

JULY 2007

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NEWSLETTER OF THE HYDROLOGICAL SOCIETY OF SOUTH AUSTRALIA

CSIRO LAND AND WATER: FOCUSING ON NATIONAL PRIORITIES

Helen Beringen

From July 1, CSIRO is changing the way it manages and deploys its people and facilities to better deliver research outcomes in areas of national priority.

The people and phone numbers in the existing CSIRO Land and Water Division are largely unchanged, but their roles may have shifted as the research agency focuses its capabilities across disciplinary boundaries and on strategic research that addresses land and water resource issues.

Land and Water researchers will undertake research projects under six major research areas (Themes). Four Themes will be delivered through the Water for a Healthy Country Flagship (WfHC) in collaboration with researchers from other CSIRO Divisions and other public and privately funded research agencies, universities and CRCs.

Research Themes include:

- Better Basin Futures, led by Glen Walker, Urrbrae (WfHC)
- Managing Australia's Soil And Landscape Assets led by Neil McKenzie, Canberra
- Urban Water, led by Alan Gregory, Sydney (WfHC)
- Healthy Water Ecosystems, led by Mike Grundy, Brisbane (WfHC)
- Water Resources Observation Network, led by Ross Ackland (WfHC)
- Centre for Environmental Contaminants Research, led by Simon Apte, Sydney.

Peter Dillon leads the Recycling & Diversified Supply stream within the Urban Water research theme.

Sébastien Lamontagne continues as CSIRO's leader of the CLLAMMecology Collaboration Research Cluster undertaken through the WfHC Flagship in the Coorong, Lower Lakes and Murray Mouth region.

(Continued on page 3)

MANAGING THE RISKS ASSOCIATED WITH IMPORTING IRRIGATION WATER INTO THE CLARE VALLEY, SOUTH AUSTRALIA

Tony Thomson, Paul Howe and Laurie Poppleton.

Completed in 2005, the Clare Water Supply Scheme was built to reticulate River Murray water more widely through the Clare region.

The scheme connects the Swan Reach-to-Wallaroo pipeline with the Morgan-to-Whyalla pipeline in order to distribute additional water from the Murray through Clare and beyond. So that the imported water can be used for irrigation without increasing the salinity of the soils or groundwater in the Clare region, a framework has been developed to enable irrigators to identify and to manage the environmental risks associated with the use of River Murray water for irrigation.

The adopted framework has five innovative components. First, to limit and control salt accumulation over decades, irrigation water is allocated on the basis of its salt load rather than by volume.

Second, the irrigation water can be applied only in a sub-catchment where the groundwater salinity trend is decreasing; it cannot be

applied where the groundwater salinity trend is stable or increasing.

Third, irrigators use district-scale Risk Maps and they undertake property-scale soil surveys to avoid applying irrigation water (and salt) onto areas where salt will accumulate. Soils data and the Risk Maps have been provided to irrigators as geographic information system map layers on an interactive computer compact disc.

Fourth, equivalent salt loads are calculated to enable the exchange of a licence to access existing water resources (i.e. groundwater and / or surface water) for a licence to access a larger volume of lower salinity, River Murray (pipeline) water.

Finally, monitoring and irrigation annual reporting have been added to the conditions on water licences.

This article is the abstract for a paper with the same title as this article. For more information, or a complete copy of the paper, please contact Tony Thompson by email at thomson.tony@saugov.sa.gov.au

MURRAY'S POINT WETLAND FLINDERS UNIVERSITY EARTH SCIENCE CAMP 2007

Luisa Powell, Sam Milgate, Enys Watt, Peter Kretschmer and Adrian Werner

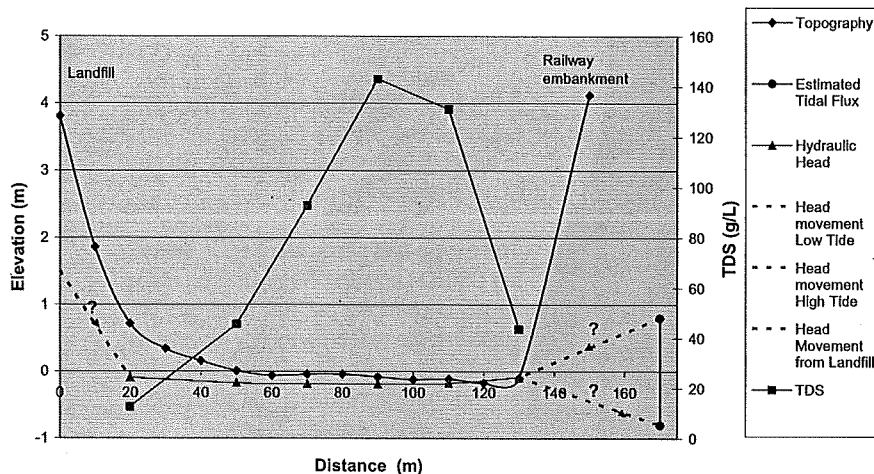
In April 2007, Flinders University took 60 undergraduate Earth Science students to Murray's Point Wetland, Proper Bay, Port Lincoln for a 4-day intensive field camp. This coastal wetland is situated within a tidal environment located between a railway embankment and the old town landfill. Building on previous theses from Flinders since 1999, students gained hands-on experience in various investigation activities under the guidance of University academics and industry professionals. Activities included: the design and installation of a monitoring bore network, water quality sampling, aquifer and soil testing, geophysics, surveying, water level monitoring and vegetation surveys

The Geophysics group investigated resistivities along the wetland with EM-31, Sting and GEM. This group also conducted a survey of each transect using Transect D to bring the separate transects together.

Geophysics produced numerous profiles throughout the wetland, which correlate to the trends discussed in Hydrology and Soils below. Results from survey data allowed comparisons to be made from one transect to another by relating all data to a common datum (MSL).

Hydrology investigated the groundwater by installing piezometers along Transects A, B, and C, sampling EC, pH, temperature, and to a lesser extent nitrate and DO, and determining hydraulic conductivities with a Guelph Permeameter.

Transect A Topography, Hydraulic Head, and TDS



The TDS, hydraulic head and topography were surveyed along Transect A, and this showed the highest TDS concentration in the central part of the wetland (140 g/L) and the lowest TDS at the start of the transect near the landfill (~20g/L).

The hydraulic head shows a general trend of movement into the central part of the wetland. The water levels in the piezometers located at the base of the railway embankment were tidal artesian, demonstrated in the graphic provided. High tide is 80cm higher than the wetland and will induce a flow from the ocean into the wetland. At low tide the reverse occurs and there is a flow out. From Rawson (2000) it was found that there is a flow from the groundwater in the landfill towards the wetland. This data was not avail-

able.

The survey data illustrates the significant rise from the wetland to the highest points of approximately 4 meters located on either side of the wetland

Transect A was the only transect that held enough data to make any conclusions. From the data that was obtained for the other transects it was found that both Transect B and Transect C hold the same trends as Transect A.

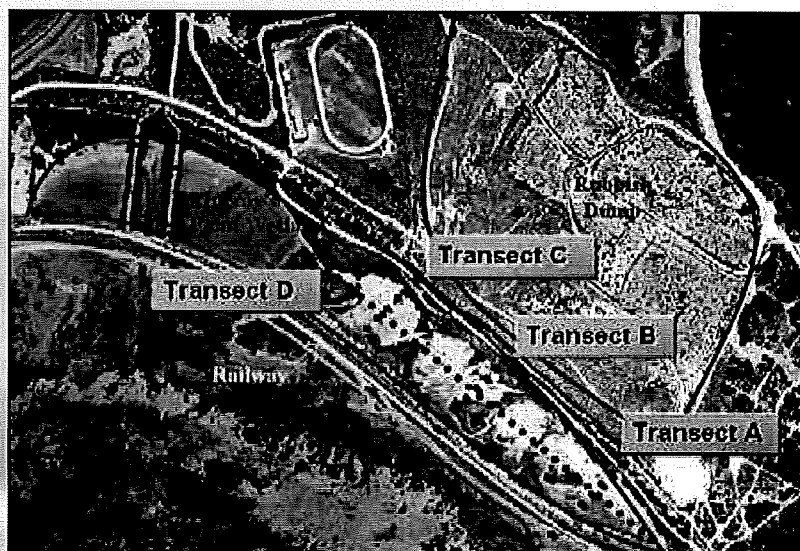
Guelph Permeameter results ranged from 39.4 - 0.2 m/day with a general decrease in hydraulic conductivities from the landfill towards the ocean. This resulted in an average transit time from landfill to the wetland of approximately 22 years.

Salinity affects evaporation rates, hence using tap water to estimate evaporative loss within the wetland is not appropriate. A more accurate estimation of evaporation rates within the wetland using a representative sample of wetland salinity found a 33% reduction of evaporation compared to the conventional evaporation pan estimates.

A general trend of an increase in salinity occurs towards south east end of the wetland. It also shows as salinity increases, vegetation density decreases. Salinity across the entire wetland ranges from about 40 to 160 mS/cm.

The Soils group investigated evaporation

(Continued on page 3)



LOCATIONS OF TRANSECTS STUDIED

CSIRO LAND AND WATER: FOCUSING ON NATIONAL PRIORITIES

Helen Beringen

(Continued from page 1)

The work of the Water for a Healthy Country Flagship

The WfHC Flagship is a partnership between CSIRO and key scientists in research institutions and industries across Australia and internationally. The flagship aims to achieve a tenfold increase in the economic, social and environmental benefits from water by 2025.

Flagship research is focussed on: **Urban Water** (water for our cities): addressing the projected 2030 shortfall of 100GL a year in urban water supplies by delivering affordable and environmentally-beneficial management solutions for Australia's urban water.

Better Basin Futures (water for agriculture): to help the nation's water managers increase productivity and returns from water use,

through more effective water trading; reduce unwanted consequences of water and salt fluxes due to land-use change; provide expert assistance in dealing with climate change and assess the implications of natural resources policies.

Healthy Water Ecosystems (water for the environment): to deliver knowledge to help protect and restore the health of water ecosystems and increase their social, ecological and economic benefits to Australian communities, particularly by ensuring that knowledge and science-based management become central to all planning by 2012.

The Water Resource Observation Network (WRON) (how much water we have and where it is located): is establishing the technology platform to provide a national system for reporting and forecasting Australia's water resources.

Land and Water themes

CSIRO Land and Water Division-based Themes will undertake research on:

Centre for Environmental Contaminants Research (CECR): to underpin the maintenance and protection of Australia's land and water resources from contamination, leading to improved national regulations and guidelines which protect human and ecosystem health and allow safe use of chemicals and disposal of wastes.

Managing Australia's Soil and Landscape Assets (MASALA): to increase certainty for decision makers in natural resource management by providing baselines, soil condition targets and seasonal predictions of processes threatening the function of Australian soils (most notably soil acidification, declining soil organic carbon and nutrients, and soil erosion by wind and water).

"The WfHC Flagship is a partnership between CSIRO and key scientists in research institutions and industries across Australia and internationally"

MURRAY'S POINT WETLAND—FLINDERS UNIVERSITY EARTH SCIENCE CAMP 2007

Luisa Powell, Sam Milgate, Enys Watt, Peter Kretschmer and Adrian Werner

(Continued from page 2)

rates, vegetation, and a preliminary soils analysis (colour, texture, gravimetric water contents, bulk densities, soil EC and nitrate) along all four transects.

Two dominant species of vegetation were identified within Murray's Point Wetland: Samphire, found in hypersaline conditions near the centre of the wetland; and *Juncus acutis* (Spiny Rush), which thrived near the outskirts of the wetland.

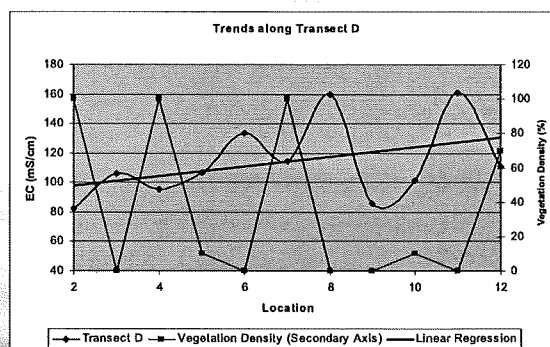
Soil pore water extracts were analysed for EC and showed results to those from Transect D.

Bulk densities were much lower than expected due to the presence of organic matter and carbonates and were erroneous due to the high organic content.

From the data discussed above the

following conclusions could be made:

- Salinities are highest near the middle of the wetland due to evapo-concentration of surface water
- When rain occurs in sufficient quantities it flushes the salts built up at the surface back into the water table
- As salinity increases, evaporation rates increase within the wetland
- General flow was found to be towards wetland centre with a smaller flow towards the ocean where denser saline water moves under "fresh" ocean water



TRANSECT D SHOWING THE RELATIONSHIP BETWEEN EC AND VEGETATION DENSITY

- Estimated transit time under study conditions is nearly 22 years.
- The bulk density of the wetland is low due to the presence of carbonates and organic matter in the soil

The authors may be contacted for further information through Flin-

SIMPLE TOOL FIGHTS MULTI-MILLION DOLLAR SALINITY PROBLEM

Sentek Media Release

"It allows them to measure the salinity of water anywhere on their property"

A simple tool developed in Adelaide to manage a multi-million dollar salinity problem will be marketed world-wide.

The Australian horticulture industry will be first in line to benefit from the new device that places effective salinity management within the reach of all growers.

Industry groups, the irrigation industry and local growers will gather to see the inexpensive and simple-to-use device which helps growers monitor the emerging problem of root zone salinity under highly efficient irrigation systems.

If left unchecked, salinity damage could cost the \$2 billion Riverland and Sunraysia horticulture industries alone \$100m a year.

The soil water extractor was developed by the South Australian Research and Development Institute (SARDI) when its scientists recognised that modern irrigation practices were resulting in the build up of salt in the roots of plants. This caused leaf tip burn, yield loss and eventually the death of the plant. The plants are often damaged before the symptoms present.

The product, called the Sentek Solu-SAMPLER™, is being manufactured and distributed by Adelaide-based company Sentek Sensor Technologies, a world leader in the development, manufacture and marketing of innovative technology for the irrigation industry.

Sentek's General Manager - Sales & Marketing, Mike Donkersley stated "As irrigators are continually striving to increase irrigation efficiency, this has highlighted the emergence of salinity related problems. This simple, portable and easy to use device is a breakthrough for growers. It allows them to measure the salinity of water anywhere on their property, and adjust their irrigation management accordingly to avoid the build up of salts in the root zone."

Mr Dridan says McLaren Vale growers are keen to use this type of device to monitor and manage root zone salinity.

"It's a simple low cost device that growers can use themselves to measure salinity on their property. The water samples provided by the Sentek SoluSAMPLER™ can be easily checked using an EC or salinity meter. If growers want to go further and check nutrient levels, water



SARDI Scientist Dr Tapas Biswas (left) and Agriculture, Food and Fisheries Minister Rory McEwen

samples collected by the Sentek SoluSAMPLER™ can be analysed at the laboratory. Growers here for example are now using recycled water on their vines, which might mean they could reduce their use of fertiliser."

For further information or photos please visit www.sentek.com.au.

MEMBRANE DISTILLATION—A LOW ENERGY DESALTING TECHNIQUE?

B. Bolto, T. Tran & M. Hoang

Membrane distillation (MD) is a relatively new process, having been introduced commercially only in the last few years.

"It involves the transport of water vapour through a hydrophobic membrane"

It involves the transport of water vapour through a hydrophobic membrane. Condensation takes place on the cooler side of the membrane. The driving force is the temperature difference, and hence the vapour pressure difference, between the warm and cool surfaces.

Low-grade energy sources can be utilised, the energy requirement being significantly less than for thermal distillation. The process in effect

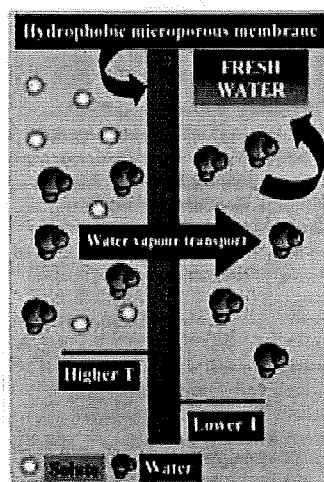


Figure 1. The general principle of MD.

combines the advantages of reverse osmosis (RO), but has higher yields and the possibility of using cheap waste heat energy.

The differential in vapour pressure of the water is the driving force rather than the total pressure. RO is not adequate for the treatment of high salinity waters and is seen as energy intensive and lacking in efficiency as regards to the yield of desalted water.

Extract from Bolto *et al* 2007 'Membrane Distillation – A Low Energy Desalting Technique?' In *Water* Vol 34 No 4. Journal of the Australian Water Association. Reprinted with permission.

MEDIA WATCH

SA PLAN TO BOOST WATER STORAGE CAPACITY

Adelaide's water storages could be doubled over time under a proposal by the South Australian Government.

SA Water has done a scoping study and found that a five-fold increase in the size of Mount Bold reservoir, to Adelaide's south, would cost about \$850 million.

SA's Water Minister Karlene Maywald says the larger dam would allow more water from the River Murray to be stored and give the state more control over its supplies.

"Adelaide has a licence which is around 650 gigalitres. It's a rolling licence over five years," she said.

"We need to be able to better manage that. By increasing the capacity of the Mount Bold reservoir we will be better able to utilise our River Murray water and be dependent on our own management rather than management of the systems interstate.

"It would give us two years back-up rather than the less-than-one-year back-up that we currently have in the Adelaide hills."

From <http://abcnews.go.com/>

Dr Rick Evans's report for LAND and WATER AUSTRALIA 'The Impact of Groundwater Use on Australia's Rivers,' cautions that we have often double counted water as surface and groundwater, when they are usually closely linked and are really only a single source. This has exacerbated shortages, but can take many years to emerge. This report can be downloaded at <http://www.lwa.gov.au/index.aspx>

Professor Mike Young, University of Adelaide, says that the States need to focus on the vision of the Government's WATER PLAN (managing the Murray Darling system as one), not get bogged down in the administrative details. However, Victoria is playing a useful role in addressing balanced water sharing and resolving the over-allocation of water. Hear his interview on H2OTODAY. <http://www.h2otoday.com.au/>

South Australia's Minister for Water Security, Karlene Maywald, has pushed out the decision date on whether or not to build a TEMPORARY WEIR on River Murray below Wellington. The project has been referred to the Commonwealth to determine the level of ENVIRONMENTAL ASSESSMENT of the structure required by the Environment Protection and Biodiversity Conservation Act <http://www.premier.sa.gov.au/news.php?id=1672>

RECYCLED WATER GUIDELINES
(Phase 1) Non potable reuse guidelines

documents soon to be available in hardcopy. Register to attend a one-day seminar giving explanations and examples, chapter by chapter. - Daryl Stevens, David Cunliffe among speakers. Begins with Alice Springs 9 Aug, Perth 22 Aug, Adelaide 21 August. http://www.awa.asn.au/AM/Template.cfm?Section=b_Various_07_b_Recycled_Water_Guidelines

Special Master Class DBOOT DESALINATION. Two day intensive class, limited numbers in Adelaide (Sept 13-14) and Sydney (Sept 17-18). Speakers: Nikolay Voutchkov (Poseidon Resources, US), Tony Fane, Borvin Kracman & others. Covers planning, design, construction, installation, operation, trouble shooting, cost & energy issues. Program and registration form at http://www.awa.asn.au/AM/Template.cfm?Section=b_Sept_07_b_DBOOT_Desalination

Small concentrations of antibiotics have the ability to pass through conventional wastewater treatment plants, according to a new study that will reignite the debate over the use of recycled sewage. <http://www.theaustralian.news.com.au/story/0,20867,21811504-30417,00.html>

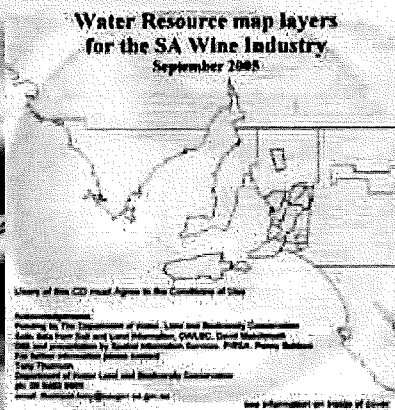
SA WATER RESOURCES MAP LAYERS CD FOR 2004

The South Australian Water Resources map layers computer compact disc.

The SA Water Resources map layers CD provides information about water volumes in South Australia for 2004.

The data includes the megalitre volumes that were (1) sustainably available (2) allocated and (3) used. Data is provided about surface water, groundwater and recycled water for each of the prescribed areas.

For each Prescribed Area, the total hectares of all irrigated crops, the hectares of irrigated grapes and the volume of irrigation water applied onto grapes are provided.



The Water Resource map layers CD provides more than 40 map layers plus the Geographic Information System software ("Arc Reader" and "Image Viewer") that is used to manipulate the map layers. Any person who uses the CD can design, view and print their own maps. They can display any combination of map layers and they can choose the boundary of the piece of land to be mapped.

For more information, please contact Tony Thompson on (08) 8346 6855 thompson.tony@saugov.sa.gov.au

UPCOMING EVENTS

The AWA South Australian Water Awards were established in 1996 to recognise the outstanding and innovative contributions to the water industry in South Australia. Submissions are now invited in the following categories:

AWA Awards
Infrastructure Development and Management
Water, Environment and Society
Premier's Medal

Sponsored Awards
The Water Industry Alliance, Research and Development
Award
United Water, Post Graduate Research Award

Entries Close 3pm Monday 20th August 2007. Entry forms and sponsorship details can be obtained from:

Sarah Carey, AWA Administrator
11 Bagot Street
North Adelaide SA 5006
Phone (08) 8267 1134
Facsimile (08) 8239 0932

The AWA Water Awards Dinner and Presentations will be held on Friday 19th October 2007 at the Adelaide Convention Centre, North Terrace at 7pm.

Hydrological impacts of climate change

November 15-16, 2007 Optus Theatre, CSIRO Discovery Centre, Canberra

This symposium will bring together Australia's leading climate and water scientists to improve understanding of the likely hydrological consequences of future climate across Australia.

The meeting, for researchers working in hydrology (including groundwater), climate science, simulation, modelling and remote sensing, will assemble the latest knowledge on climate change and water science. It will also explore different approaches to hydrological prediction, and integrating hydrological prediction into climate modelling and how that can help provide more accurate forecasting of climate and water resources.

Twenty speakers from key Australian institutions will explore the key questions surrounding the impact of climate change on water.

The symposium, facilitated by the Water for a Healthy Country Flagship, is one of a series of Cutting Edge Science Symposia sponsored by CSIRO's Office of the Chief Executive (OCE) Science Team to boost the level of scientific discussion and interaction on issues of national and international concern.

Registration details:

Numbers are limited to 150 delegates. There is no cost to register for the symposium. Registrations close Friday, October 26, 2007. You can register online from the CSIRO website: www.csiro.au/events/pe6t.



CGS Short Courses 2007
Australia - New Zealand
www.groundwater.com.au

Endorsed by:
National Groundwater
Committee



Course Name	Course Leaders	When & Where	Fees
33rd Australian Groundwater School Tamie Weaver URS-UniMelb, Ian Cartwright Monash Uni, David Ife URS, Tony Laws, Randall Nott, Kevan Richards, Vic Department of Sustainability & Environment		Mon 9 - Fri 13 July 2007 Uni Melbourne, International House, 241 Royal Parade, Parkville VIC	\$1560
2nd NZ Groundwater Modelling School: Concepts; Application GW Vistas; Predictive Uncertainty PEST Noel Merrick NCGM-UTS, John Doherty Watermark, Jim Rumbaugh ESI		Tues 31 July - Fri 3 Aug 2007 Quest on Willis, 219 Willis St, Wellington NZ	\$1870
7th Australian Groundwater Modelling School: Concepts; Application GW Vistas; Predictive Uncertainty PEST Noel Merrick NCGM-UTS, John Doherty Watermark, Jim Rumbaugh ESI		Tues 7 - Fri 10 Aug 2007 DPI&F Conf Centre, 80 Ann St, Brisbane QLD	\$1870
8th Australian Groundwater Modelling School: Concepts; Application GW Vistas; Predictive Uncertainty PEST Noel Merrick NCGM-UTS, John Doherty Watermark, Jim Rumbaugh ESI		Tues 14 - Fri 17 Aug 2007 Kings Perth Hotel, 517 Hay St, Perth WA	\$1870
2nd New Zealand Getting to know Groundwater & Surfacewater Paul White GNS, Neil Power DWLBC-SA, Prof Ian Acworth UNSW-WRL		Wed 5 - Fri 7 Sept 2007 Quest on Willis, 219 Willis St, Wellington NZ	\$830
1st FEFLOW Groundwater Modelling Course - WA Peter Schätzl: Product Manager FEFLOW, WASY GmbH, Institute for Water Resources Planning & Systems Research Berlin		Tues 9 - Fri 12 Oct 2007 Kings Perth Hotel, 517 Hay St, Perth WA	\$1870
2nd FEFLOW Groundwater Modelling Course - QLD Peter Schätzl: Product Manager FEFLOW, WASY GmbH, Institute for Water Resources Planning & Systems Research Berlin		Tues 9 - Fri 12 Oct 2007 DPI&F Conf Centre, 80 Ann St, Brisbane QLD	\$1870
34th Australian Groundwater School NGC Aust, Tony Laws WA, Jenny Deakin, Miladin Latinovic, Lud Schmidt Tas. Primary Ind. Water & Env		Mon 26 - Fri 30 Nov 2007 Hobart F&C Centre, Elizabeth St Pier, Hobart TAS	\$1560



<http://www.hydsoc.org>

PO Box 6136, Halifax Street
ADELAIDE SA 5000

Executive Committee

Chairperson
Linton Johnston
Phone: 8366 2600
Email: l.johnston@bom.gov.au

Vice
Marion Santich
Phone: 8273 9114
Email:
marion.santich@adelaide.nrm.sa.gov.au

Treasurer
Bill Lipp
Phone: 8343 2508
Email: bill.lipp@saugov.sa.gov.au

Secretary
Ken Schalk
Phone: 8273 3100
Email: ken.schalk@tonkin.com.au

Committee

Emma MacKenzie
Phone: 8378 8000
Email:
emma.mackenzie@austwaterenv.com.au

Sebastien Lamontagne
Phone: 8303 8713
Email: sebastien.lamontagne@csiro.au

Martin Lambert
Phone: 8303 5838
Email: mlambert@civeng.adelaide.edu.au

Martin Fidge
Phone: 8339 9821
Email: fidge.martin@saugov.sa.gov.au

David Pezzaniti
Phone: 8302 3652
Email: david.pezzaniti@unisa.edu.au

David Seeliger
Phone: 8273 3100
Email: david.seeliger@tonkin.com.au

Editor

Renae Eden
Phone: 8280 5910
Email: renae@deltaenvironmental.com.au

SUMMARY OF DROUGHT AND ADELAIDE WATER SUPPLY SEMINAR PRESENTATIONS

On Wednesday 20th June 2007 HYDSOC presented a half day seminar, with speakers having a range of perspectives and involvement in Adelaide's water supply ranging from water resource management, climate prediction, to operational planning and management and development of alternative water sources. Below are summaries of two of the presentations given. The full presentations will be available via the HYDSOC website.

The Drought: What Does it Mean for Water Quality in the River Murray?

Michael Burch, Tim Kildea & Justin Brookes.

- Higher than normal risk of algal blooms this summer - may be starting earlier than usual
- Blooms may be both smelly and toxic
- Filtration plants will cope satisfactorily for the public water supply
- May be some issues for unfiltered supplies - toxins & odours
- Algal blooms may affect the use of the River for recreation

Meteorological Aspects of the 2006-07 drought

Bruce Brooks, Manager Climate Services, South Australia

- The 2006 drought was compounded by warm temperatures and what has been a dry decade over much of the MDB.
- Rainfall has been close to average across much of the MDB since March.
- The outlook for the coming season is neutral for chances of above average rainfall in the MDB.
- Higher than average rainfall typically occurs in the year following an El Niño year. Higher than average rainfall usually occurs in a La Niña year.
- The chance of a La Niña developing in 2007 is higher than the long-term average (which is about one in five)

Will the River Murray dry up? Managing for sustainable use

Paul Harvey, Department of Water, Land and Biodiversity Conservation

- Current volume of water flowing through the Murray River system too small to flush salts, maintain the connectivity between the river and its floodplains, and to prevent sand from accumulating at the Murray Mouth
- Situation made worse by the current drought
- Storage levels across the basin currently very low - will take several years of above average rainfall to fill them
- Current policy across the basin is to maintain the safety of the water supply for Adelaide and rural towns along the Murray as a priority
- SA has established a Drought Response Group to coordinate efforts to maintain the water supply
- Inflows next Spring will be critical - some positive signs so far

IAN LAING PRIZE

The Hydrological Society of SA offers the Ian Laing prize for the best student work in water related studies, for an amount of \$750.

Students eligible for the academic prize will be undertaking their final year of an ordinary or honours degree course or post graduate diploma course which involves some study of hydrological and related sciences or water resources management.

The prize will be awarded on the basis of:

- ♦ overall academic record
- ♦ performance in subjects or units specifically related to water studies
- ♦ a demonstrated interest in water studies

The successful applicant will preferably, but not necessarily, be undertaking research or project work in a field of study embraced by the Prize, including hydrology, hydraulics, meteorology, hydrogeology, marine or freshwater ecology, aquatic chemistry, geomorphology, oceanography, water law, water resources planning and management.

Applications will close on October 31, 2007

Apply to Mr Ken Schalk,
c/- Tonkin Consulting,
5 Cooke Terrace,
Wayville SA 5034;
fax (08) 8273 3110

