policy expert, was previously Deputy Director General of the former NSW Department of Infrastructure, Planning and Natural Resources, and former Chief Executive of the (then) Department for Environment, Heritage and Aboriginal Affairs and (previously) Department of Environment and Natural Resources in South Australia.

### **Water Targets in South Australian policies**

South Australia's Strategic Plan

## Water Research Cluster Postgraduate Corner

Water treatment and re-use was the theme for the Water Research Cluster Postgraduate excursion in December to Bolivar Treatment Plant and the Parafield Wetlands. Manager Ric Ingerson hosted the tour of the water re-use facility and Dissolved Air Flotation Filtration (DAFF) water quality plant, which carries out 50% of Adelaide's sewage treatment, processing 155 ML per day. The DAFF plant provides 30% re-use water to Virginia and Mawson Lakes. Significant volumes of bio-solids from the plant are being used by dryland farmers as nutrient supplements. An aquifer storage and recovery trial is currently being conducted by CSIRO.

At the Parafield Wetlands, the enthusiastic staff of Salisbury Council and the Airports Authority outlined plans to triple the volumes of stormwater being treated in the wetlands for recycling to local business and community uses. The wetland ponds are covered with white mesh nets to prevent bird strikes on the nearby airfield, but that

does not stop the ducks from finding their way into a very attractive habitat of reeds and rushes, now so high that they are pushing through the net covers. Thanks to the Water Research Cluster for sponsoring a very informative outing for the Postgraduate group. The very successful tour was encapsulated by our resident poet, Joy Ricci, who is studying Chinese water poetry. Her poem on the Parafield wetlands is an example of her special talents.

### **Parafield**

**P**artnering know-how with nature with in

**A**erobic holding ponds

**R**ampant with reeds –

**A**rming engineers with storm-water

**F**iltered naturally and off'

**I**njected into aquifers or ponds

**E**nclosed by gigantic nets –

**L**eaving precious water

**D**esirably refreshed – awaiting buyers.

*R. Joy Ricci – 7th December 2005*



## Water Info Links

Useful information on water-related topics can be found in the electronic sources listed below.

### **EnviroInfo Newsletter**

EnviroInfo is a fortnightly eNewsletter for professionals in the natural resources and environment management fields. You can obtain a subscription by sending an email to [info@envirocentre.com.au](mailto:info@envirocentre.com.au) with the words 'Subscribe EnviroInfo' in the subject line. Other publications from the same group include:

- **Enviro Jobs**  
<http://www.envirojobs.com.au>
- **Environment Business**  
<http://www.halledit.com.au/publications/envbiz.htm>
- **Land and Water News**  
<http://www.halledit.com.au/publications/lawn.htm>
- The International Centre of Excellence in Water Resources Management produces the **ICE WaRM eNewsletter**. You can subscribe at <http://www.icewarm.com.au/mailman/listinfo/enews>
- **EcoVoice** environmental newspaper is available online at [www.ecovoice.com.au](http://www.ecovoice.com.au)

### **Australian Water Association**

Many items of interest can be found on the website of the Australian Water Association -- visit <http://www.awa.asn.au/> and view the calendar and weekly newsletter there.

### **Land & Water Australia**

Land & Water Australia provide significant sources of water-related research information and funding for projects. Their website is [www.rivers.gov.au](http://www.rivers.gov.au) and access to their many publications can be gained from there. A recent series of seminars around Australia presented the outcomes of the five-year National Riparian Lands program, including a rapid assessment technique for riparian condition.

### **CSIRO Australian Research Centre for Water in Society (ARCWIS)**

Interesting research results are published in the regular newsletter or through the website [www.clw.csiro.au/research/arcwis/](http://www.clw.csiro.au/research/arcwis/)

The newsletter can be ordered by email at [arcwis-enquiries@csiro.au](mailto:arcwis-enquiries@csiro.au)

### **Greening Australia**

A very useful publication from Greening Australia is Riverways: shortcuts to river management information in Australia. This compilation is based on a survey of river managers about the most useful sources of information, and presents neat single-page summaries for departments, catchment management authorities, non-government organizations, publications and other resources. (Anne Jensen has two spare copies available, otherwise contact Greening Australia).

# Water Research Links – Funding Opportunities

Watch for new funding opportunities on the ARI website <http://www.adelaide.edu.au/ari/researchers/grants/fundingopps.html>

The Grant Opportunities page on the ARI website provides access to all ARC and NHMRC opportunities as well as the rural and natural resources R&D corporations. In addition, you can also access the myriad of other funding opportunities.

## Australian Research Council (ARC)

Linkage – International Awards

Internal Closing Date: Continuous

[http://www.adelaide.edu.au/ari/researchers/grants/ARC\\_LinkIntern.html](http://www.adelaide.edu.au/ari/researchers/grants/ARC_LinkIntern.html)

Purpose: Build links between research centres of excellence in Australia and overseas by funding extended collaborations

## Australia & Pacific Foundation

Closing Date: Friday 17 March 2006, for grants beginning 1 July 2006

<http://www.apscience.org.au/background.html>

Typically the APSF provides project grants up to approximately \$AUD15,000 per year for up to three years, for activities in countries of the South West Pacific region.

## Cooperative Research Centres Programme 2006 Selection Round

The CRC Programme funds collaborations between researchers and industry to improve the effectiveness of Australia's research and development effort. Applications for Stage 1 of the selection process are due in Adelaide University Research Branch on 17 March 2006. If you are intending to put in an application please let Lynette Kelly know by 28 February 2006.

Further information is available at: [http://www.adelaide.edu.au/ari/researchers/grants/CRC\\_National.html](http://www.adelaide.edu.au/ari/researchers/grants/CRC_National.html).

## CSIRO Flagship Collaboration Fund - Visiting Fellowships (\$100K)

<http://www.adelaide.edu.au/ari/ne/Newsletter/November/07November05.html> - CSIRO

## International Science Linkages Programme

<https://sciencegrants.dest.gov.au/ISL/Pages/Home.aspx>

The International Science Linkages programme supports Australian scientists, from both the public and private sectors, to collaborate with international partners on leading edge science and technology in order to contribute to Australia's economic, social and environmental wellbeing.

Applications for the French-Australian Science and Technology Programme (FAST) close 16 November 2005.

## ICE WaRM Scholarships, visits and exchanges

Internal Closing Date: 17 March 2006

<http://www.icewarm.com.au>

Facilitate the international exchange of skills, knowledge, research and experience in water resources management.

## Macquarie Bank Foundation

Internal Closing Date: Apply any time

[http://www.macquarie.com.au/au/about\\_macquarie/macquarie\\_in\\_the\\_community.htm](http://www.macquarie.com.au/au/about_macquarie/macquarie_in_the_community.htm)

Areas of interest: education, the arts, health research and health care, welfare and the environment.

## Middle East Desalination Research Center (Oman)

Internal Closing Date: Apply any time

<http://www.medrc.org>

Purpose: conduct, support and coordinate basic and applied R&D in water desalination and supporting fields, with the overall objective to reduce the cost of desalination.

## Myer Foundation

Internal Closing Date: Apply any time

<http://www.myerfoundation.org.au>

Areas of Focus: Arts and Humanities, "Beyond Australia", Water and Environment, Philanthropy, Social Justice

## Sarah Scaife Foundation (USA)

Internal Closing Date: Apply any time

<http://www.scaife.com/sarah.html>

Interest: public policy programs that address major domestic and international issues

## Specially for Sciences - Department of Agriculture, Fisheries and Forestry - Australia China Agricultural Cooperation Agreement (ACACA)

<http://www.adelaide.edu.au/ari/ne/Newsletter/November/07November05.html> - Sciences

## Grants for Field Research -- Earthwatch

Closing Date: Ongoing

Purpose: To create a public offering of significant research that addresses scientific, environmental, and public policy problems and issues.

Website: <http://www.earthwatch.org/research/index.html>

Contact Details: Ms Jane Gilmour, Director Earthwatch Australia

Email: [jgilmour@creativeaccess.com.au](mailto:jgilmour@creativeaccess.com.au)

Telephone: (03) 9682 6828

## Tenders

Tenders are posted on the NRMjobs website, which can be found at: <http://www.nrmjobs.com.au>