

# WATER RESEARCH CLUSTER

# Newsletter



THE UNIVERSITY  
OF ADELAIDE  
AUSTRALIA

December 2004

As the year comes to an end, the Water Research Cluster is in celebration mode. Researchers from the Water Research Cluster have been successful in the latest round of funding from the Australian Research Council. The Cluster is keen to encourage more collaborative projects for the next round which is due in April 2005.

For those of you who are interested in honing your skills or gaining an edge in the employment market, the newsletter highlights the details of a national course in Integrated Catchment Management, to be held in September of 2005 in Adelaide.

We summarise the research priorities identified by the Australian Water Conservation and Reuse Research Program which has just released its latest report.

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# New Projects Funded in Water Research by ARC

A number of Water Research Cluster members were successful in the latest Australian Research Council round of funding. These projects are described briefly below.

If you would be interested in collaborating with the University to prepare a bid for the next round of funding, now is the time to contact Paul Dalby or a researcher in the field to start preparing your bid. **Well done to all successful candidates.**

## Understanding the fluid mechanics of unsteady friction

\$435,000

Dr Jim Denier; Dr RM Kelso; Dr AR Simpson; Emeritus

Professor JA Liggett

Contact: Jim Denier, 08 8303 5094, [jdenier@maths.adelaide.edu.au](mailto:jdenier@maths.adelaide.edu.au)

Unsteady fluids flows are common in the fields of technology, engineering and physiology. This project brings together a multi-disciplinary team to consider the issue of unsteady friction. The research will focus on understanding the behaviour of water in pipes when subject to very fast transient events (such as those which cause the common problem of water hammer in the home).

In unsteady pipe flow, the frictional aspects have long been calculated using steady-flow formulas, which are demonstrably incorrect. Previous research work has limited application because it based on empirical modeling, rather than on systems based on an understanding of the fundamentals of fluid mechanics of boundary layers in unsteady flow. This research will discover these fundamentals through flow visualisation, detailed velocity measurement experiments and by sophisticated numerical simulation. Those fundamentals will be used for the interpretation of laboratory experiment results and numerical calculations in systems. Primary applications are in unsteady pipe flow, especially inverse problems, for detecting leaks in pipes.

The project will produce new results that will be used by water engineers to design improved techniques for the rapid non-invasive identification of leaks in underground pipelines. As such the research has the potential to contribute huge savings to Australia's increasingly valuable water resources

## European impact on Eastern Australian coastal lakes: understanding pre-impact conditions and post-settlement modification.

\$266,000

Dr John Tibby (Geography and Environmental Studies)

Contact: 08 8303 5146, [john.tibby@adelaide.edu.au](mailto:john.tibby@adelaide.edu.au)

Coastal lakes are vulnerable to European impact, yet little is known about how they have been altered in the last 200 years. For example: Are blue-green algal blooms a natural occurrence in coastal lakes? How long have freshwater lakes been isolated from the ocean?

Preliminary results indicate that, at key sites, blue-green algae were more abundant before European settlement and that coastal lakes thought to be permanently fresh have been exposed to the ocean within the past 200 years. By documenting change at representative sites, the project will identify which lake types are most vulnerable to impact. Results from the project will ensure that costly restoration efforts are not misplaced.

## Sediment-derived scenarios of wetland status and change, the Lower River Murray, SA.

\$187,953

Dr Peter Gell (Geography and Environmental Studies)

Contact: 08 8303 4774, [peter.gell@adelaide.edu.au](mailto:peter.gell@adelaide.edu.au)

River Murray wetlands changed early in European settlement so the pre-impact conditions are invisible to managers relying on anecdote or monitoring. Baseline conditions of wetlands can be derived from ecological archives preserved in sediments. Fossil diatom assemblages, reflective of past water quality, and other fossils, will be exhumed from sediment sequences to reconstruct wetland conditions. The integration of multiple indicators of the past will generate graphic re-enactments of natural wetland dynamics. These will provide a vision for community and government on-ground managers enabling them to perceive appropriate targets for wetland state and so generate measures to work towards sustainable conditions.

The ARC will provide \$178,000 across the three years of 2005-07 supported by an additional \$90,000 cash and \$99,000 in kind contributions from the River Murray Catchment Water Management Board.

Dr. Gell and his team will explore the limnological histories of 10-12 key wetlands through the riverland of South Australia providing insights of past states and trends of water quality and aquatic ecosystems.



Lake Ainsworth a coastal dune lake near Ballina, northern NSW. The lake was, until recently, thought to be 'permanently' freshwater, but core based studies have revealed regular connection to the ocean.

# Australian Water Conservation and Reuse Research Program

The first stage of the Australian Water Conservation and Reuse Research Program involved twelve reviews of knowledge gaps and other factors considered to impede improved urban water management. The key research issues identified by the Program are listed below.

## The big picture

- Water recycling in Australia.
- A review of stormwater sensitive urban design in Australia.
- Integrated urban water management: A review of current Australian practice.

## Social acceptance

- Factors affecting public perceptions of water reuse.

## Health and risk assessment

- The fate of viruses and other pathogens: health risks in non-potable reuse of stormwater and reclaimed water.
- Quantitative microbial risk assessment in water recycling

## Implementing new technology

- Innovation in on-site domestic water management systems in Australia: A review of rainwater, greywater, stormwater and wastewater utilisation techniques
- Review of national & state plumbing codes to facilitate domestic water reuse

## Agricultural and Environmental Issues

- Endocrine disrupting chemicals, pharmaceuticals and personal care products in reclaimed water in Australia.
- Impacts on crop quality from irrigation with reclaimed water.
- Impacts on soil, groundwater and surface water from continued irrigation of food and turf crops with reclaimed water.

## Economics and contractual arrangements

- The economics of water: Taking full account of first use, reuse and return to the environment
- Exploring the institutional impediments to water reuse
- The reclaimed water agreement manual

A series of state workshops that were conducted in May 2004 will provide a basis for establishing a national portfolio of innovative demonstration projects that will produce direct local benefits and provide field laboratories for research on the identified priority issues.

A review paper prepared for the Program gives a summary of progress of the program and assesses its contribution to coordination of national and international research efforts for the advancement of management of urban water resources of all types.

For more information, contact Peter Dillon from CSIRO or download the review and supporting documents from <http://www.clw.csiro.au/priorities/urban/awcrp/>

## Summer Student to Undertake Study on Artificial Wetland

Elizabeth Cala is a Geography student at The University of Adelaide who has received a Summer Research Scholarship. The scholarship is awarded for a six week research study in an area of interest applicable to the student's degree. Elizabeth has undertaken to scope environmental options for the Bakabakandi (Victoria Park) artificial wetland development for Adelaide City Council. The Bakabakandi artificial wetland development would form part of the South Park Lands Flood Mitigation and Creek Restoration project, which will formalize existing areas of flood detention, increase detention capacity with wetland style detention and rehabilitate the Park Lands Creek.

The Council's aims for the Bakabakandi artificial wetland development are to:

- Retain stormwater for irrigation use, with the potential for ASR
- Flood mitigation
- Improve the amenity of the area
- Achieve biodiversity and water quality benefits.

Within these aims, there are a range of management strategies which can be adopted. Elizabeth will be investigating management strategies, evaluating the social and environmental impacts of these strategies and identifying an appropriate management strategy that meets the needs of Adelaide City Council and maximizes environmental and social outcomes. She will be supervised by Neil Ward at the ACC and Peter Gell at the University.

Elizabeth is aware of the interest of some of the cluster members in artificial wetland issues and she may be contact you to discuss the project over the summer. She can be contacted on: [elizabeth.cala@student.adelaide.edu.au](mailto:elizabeth.cala@student.adelaide.edu.au)

Summer Students Scholarships are an effective and efficient way of undertaking a short, intensive research project. Students who work on these projects often end up working for the organisation who sponsored them. If you would be interested in being involved as a sponsor of a Summer Student Scholarship, please contact Paul Dalby on 08 8303 6697 or [paul.dalby@saugov.sa.gov.au](mailto:paul.dalby@saugov.sa.gov.au)

# Water Research Links - Funding Opportunities

Closing dates for grants: January - March

## Australia and Pacific Science Foundation

Internal Closing Date: 18 March 2005

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

Purpose: Encourage high quality research by scientists in Australian national or state institutions, and universities. "Seed money" to initiate projects, which may subsequently expand and attract major funding from other sources

## Australian Research Council (ARC) Linkage – International Fellowships

Internal Closing Date: 1 March 2005

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

Purpose: The reciprocal exchange of postdoctoral researchers under international agreements

## 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

## AWWA (American Water Works Association) Research Foundation (USA)

Internal Closing Date: 19 January 2005

<http://www.awwarf.org/research/projectAdmin/proposalGuidelines.aspx>

Purpose: Advancing the science of water to improve the quality of life

## French-Australian Science and Technology Programme (FAST)

Internal Closing Date: March – more details released on website in January

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

Purpose: Promote and support scientific and technological cooperation between Australian and French researchers in both public and private sectors

## International Science Linkage

Internal Closing Date: More details released on website in January

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

Purpose: Promote innovation and competitiveness by increasing Australian access to global research and technologies and facilitate their uptake by Australian researchers and firms, particularly small to medium sized enterprises

## George Alexander Foundation

Internal Closing Date: 22 Jan 2005

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

Purpose: to develop partnerships with communities, government and the private sector to prevent irreversible damage to the environment and to encourage the maintenance of biodiversity

## Ian Potter Foundation

Internal Closing Date: usually February, to be announced

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

Areas of interest: Arts, Education, Environment & Conservation, Health, Medical Research, Science, Social Welfare, Travel

Applications for programs which cover more than one area are encouraged.

## 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. Opportunities that are innovative and genuinely responsive to the community's needs

## 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

## PADI Foundation (USA)

Internal Closing Date: usually January, to be announced

<http://padifoundation.org>

Supports: underwater science, environmental projects

## 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

Keep you eye out for new funding opportunities on the ARI website

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

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

[pdalby@internode.on.net](mailto:pdalby@internode.on.net)



## Profile: Greer Kingston

**PhD Student:** Environmental and Civil Engineering

**Supervisor:** Holger Maeier

**Research topic:** Artificial neural networks applied to water resource modelling

Greer Kingston started out her research career modelling algal populations in water bodies. Following the successful completion of an Honours degree with Holger Maeier where she received first class honours, she started out her PhD with all of the intentions of modelling algae in the River Murray using artificial neural networks (ANNs).

Greer was dissatisfied with the available ANN software because it did not take into account uncertainty in the model parameters, so she started writing her own models and applying them. Her research has now changed its emphasis to focus more on modelling techniques. Algal modelling is now just a case study in her thesis.

By using Bayesian methods and her own programs and models, Greer is currently involved in modelling rainfall runoff in Boggy Creek (Victoria) and Scott Creek in South Australia. She has also begun modelling algae and salinity concentrations in the River Murray.

In June, Greer attended the International Environmental Modelling and Software Society conference in Osnabrück in Germany where she presented a paper on her work. I asked Greer what was most rewarding about the conference:

“It was good to meet everyone I had read about in the literature, but it was fantastic to have my research accepted and it confirmed that what I am doing in my research is unique”.

A research career beckons Greer once she has finished her PhD in mid 2005.

“I would like to do research in a different environment, perhaps in CSIRO or a government agency. I want to keep solving practical problems and would be interested in traveling interstate or overseas, maybe the Netherlands or the UK”.

If you are interested in talking to Greer about her research, you can contact her on 08 8303 3740 or email [gkingsto@civeng.adelaide.edu.au](mailto:gkingsto@civeng.adelaide.edu.au)

## Water Research Cluster Christmas Party

You are invited to the end of year Water Research Cluster Christmas Celebration.

This inaugural and auspicious event will be held at

**Scoozi's Caffe on Rundle Street in the city**

**at 12:30pm on 22 December 2004.**

*You'd have to be a drip to miss out!*

RSVP: [joanne.manuel@adelaide.edu.au](mailto:joanne.manuel@adelaide.edu.au) by 17th December.



CRC for Water Quality  
and Treatment



THE UNIVERSITY  
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AUSTRALIA

## Short Course INTEGRATED CATCHMENT MANAGEMENT

19 September – 30 September 2005.  
WAITE Campus, Adelaide.

This course provides participants with an understanding of:

- (1) ecological and hydrological processes governing catchment systems, and
- (2) concepts for the assessment and management of catchment systems.

On completion of this course participants will be able to:

- (1) assess catchment systems regarding:
  - the hydrological, chemical and biological status,
  - the land use, hydrology and nutrient transport,
  - the point and non-point sources of nutrients,
  - the vegetation composition, biomass and productivity,
  - the stream water quality and environmental flows,
  - the salinisation and eutrophication of soil and water.
- (2) recommend sustainable management options for:
  - agricultural land use,
  - revegetation/reforestation,
  - land and stream restoration,
  - salinisation control,
  - eutrophication control.

Field practicals will be conducted in the Bradbury catchment in order to gain skills for the monitoring, assessment and management of such catchments, and to collect water, soil and vegetation samples. Laboratory practicals will be conducted for the chemical and physical analysis of soil and freshwater samples, and the identification and assessment of vegetation samples.

Participants are required to complete an assignment on the assessment of the Bradbury catchment based on data analysis from field and laboratory practicals.

**Course Fee:** \$ 4,500 (plus GST)

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