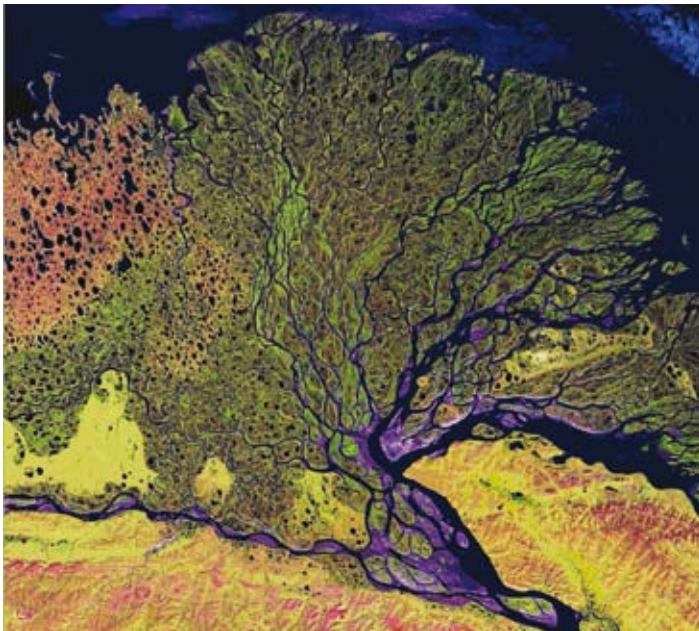


What's happening in water research at the University of Adelaide

The Water Research Cluster continues to evolve its identity and developing its profile as research projects get under way and its partners establish links. A sample of the range of current activities is presented in this Newsletter.



Ever improving image tools available to researchers.
The Lena River Wilderness Reserve – Russia
(NASA <http://earthasart.gsfc.nasa.gov/lena.html>)

In this issue:

- News around the Water Research Cluster
- PROFILE: Introducing Water Researchers within Soil and Land Systems, School of Earth & Environmental Sciences
- Water Research Cluster Postgraduate Corner
- Water Proofing Adelaide: the challenge of choosing the best options
- Water Fact File



The issue of scale is critical in water research, as research questions can range from the context of catchments to individual soil particles. The extreme range of research interests in the Water Research Cluster is illustrated in the contrast between the delta of the Lena River Wilderness Reserve in Russia and the soil profiles from Delamere on Fleurieu Peninsula.

Left: Terra rossa (gradational clay loam)

Right: Loam over brown clay

Photos by Jordan Foster

Research Cluster

by Dr Paul Dalby, Water Research Cluster Coordinator

Bid to National Water Initiative for Mount Lofty Ranges Research Program

The Water Research Cluster from the University of Adelaide has identified the National Water Initiative as a significant potential source of funding for larger, integrated research programs that would require cross-institutional collaboration to be successful. The preferred region is the Mt Lofty Ranges, which has been nominated as a priority strategic target for the Cluster to develop project proposals which integrate catchment management and economic development issues.

As reported in the July Newsletter, the *National Water Commission Act 2004* has established the National Water Commission and the **Australian Government Water Fund** (PM&C 2005). The Commission is responsible for advising the Prime Minister on the use of this fund for the \$1.6 billion *Water Smart Australia* programme to accelerate the development and uptake of smart technologies and practices in water use across Australia. The Commission also manages the \$200 million *Raising National Water Standards* programme to advance Australia's national capacity to measure, monitor and manage its water resources. The \$200 million *Water Fund Communities Programme*, administered by the Departments of Agriculture, Fisheries & Forestry and Environment & Heritage, is also supported from the Australian Government Water Fund.

John Radcliffe, a Commissioner on the National Water Commission and Chairman of the Water Research Cluster Advisory Board, highlighted the possibilities for project development to Cluster members in August 2005. A small group involving the Water Research Cluster (Paul Dalby), University of South Australia (Justin Brookes), the Watershed Protection Office (Peter Newland) and the MLR Integrated Natural Resource Management Group (Scott Donnor) has since proposed a bid to the NWI *Raising National Water Standards Programme* for the Mt Lofty Ranges.

The over-arching theme for the bid is "Managing hydrology to maximise water benefits in the Mt Lofty Ranges". These benefits encompass:

- water for the environment
- water for potable supply
- reducing pressure on other water sources
- reducing contaminants discharged to the coastal zones.

The work would implement a range of remediation strategies that may require infrastructure but would certainly also require innovative solutions. The science required to evaluate the strategies and the additional science necessary to support planning for future management would be a fundamental component of the project. The proposal will be structured to address state priorities and build on existing initiatives.

ICEWaRM have organised a workshop on 22-23 September at Wirrina Resort to generate ideas and bring together the various stakeholders for the development of a bid.

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:

- Peter Gell (Geography) - Convenor
- Peng Bi (Health)
- David Chittleborough (Geology and Geophysics) - Champion
- Graeme Dandy (Civil and Environmental Engineering) - Champion
- David Jones (Architecture)
- Nicole Morcom (Adelaide Research and Innovation)
- Angus Simpson (Civil and Environmental Engineering)
- Keith Walker (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

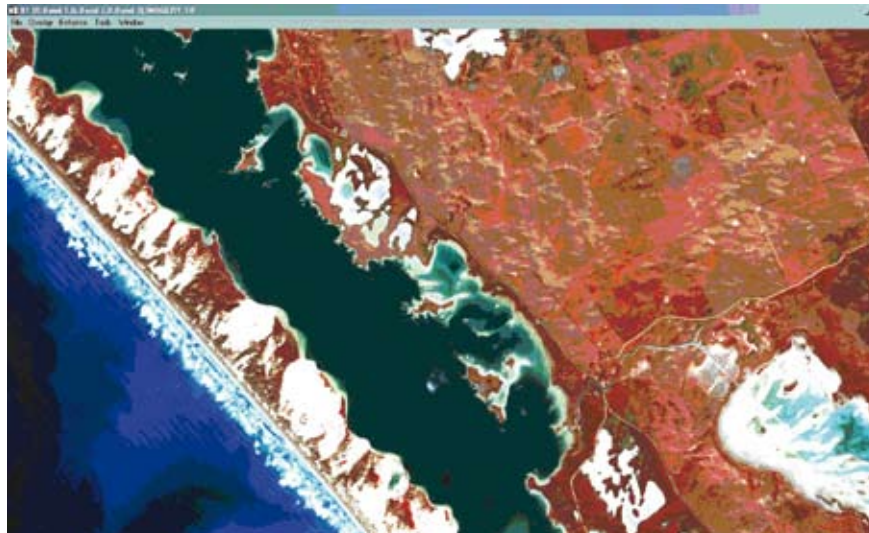
Eureka Winners And Finalists

Two research groups with links to the Water Research Cluster were recently finalists in the 2005 Eureka Prize for Water Research, sponsored by Land and Water Australia. The prize of \$10,000 is awarded to an Australian individual, team or organisation for highly innovative research that has made, or has the potential to make, an outstanding contribution to the protection, sustainable use and management of Australia's water resources and water-dependent ecosystems.

One of the finalists is the research group nominated for development of a fast, cost effective and efficient geophysical survey system that detects salinity in riverbed sediments, leading to the more efficient use of salt interception schemes.

This group includes Dr Graham Heinson and Brian Barrett of the School of Earth & Environmental Sciences with Michael Hatch of Zonge Engineering and Research Organisation (Australia) Pty Ltd and Andrew Telfer of Australian Water Environments Pty Ltd.

The winners in this category are Prof Mike Young, Chief Research Scientist in CSIRO Land and Water and Jim McColl, Visiting Fellow, for developing a framework that combines well-established research findings and insights into a highly innovative framework for improving systems of water rights in Australia. In its various forms, it is now being implemented across the Murray-Darling Basin, and elsewhere. See www.clw.csiro.au/research/peru/



False colour composite SPOT image as used for wetlands monitoring, Coorong, Upper South East (Sean Mahoney, University of Adelaide)

New Toys From Google Earth

Scientists from every discipline will find a use for the latest tool available from Google. Visiting postgraduate student Scott Mills is very excited about the potential uses of this new development, and wanted to share the details with the Water Research Cluster.

Google Earth opens a new era in mapping giving individuals access to an online virtual world streamed over the internet. The Google team has bought together satellite imagery and traditional map information in an intuitive and flexible package allowing users to zoom in and out of a virtual model of the world. The free version offers resolutions of between 1 and 15m across the entire surface of the earth, as shown in the detail of a River Murray floodplain field site near Morgan, and in the individual buildings of the Adelaide campus in the figures included.

The standard version of Google Earth can be downloaded, 11.1 MB, from <http://earth.google.com/> for free! If you are interested in more capability, Google Earth Plus, a version with GPS device support, the ability to import spreadsheets, drawing tools and better printing resolution can be purchased for the low sum of \$US20 per annum. Or why not upgrade to Google Earth Pro allowing you to view 3D satellite images, at an additional cost of \$US400 per annum.

Google Earth also offers a number of plug-ins, for a nominal fee of \$US200, such as the Movie Making Module and Premium Printing Module that have to be seen to be believed, check them out at http://earth.google.com/earth_pro.html.

Happy Mapping!

Scott Mills

**Visiting Postgraduate to Environmental Biology
Specializing in aquatic microinvertebrate taxonomy**

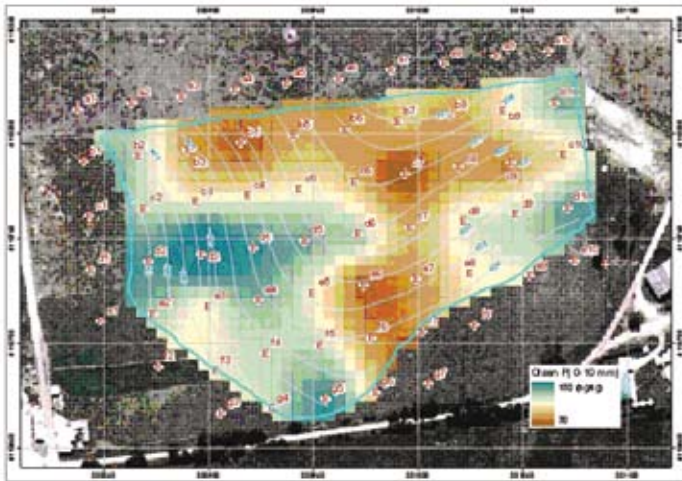


Figure 1. Brenda Park

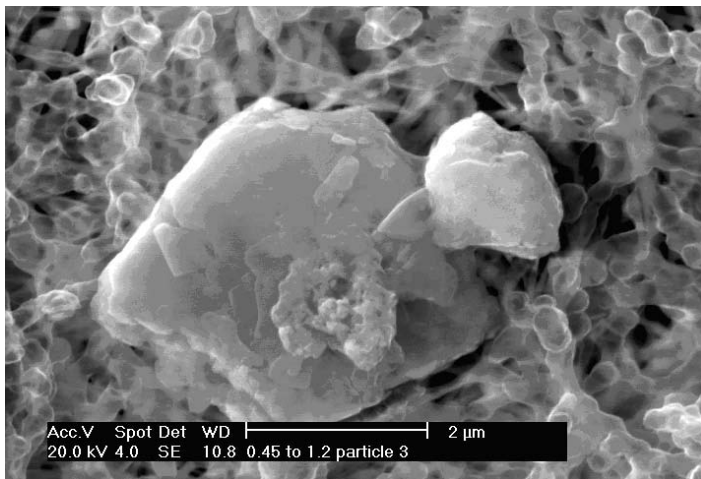


Figure 2. Adelaide University

PROFILE: Introducing Water Researchers within Soil and Land Systems, School of Earth & Environmental Sciences



A surface soil phosphorus (P) map used in the study of P exports from a sub-catchment used for intensive grazing in the Adelaide Hills.



A fine clay particle mobilised in runoff from dairy pastures



Dairy cows grazing a sub-catchment instrumented for runoff in Phosphorus research

Staff and students within Soil and Land Systems carry out a wide range of water related research. There are three groups within SLS, i.e. Spatial Information, Soil Biology, and Soil Physics and Chemistry. Expertise within these groups relating to water research includes remote sensing and interpretation, the chemistry and physics of soil and the influence of soil and land management on water quality. A wide range of expertise is available to assist in issues relating to land management and water quality.

Assoc. Prof David Chittleborough

Pedology – origin and development of soils; catchment processes – mobility of clay and organic colloids in watersheds separation technology – methods for fractionation of organic and inorganic colloids; contaminant transport – movement of P and C through soils and the effect on water quality.

Senior Research Fellow - Jock Churchman

Clay mineralogy; surface chemistry; especially of clays; remediation of nutrient polluted soils.

Senior Research Fellow – Pichu Rengasamy

Soil salinity and sodicity, and their effects on soil physical properties and plant growth.

PhD Students

Warwick Dougherty Processes of Phosphorus mobilisation in surface runoff from intensively managed dairy pastures

Michael Durkay Effect of drainage in the Upper South East on the chemistry of the soils

Sean Mahoney Evaluation and development of the use of multi-temporal imagery for water condition monitoring, environmental and wetland management in the Upper South East of South Australia

Mel Fraser Salinity and sodicity of clay soils in response to drainage

Jordan Foster Water use by native vegetation in soils with strong texture contrast

Mike Williams Fate and Effects of Human Pharmaceuticals in the Aquatic Environment

Honours students

Michelle Sullivan Effect of soil amendments in reducing water movement and their effect on plant growth.

Further information on the Soil and Land Systems Research Group contact Dr Megan Lewis 8303 6522 (megan.lewis@adelaide.edu.au) or visit <http://www.ees.adelaide.edu.au/research/soil/index.html>

Thanks to *Warwick Dougherty* for collating this profile and the accompanying photographs for this edition.

Water Research Cluster Postgraduate Corner: September Postgraduate Forum

The September WRC Postgraduate Forum featured presentations on the Waterproofing Adelaide Strategy and the Urban Stormwater Initiative. The two presenters Steven Rose and Nicholas Newland provided excellent overviews which highlighted the practical difficulties of water management in the multi-faceted context of a metropolitan catchment. The research and information gaps still remaining are startling and lively discussion highlighted the many challenges still remaining.

Steven Rose presented a summary of the Waterproofing Adelaide Strategy, which has assessed all possible options, from the obvious to the totally impractical, in order to provide a solid factual basis for their recommendations for action to provide near 'waterproofing' for Adelaide up to 2025. The Strategy includes the following elements:

- managing our existing resources (River Murray, Adelaide Hills and groundwater)
- responsible water use (household, commercial, agricultural and community)
- additional water supplies and fostering innovation (stormwater and recycled water).

If all recommendations are implemented, Adelaide will be able to reduce its projected water shortfall to manageable proportions in drought years, from the 'do nothing' projection of 35 GL back to 5GL, which could be managed with temporary restrictions. However, it will require a substantial investment of about \$43 million and consistent political will to complete the program to full effect.

Steve Rose highlighted the fact that Environmental & Civil Engineering PhD student Kylie Hyde had a special role in the Waterproofing Adelaide Strategy, applying her assessment method for comparative analysis of various options to reduce the project shortfall in water resources for Adelaide. She worked with the technical team from Water Proofing Adelaide, and used her methodology to validate the preferred options which were included in the final Strategy.

Next Water Research Cluster Postgraduate Forum

Wednesday 7 December
12:00pm – 6:30pm

Field trip to Bolivar Water Treatment Centre and Parafield Airport Wetland includes informal lunch and Christmas drinks sponsored by Water Research Cluster. All Water Cluster postgraduates welcome.

Bookings essential to ensure a seat.
Contact Paul Dalby paul.dalby@adelaide.edu.au

Nicholas Newland quoted a description of the long history since 1919 of meetings on stormwater management between the multiple stakeholders as slow-moving, grudging, and parsimonious. However, in spite of still showing these elements at times, positive breakthroughs have been made in building partnerships and initiatives through the Urban Stormwater Initiative, particularly with the recent production of the Urban Stormwater Management Policy for South Australia. This policy provides a forward-looking, multi-objective framework for the multiple authorities with responsibilities for stormwater management.

The emerging priority for water recycling has given added impetus to projects. The challenges include:

- building cooperation between councils, NRM boards and state agencies
- agreeing on a policy framework
- encouraging innovation
- coordinating planning and establishing best building practices
- encouraging private sector investment
- defining who is responsible for what
- deciding who owns the stormwater.

The key strategies revolve around:

- risk minimisation
- governance
- planning
- environmental sustainability
- funding.

The issue of stormwater management will be a top management priority for many years to come, with increasing urbanisation resulting in increased flood risk and more complex management contexts.



Following the formal presentations, the postgraduate group enjoyed an opportunity for informal networking over lunch.

Water Proofing Adelaide: the challenge of choosing the best options

The great challenge of developing the Water Proofing Adelaide Strategy was the selection of the appropriate mix of options for an effective and sustainable strategy package. An additional challenge was the operating context of established urban areas and water supply infrastructure, as well as the 'greenfields' scenario of new development. This was assisted by the development of an objective assessment tool based on evaluation of best practice in Australian water management and tailored to the specifics of the Adelaide situation.

The strategy developed an integrated approach, featuring:

- Managing our existing resources
- Responsible water use, including reducing demand and reducing losses from the delivery system, and
- Developing additional water supplies and fostering innovation, including new or alternative sources of water.

The selection process needed to find a combination of options which would provide a secure water supply while allowing for social equity, future economic growth and ongoing ecosystem health. The assessment tool needed to compare a diverse range of options on a common basis, and to be able to include factors which did not have clear monetary values.

More than fifty options were evaluated, in a two-tiered selection process which was tailored for the special needs of the Adelaide context to progress towards water-sensitive urban development (WSUD). The first test eliminated some 15 options which did not meet minimum ecosystem or community cost criteria. A further 12 options did not clearly pass the second test and would require significant development work before consideration.

The remaining options were developed further, and in some cases expanded into sub-options, and then ranked for inclusion in the recommended strategy. The assessment process compared actions on a triple bottom line basis and against key principles, calculating a weighted index. The four categories used were:

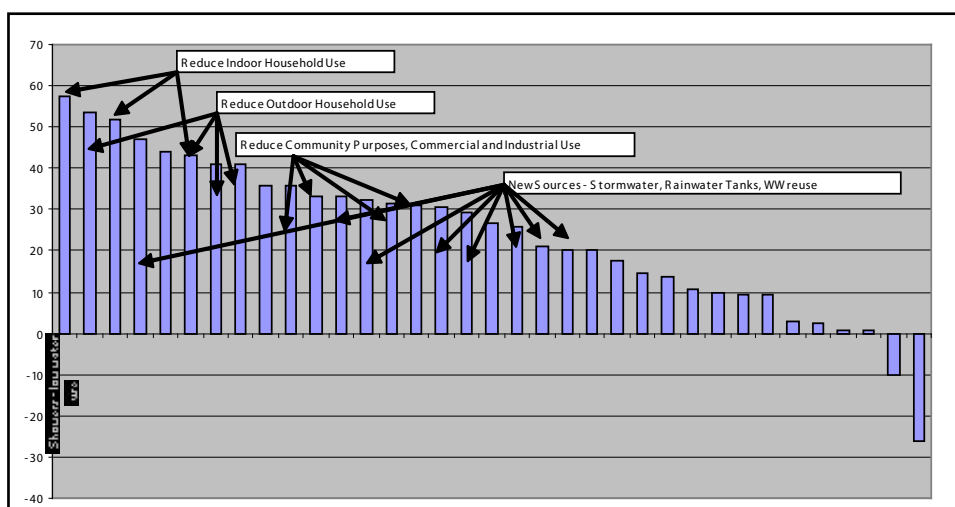
- economic
- social
- environment
- functionality.

Sub-objectives covered within categories included total cost, long term maintenance, public health, risk of water quality incidents, cultural acceptability, environmental impacts, greenhouse impacts, flexibility, adaptability, risk of failure.

The mix of options are summarised in the table and figure provided, which show the relative quantities of potential water savings and the relative sustainability scores for various options.

	Totals (GL)
Responsible water use	
• Permanent water conservation measures	12
• Reduce indoor household water use	12
• Reduce outdoor household water use (additional to permanent water conservation measures)	7
• Reduce community purposes water use (additional to permanent water conservation measures)	3
• Reduce commercial and industrial water use	2
• Reduce losses from mains water system	1
Additional water supplies and fostering innovation	
• Large scale stormwater use projects	11
• Rainwater tanks in new homes	4
• Water sensitive urban development in new land divisions	2
• Recycled water	16
Totals:	70

Efficiency gains and new sources recommended in the Water Proofing Adelaide strategy



Example of sustainability analysis outcomes for Water Proofing Adelaide

The investment in development of this assessment tool allowed the Water Proofing Adelaide team to undertake an objective, rigorous and transparent evaluation of the multitude of options put forward during the public consultation phase of the project, as well as exploring all technical possibilities available to solve this complex and critical challenge in sustainable management. Adelaide now has a comprehensive blueprint for sustainable water management to 2025, ready to implement.

Thanks to Paul Doherty, Technical Manager of the Water Proofing Adelaide team, for providing two papers outlining the assessment process for selecting sustainable options in the Water Proofing Adelaide strategy and his input to this article. Paul is now Manager Systems Planning in SA Water.

More detail on the Water Proofing Adelaide strategy is available at <http://www.waterproofingadelaide.sa.gov.au/>

Water Fact File

It is useful to have some quick water facts at our fingertips for inclusion in presentations and papers. When searching for water facts, it is fascinating to reflect on the source and perspective of the facts presented. The first list is designed for use in children's education by a New Jersey water authority.

The **Kids' Water Zone Fun Water Facts**, where a variety of interesting statements about the world's water resources can be found:

- 75% of the earth is covered with water
- 97% of the earth's water is in the oceans
- only 3% of the earth's water can be used as drinking water
- 75% of the earth's fresh water is frozen in the polar ice caps.

The **Fun Water Facts** focus on the rate of water usage in the United States:

- the average person in the US uses 80-100 gallons of water each day, compared to 5 gallons per day use in medieval times (1 gallon = 3.8 litres)
- it takes 2 gallons to brush your teeth, 2-7 gallons to flush the toilet, 25-50 gallons to shower
- it takes about 1 gallon of water to process 0.25 pounds of hamburger mince
- it takes over 2,000 gallons of water to make four new vehicle tyres.

<http://www.njawwa.org/kidsweb/waterfacts/waterfacts.htm>



A very different perspective comes from an advocate of the use of water as medicine, who affirms that the most important substance for sustaining life is water (**Water Medicine**, Tietze 1995). Tietze lists some special features which are important in the use of water as medicine:

- our body is 75% water
- our brain is 85% water.
- we can survive without food for some weeks but without water for only a few days
- the biological zero of water is 4°C. It decreases in volume only to that temperature, and then expands again. That's why icebergs float, water pipes burst and rocks with cracks fall apart after frost
- water is affected by lunar cycles.

Water has been accepted as an effective medicine in some cultures. In Germany, public health programs fund one water cure per person for up to 6 weeks once every 3 years in the 'rehabilitation before pension' program. There is a strict routine of diet, exercise, rest, drinking mineral waters, no alcohol or smoking, set bed times, limited visitors, professional supervision and health education. Studies show long-term improvement in endurance in the workplace and improvement in chronic illness sufferers, with reduced stress, better physical balance, less rheumatic pain and reduced incidence of illnesses (Tietze 1995).

Financial Support Offered for ARC Linkage Bids

The Water Research Cluster is offering cash support of \$1,000 to University of Adelaide staff to assist in the preparation of applications to the next round of ARC Linkage. The funding can be used to employ casual assistance to prepare budgets, write the grants and liaise with partners.

The \$1,000 is contingent on a number of criteria being met:

1. The research project relates to water and is "multi-disciplinary" in nature
2. The project is ineligible for the Science Faculty support of \$5,000 which requires the CI to be based in the Science Faculty and the industry contribution to be 30% or greater.
3. If you would like to take advantage of this offer by the Cluster, please email paul.dalby@adelaide.edu.au with a brief application that includes:
 - a title
 - a brief description of the project
 - the Chief Investigators and other participating researcher
 - a short justification on why you think the project is multi-disciplinary
 - a list of the industry partners and their contribution
 - a list of the other cash and in-kind resources sought for the project.

Water Research Links – Funding Opportunities

Australian Research Council (ARC)

Linkage – Projects

Internal Closing Dates: 28 October 2005 (Round 2)

http://www.adelaide.edu.au/ari/researchers/grants/ARC_LinkProj.html

A specific objective of this program is to provide opportunities for Postdoctoral and Postgraduate researchers to pursue high quality research collaboration with external organisations.

Australian Research Council (ARC)

Linkage – International Awards

Internal Closing Date: Continuous

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.

Commonwealth Environmental Research Facilities (CERF) Program

Closing Date: 28 October 2005, for Expressions of Interest

<http://www.deh.gov.au/programs/cerf/>

CERF will provide funding for the creation of national multi-disciplinary research hubs. Some funding may also be provided for separate significant projects and fellowships.

Conservation, Food & Health Foundation

Internal Closing Date: 18-Oct-04

<http://www.grantsmanagement.com/cfhguide.html>

Interest: to assist in the conservation of natural resources, the production and distribution of food, and the improvement and promotion of health in the developing world.

George Alexander Foundation

Internal Closing Date: 2-Nov-05

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

Interest: The George Alexander Foundation has an emphasis on helping talented young people, especially those experiencing economic disadvantage, to achieve educational and employment goals. Conservation of the environment is another important interest.

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.

Macquarie Bank Foundation

Internal Closing Date: Apply any time

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

Vetlesen (G. Unger) Foundation

Internal Closing Date: 31-Oct-05

<http://www.monellvetlesen.org/vetlesen/default.htm>

Interest: voluntarily aiding and contributing to religious, charitable, scientific, literary, and educational uses and purposes, in New York, elsewhere in the United States and throughout the world.

Watch for new funding opportunities on the ARI website

<http://www.adelaide.edu.au/ari/researchers/grants/fundingopps.html>

ICE WaRM eNewsletter launched

The first edition of the International Centre of Excellence for Water Resources Management (ICE WaRM) bi-monthly eNewsletter has just been released. In the first edition, information is provided on the Centre's latest developments, including selected events and opportunities through their partners. You are invited to subscribe to the eNewsletter, and to forward the link on to other interested colleagues.

<http://www.icewarm.com.au/mailman/listinfo/enews>

If you would like to advertise or send material for inclusion in this Water Research Cluster Newsletter, please contact Dr Paul Dalby on: 0401 122 204 or paul.dalby@adelaide.edu.au

This edition edited by Anne E Jensen, Environmental Consultant contact ajensen@chariot.net.au mobile 0407 170 706