

# WATERRESEARCH



# Newsletter

October  
2009



What's happening in the Water Research Centre at the University of Adelaide

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Welcome to the Water Research Centre Newsletter. In this issue we are highlighting our collaborative projects with SA Water and the contribution we are making to the local water industry.

*Justin Brookes, Director*



The mighty Murray downstream of Blanchetown weir in June 2009

*Photo by Anne Jensen*

This edition edited by Julie Francis. Articles for future newsletters email: [julianne.francis@adelaide.edu.au](mailto:julianne.francis@adelaide.edu.au) Phone: 8303 5566

Information about the Water Research Centre's structure and members, and other Water Links, can be found at:

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

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## Water Research Centre News

Finding solutions is the focus of the Water Research Centre and we have a nice balance of blue sky and applied research. The key to successful collaborations, such as those we have with SA Water, includes us understanding the business, recognising where there are risks and being part of the solution. Partnerships are vital to us moving forward and applying our research skills to big problems. The wealth of skills the University of Adelaide can apply to solving problems has been highlighted at the Linkfests we have been holding internally. This has identified skills in sensing, modelling and chemistry that can all be applied to the water sector. We are planning to open these up as public forums to showcase talent and the problem-solving capability at Adelaide University. I look forward to seeing you at a Linkfest or Water Wednesday soon.

Justin Brookes  
Director, Water Research Centre

## WRC is officially launched

The launch of the Water Research Centre in the Learning Centre of SA Water House on 9<sup>th</sup> September was well attended by a mix of our affiliates from industry and WRC members, both academics and students. Graeme Dandy spoke of the achievements of the Water Research Cluster and then introduced the new Director of the Centre, Justin Brookes, who spoke about strengthening existing engagement with government, industry and community while building new networks across a broad range of disciplines, providing evidence based research for water based management.

## Final Report from CLLAMMecology

CLLAMMecology delivered its final briefing to managers and the scientific community and media on July 21<sup>st</sup> and 22<sup>nd</sup>. The outcomes of this 3 year collaborative project were covered by a large media contingent, from local, regional and national radio, television and press. Podcast and slidecasts of the presentations from the final briefing can be found on the Water Research Centre website:

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

The CLLAMMecology Research Cluster has been recognised for their research and collaboration as a finalist in the SA Science Excellence Awards in the category for Collaboration.

The summary report as well as the project reports from the 4 themes are available on the CSIRO website

[http://www.csiro.au/partnerships/CLLAMMecology-Cluster--ci\\_pageNo-2.html](http://www.csiro.au/partnerships/CLLAMMecology-Cluster--ci_pageNo-2.html).

If you would like a hard copy of the CLLAMMecology Summary Report, please email Julie Francis, [julianne.francis@adelaide.edu.au](mailto:julianne.francis@adelaide.edu.au).

## Special Relationship with SA Water

Director Justin Brookes has a long history with SA Water. Upon completion of his PhD he worked at the Australian Water Quality Centre. This was a great environment to learn about the water industry. In a single day he could work on cyano-bacterial control with Mike Burch, learn about de-nitrification from Peter Christy, and be mentored by Don Bursill, Dennis Steffensen and John Howard about local and international water issues.

The special relationship with SA Water is growing, with a number of collaborative projects with AWQC, four SA Water staff as affiliates and our graduates are filling positions within their graduate program. This all serves to improve knowledge on water in South Australia and collaboratively train the next generation of water professionals. Water Research Centre staff play a key role in providing opportunities for students to enter the water industry and the relationship with SA Water helps to achieve this.

## Water Research Centre Research projects with SA Water

### Projects with Justin Brookes

- Degradation of chemical contaminants from wastewater using biofiltration
- Alternatives to algicides (funded by AAWWARF in partnership with SA Water and WQRA)
- 3D model of hydrodynamics and biogeochemistry in the lower River Murray and lower lakes

### Projects with David Chittleborough

- Nutrient and DOC retention of Mt Lofty ranges catchments

### Projects with Bo Jin

- Production of biodegradable polyhydroxyalkanoate polymer using advanced biological wastewater treatment process technology (ARC).
- Feasibility of biological hydrogen production from biomass wastes using activate sludge microorganisms (ARC).
- Developing better indicators of pathogen presence in waste matrices (US WERF).
- Fungal biomass protein, a bioproduct from treatment process of winery waste streams (ARC).
- Solar nano-photocatalytic disinfection and mineralization of treated wastewater from sewage treatment plant (ARC)
- Innovative nanotechnological treatment process for reclaimed wastewaters

## Chris Saint

Chris Saint is the Research, Development & Innovation Manager and Principal Microbiologist with SA Water Corporation. He also holds Affiliate Professor status within the School of Earth & Environmental Sciences at the University of Adelaide. Chris's research interests centre around the microbiology of water and wastewater related issues and he has been involved in establishing molecular biology diagnosis techniques for water borne microorganisms at the Australian Water quality Centre.



The move into the new SA Water building in Victoria Square provides an exciting opportunity to strengthen the existing links with the Water Research Centre and develop new links with other research groups at the University of Adelaide with water interests. Chris can be contacted on 7424 2143 or [chris.saint@sawater.com.au](mailto:chris.saint@sawater.com.au)

## Mike Burch

Mike Burch is Affiliate Associate Professor in the School of Earth and Environmental Sciences with a long association with water research at the University, including project collaboration and supervising PhD and Honours students.

Joint projects with Assoc Prof Justin Brookes include the project 'Alternative and Innovative Methods for Algal Control' for the Water Research Foundation (USA) and Water Quality Research Australia; development of a Hydrodynamic and Water Quality model for the lower River Murray to assist with forecasting and water quality management; and an AusAID project under the Australia China Environment Development Program, entitled 'Lake Tai Water Pollution Treatment Project'. Mike has also been assisting with establishing research collaboration with the National Cheng Kung University in Taiwan.

Mike is research leader for Biology Research in the Australian Water Quality Centre. He has worked in freshwater science since 1977. His early research involved studying lakes in Antarctica 1977-1980, then research and water quality management for SA Water since 1981. He has been involved mainly in research and management relating to control of algal blooms and toxic cyanobacteria in reservoirs and rivers, including chemical control, aeration, mixing, contaminant transport and river flow.

As National Algal Manager for ARMCANZ (Agriculture and Resource Management Council) from 1999-2002, Mike was responsible for developing current Australian drinking water and recreational water guidelines for cyanobacteria and toxins for the NHMRC and also contributed to management documents for the World Health Organization (WHO) and for UNESCO.

## Lionel Ho

Lionel Ho is currently employed as a Senior Research Scientist at the Australian Water Quality Centre, SA Water Corporation, where he has been involved in a range of nationally and internationally funded projects and consultancies encompassing the entire water cycle. Lionel is currently co-supervisor for PhD students from the Schools of Chemical Engineering and Earth & Environmental Sciences.



Lionel is co-leader of a project with Assoc Prof Justin Brookes which is focussed on the biological filtration of chemical contaminants from re-use water. This project is funded by AusIndustry and a consortium including SA Water, Melbourne Water, United Water, Power & Water, Ecwise Environmental and Water Services Association.

Lionel has over 10 years experience in the water industry and has expertise in areas including, water treatment, analysis and treatment of cyano-bacterial metabolites and aquatic microbiology. Lionel is currently the Deputy Vice President of the AWA SA Branch Committee and has also been invited to participate in a number of committees, including the National Representative Committee for the Young Water Professionals Network of the AWA, Organising Committee of the IWA NOM Research: Innovations and Applications for Drinking Water Treatment, Convenor of the SA AWA Young Water Professionals, Chairman of the 4th Annual Australian Environmental Engineering Research Event. Lionel has authored or co-authored over 80 papers in peer-reviewed journals, book chapters and conference publications.

## Daniel Hoefel

Daniel Hoefel is an Affiliate Lecturer in the School of Earth and Environmental Sciences. He is currently collaborating with Assoc Prof Justin Brookes investigating bio-filtration processes as an additional treatment barrier for water destined for re-use. He also co-supervises PhD students.



Daniel is a Senior Research Scientist at the Australian Water Quality Centre with 9 years of research experience within the water industry. Daniel's water related projects include the rapid detection and molecular profiling of water-borne bacteria from source waters, through water treatment and into distribution; techniques to investigate the solar inactivation of *Cryptosporidium*; the development of whole cell bio-sensors for the detection various organic compounds; the bio-filtration of secondary algal metabolites from drinking water in addition to various contaminants from waste water destined for reuse. Daniel has published 17 high impact peer reviewed journal papers and has presented his research outcomes at numerous national and international conferences.

# WRC External Events

## Water Wednesday

The Water Wednesday seminar held on 15 July was successful event with the theme of 'Sustaining the River Murray with less – how science can enable water managers and business investment to manage sustainably with 30% less water'. The speakers were Dr Bill Young from the Murray-Darling Basin Authority, Ms Robyn McLeod, Commissioner for Water Security (presented by Prof Mike Young in her absence due to illness) and Assoc Prof George Ganf, University of Adelaide.

Chaired by Prof Martin Lambert, Head of School of Civil, Environmental and Mining Engineering. He reminded us that water is something that we all need, but our demand is ever increasing. Water from rainfall has tremendous variability, and catchments can capture rainfall and focus it into channels for easy access. If our demand on this resource however exceeds the catchments ability to supply then we are headed for certain trouble. As Martin observed, science suggests that we need to return around 3,000 GL per annum to keep the River Murray healthy, but the target has been only 500 GL, which has not been achieved. The issues of past over-allocation effects plus the current drought will be compounded by predictions of future significant declines in inflows. The presentations aimed to set a realistic picture for discussion of practical future management choices, and to identify key questions where scientific research can assist management.

Dr Bill Young's presentation, 'Declining future flows predicted in the Murray-Darling Basin' gave a timely summary of the recent Murray-Darling Basin Sustainable Yields project, which examined past, present and future run-off in the 23 sub-catchments of the Murray-Darling Basin. He emphasised the fact that declining rainfall is having greatest effect in south-eastern areas in Australia, which are the primary source catchments for the Murray-Darling Basin. Bill also emphasised the need for care in using average figures, which can give a false sense of relatively low impacts across the Basin, but hide the disproportionate effect on downstream areas. He also pointed out that current sharing arrangements assign a disproportionate cost in water deprivation to the environment.

Dr Bill Young at Water Wednesday



Ms McLeod's presentation 'Maintaining a healthy working River Murray to provide water security' gave outline of the new Water Security Plan. It includes goals to increase the mix of water sources and to reduce reliance on the River Murray, thus allowing more water to remain in the River. The aim is to reduce annual extractions from the River Murray by 22 GL by 2025. The Plan includes provision for continuous review and much more adaptive approaches to water allocation. Triggers will be set for faster responses to changing circumstances, and water planning will become independent of the political framework. Within 5 years, all users will pay one price for water used, so that users have the same signal and incentives for reducing demand.

Associate Professor George Ganf gave a presentation entitled Minimum flows to fill and sustain wetlands in a healthy working River Murray. George presented his recently completed project which investigated the state of Murray Valley wetlands and their water requirements. Approximately 2,000 GL per annum would maintain maximum diversity in surviving wetlands. There is sufficient water in the river in most years to deliver this outcome, however, current river management must be changed. George emphasised the need to adapt to the changed hydrology of the river system, and argued for the water use of weir structures to manipulate water to achieve maximum connectivity in each weir pool, giving a more natural regime for separate river reaches. He showed the example of the proposed water control structure in Chowilla Creek, which could water significant areas of the floodplain within the current regulated flow regime.

The full presentations are available at:  
<http://www.adelaide.edu.au/environment/wrc/news/2009/waterwednesday2.html>.



Excellent audience at Water Wednesday  
Photos: Anne Jensen

# WRC Internal Events

## Linkfest

The first two Linkfests were very successful, indicating that this new format for developing partnerships works well. The first topic was 'Sensors and Sensing, and the second topic was 'Modelling and prediction'.

The first Linkfest included Dr Heike Ebbendorff-Heidepriem, Deputy Director of the Centre of Excellence in Photonics, who presented the fascinating world of hollow optical fibre technology. Assoc Prof Megan Lewis gave a comprehensive overview of the capabilities of the Soil and Land Systems Group in spectral and spatial data analysis at the landscape scale. Dr Anne Jensen brought a pitch 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. Assoc Prof Martin Lambert gave his presentation via video of technologies developed for detecting deterioration and blockages in long-distance pipelines.

The second Linkfest featured Prof Nigel Bean on the process of mathematical modelling and how that can be applied to environmental questions. Assoc Prof Corey Bradshaw showed the close links between ecological research and modelling, and demonstrated several cases where complex modelling has been applied to understand trends in ecosystems and sustainable management. Prof Holger Maier talked about modelling from the engineering perspective, and gave the example of modelling the complex drainage systems of the South East to benefit wetland ecosystems. Assoc Prof David Paton posed a challenge to the audience to assess the risk of extinction for two endangered species in the Coorong, providing research data on the Fairy Terns and *Ruppia tuberosa* which are likely to disappear from the Coorong ecosystem.

Suggestions for future Linkfests include environmental water and water policy.

*Ruppia tuberosa*  
Photo by Brian Deegan



Fairy Terns  
Photo by Dan Rogers

## Linkfest Follow Up

Following Linkfest discussions, Prof Douglas Gray of the School of Electrical and Electronic Engineering contacted Anne Jensen to discuss a program he is starting to measure soil moisture with synthetic aperture radar data. He currently has a Nigerian Masters student from the International Space University in Strasbourg France visiting for a few months and doing some preliminary reading on this topic. Bola and Doug were planning to visit an area of the River Murray floodplain near Morgan, and Anne was able to provide background information on the Morgan Conservation Park and Brenda Park floodplains to suggest sites for correlating river red gum health with soil moisture

After the field trip, Bola contacted Anne for assistance with access image software packages to analyse his data. Anne referred him to Megan Lewis, who has been able to provide access to appropriate software. Bola is working on creating a shapefile of GPS points, then integrating the shapefile with satellite images and geo-referencing the satellite images.

This technique may have potential for monitoring soil moisture at the floodplain scale, which was the subject of Anne's presentation at the first Linkfest. Thanks to Martin Lambert who suggested the inclusion of Doug Gray on the invitation list.

In response to Heidi Eppendorff's presentation on the capabilities of optic sensors, Megan Lewis has invited Heidi's group to visit the Waite campus for a joint meeting of the two research groups.

## Future Linkfest Suggestions

Email other suggestions for future topics to:  
Dr Anne Jensen, email: [ajensen@internode.on.net](mailto:ajensen@internode.on.net)

## Water Aid Gala Charity Dinner

The Water Research Centre hosted a table at the highly successful Water Aid Gala Dinner held at the Convention Centre on 25 July. Over 1,000 people attended and assisted in raising >\$300,000 through auctions and sales. Funds raised are used to ensure clean water supplies to developing countries in the Asia-Pacific region.

## ASL Conference

Water Research Centre was well represented at the Australian Society Limnology Conference in Alice Springs at the end of September.

Congratulations to Dae Heui Kim, student with Justin Brookes, who received an honourable mention for her student presentation on the effects of salinity on ruppia in the Coorong.

# WRC Future Events

## Next Water Wednesday

21 October 2009

5:30-6:45pm Napier 102 lecture theatre  
North Terrace campus, University of Adelaide

### 'Managing the Murray icon sites: can engineering save the environment?'

The 3 Murray icon sites in SA are Chowilla, the main-stream, and the Coorong & Lower Lakes. Each of these icon sites identified in the *Living Murray Program* is suffering significant environmental damage, and the options for repair are limited by the lack of available water. New approaches are needed to find innovative alternatives as interim measures until flows can be increased to provide effective environmental flows. The role of engineering solutions in this context is controversial.

Invited speakers are Judy Goode (Environmental Water Manager) on options for the environmental future of the River Murray ecosystem in South Australia, Tony Herbert (Department of Land, Water & Biodiversity Conservation) on the potential benefits and impacts of the proposed Chowilla watering structure, and Associate Professor Justin Brookes (University of Adelaide) on future options for the Lower Lakes and Coorong.

The Water Wednesday forum is being held in National Water Week 18-24 October 2009. The theme for 2009 is **Securing our Water Future**. In the face of climate uncertainty, Australia needs to ensure that we have adequate, safe water supplies for critical human needs, but also for agriculture, and with sufficient water left for the environment. Key Messages of NWW for 2009 are:

- Water supplies are limited
- Our water comes from a number of different sources
- We all share water
- *We're all responsible for our water future!*

Dr Anne Jensen.  
WRC Events Coordinator

## Travel Funding

Travel funding is available from the Environment Institute for business development. This fund is specifically to:

- build profile and linkages with key agencies and other major research centres and institutes
- seek funding for grant programs, particularly large grants that involve more than one individual from the Environment Institute.

Forms and details are available at:  
<http://www.adelaide.edu.au/environment/travel/>

## Next Linkfest

### YOUNG GUNS OF CHEMISTRY

Time: 4-5pm, 9 October followed by drinks and nibbles

Venue: Margaret Murray Room, Level 4 Union House

**RSVP** to [julianne.francis@adeladie.edu.au](mailto:julianne.francis@adeladie.edu.au).

The Water Research Centre will be holding another Linkfest event to build networks and identify complementary skills across the Environment Institute. You are invited to listen to some of the best up and coming chemists in Australia talk about their research in environmental chemistry.

Presenters will have 5 minutes to outline research topics, results, ideas and suggestions for potential collaboration on project proposals and research linkages. All attendees are invited to join in discussion of potential future research directions and projects. The aim of this process is to bring applications and techniques together in new and innovative ways.



**Hugh Harris**

Tracking heavy element toxins and their chemistry in the environment



**Christopher Sumbly**

New compounds to solve intractable environmental problems



**Tara Pukala**

The chemistry of biodiversity



**Tak Kee**

Advanced microscopy to investigate important bio-molecular processes

## Research Opportunities

The role of the Water Research Centre is to support its membership, so if you require assistance with grant writing, securing co-investment for ARC-linkage or grant writing, then please contact Justin to discuss.

# SA Science Excellence Awards

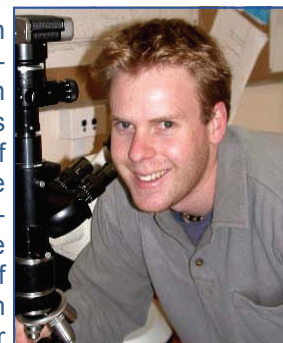
## Congratulations Holger Maier

Congratulations to Holger Maier from the School of Civil, Environmental and Mining Engineering on winning the Tertiary Science Educator of the Year at the SA Science Excellence Awards Gala dinner in August at the Hilton Adelaide. He has also recently won the ECMS Faculty Award for Excellence for Higher Degree by Research Supervision for 2009. This is Holger's seventh award for education. Holger teaches in water and environmental engineering and is the co-developer of the multi-award winning Mekong e-Sim, an online role-play simulation program to assist students in problem solving on the impacts of engineering projects on society.



## Tall Poppy

Dr Travis Elsdon, a Research Fellow from Fish Ecology & Estuarine Ecology, School of Earth & Environmental Sciences was selected in August 2009 as one of 10 Young Tall Poppies of Science by the Australian Institute of Policy and Science. The awards are for scientists under 35 years of age with demonstrated research achievements and passion for communicating science. Travis studies fish and estuarine ecology, focussing on understanding water quality and fish movements. He uses chemicals in fish ear bones to determine movements, migrations and stock structure of fish, and also uses stable isotopes to determine fish diet.



## Country Hour

Anne Jensen was part of a special edition of the South Australian Country Hour in June, when hosts Drew Bradford and Annabelle Homer donned wetsuits and conducted interviews while wading across the River Murray downstream of the Blanchetown weir. This part of the Murray mainstream has dropped by more than 2 m, exposing more than half the channel width as sand banks and leaving only a narrow channel <1.2m deep. Red gums and other terrestrial species are colonising the sand banks, and native water plants are rapidly colonising the shallow clear waters. The interviews also included irrigators from this region who do not qualify for financial assistance schemes. Visit the ABC website for more details:

<http://www.abc.net.au/rural/content/2008/s2600605.htm>



Country Hour's broadcasting site at Blanchetown downstream from Blanchetown weir. Photo by Anne Jensen

## Skukuza 2009

### "Water allocation and climate change: the future of the world's rivers"

The Skukuza 2009 Meeting of the Global Wetland and Rivers Expert Group had as its theme "Management of environmental flows within a changing climate". The meeting at Goolwa in September heard presentations on how climate change might affect rivers in Australia, South Africa, Britain, Spain, California and China. Scientists from around Australia and the world saw the Murray Mouth dredging, the extensive barrages and the extremely low water levels in Lake Alexandrina upstream of the barrages and were overwhelmed by the high degree of "engineered management" at the mouth of Australia's great river.

As part of the meeting we held an evening of public presentations from Prof Richard Kingsford of the University of NSW, Dr Harry Biggs, South African National Parks, Trevor Bishop, Environment Agency of England and Wales and David Rheinheimer, University of California, USA. Prof Max Finlayson, Charles Sturt University and Ramsar Scientific and Technical Review Panel and the Mayor of Alexandrina Council, Kim McHugh.

The major output from the Skukuza Meeting will be several scientific and technical papers on rivers, wetlands and climate change that will be submitted to the journal Marine and Freshwater Research for a Special Issue of the Journal, hopefully in 2010. There will also be popular article appearing in Water21 in the next few months.

If you want to know more about Skukuza 2009 contact Mike Geddes: [mike.geddes@adelaide.edu.au](mailto:mike.geddes@adelaide.edu.au).

# Droplet Series

## Securing water: What is the best and fairest way to secure water for the environment?

In July's Droplet Series, No 18 by Mike Young and Jim McColl continue to look at the question of the best and fairest way of securing water for the environment. They look at the issue of over-allocation of the river water. Fixing the causes of over-allocation involves complex changes to legislation, governance arrangements and water resource plans. All of which take time to negotiate and implement.

They discuss 3 options to solve over allocation of water:

- continue to buy water but at a dramatically accelerated rate
- issue the environment a proportional share of each entitlement type.
- to run a reverse tender and buy all the water needed for the environment in one hit.

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](http://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](mailto:droplets@adelaide.edu.au) or go to the website at [www.myoung.net.au](http://www.myoung.net.au)

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

# WRC Conference Calender

## National Forum & Workshop - Settlements & Infrastructure

The 2<sup>nd</sup> national forum and workshop on the 'Adaptation Research Network for Settlements & Infrastructure at the University of New South Wales, Sydney from 9-11 November 2009.

The forum will enable researchers to discover the broad range of climate change adaptation research being carried out in Australia, and provide an opportunity to influence the future direction of climate change adaptation research in Australia.

Details and registration forms available at:  
<http://www.nccarf.edu.au/node/176>

## Engineering Mathematics and Applications Conference (EMAC2009)

**6- 9 December 2009**  
**University of Adelaide**

The organizing committee of The 9th Engineering Mathematics and Applications Conference (EMAC2009) has announced a call for abstracts and invites you to participate. Abstracts may be submitted at any time until 30th October 2009.

Instructions for submitting abstracts, and details of registration are available on the conference website:  
<http://www.maths.adelaide.edu.au/emacs2009/>

## ICEWaRM short courses

Upcoming ICEWaRM short courses for 2009.

### **Australian Water Industry Essentials**

Perth October, 2009 (dates TBC)

For more information, download flyer  
[www.icewarm.com.au](http://www.icewarm.com.au) > Programmes > Short Courses > Australian Water Industry Essentials

### **River and Floodplain Modelling**

Sydney - 10-11th November, 2009

For more information, download flyer  
[www.icewarm.com.au](http://www.icewarm.com.au) > Programmes > Short Courses > River and Floodplain Modelling.

July's ICEWaRM newsletter:

<http://www.icewarm.com.au/page.php?pld=364>

## LET2010, 2- 4 June, Phoenix, Arizona

International Water Association 7th Leading Edge Conference on Water and Wastewater Technologies focuses specifically on technologies in advancement and developments in water and wastewater.

Conference website for submissions and to find out more information about the Conference visit: [www.let2010.org](http://www.let2010.org)

Submissions are welcome from 1 September 2008 and must be received by **15 October 2009**.