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NEWSLETTER

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NEWS FROM THE STATES AND TERRITORIES

AUSTRALIAN CAPITAL TERRITORY

COOPERATIVE RESEARCH CENTRE FOR CATCHMENT HYDROLOGY
and
CSIRO LAND AND WATER

Seminar: Plantations on salty water tables: Are they sustainable?

Richard Silberstein
(Email: richard.silberstein@cbr.clw.csiro.au)

Thursday 18 September 1997 at Conference Room, Building 201
CSIRO Land and Water, Black Mountain Laboratory Canberra, (Clunies Ross Street, Acton)

At Kyabram, northern Victoria, a small (2ha) plantation was established 19 years ago, over a shallow saline watertable in an irrigation area. The plantation has been the subject of an intensive monitoring program over the last two years as part of CRC Project A5: Sustainable hardwood production in shallow waterable areas, to assess the current status of the soil-water-solute system, and the impact of that system on tree growth.

Crucial to the assessment of the plantation and its effect on the local groundwater, has been the development of a computer model which can simulate both the soil-water dynamics and soil-solute transport as well as the growth and water use of the plantation. TOPOG_Dynamic is a model which combines hydrologic and ecological/biological aspects. It simulates the 3-dimensional water and solute dynamics within a catchment, and couples these to plant growth and carbon allocation.

Richard Silberstein will discuss the response of the trees to water stress and how this response is affected by the salinity of the groundwater. The impact of rising salinity levels is of particular concern, as the plantation is likely to reduce its water consumption further in response to this stress. The extent to which the trees can help the surrounding agricultural land through watertable control depends on the sustainability of this system, which may be limited by salt accumulation beneath the trees through concentrated water uptake.

NORTHERN TERRITORY

Water Resources Division
Department of Lands, Planning and Environment

Steven Tickell informs us that the Water Resources Division in Darwin has relocated to Palmerston, a satellite city 15 km from Darwin. It has also been transferred from the Power and Water Authority to the Department of Lands, Planning and Environment.

The postal address remains the same:

PO Box 1096, Darwin, NT, 0801

The street address is now:

4th Floor, Toyden centre, Chung Wah Terrace, Palmerston.

The new telephone is: 08 8999 3659 fax is: 08 8999 3666.

The Alice Springs office is not moving.

Steve invites any members who are visiting the territory to drop into either of the Water Resources offices in Darwin or Alice Springs to have a chat to the NT people.

WESTERN AUSTRALIA

BRANCH MEETINGS

Speakers at Meetings

Monday 23 June 1997 Annual General Meeting

Prof John Wilson, New Mexico Institute of Mining and Technology:
Visualisation of groundwater flow and transport through a microscope

Monday 28 July 1997

Peter Harrop, Hydrogeological Consulting Services, WA:
Occurrence of Late Miocene Palaeochannels in the Mediterranean

Monday 25 August 1997

Ian Brunner Dames and Moore:
Broad concepts of Collie Basin hydrogeology

New Committee for 1997-8

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Education Representative	Qadir Rathur
State Liaison Member	Phil Commander

SOFTWARE

Hydraulics, Water Resources and Environmental Software

Download freeware, shareware, demos

<http://www.100folhas.pt/software/>

CATCHMENT MANAGEMENT SOFTWARE PACKAGE

CSIRO Land and Water

CSIRO Land and Water is seeking Expressions of Interest to market, distribute and provide after sales support, under licence, for its in-house developed Catchment Management Support System (CMSS). This system predicts the impacts of land use and land management change on the nutrient loads of a catchment's waterways.

CMSS has been marketed successfully by CSIRO for 6 years and has recently been redeveloped with a Windows interface. The software has an existing market of users wishing to upgrade and there are other marketing opportunities. The product has user acceptance over several years and is well documented. The system requires training and help desk support which would attract an additional fee from the user. Training materials are available.

Although this closed 8 August, 1997, the system itself will be of interest to people.

Enquiries: Keith Farquhar Phone: 0419 493 138

Investigation of Historic Gas Manufacturing Sites in Western Australia Evaluation of Potential Impacts on Surface and Groundwater Resources

John White

Groundwater Investigations Branch
Western Australian Water & Rivers Commission

The Groundwater Investigation Branch of the Water & Rivers Commission (the Commission) is conducting an investigation of historic gas manufacturing sites throughout Western Australia. This investigation is one of the Commission's strategic initiatives to manage the water resources of Western Australia specifically where former industrial sites are subject to redevelopment.

The Commission is undertaking this investigation following recent environmental investigations conducted at the former gasworks site located in Albany and remediation work conducted at the former East Perth gasworks site. Both of these sites have been subject to contamination with mixtures of byproduct oils, tars, and spent oxides related to gas production and waste handling/disposal processes. Once in contact with groundwater or surface water, these mixtures can result in a complex distribution of light non-aqueous phase liquid (LNAPL) oils, dense non-aqueous phase liquid (DNAPL) tars, and a suite of dissolved phase contaminants. The Commission considers that gas manufacturing sites have the potential to contaminate the State's water resources.

Gas was first manufactured in the State from various types of wood as early as 1849 for domestic lighting and/or heating purposes. Subsequently, gas was manufactured from wood, coal, and/or heavy oils in various urban areas and industrial facilities throughout Western Australia. The first gas lights were operated by local gas producing companies such as the City of Perth Gas Company (est. 1882) and the Fremantle Gas and Coke Company (est. 1883). Shortly thereafter, gas was manufactured for the supply of gas-driven equipment including electrical generators that were operated at the smaller port towns. These include the Albany gasworks (est. 1891), Geraldton gasworks (est. 1895) and the Carnarvon Electric Light Company gasworks (est. 1915).

Anecdotal evidence suggests several other towns and isolated industrial facilities have relied on local gas manufacturing facilities to operate equipment including electricity generators, boilers, and furnaces. With advancing technology this equipment was decommissioned mostly during the first part of this century and generally replaced by natural gas and petroleum fuel-driven systems. Most of these gas manufacturing sites have been subject to redevelopment and, in some cases, surface water and/or groundwater resources may be utilised in the vicinity of these sites without due consideration of potential contamination issues.

This investigation program is broadly divided into three successive phases:

Phase 1: currently in progress, aims to locate most of the former gas manufacturing sites in the state through interviews and a review of historical records and publications. Once identified, an attempt will be made to rank the known sites in terms of their potential for impact(s) on the environment and related risks to human health. This "ranking" would be based on factors including the current land use, reliance on surface and/or groundwater resources, and other health considerations such as soil contamination.

Phase 2: will include a review of available sources of information for each site such as historical aerial photographs, site plans, local archives, current land use, and interviews with former employees. These reviews will focus on the identification of sites that are likely to contain significant contamination. Phase 2 will make recommendations as to which sites would require further investigation and development of site-specific sampling and analysis programs.

Phase 3: will include implementation of the site-specific sampling and analysis programs, review and interpretation of data, and preparation of written reports. Results and recommendations will be made available to the community.

It is hoped that the implementation of this program will continue to develop an awareness of some of the implications with regard to the redevelopment of old industrial sites.

For further information contact:

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GENERAL NEWS

Song Of The Artesian Water A Poem by Banjo Paterson

(submitted by Ian Ackworth, i.acworth@unsw.edu.au, UNSW)

Now the stock have started dying, for the Lord has sent a drought,
But we're sick of prayers and Providence - we're going to do without,
With the derricks up above us and the solid earth below,
We are waiting at the lever for the word to let her go.
Sinking down, deeper down,
Oh, we'll sink it deeper down:
As the drill is plugging downward at a thousand feet of level,
If the Lord won't send us water, oh, we'll get it from the devil;
Yes, we'll get it from the devil deeper down.

Now, our engine's built in Glasgow by a very canny Scot,
And he marked it twenty horse-power, but he didn't know what is what.
When Canadian Bill is firing with the sun-dried gidgee logs,
She can equal thirty horses and a score or so of dogs.
Sinking down, deeper down
Oh, we're going deeper down:
If we fail to get the water, then it's ruin to the squatter,
For the drought is on the station and the weather's growing hotter,
But we're bound to get the water deeper down.

But the shaft has started caving and the sinking's very slow,
And the yellow rods are bending in the water down below,
And the tubes are always jamming, and they can't be made to shift
Till we nearly burst the engine with a forty horse-power lift,
Sinking down, deeper down,
Oh, we're going deeper down:
Though the shaft is always caving, and the tubes are always jamming,
Yet we'll fight our way to water while the stubborn drill is ramming
While the stubborn drill is ramming deeper down.

But there's no artesian water, though we're passed three thousand feet,
And the contract price is growing, and the boss is nearly beat.
But it must be down beneath us, and it's down we've got to go.
Though she's bumping on the solid rock four thousand feet below,
Sinking down, deeper down,
Oh, we're going deeper down:
And it's time they heard us knocking on the roof of Satan's dwellin',
But we'll get artesian water if we cave the roof of hell in
Oh we'll get artesian water deeper down.

But it's hark! the whistle's blowing with a wild, exultant blast,
And the boys are madly cheering, for they've struck the flow at last:
And it's rushing up the tubing from four thousand feet below,
Till it spouts above the casing in a million-gallon flow.
And it's down, deeper down-
Oh, it comes from deeper down:
It is flowing, ever flowing, in a free, unstinted measure
From the silent hidden places where the old earth hides her treasure
Where the old earth hides her treasures deeper down.

And it's clear away the timber and it's let the water run,
 How it glimmers in the shadow, how it flashes in the sun!
 By the silent belts of timber, by the miles of blazing plain
 It is bringing hope and comfort to the thirsty land again.

Flowing down, further down:

It is flowing further down

To the tortured thirsty cattle, bringing gladness in its going;
 Through the droughty days of summer it is flowing, ever flowing
 It is flowing, ever flowing, further down.

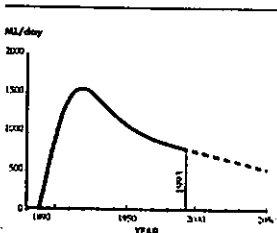
Ian considers that this may be timely with a severe El Nino event looming, although he questions the political correctness of "letting the bore flow". He's right there, this approach certainly is before the Great Artesian Basin Bore Rehabilitation Program, and the policy against free-flowing open bore drains. Maybe the next verse should start something like:

And the pressure she is dropping, and the bore will barely flow
 As the piezometric level is now a fair way down below
 The artesian head was magic when there were a 100 bores
 But now past 1500 and 2000 megs a day
 The water's being wasted and "pipe the bores" is what we say

ARTESIAN BORES AND BORE DRAINS

The Great Artesian basin was discovered in 1886. Graziers quickly recognised the value of this naturally flowing supply of groundwater, and by 1914 over 1200 artesian bores had been drilled for stock water.

Many of these early bores were located near watercourses, along which water was directed for use by stock. However, it soon became normal practice to locate bores on the higher parts of properties and gravitate water along specially constructed drains. These bore drains were often over 100 km long, and by 1954, 27 000 km of drains had been constructed in Queensland.



Historic and projected flow from the Great Artesian Basin assuming continued use of bore drain distribution systems.

Total flow from the basin peaked in 1914 at 1600 megalitres (ML) per day. By 1954, although many more bores had been drilled, flow had dropped to 1000 ML/day and one third of the bores had ceased to flow.

In 1954, legislation was introduced requiring new bores to be properly controlled with a valve and water distributed by pipeline. However, the existing 27 000 km of bore drains remained and most are still in use today.

If wasteful bore drains continue to be relied on, water yield from a significant proportion of the basin is likely to drop another 20% over the next 20 years. This will cause many bores to stop flowing altogether and further reduce the effectiveness of the remaining bore drains.

Over 90% of the water that flows into bore drains is wasted through evaporation and seepage. These losses are eliminated when bore drains are replaced with piped reticulation systems.

THE ADVANTAGES OF PIPING BORES

Piping Increases Pressure

Artesian pressure has stabilised in some areas of the basin, but is continuing to fall in others. The repair of old, uncontrollable bores now encouraged under the Great Artesian Basin Rehabilitation Project, is the necessary first step in reducing water wastage. However, bore drains remain the major cause of the continuing decline in artesian pressure.



A rehabilitated artesian bore showing valves to control flow, pipes to reticulate water and a fence for protection from stock.

MURRAY DARLING BASIN WORKSHOP '97
TOOWOOMBA 26-28 AUGUST
"Groundwater - in the Balance"

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Resource Sciences & Knowledge

an open day to launch the new
Resource Sciences and Knowledge Program

12 November 1997 from 10 a.m. to 1.30 p.m.
at 80 Meiers Road, Indooroopilly, Brisbane

Following a short formal program, guests will be invited to take tours to three sites within the Resource Sciences Centre where project leaders will present the latest in the department's innovative scientific research and information work.

RSVP: Wednesday 5 November 1997
Michelle or Jackie
Ph: (07) 3696 9475

Enter at gate 4 for parking
Signage will direct guests to function location



THREE NEW AND VERY USEFUL BOOKS

GROUNDWATER IN THE BALANCE

Extended abstracts of the Murray-Darling 1997 Workshop, 26-28 August, 1997, Toowoomba, Queensland. ISBN 0 7242 7410 3

Department of Natural Resources
GPO Box 2454

Brisbane, QLD, 4001

289 pages of short papers, typically 4 to 6 pages in length, which represent both the oral presentations and the posters at the workshop. There are a total of 64 papers.

MURRAY-DARLING BASIN GROUNDWATER QUALITY SAMPLING GUIDELINES

Technical Report No. 3, Groundwater Working Group, Murray-Darling Basin Commission. Compiled by Patty Please on behalf of the NRMS funded Murray-Darling Basin Groundwater Quality Project. 1997.

ISBN 1 875209 74 3

43 pages. Contents: 1. Introduction, 2. Groundwater sampling objectives and principles, 3. Planning and preparation, 4. Indicator selection, 5. Location and frequency, 6. Sampling devices, 7. Decontamination, 8. Bore purging, 9. Field measurements, 10. Filtration, 11. Containers, preservation, holding and transport, 12. Chain of custody records, 13. Quality assurance/quality control, 14. Problems commonly encountered with groundwater sampling, 15. Summary of groundwater sampling guidelines, 16. References.

MINIMUM CONSTRUCTION REQUIREMENTS FOR WATER BORES IN AUSTRALIA

Produced by the Agriculture and Resource Management Council of Australia and New Zealand. 1997. ISBN 0 7242 7401 4

Available from:

The State Library of Queensland, The National Library of Canberra, and

Department of Natural Resources Library

GPO Box 2454

Brisbane, QLD, 4001

85 pages. Contents: 1. Introduction, 2. Administrative requirements, 3. Responsibilities, 4. Drillers classification system and drilling methods used, 5. Siting a water supply bore, 6. Formation (strata) sampling and water sampling, 7. Drilling fluids, 8. Plumbness and alignment of bores, 9. Casing, 10. Grouting, 11. Water entry, 12. Bore development, 13. Disinfection of water bores, 14. Test pumping of bores, 15. Recording and reporting data, 16. Headworks and completion of bore site, 17. Reconditioning of bores, 18. Decommissioning of bores (abandonment).

TRAINING AND SUPPORT

16th Australian Groundwater School
Presented by Centre for Groundwater Studies in cooperation with
UNSW Groundwater Centre and UTS National Centre for Groundwater
Management.

Sydney, 1 to 11 December 1997
University of New South Wales

Location:

Main Common Room of New College, University of New South Wales, Anzac Parade, Kensington.

Background:

Established more than 20 years ago, the Australian Groundwater School is Australia's primary groundwater training program. As an annual end-of-year event it is rotated through the main Australian cities. It consists of a 2-week program of lectures, tutorials, discussions, field studies and other events as follows:

Week 1 - a broad overview from a distinguished group of industry professionals, addressing the fundamentals of groundwater science, technology and management.

Week 2 - workshops are presented for specific areas of interest.

Lectures and tutorials for the Australian Groundwater School have largely been given by practising hydrogeologists and specialists who have hands-on experience with groundwater management, and by specialists in universities and research agencies such as CSIRO.

Week 1: 1st -5th December, 1997

"Fundamentals of Groundwater Science, Technology & Management"
(Fee is \$975 for the 5 days and includes a full set of notes and catering)

DRAFT PROGRAM

1. Groundwater Issues in Australia
2. Hydrology: Surface Water - Groundwater Interaction
3. Hydrogeology
4. Groundwater Hydraulics 1
5. Groundwater Hydraulics 2
6. Aquifer Tests by Pumping
7. Groundwater Chemistry
8. Isotope Hydrology & Microbiology
9. Geophysics - Surface
10. Geophysics - Downhole and Airborne
11. Recharge / Discharge Estimation
12. Conceptual Modelling
13. Mine Dewatering
14. Dryland Salinity - Waterlogging
15. Hydrogeological Mapping
16. Groundwater Pollution
17. Drilling Methods & Piezo Well Design
18. Monitoring & Sampling Methods
19. Groundwater Management

Evening Tutorial:

An integrative problem involving mine dewatering, salinity, pollution, hydrogeological mapping.

Field Demonstrations of Groundwater Investigation Technologies:

A program of Field Demonstrations has been introduced this year to allow hands-on experience of a number of field methods. Four participative demonstrations have been organised on,

Week 2: Two workshops: 8th - 11th December, 1997
(\$500 per 2-day workshop; includes a set of notes and catering)

Workshop 1

8th-9th December "Assessing and Managing Diffuse-Source Pollution of Groundwater"

Sponsor: LWRRDC

Special guest: Prof. Bob Kuzelka, Groundwater Guardian Program, University of Nebraska

Objectives:

Nitrate, pesticides and pathogens pollution of groundwater are notoriously difficult to assess and manage. Australia is still in its infancy in learning to manage diffuse source contamination of groundwater, and few would say it is managed effectively. This workshop conveys findings from a series of national studies on the assessment of pollutants from dispersed sources (agriculture, grazing, septic tanks), and the effectiveness of assessment procedures. Given the pressures on agriculture to intensify production, it is time for some discussion and creative thinking on management approaches, including assessment, policy formation, and community participation.

On Tuesday we will explore outcomes of groundwater protection guidelines of the National Water Quality Management Strategy, and put forward some new initiatives. These include use of market approaches, and the critical and almost untapped potential for community participation in managing diffuse source pollution. Examples of these applications for managing diffuse source pollution will be given from USA and, where possible, Australia.

Workshop 2

10th-11th December "Towards Environmentally Sustainable Wastewater Irrigation"

Sponsors: LWRRDC, PigRDC, NSW Dept Land and Water Conservation

Objectives:

This workshop is aimed at water utilities, intensive rural industries, consultants, natural resource managers and environmental regulators who are concerned with siting, design, establishment and management of wastewater irrigation / land-treatment operations. It is widely recognised that groundwater quality protection is a major constraint to wastewater application rates which are environmentally sustainable. In many instances current guidelines do not adequately protect groundwater quality.

This workshop will present outcomes of a number of national research projects, on assessment and prediction of effects on soil and groundwater of irrigation with secondary and intensive rural industry effluent. It will also cover a new technique for wastewater land-treatment and monitoring methods for determining environmental impacts. It is intended that this will lead to better understanding of the environmental performance of these systems by those who need to know, and to identify priorities for any further R&D and communication in this field.

Trevor Pillar

Phone: 61 8 8303 8700

Email: cgs.training@adl.clw.csiro.au

Fax: 61 8 8303 8750

WWW: <http://www.clw.csiro.au/CGS>

Administration:

Heather Bajcarz

Phone: (61) 8 8303 8700

Email: Heather.Bajcarz@adl.clw.csiro.au

Fax: (61) 8 8303 8750

Centre for Groundwater Studies
C/- CSIRO Land and Water,
Waite Road, Urrbrae, South Australia 5064
PMB 2 Glen Osmond SA 5064

Studies In Environmental Pollution Of Soils PhD, MSc & Honours Scholarships

A number of postgraduate & honours scholarships are available in 1998 for the following projects:

- Modelling Preferential Transport Of Nutrients In Agricultural Soils.
- Environmental Fate Of Fertilisers Used In Australian Viticulture: Comparative Behaviour Of Fertilisers In The Soils Of The South Australian Riverland.
- The Mobility & Population Dynamics Of Soil Microorganisms: Implications For Land Disposal Of Sewerage.
- Effects Of Hysteresis & Water Repellency On The Dispersion & Transport Of Contaminants In Soils.
- Influence Of Soil Macropores On Biodegradability Of Commonly Used Pesticides.
- Decision Support For Assessing Risk Of Environmental Pollution Of Soils By Surface-Applied Chemicals.
- Tidal Effects On Contaminant Plumes In Unconfined Coastal Aquifers.

Experience:

Candidates for honours should have a strong undergraduate record in agricultural, chemical, physical or mathematical sciences. Candidates for MSc should preferably have a first-class honours or equivalent experience. Candidates for PhD should preferably have a first-class honours, an MSc (by Research) and/or equivalent experience.

Experience in one or more of the following would be an advantage.

- Soil Chemistry
- Soil Physics
- Soil Microbiology
- Groundwater Hydrology
- Engineering or Applied Mathematics

Funding:

Several projects are currently funded by Australian Research Council Large Grants Scheme and the Department of Industry, Science & Tourism, International Science & Technology Program. It is anticipated that funding for other projects will also become available by the end of the year.

Stipend:

Deakin University provides a limited number of scholarships for Australian residents (DUPRA) and for non-residents & overseas students (OSPRA). All scholarships are free of tax and exempt from HECS charges. The basic stipend for MSc and PhD candidates is about \$15,000 AUD per annum (including various allowances). Candidates that are successful in securing either a University scholarship (DUPRA) or a federal government scholarship (APRA) will be offered an additional tax-free stipend of up to \$10,000 (depending on experience and qualifications). Outstanding candidates maybe offered more. Candidates that are not Australian citizens or residents can only be considered for a position if they secure a Deakin University Overseas Post-graduate Award (OSPRA) or obtain funding from other sources. Honours scholarships provide a stipend for one year of \$2,500 and a relocation allowance of \$500.

Closing Dates:

Round 1: 30 September 1997
Round 2: 28 November 1997

Contact:

Dr Frank Stagnitti
Deakin University
PO Box 423,
Warrnambool, 3280. Australia.
ph. +61 (0)3 5563 3535
fax. +61 (0)3 5563 3462
email. frankst@deakin.edu.au
<http://www.cm.deakin.edu.au/~frankst/>

POSTGRADUATE OPPORTUNITIES IN GROUNDWATER RESEARCH

Centre for Groundwater Studies (CGS)

Applications are invited from students who are interested in commencing in 1998, a PhD or MSc in selected CGS projects, the details of which are available on the web: <http://www.dwr.csiro.au>. Successful applicants will be Australian citizens or have permanent residency status; have the minimum of a First Class Honours in science, engineering or mathematics, or an ordinary undergraduate degree plus relevant work experience; and have applied in 1998 for an Australian Postgraduate Award (APA), Flinders University Research Scholarship (FURS), or University of Western Australia Research Scholarship (UWARS). These scholarships currently pay \$15,637pa tax free and indexed, are HECS exempt, and offer a relocation allowance.

The value of the CGS award will consist of full operating funding and in-kind support from the Centre's partners and access to generous overseas travel grants.

Applications close 31 October 1997.

Application forms for APA/FURS or APA/UWARS are available from:

ADELAIDE
Scholarships Office
Flinders University of SA
email: Kay.Peglar@flinders.edu.au
ph: (08) 8201 3115

PERTH*
Scholarships Office
University of Western Australia
email: medwards@acs.uwa.edu.au
ph: (08) 9380 2490

*Application forms for Perth are best obtained from: <http://www.acs.uwa.edu.au/research/>

or from:

Adelaide email: Heather.Bajcarz@adl.clw.csiro.au ph: (08) 8303 8700

Perth email: Karen.Hansen@per.clw.csiro.au ph: (08) 9333 6250

UNIVERSITY RESEARCH STUDENTSHIP

Design and Implementation of a Modelling Environment for Groundwater Geochemistry Evaluation

Applications are invited from holders of first class or second class honours degrees for a 3 year research studentship funded by the European Social Fund (ESF) and The Queen's University of Belfast, available immediately. This project will be linked to active international research at Queen's University of Belfast and the International Atomic Energy Agency in Vienna, Austria on the interpretation of geochemistry in natural groundwater systems. For this specific research programme, there is a need for design and implementation of a windows-based modelling environment to assist developing countries applying modelling techniques to groundwater geochemistry. An interest in windows-based software development is preferred.

The studentship covers both tuition fees and a maintenance award and is available to persons who are both EC national and residents and who have not previously undertaken ESF assisted training at post graduate level.

The successful candidate must register at Queen's University of Belfast on or before 1 December 1997.

Dr. Robert M. Kalin
Director, Environmental Engineering Research Centre
Department of Civil Engineering
The Queen's University of Belfast
Belfast BT7 1NN N.Ireland UK
Phone: (44) 1232 274018 Fax: (44) 1232 663754
r.kalin@qub.ac.uk

COOPERATIVE RESEARCH CENTRE FOR CATCHMENT HYDROLOGY

VACATION STUDENTSHIPS

Studentships to participate in land and water management research projects are being offered by the Cooperative Research Centre (CRC) for Catchment Hydrology for the 1997/98 summer vacation.

Third or fourth year students are eligible to apply for the studentships which will provide research experience at either Monash University, The University of Melbourne, or the CSIRO Land and Water in the research fields of:

Salinity
Urban hydrology

Forest hydrology
Flood hydrology

Waterway management

The Studentships provide \$300/week for eight to ten weeks during December to February.

POSTGRADUATE SCHOLARSHIPS

The Cooperative Research Centre (CRC) for Catchment Hydrology has funding for a number of supplementary postgraduate scholarships for exceptional candidates at Masters and PhD level at Monash University and the University of Melbourne. These scholarships will provide an industry-based loading of \$3,000 to \$5,000 for candidates holding APA or similar scholarships.

The Centre brings together expertise and resources from CSIRO Land and Water, the Bureau of Meteorology, Monash and Melbourne Universities, Dept of Natural Resources and Environment, Goulburn-Murray Water, Melbourne Water and the Murray-Darling Basin Commission, Southern Rural Water and Wimmera-Mallee Water. CRC Associates - Dept Land and Water Conservation NSW; Dept Natural Resources Qld; Hydro-Electric Corporation, Tas; and State Forests of NSW are major project participants.

(Please note positions are open to Australian citizens or Permanent Residents of Australia only.)

For details and application forms, please contact
Virginia Verrelli Tel: (03) 9905 2704
Email: virginia.verrelli@eng.monash.edu.au.

Fax: (03) 9905 5033,

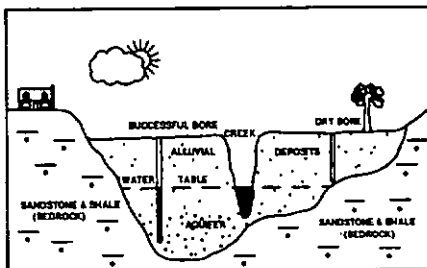
For specific information on research fields, please refer to the CRC web site at:
<http://www-civil.eng.monash.edu.au/centres/crcch/>.

Written applications need to be made by Friday 31 October 1997

BORE SITING

In addition to hydrogeological aspects, consideration should be given to the following when siting the bore:-

- Possible sources of pollution (e.g. septic installation)
- Property boundary
- Source of power to drive pump
- Neighbouring bores (avoid likely pumping interference)
- Service facilities (power, telephone lines, gas etc)



DRY BORE - POORLY SITED

UPCOMING CONFERENCES

"Application of GIS, Remote Sensing, Geostatistics and Solute Transport Modeling to the Assessment of Nonpoint Source Pollutants in the Vadose Zone"

October 19-24, 1997

Mission Inn, Riverside, California

Conference Objective: The objective of the jointly-sponsored conference is to explore current multidisciplinary methodologies for assessing the impact of non-point source pollutants upon soil and groundwater resources. Topics covered by the conference will include, but are not limited to, spatial analysis, geostatistics, remote sensing and non-invasive techniques for solute transport parameter measurement, solute transport parameter estimation techniques (e.g., pedo-transfer functions), soil databases, spatial and temporal variability, scaling, uncertainty and sensitivity analysis, fuzzy set theory and fractal approaches, risk assessment, GIS and solute transport modeling as related to the assessment of the impact of nonpoint source pollutants upon soil and groundwater resources from a local to a global scale.

For further conference details contact:

Elynn Grossman, Meetings Manager, American Geophysical Union, 2000

Florida Ave., N.W., Washington, D.C. 20009,

telephone #: 202-462-6910 ext. 242, fax #: 202-328-0566,

e-mail: EGrossman@Kosmos.agu.org

OR

Dennis L. Corwin, Ph.D., Conference Organizer, USDA-ARS, U.S. Salinity

Laboratory, 450 West Big Springs Road, Riverside, CA 92507-4617,

telephone #: (909) 369-4819, fax #: 909-342-4962,

e-mail: dcorwin@ussl.ars.usda.gov.

"WAI WHENUA - WATER/LAND".

**24th Hydrology and Water Resources Symposium,
Auckland, New Zealand.**

24-27 November 1997.

The 24th Hydrology and Water Resources Symposium this November will be held in Auckland, New Zealand. It is a combined symposium with the NZ Hydrological Society and the Institute of Engineers, Australia. The call for abstracts has now closed and an excellent response has been received. As a result we have had to expand the programme to incorporate a greater number of presentations.

Contact Bryan Bates, symposium convenor, at

bbates@arc.govt.nz or in New Zealand on 09 3662034 or fax 09 3662155.

OR

HWRS '97, The Conference Company, PO

Box 90-040, Auckland, NZ.

(Phone: 0064-9-360-1240, Fax: 0064-9-360-1242,

Email: info@tcc.co.nz).

2nd PRODUCTION AND ENVIRONMENTAL MONITORING WORKSHOP
9th to the 11th DECEMBER 1997 at the
UNIVERSITY OF NEW ENGLAND, ARMIDALE, NSW.

This workshop is designed for those involved in monitoring of primary production or environmental variables on the farm or rural based industry. This workshop provides you with the practical experience to do it properly.

This workshop is being conducted by the University of New England Divisions of Environmental Engineering, Ecosystem Management and Agronomy and Soil Science in conjunction with the Cooperative Research Centre for the Cattle and Beef Industry (Meat Quality) and the Meat Research Corporation.

Background:

The focus of the workshop is to give participants a practical understanding and hands on application of production and environmental monitoring practices. These practices are applicable to intensive livestock facilities and other rural industries that apply wastes to the soil-plant system. The beef cattle feedlot industry has developed new technologies and is leading the way ahead in clean, green agriculture through quality assurance programs, environmental management practices, monitoring programmes and associated research. This information will be presented in the workshop and will be useful to people in many industries.

Aims:

The aim of the workshop is to provide a valuable overview of the environmental monitoring techniques used to assess the production system for its improvement and environmental compliance. This will enable the participant to have a greater understanding of the correct procedures for sample collection, handling, testing and data analysis.

Themes:

Well respected speakers on the following topics:

- Environmental Management Systems
- Environmental monitoring
- Using monitoring systems to improve production
- Laboratory techniques
- Management and analysis of the data
- Practical sessions on production and environmental sample collection and handling
- Practical approaches to safe use of organic wastes

The workshop has been designed for people involved in the application of organic wastes to agricultural land. It will include explanations, practical demonstrations and discussions on; environmental monitoring, application of waste, feed, water, soil and crop sampling, and minimising erosion and excess irrigation tailwaters.

Location:

The workshop will be held at the University of New England, Armidale. The Tullimba Cattle Research Facility, 50km west of Armidale, will be used for the practical sessions.

Accommodation will be available at Austin College for the daily cost of \$50 (includes breakfasts and informal dinners).

Earlybird Workshop registration is \$540

Please note full registration of \$600 after 10 November 1997.

Information;

UNE Conference Company
ARMIDALE NSW 2351
Phone (02) 6773 2154
Facsimile (02) 6773 3766



UNEP

International Regional Conference

ON

ENVIRONMENTAL TECHNOLOGIES FOR WASTEWATER MANAGEMENT

4 - 5 December 1997

CONFERENCE TOPICS

The conference topics will include environmental technologies in the following areas dealing with treatment and management of wastes.

- Composting systems
- Sludge treatment
- Greywater reuse
- Wastewater irrigation
- Nutrient removal operations
- Infiltration and soil filters
- Stabilisation ponds
- Wetland systems
- Standards and regulations
- Treatment systems for single houses / housing complexes

OBJECTIVES

Concern for human and environmental health demands proper treatment of waste generated by the community. The cost of providing a deep sewer system with a centralised treatment plant for all human settlements will be very high. It is therefore imperative for us to develop a new generation of innovative environmental technologies to meet the challenge.

Design and operation of such technologies need special attention due to variation in flow and pollution load. Such units should also be able to be operated with minimum maintenance and supervision, because of lack of or isolation from service facilities.

The conference will focus on the design, operation, maintenance and management of small treatment units. New innovations in the field, case studies on safe and reliable system, removal of nutrients, water reuse, and methods for non-attended operation will be discussed. In addition to the above, the treatment of wastewater from single houses or housing complexes will also be presented.

For further information please contact:

Dr. Kuruvilla Mathew
Environmental Science
Murdoch University
MURDOCH 6150
WESTERN AUSTRALIA

ph: 61 9 360 2896

fax: 61 9 310 4997

email: mathew@assun1.murdoch.edu.au

GAMBLING WITH GROUNDWATER

International Association of Hydrogeologists
XXVIII Congress

&

Annual Meeting of the American Institute of
Hydrology

PHYSICAL, CHEMICAL, AND BIOLOGICAL ASPECTS OF AQUIFER-STREAM RELATIONS



Las Vegas, Nevada, USA
September 27-October 2, 1998



Symposia

Interaction of surface water and groundwater in environmentally-fragile hydrogeologic environments; politics/environment/science; national water-quality assessments; hydrogeologic processes of the unsaturated zone; hydrogeologic considerations in the long-term storage of hazardous wastes; hydrogeology, geochemistry, and biology of springs; role of hydrogeology in the occurrence and abatement of natural hazards; application of interdisciplinary techniques in hydrogeology.

IAH/AIH Conference Las Vegas -- Conference Headquarters

Attn: Helen Klose

2499 Rice St., Suite 135

St. Paul, MN 55113-3724 USA

phone: 612.484.8169 fax: 612.484.8357 email: AIHydro@aol.com

BNR 3 Conference

30 November - 4 December 1997

BNR 3 is the third specialist Biological Nutrient Removal conference to be held in Australia by the Australian Water and Wastewater Association (AWWA) and the International Association of Water Quality (IAWQ).

The conference is very highly regarded by all practitioners, local, state and international, as a demonstration of leading edge issues, knowledge and technology.

After the previous successful conferences in Bendigo and Albury, BNR 3 is to convene in the new Brisbane Convention Centre alongside the famous Brisbane South Bank Parklands in December 1997. This modern centre and location will provide an ideal venue for both formal and informal discussion on the latest developments in BNR. By late 1997, South East Queensland will be the leading area in Australia in the application of BNR technology with 9 operational plants located within 200km of Brisbane.

Biological Nutrient Removal is arguably one of the fastest growing technical areas in the field of pollution control and treatment of wastewater in the world today. This conference will significantly increase knowledge within this field and encourage transfer of information both locally and internationally. Delegates will be able to participate in all aspects of the conference and hear of the latest developments in this important technology from leading Australian and international practitioners.

Contact: Selwyn McFaul
BNR3 Organising Committee
Pri: 07 3244 9600
Ms Lorelei Baum
Viva Public Relations
Ph. 0411 852 378



Australian Water & Wastewater Association Inc

Federal Office
Level 2, 44 Hampden Rd
Artarmon NSW 2064
Facsimile (02) 9413 10479
Telephone (02) 9413 1288

Name of event: 1998 Ozwater & Ozwaste Trade Exhibition

Dates: 27 - 29 April 1998

Venue: Brisbane Convention & Exhibition Centre, Brisbane, Australia

Organiser: Australian Water & Wastewater Association (AWWA)

Enquiries: Anne Adams

Facsimile: +61 2 9413 1047

Telephone: +61 2 9413 1288

75 organisations have already booked

We expect over 3500 visitors and delegates

Third International Symposium on
Artificial Recharge of Groundwater

ISAR 98

Store or Restore

Amsterdam,

September 21 - September 25 1998

Programme

About 50 general papers will be presented on various aspects of artificial recharge of groundwater. In addition to the presentation of papers, posters will be presented which can be discussed during a special poster session. The programme starts with a short course on design and management of artificial groundwater recharge systems and on the hydrology and chemistry of artificial recharge. This course has a separate fee. Included in the programme is an excursion on Wednesday afternoon September 23. There will be a post conference tour on Friday, September 25 to locations in the south of the Netherlands with water-management issues related to salt water, subsidence, reclamation of lakes and artificial recharge.

Homepage internet: www.kiwa.nl/tisar

Symposium secretariat
Buerweg 51
1861 CH Bergen
The Netherlands
tel +31 72 5899062
fax +31 72 5899040
e-mail R.R.Kruize@inter.nl.net

Topics

Environmental aspects and sustainability
aquifer, soil, ecology, landscape

Water quality aspects

requirements, regulations and guidelines with respect to operation, clogging, environment, vegetation; changes in quality, pathogens, pretreatment

Developments

endurability, cleaning, maintenance, rehabilitation, types and methods of recharge (bankfiltration, well recharge, open/surface recharge) pretreatment, hydrological modeling

Applications

conjunctive use of surface and groundwater for water supply, alternatives, economics, storage and recovery, aquifer treatment, ecological restoration, scenic enhancement, management of water and water resources, community benefits, aquifer control

Role of Artificial Recharge and its merits to tackle prevailing and future water problems

drinking water, water management, irrigation in developed and developing countries

DESIRABLE RESEARCH PROJECT IN HYDROLOGY

(taken from the internet 16 September, 1997)

Philippe Gourbesville

Now I am involved in a project of design for a new vineyard in Champagne (France). The hydraulic difficulty is to manage intensive rainfalls (70 to 100 mm/day) on a hillside with a slope over 40%. My actual idea is to create different regulation structures located in the hillside.

I am looking for any experiences in similar situations: hillsides with strong slope and massive soil erosion.

Dr Philippe Gourbesville
Associate Professor, Department of Geography
University of Nice, Sophia Antipolis
France
email: phg@nice.pacwan.net

**INTERNATIONAL ASSOCIATION
OF HYDROGEOLOGISTS
INTERNATIONAL GROUNDWATER
CONFERENCE
1998**

Groundwater is a critical resource both globally and in the Australian environment. Adequate protection and management of this resource is critical to ensure its sustainability into the twenty-first century. Through a series of talks, discussions and workshops the conference will be striving for the sustainable use of groundwater resources through their protection and management.

Specific issues to be addressed include the investigation and management of groundwater in salt-affected areas and at contaminated sites, groundwater pollution prevention and the interrelationship between groundwater and the environment.

Hydrogeologists in Victoria have been active in all of these areas, and Melbourne is well placed in terms of the number of investigators and access to field sites.



**International Association
of Hydrogeologists**
AUSTRALIAN NATIONAL CHAPTER

Further enquiries may be made by contacting:

CONVENTION & INCENTIVE SERVICES
Level 2, 370 Glenhuntly Road
Elsternwick VIC 3185
Australia

Tel: +61-3-9523 8290 Fax: +61-3-9528 4046
E-mail: cis@ozemail.com.au

**GROUNDWATER:
SUSTAINABLE
SOLUTIONS**

**University of Melbourne
Melbourne, AUSTRALIA
8-13 February, 1998**

Topics for papers and poster presentations will include:

Salinisation

- Dryland salinisation
- Irrigation salinisation
- Effectiveness of control measures

Groundwater Contamination - Causes, Effects, and Management

- Diffuse pollution
- Contaminated sites
- Landfill disposal
- Groundwater remediation
- Waste water disposal
- Mining

Groundwater - Surface Water Interaction

- Wetlands
- Eutrophication
- Stream baseflow
- Catchment management

Urban Hydrology

Groundwater Sustainability and Planning

- Groundwater resource abuse and management
- Changing demands for groundwater
- Impacts of government downsizing and privatisation
- Groundwater monitoring and reassessment

INTERNATIONAL OPPORTUNITIES

Hydrogeologists

Our client is a well respected, diverse and profitable Consulting Company with offices throughout Australia, South East Asia and North America. Through dynamic National and International growth they are looking to appoint highly motivated Senior & Principal level Hydrogeologists with experience running major international projects, the ability to win work and report on major projects. The successful candidates will be energetic, highly motivated and able to work well in a team environment.

South Africa

- Minimum 10 years in the field of Hydrogeology
- A record in open cut and underground mine dewatering and computer aquifer modelling
- Aquifer injection and in-situ mining experience advantageous
- Proven Project Management skills
- Negotiation and report writing skills essential
- Based in Johannesburg and working with major mining houses as well as internally within a respected consulting group
- Previous groundwater project experience in Africa would be highly regarded

South East Asia

- At least 10 years experience in the Field of Hydrogeology
- Background in village to city water supply projects, particularly through ADB & World Bank
- Experience in civil and mine construction dewatering and groundwater pollution assessment
- Ground water modelling skills
- Command of Asian languages and previous experience in South East Asia advantageous
- Strong Project Management skills

There is potential for rapid advancement within the group. The Company offer competitive salary packages and have in place a system for rewarding performance with progressive share ownership.

For additional information please call: Lynn Handley on (61 2) 9238 6196



Management Services P/L

HN Management Services Pty Ltd
PO Box 192 Turramurra SYDNEY NSW 2074
Level 67 MLC Centre Martin Place
SYDNEY NSW 2000
Telephone: 61 2 9238 6196
Facsimile: 61 2 9489 8564
E-Mail: hnmrecruit@bigpond.com
ACN: 072069106

Quality Professional Recruitment Solutions

**MEMBERS MOVEMENTS
and
NEW ADDRESSES**

CHANGE OF ADDRESS

Sean MURPHY: Queensland
24 Tanaldi St., Shailer Park, 4128

NEW MEMBERS

We are pleased to welcome the following new members recently accepted into the IAH.
Congratulations.

There are quite a few but they will be listed in the next Newsletter

Items for Newsletter

The best way to send Newsletter items is direct to the editor, either by email (which I can extract and reformat), or mail it in a camera-ready form of A4 size (which will be reduced to A5). To:

Malcolm Cox
IAH Newsletter Editor
School of Natural Resource Sciences, QUT
GPO Box 2434, Brisbane, QLD, 4001
tel: (07) 864 1649
fax: (07) 1535
email: m.cox@qut.edu.au

**PLEASE BE SURE YOUR FEES AND
ADDRESS/CONTACTS
ARE UP TO DATE**