

WATERRESEARCH Centre Newsletter

June
2009

What's happening at the Water Research Centre (WRC)

In this issue:

- WRC News
- WRC Profiles
- WRC Postgraduate Corner
- Water Droplet Series
- Water News Updates
- Conference Diary



Photo: courtesy of Paul Harvey

As bad as it gets in the Lower Lakes?

Aerial view of Currency Creek and the Finniss River, 2 March 2009. Lake Level -0.9m AHD

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Information about the Water Research Centre's structure and members, and other Water Links, can be found at:
www.water.adelaide.edu.au

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Environment Institute Takes Off

Launched on the eve of World Environment Day, 4 June, the University of Adelaide's Environment Institute has opened up new opportunities for the water research community.

Water is heavy and requires a lot of energy to lift and even more to clean. One of the more interesting challenges is to find ways to make energy use more efficient. Three way partnerships among water researchers, energy researchers and industry are starting to emerge. The opportunities are massive and the potential for savings enormous – SA Water is one of the energy industry's biggest customers.

There is a flip side to the energy water nexus. Many of the technologies used to produce electricity use large amounts of water. Finding ways to save water is of interest to the electricity industry.

Cleaning up and finding better ways to recycle water is another part of the emerging research agenda and always has been. One of the more recent marine research findings is that the installation of purple pipes that carry recycled water back into the city is restoring the health of Gulf St. Vincent. Observations like these can dramatically change how policy people assess the benefits and costs of different ways of using water.

Water connects landscapes and people together. Understanding the nature of this connectedness and finding ways to ensure that all connections lead to positive outcomes is one of the Environment Institute's biggest challenges.

At the launch, South Australia's Minister for the Environment, Jay Weatherill, invited Environment Institute scientists to set up a revolving door with his departments. He imagines a brave new world where scientists can spend part of their time working in government and part in the University assembling the knowledge necessary to help managers make the right decisions and take the right actions.

We are now seeking opportunities to establish similar revolving door policies with industry and with the community. If you are interested in developing such a relationship, our door is open.

Mike Young

Director
The Environment Institute

Special WRC Event

The next WRC Water Wednesday seminar is scheduled for 15 July. The theme will be 'Sustaining the River Murray with less – how science can enable water managers and business investment to manage sustainably with 30% less water'.

Special guest speaker will be Dr Bill Young, coordinator of the CSIRO Sustainable Yields Project for the Murray-Darling Basin, and now seconded to the new Murray-Darling Basin Authority.

The second speaker (yet to be confirmed) is expected to be the new Commissioner for Water Security, Robyn McLeod, who has been invited to present the new Water Security Plan hot off the press.

The third speaker will be Assoc Prof George Ganf, who has just completed a project to identify the volumes of water needed to fill wetlands along the River Murray mainstream, and he will talk about the environmental needs of the Murray system.

Water Wednesday will be held in the Napier 102 Lecture Theatre, commencing at 5:30 pm and concluding at 6:45 pm following a combined question session. Please register at environment@adelaide.edu.au with 'Water Wednesday' in the email subject line. All are welcome to attend this open event.

New WRC website

<http://www.adelaide.edu.au/environment/wrc/>

A new website is being developed for the Water Research Centre (WRC). Although this website is now live and features information about the research themes within the WRC and the principal researchers involved, there is much more to come, including information about affiliates and postgraduate researchers.

In the near future, links to WRC events, publications and postgraduate forums will be made available. The current newsletter, and links to archived newsletters, can now be found at the following link: <https://webdev.adelaide.edu.au/environment/wrc/news/newsletters/>



Water Research Centre
Capability and expertise in water

Dunstan Environment Dialogues: The Water Rush of the 21st Century

The first Dunstan Environment Dialogue, coordinated by the Don Dunstan Foundation and the Environment Institute of the University of Adelaide, was held 18 June. The topic of the first Dialogue was 'The Water Rush of the 21st Century'.

The Dunstan Environment Dialogues are public forums designed to stimulate debate on how to better manage our environmental resources. The forums will be held as part of a series exploring the idea of a Green New Deal for Australia, to address nationally important issues of water, energy, biodiversity and social justice.

The Dialogue format also represented a novel discussion style, with an informal conversation chaired by Professor Mike Young, Director of the Environment Institute. Mike invited introductory comments from each of the guest speakers, leading thinkers in their fields, before conducting a wide-ranging discussion including members of the audience. This first Dialogue was particularly successful in attracting a diverse and well-informed audience who contributed to a lively debate.

The guest speakers and introductory comments were as follows:

Professor Graeme Dandy, of the School of Civil, Environmental and Mining Engineering at the University of Adelaide, explained the complex systems supplying water to South Australians, and the equally complex systems removing sewage and collecting storm water. Graeme suggested that the subject of recycling stormwater could develop into a new economy, with the potential to supply one-third of Adelaide's water needs. Greenfields developments will offer opportunities for incorporating recycling and re-use at a local scale.

Dr Richard Denniss, Executive Director of The Australia Institute in Canberra, had some unexpected perspectives to get everyone

thinking. Richard is an economist with a particular interest in the role of regulation. He highlighted the need to know where water is being bought back before investing in irrigation infrastructure upgrades. He also expressed concern about the energy costs of desalination plants and the impact of increased carbon emissions.

Mr Ross Young, Executive Director of Water Services Association of Australia – a group based in Sydney, said that Canberra and Melbourne have already declined to 2060 prediction levels for inflows in their water supply catchments. These dramatic changes have led to major infrastructure investment of \$30 billion to diversify water sources. Ross had all the statistics on urban use and options for future water supplies at his fingertips. Aided as such, he presented a relatively optimistic view that the current infrastructure investment will be sufficient to secure water supplies to cities and high density populations across Australia.

Throughout the course of the evening, audience participation was very productive, with some well-placed, astute questions demonstrating that the audience possessed a great depth of understanding about water issues. The water issues covered on the night included the impact of continuing population growth through migration, water prices, trading water from agricultural to urban use, continuing smart water saving practices when restrictions are eased, and how to address over-allocation of resources.

Water is a subject of paramount importance in South Australia and discussions regarding water issues will continue to dominate the public arena. For example, 'Options for the Coorong and Lower Lakes', an issue at the forefront of many people's minds, will be addressed at a later date with the participation of relevant experts providing a factual basis for debate on this specific topic. Without a doubt, there is plenty of scope to continue discussions about water for quite some time.

The first Dunstan Environment Dialogue was certainly engaging and stimulating, paving the way for more debates in this much more interactive format.

First Water Linkfest hailed a success

A new format for creating networks and identifying complementary skills has been trialled successfully by the WRC. The first Water Linkfest on 11 June attracted 25 participants, with many new faces achieving the cross-disciplinary links we are looking to establish. The concept is modelled after the earlier Pitchfest series.

The theme for the first Linkfest was 'Sensors and Sensing Applications', with applications ranging from nano-scale photonics to landscape-scale spectral and satellite imaging. The proceedings were opened by Dr Paul Dalby, business manager and facilitator for the Environment Institute. Four presenters were given 5 minutes each to pitch their research topics, results, ideas and suggestions for potential collaboration on project proposals and research linkages.

Dr Heike Ebendorff-Heidepriem
Fibre optic sensors

Heike presented the fascinating world of hollow optical fibre technology, and demonstrated some of the ever-expanding applications in sensing, both in the field and in the laboratory. This world-first technology is available to the Water Research Centre for innovative applications and development.

Heike is Deputy Director of the Centre of Excellence in Photonics (CoEP) within the School of Chemistry & Physics at the University of Adelaide. CoEP designs and makes optical fibres and nano/microstructured fibres. Applications of this technology include real-time *in-situ* sensing of (bio)chemicals. Heike can be contacted at: heike.ebendorff@adelaide.edu.au

Assoc Prof Megan Lewis
Sensing applications: spectral and spatial

Megan gave a comprehensive overview of the capabilities of the Soil and Land Systems Group in spectral and spatial data analysis at the landscape scale. This was a very timely demonstration of the rapidly evolving technologies for better monitoring of landscape condition. The broad applicability of these tools means this group is well placed for innovative research partnerships.

Megan is Head of the Discipline of Soil and Land Systems within the School of Earth & Environmental Sciences at the University of Adelaide. Megan can be contacted at: megan.lewis@adelaide.edu.au

Dr Anne Jensen
Sensing applications at a floodplain scale

Anne pitched from the research side of the equation, looking for opportunities to adapt evolving technologies to analyse and monitor soil moisture availability for river red gum communities, not only in the River Murray Valley but also across the Flinders Ranges and Mid-North regions. A paucity of long-term, broad-scale data on hydrology and hydrogeology hinders investigations into red gum health and projected survival. Without these data, it is very difficult to determine what the natural water sources are in different habitats. The questions that need to be answered are, 'How they are changing through time? What are the causes of change? And what are the management options to address the problem of declining water sources for the trees?'

Anne is a consulting scientist for the Freshwater Ecology theme of the WRC. Anne can be contacted at: anne.jensen@adelaide.edu.au

Prof Martin Lambert
Using fluid transients to detect anomalies in pipe systems

Martin proved that you do not have to be physically present to participate in Water Linkfest, with his presentation via video proving just as effective in telling his story of technologies developed for detecting deterioration and blockages in long-distance pipeline.

High speed pressure waves are used to map: internal corrosion; improperly sealed or incorrectly closed valves; and blockages inside major pipelines, such as the Morgan-Whyalla connection. This technology has widespread application in condition assessment of thousands of kilometres of pipes buried underground.

Martin is Head of the School of Civil, Environmental and Mining Engineering at the University of Adelaide. Martin can be contacted at: martin.lambert@adelaide.edu.au

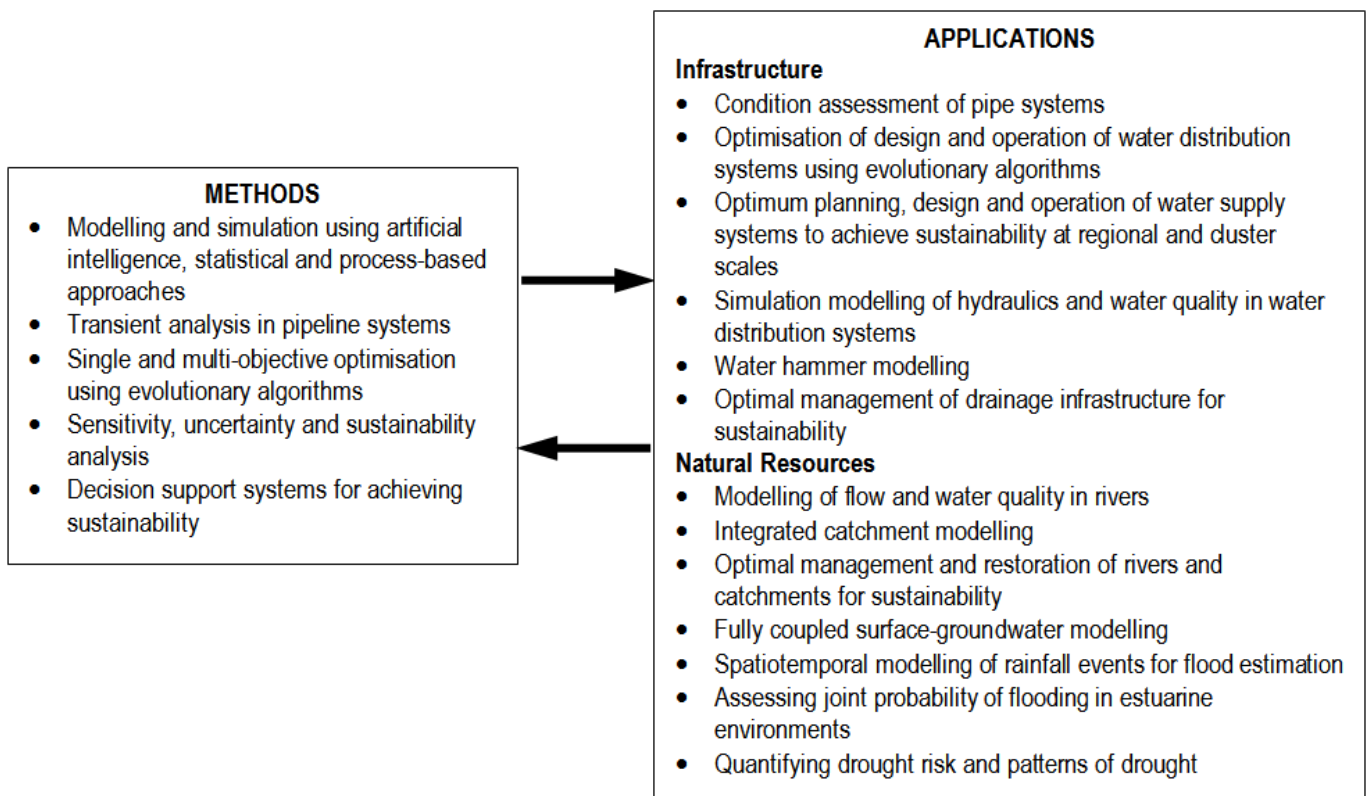
Each presentation was punctuated by a short question period, often also involving expressions of interest in potential collaboration. Following the formal presentations, lively discussion continued for another hour over drinks and cheese, with several invitations issued for meetings between interested groups to develop linkage ideas. The next Water Linkfest will feature the theme of 'Modelling and Predictions' and will occur on 31 July.

For more WRC information, contact Justin Brookes at: justin.brookes@adelaide.edu.au

WRC Profiles

Research Overview

The Sustainable Planning, Design, Operation and Management of Infrastructure & Natural Resources focuses on novel methods for achieving its namesake, as well as a range of application areas shown in the figure below. This research is supported through a number of different avenues, including ARC Discovery and Linkage grants, the eWater CRC and a range of industry partners, such as the Department for Land, Water and Biodiversity Conservation, the Murray Darling Basin Authority, United Water and SA Water. Case study projects have focussed on Adelaide's water supply system, the River Murray and the Upper South East Region of South Australia.



People

This Research Group is part of the School of Civil, Environmental and Mining Engineering and includes 4 Academic staff members, 5 full time research staff and 15 PhD students. To find out more about this Research Group, please direct all queries to one of the Academic staff: graeme.dandy@adelaide.edu.au, holger.maier@adelaide.edu.au, angus.simpson@adelaide.edu.au, or martin.lambert@adelaide.edu.au

Academic Staff

Professor Graeme Dandy:

Graeme's research interests include sustainable management of urban water systems using multi-objective optimisation techniques; optimisation of water resources planning and management using evolutionary algorithms; use of artificial neural networks for forecasting flow and water quality in rivers; sensitivity analysis and uncertainty of integrated water resources models.

Professor Holger Maier:

Holger's research interests span a range of techniques in water resources and infrastructure modelling and management, including modelling using artificial neural networks (ANNs) and process-driven models, optimisation using genetic algorithms (GAs) and Ant Colony Optimisation (ACO), uncertainty and sensitivity analysis and sustainability, as well as a range of application areas, including natural resource management and urban water supply.

Professor Angus Simpson:

Angus' research focuses on simulation modelling of water distribution systems, optimisation of water distribution system design and operation using evolutionary algorithms, multi-objective optimisation to account for life cycle sustainability of pipe pumping systems, water hammer modelling and condition assessment of pipe systems using transient analysis.

Professor Martin Lambert:

Martin's research interests cover the two areas of hydraulics and hydrology, including the analysis of transients for pipeline condition assessment, open channel flow and ecohydraulics for assessing habitat complexity and stochastic hydrology for assessing climate variability, flood estimation and drought response.



Pressure measurement sensor for hydraulic transient analysis. This is part of an ARC Discovery project to develop techniques that non-invasively assess the condition of a long pipeline sections by analysing reflections from pressure waves.

Research Staff

Dr Matthew Gibbs:

The aim of Matt's research is develop a Decision Support Tool to assist in the management of the regulators in the drains and wetlands in the Upper South East region of South Australia. This involves the modelling and optimisation of the rainfall-runoff processes, hydraulics of drains, wetland ecology and groundwater influences in the region.

Dr Young-il Kim:

Young-il has developed an advanced transient analysis model that can simulate various pipeline unsteady flow conditions including unsteady wall friction and various local flow components, and has investigated pressure wave reflections of intentionally injected waves for pipeline fault detection and condition assessment by the signal analysis.

Mr Michael Leonard:

Michael's research is into space-time rainfall patterns observed in rainfall records. He uses point process models to stochastically generate patterns of rainfall that reproduce key statistics at a wide range of temporal and spatial scales, for example means, variances, correlations and dry portions.

Ms Jakin Ravalico:

Jakin's research involves development of new for methods of sensitivity analysis using single and multi-objective evolutionary algorithms, for models used to assist decision-making. She is also currently investigating the use of multi-objective genetic algorithms for the optimisation of urban water systems, with the goal of improving sustainability of the systems.

Mr Aaron Zecchin:

Aaron has focussed on single dimensional time and Laplace-domain transient models for pipeline fluid flow, frequency-domain pipeline fault detection and estimation methods and behavioural analysis of population based meta-heuristics and their application to water resource problems.

PhD Students

Ms Nicole Arbon:

Nicole's research is focussed on the development of hydraulic transient based analysis techniques for the non-invasive condition assessment of water distribution systems. The research includes the field application of transient testing in the Adelaide Metropolitan Water Distribution System.

Mr Darren Broad:

Darren's research is focussed on increasing the computational efficiency of the optimisation of water distribution systems by using artificial neural network metamodels so that water quality and reliability can be taken into account in addition to hydraulic considerations.

Ms Abigail Goodman:

Abby is investigating the tolerance of freshwater plants to increases in the salinity concentration of water in wetlands, and is aiming to use a Bayesian modelling approach to assess the effects of increasing salinity on the occurrence of these plants.

Ms Gayani Fernando:

Gayani's research is focussing on developing a robust dynamic model averaging framework to reduce the prediction uncertainty and to improve the prediction accuracy in hydrological modelling.

Ms Li Li:

Li Li's research is focused on developing a better understanding of the relationship between base flow and physical catchment characteristics by using fully coupled surface-groundwater models

Mr Robert May:

Rob is interested in techniques to develop artificial neural networks used for modelling water quality in distribution systems, modelling treatment processes, and remote sensing of water quality variables.

Mr Steven Need:

Steven uses continuous simulation and regression approximation models to study the occurrence of flooding in reaches that are subject to multiple forcing events, such as estuarine environments that are subject to jointly occurring elevated oceans and freshwater inflows. Steven has also developed stochastic models of cyclone tracks to allow for the incidence probability of extreme events at certain locations and has applied his models to flooding in the Bay of Bengal region.

Mr Jeffrey Newman:

Jeff's research looks to develop optimisation methods for the planning decisions regarding the urban water cycle of Greenfield developments, thereby characterising the relevant water flows and storages.



Structures for regulating flow in deep drains in the Upper South East of South Australia. There is an ARC Linkage project that is developing a decision support system for the complex system of drains in the Upper South East region of South Australia in order to balance the needs of flood protection, combating soil salinisation and providing environmental flows to the region's approximately 200 wetlands.

Mr Alexander Osti:

Alex has focussed his research on patterns of drought occurrence. He uses various random field models to mimic drought patterns across large portions of Australia and significant basins such as the Murray-Darling. Alex has developed various statistics that are useful for characterising drought, such as severity area frequency curves and drought perimeter metrics.

Ms Fiona Paton:

Fiona's research explores a multi-objective optimisation approach to help sustainably manage and plan a city's urban water supply system.

Mr Daniel Partington:

Daniel is focusing his research on improved analysis and diagnostic capability of fully coupled surface-water/groundwater models.

Mr Tim Rowan:

Tim is interested in investigating how climate change, climate variability and water management policies interact to affect the sustainability of water-dependent agricultural systems.

Mr Andrew Skinner:

Andrew's research has developed new sensors that measure very low flows for use in a wide variety of environmental monitoring applications, for example, measuring reservoir temperature profiles, and monitoring vine moisture levels for improved irrigation.

Ms Joanna Szemis:

Joanna's research focuses on developing an optimisation methodology for implementation of catchment restoration practices using ant colony optimisation algorithms.

Ms Wenyan Wu:

Wenyan's research is focussing on the multi-objective optimisation of Water Distribution Systems to reduce both the cost of and Greenhouse emissions from these systems.

Honours Students

The research group generally includes between 16 and 32 final year research students, who work on projects in groups of 4.

Recent Awards

Fiona Paton, Ian Laing Prize, Hydrological Society of South Australia, 2009

Fiona Paton, John Baulis, Lisa Lloyd and Ben Stanford, Sustainability Prize, Engineers Australia, 2009

WRC Postgraduate Corner

The Water Research Cluster hosts a quarterly forum for postgraduates who are studying water-related topics, to provide opportunities for building networks and contacts, and to experience alternative techniques and fields of research.

The most recent postgraduate forum, held 12 June, dealt with the topic of the Lower Lakes. In particular, the issues of acid sulphate soils and increasing salinity in and around Lake Alexandrina were witnessed first-hand as part of a field trip organised through the office of Hon David Winderlich MLC (Australian Democrats), with proceeds going to the River, Lakes and Coorong Action Group. Being open to the public, this trip comprised an even mix of postgraduate students and non-academic residents of Adelaide.

David hosted this 'Acid Trip', as it has been promoted by his office, and introduced us to several people involved in addressing the issues of the Lower Lakes, including tour guides Assoc Prof Keith Walker (freshwater ecologist) and Prof Diane Bell (anthropologist).

Our first stop at Milang included seeing how school children are helping to rescue turtles from tube worm encrustations caused by increasing salinity levels in Lake Alexandrina. We met and heard from several children, one of their mentors, and Karyn Bradford (Co-ordinator of the Milang Old School House Community Centre). The catastrophic impact that changes to the lake are having on turtles was startling to see first-hand.



School children actively involved in rescuing turtles from tubeworm encrustations in the Lower Lakes. Assoc Prof Keith Walker and Prof Diane Bell look on.



A picture is worth a thousand words.



Is it any wonder turtles are dying in the Lower Lakes?



The thankless task of scraping off tubeworm encrustations – difficult, messy and stinky!



Milang foreshore. Redundant sign, stranded boats, and vegetation re-growth.

The second stop was at Point Sturt, to visit the property of Anne Hartnett (local cattle farmer and Chair of the River, Lakes and Coorong Action Group). Here, everyone had the opportunity to observe acid sulphate soil testing along the edge of the lake. Re-growth through the acid-sulphate soils could also be seen there.



Turtle enclosure at Milang Old School House Community Centre. Rescued turtles warm up in the sun after soaking treatment and having tubeworm encrustations removed.

While at Milang, the tour proceeded to the lake shore to observe just how far the shoreline had receded in the past two years. Vegetation re-growth could also be observed across much of the now exposed area of lake bed. Efforts to re-vegetate these exposed soils are a source of pride for the locals of the Lower Lakes.



Acid sulphate soil test result at Point Sturt – about 3.5!

The tour stopped for a lovely lunch in Clayton, where we heard more from Keith, Diane, and also from Carole Richardson (Bioremediation Project Officer and member of the Clayton Foreshore Committee). Between the science and the social concern expressed by those at lunch, it was made abundantly clear just how important having a restored freshwater lake is to the people who live near the Lower Lakes.



Snug Cove, near Clayton. Evidence of recent rain, however water levels are still very low.

From Clayton, the tour proceeded to nearby Snug Cove, a Ramsar site, to see the impact of low water levels and recent rains on the wetlands. Not far from there, the tour also visited the proposed site for the weir (regulator) at Clayton. Regardless of the names given to these structures (e.g. weirs, dams, regulators), they all represent man-made obstructions to natural flows of water and wildlife. Despite providing well-argued short-term benefits, the burning question on the lips of locals is, “What are the long-term impacts of these structures?”

Travelling up the Finnis River, from its confluence with Currency Creek at the Goolwa Channel, the tour then visited Finnis Ford to observe acid testing of the water and to hear details about the construction of pipelines and pumping regimes to deliver water to regions such as Langhorne Creek.



Finnis River at Finnis Ford.

The final stop of the tour was at Wally’s Landing, and anabranch of the Finnis River. This is the location that Minister Maywald cited as having an acidified stream on 12 May. Testing of the water one month later demonstrated that it was in fact close to a neutral pH of 7, suggesting that there may be efforts on the part of the government to exaggerate the real impact of acid sulphate soils in the area. The last thing we observed before heading back to Adelaide (via a quick and welcome stop in Goolwa for warming beverages) was a liming site just downstream of Wally’s Landing.



Liming site downstream of Wally’s Landing



‘Acid Trip’ participants at Wally’s Landing.

A great deal of thanks goes to all of the members of the River, Lakes and Coorong Action Group, as well as David Winderlich’s office, for organising such an informative and enjoyable ‘Acid Trip’.

(All ‘Acid Trip’ photos taken by Eric Nicholson)

Water Droplet Series

Prof Mike Young and Jim McColl continue to produce their series of Droplets, which are short discussion papers on water management issues. These Droplets explore ideas and propositions which, if developed further, might improve water use. Ideas are explored from a fundamental perspective. That is, they consider the building blocks and concepts that one might begin using if no constraints are assumed.

There have been two Droplets since the last WRC newsletter:

More from less: When should river systems be made smaller and managed differently?

“Less is more.” Ludwig Mies van der Rohe

Droplet No 16 discusses the case for reconfiguring rivers and the water-dependent ecosystems associated with them. The authors envisage a world where the approach to environmental, water quality, stream flow and stream height management is quite different to the way it is today.

*Mike Young is Professor of Water Economics and Management
School of Earth & Environmental Sciences, University of Adelaide
and CSIRO Water for a Healthy Country Flagship*

National Water Commission News ICE WaRM News

The National Water Commission is an independent statutory body whose role is to drive water reform.

Further information about the National Water Commission is available at:

<http://www.nwc.gov.au/www/html/7-home-page.asp>

The latest edition of the National Water Commission's newsletter, 'Distilled', can be viewed at:

<http://www.nwc.gov.au/www/html/2389-distilled-39---may-2009.asp?intSiteID=1>

Water-security: Should urban water use, like rural water use, be capped?

“What's good for the goose, is good for the gander” – a proverb of unknown origin

Droplet No 17 discusses the notion of imposing a cap on urban water users. The authors pose the provocative question, “What would happen if city planners were not allowed to grant building approval for a house, factory or shop until adequate water had either been secured or the applicant had made arrangements to off-set the impact of “their” proposed development on all other water users and a city's environment?”

Earlier Droplets on the development of a Sustainable Cap, new legislative arrangements, urban water trading, water governance, water interception, water accounting, water trading and stormwater management can be read at www.myoung.net.au.

Comments are welcome. The aim is to encourage people to think differently about water management. If you would like to subscribe to the Droplet list, send an email to droplets@adelaide.edu.au or go to the website at www.myoung.net.au

The International Centre of Excellence in Water Resources Management (ICE WaRM) provides a national focus and international gateway to Australia's education, training and research expertise in water.

Further information about ICE WaRM is available at: <http://www.icewarm.com.au>

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ICE WaRM Wins Prestigious Industry Award
Read this story and more in the latest edition of ICE WaRM's newsletter:

<http://www.icewarm.com.au/page.php?pld=363>

Water News Updates

Torrens Lake closed again

Torrens Lake has been closed again, this time due to elevated E-coli levels detected during routine testing. Adelaide City Council said recent rain had washed material into the lake and caused the higher reading. The closure follows on from a series of problems involving the lake, which was accidentally drained earlier this year.

Since the lake refilled it has been closed several times because of blue-green algae infestation and high E-coli levels.

Link to full story:

<http://www.independentweekly.com.au/news/local/news/general/torrens-lake-closed-again/1542196.aspx>

Source: *Indaily* 16 June

Lakes turn to poison

This is a decidedly acidic take on the acid sulphate problems of the Lower Lakes, as reported 22 May by Hendrik Gout for *The Independent Weekly*.

Link to full story:

<http://www.independentweekly.com.au/news/local/news/general/lakes-turn-to-poison/1520368.aspx>

Committee to advise on Murray-Darling plan

A new Murray-Darling Basin community committee has been formed to advise on the development of a plan to regulate the use of water. The committee will provide expertise on a range of issues, including irrigated agriculture, basin communities, indigenous matters, environmental management and water use, Climate Change Minister Penny Wong said today.

Link to full story:

<http://www.cch.com.au/au/News/ShowNews.aspx?ID=31575&Type=F&TopicIDNews=8&CategoryIDNews=36>

Source: *Indaily* 12 June

Murray irrigators to get 2% allocation

Murray River irrigators in South Australia will get at least a 2 per cent allocation when the new water year opens on July 1, the South Australian Government says. But River Murray Minister Karlene Maywald said they would also have access to some carryover water from the current year.

Link to full story:

<http://www.independentweekly.com.au/news/local/news/general/murray-irrigators-to-get-2-allocation/1514390.aspx>

Source: *Indaily* 15 May

Conference Diary

H2009 – 32nd Hydrology and Water Resources Symposium

Newcastle City Hall, King St, Newcastle
30 Nov - 3 Dec 2009

For conference details: www.h2009.org.au

The WRC newsletter is published quarterly (March, June, September and December)

At the time of publication, the latest version is uploaded to the website (<http://www.adelaide.edu.au/environment/wrc>)

(Previous newsletter editions are also available at this website)

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