

International Association of Hydrogeologists
AUSTRALIAN NATIONAL CHAPTER

Volume 12, No. 3

September, 1995



NEWSLETTER

IAH
P.O. Box 373,
Brisbane Albert Street,
QLD, 4002

STATE OFFICE HOLDERS and CONTACTS

(please update as required)

Australian Capital Territory

State Liaison Dr Rien Habermehl
tel (02) 6249 9426 fax (02) 6249 9999
AGSO, GPO Box 378, Canberra, ACT, 2601

Queensland

Chairman Mr Andrew Moser
tel (07) 3274 4411 fax (07) 3274 4977
Coffey Partners Int'l, 53B Fairlawn St, Nathan, QLD 4111

Secretary/Treasurer Ms Linda Foster
tel (07) 3224 2394 fax (07) 3224 7219
DPI-Water Resources, GPO Box 2454, Brisbane, QLD, 4001

State Liaison Mr Bruce Pearce
tel (07) 3224 7252 fax (07) 3224 8359
DPI-Water Resources, GPO Box 2454, Brisbane, QLD, 4001

New South Wales

President Prof Michael Knight
tel (02) 330 1984 fax (02) 330 1985
NCGM, U Technology, PO Box 123, Broadway, NSW, 2007

Vice President Mr Don Woolley
tel (02) 895 7557
3 Barwon Ave, Turramurra, NSW, 2074

Secretary Dr Robert Carr
tel (02) 922 2288 fax (02) 922 1195
Lawson & Treloar, PO Box 799, North Sydney, NSW, 2060

Treasurer Mr John Ross
tel (02) 502 4844 fax (02) 502 2105
Groundwater Technology, 17 Forrester St, Kingsgrove, NSW, 2208

State Liaison Mr George Gates
tel (02) 895 7860 fax (02) 891 6884
Dept Water Resources, PO Box, 3720, Parramatta, NSW, 2124

Northern Territory

State Liaison Ms Danuta Karp
tel (08) 8982 7274 fax (08) 8941 0703
Water Resources, Power and Water Authority,
GPO Box 1096, Darwin, NT, 0801
8 Cavenagh St

South Australia

State Liaison Mr Steve Barnett
tel (08) 8274 7583 fax (08) 8274 1239
Groundwater Section
Dept Mines and Energy, 191 Greenhill Rd, Parkside
PO Box 151, Eastwood, SA, 5063

Victoria

President Mr John Brumley
tel (03) 660 2379 fax (03) 639 0138
49 Unwin St, Templestowe, VIC, 3106

Vice President Dr Charles Lawrence
tel (03) 344 7963 fax (03) 344 7761
School of Earth Sciences, U Melbourne, Parkville, VIC, 3052

Secretary Mr Greg Hoxley
tel (03) 508 2345 fax (03) 508 2264
HydroTechnology, 590 Orrong Rd, Armadale, VIC, 3143

Treasurer Mr David Ife
tel (03) 279 2888 fax (03) 279 2850
AGC Woodward-Clyde, 40 Victoria Rd, E Hawthorne, VIC, 3123

State Liaison Dr Richard Evans
tel (03) 508 2640 fax (03) 508 2264
HydroTechnology, 590 Orrong Rd, Armadale, VIC, 3143

Western Australia

Chairman Mr Ron Colman
tel/fax (08) 9272 4726
Colman Groundwater, PO Box 269, Inglewood, WA, 6052
tel (08) 9420 2924 fax (08) 9420 3176
Water Authority, Leederville, WA, 6007

Vice Chairman Mr John Waterhouse
tel (08) 9381 3444 fax (08) 9381 4041
Golder Assoc., 441 Vincent St W., Leederville, WA, 6007

Secretary Mr Gary Meyer
tel (08) 9479 8443 fax (08) 94798444
Western Mining Corp., PO Box 91, Belmont, WA, 61 04

Meetings Secretary Mr Len Baddock
tel (08) 9222 3594 fax (08) 9222 3633
Geological Survey, 100 Plain St, East Perth, WA, 6004

State Liaison Dr Philip Commander
tel (08) 9222 3198 fax (08) 9222 3633
Geological Survey, 100 Plain St, East Perth, WA, 6004

IAH National Committee:

President	John Hillier
Vice President	Iain Hair
Secretary	Robert Ellis
Treasurer	Peter Evans
Newsletter Editor	Malcolm Cox
Assistant Editor	Magdalena Steffens
Committee Member	Colin Laing
Committee Member	Lindsay Furness
Committee Member	Bruce Pearce
Committee Member	Paul Smith
Committee Member	John Harman

Disclaimer: The IAH-Australia takes no responsibility for products and services that are advertised within the Newsletter, and such advertisements are accepted on good faith. Inclusion of the advertisement in the Newsletter does not represent endorsement of the product or service by the IAH.

Email Directory

Send your email address if you wish to be included.
Organisations should compile their personnel lists to send.

Ackworth, Ian acworth@manly.civeng.unsw.edu.au
UNSW Groundwater Centre, Water Research Lab., Manly Vale, NSW
Best, Peter 100353.416@compuserve.com
BHP Iron Ore, Newman, WA
Cox, Malcolm m.cox@qut.edu.au
School of Geology, QUT, Brisbane, QLD
Dillon, Peter cgs@mo.adl.dwr.csiro.au
Centre for Groundwater Studies, Div of Water Resources, CSIRO, Glen Osmond, SA
Doherty, John dohertj@salt.ind.dpi.gov.au
DPI-Land Management, Brisbane, QLD
Evans, Ray revans@agso.gov.au
Environmental Geoscience and Groundwater, AGSO, Canberra, ACT
Habermehl, Rien rhaberme@agso.gov.au
Environmental Geoscience and Groundwater, AGSO, Canberra, ACT
Hoxley, Greg gregh@rwc.org.au
HydroTechnology, Armadale, VIC
Lockington, David lockington@uq_civil.civil.uq.oz.au
Dept Civil Engineering, UQ, Brisbane, QLD
Otto, Claus claus@per.dwr.csiro.au
Div Water Resources, CSIRO, Wembley, WA
Pantelis, Garry gpa@photon.ansto.gov.au
Environmental Science Program, ANSTO, Menai, NSW
Pillar, Trevor trp@adl.dwr.csiro.au
Div Water Resources, CSIRO, Glen Osmond, SA
Prangley, Chad c.prangley@dme.wa.gov.au
Dept Minerals & Energy, Perth, WA
Townley, Lloyd lloyd@per.dwr.csiro.au
Div Water Resources, CSIRO, Wembley, WA
Walker, Colin walker@essun1.murdoch.edu.au
School of Biological and Environmental Science, Murdoch Uni, WA

Groundwater Division, Power & Water Authority, Darwin, NT

Childs, John childsj@twdl03.al.nt.gov.au
Chin, Daryl chind@twdl03.al.nt.gov.au
Jolly, Peter jollyp@twdl03.al.nt.gov.au
Karp, Danuta karpd@twdl03.al.nt.gov.au
Pidsley, Don pidsleyd@twdl03.al.nt.gov.au

Water Resources Division, Dept Primary Industries, Queensland

Arunakumaren, Jerome arunakj@mhocrm003.prose.dpi.gov.au
Dawson, Gary dawson@mhocrm003.prose.dpi.gov.au
Ellis, Robert ellisr@mhocrm003.prose.dpi.gov.au
Foster, Linda fosterl@mhocrm003.prose.dpi.gov.au
Hillier, John hilliej@mhocrm003.prose.dpi.gov.au

IAH-AUSTRALIA PRESIDENT'S MESSAGE

It is now 10 months since Queensland "took over the reins" and we are slowly coming to grips with the amount of work which has to be put into keep everything running smoothly. The office bearers have been putting in a lot of time but it all seems to be coming together now.

In June I attended the IAH Council meeting held in conjunction with the IAH Congress in Edmonton. Some major outcomes decided at the meeting were:

IAH Membership continues growing, and is now 3200. The sponsored membership program has been very successful, with 120 sponsored members and currently a few surplus sponsors. The next international members directory will be published after the Beijing meeting.

Education is still high on IAH priorities, and several publications are current.

- *The Groundwater primer has now been published (IAH Australia will get copies soon).
- *The Hydrogeology Glossary is at final review stage.
- *Basic Groundwater Concepts, and, Planning and Management of Groundwater Investigations are being written.

IAH is still quite financial, though when several publications are printed in one year there is a net decrease in funds.

The Hydrogeology Journal is progressing well, although some professionals do not want to publish in it until it is better established. Its format of publishing both reports and scientific papers was agreed to and confirmed.

Two more publications in the "International Contributions to Hydrogeology" are in the final preparation stage. These are:-

- Vol 18 "Shallow Groundwater Systems" a compilation of 20 papers
- Vol 19 "Recharge of Phreatic Aquifers in Arid Areas"

Future IAH Congresses

- 1997 Nottingham
- 1998 Las Vegas
- 1999 Not finalised, was to be South Africa, but may be an Eastern Block Country
- 2000 Rio de Janero

The Edmonton Conference was quite successful as a whole, though some doubt existed for the first couple of days when Keynote Talks and Workshops were held. During this stage it was mainly overseas delegates present. However, the Canadian and US delegates arrived in force for the last three days of the conference, and the papers presented at the individual sessions which I attended were extremely good. It really is amazing to talk to the North Americans about the amount of money being spent on clean-up of contaminants in some areas. This includes quite a few areas containing poor quality water and very low permeability where chances of success are exceedingly low.

The conference proceedings are available on CD-rom. I think that this is probably the preferred method when I consider the 10 cm high pile of unbound, and unnumbered pages that I posted back from Edmonton. I live in fear of dropping them before finally getting them bound.

John Hillier
President IAH-Australia

WATER DOWN UNDER '94

Combining IAH XXV Congress, and
International Hydrology and Water Resources Symposium, IE Aust.

*Management to Sustain Shallow Groundwater Systems
The Hydrologic Cycle: Integrating the Professions*

Adelaide Convention Centre 21-25 November 1994

FINAL REPORT TO

*IAH Australian Chapter,
IAH International Executive,
IE Aust National Committee on Water Engineering, and
National Groundwater Scientific Consultative Committee
(incorporating former AWRC Groundwater Education Subcommittee)*

by members of the Organising Committee

March 1995

SUMMARY

Water Down Under'94 was the culmination of four years planning by the two committees who mapped into one, to convene the largest Australian conference of either conference series in terms of papers (316), attendees (712), overseas visitors (180), workshop attendees (668), workshops (17), and exhibitions (22). The conference series which combined are the Institution of Engineers, Australia Hydrology and Water Resources Symposia (held approx every 18 months) and the Groundwater Conference series of the former Australian Water Resources Council (held approx every 4 years). The IAH Australian Chapter, which was formed at the first of these conferences in Sydney in 1983, has subsequently picked up the baton from AWRC. A major factor in attracting an international audience was that Water Down Under'94 included the 25th Congress of the International Association of Hydrogeologists, its first congress held in Australia.

An aim of the joint conference was to improve communication between the professions which deal with the above and below ground parts of the hydrologic cycle. An overwhelming majority of delegates attended sessions dealing with topics of common interest, and inter-disciplinary discussions continued throughout the breaks and in the social activities.

A significant proportion of papers were innovative, and all attendees should have gone away content with the input they received. The social program provided ample opportunity for mixing out of session. The workshops were a highlight of the conference, involving most delegates on a wide range of topics. Overall the conference produced a profit of approx 10% which is divided equally between the two parent organisations (IAH Aust, and NCWE). The committee believes it met or exceeded its aims on most scores, but there was also room for improvement, and these points are covered in the following report for the benefit of future conference organising committees.

AUSTRALIAN NOMINATION FOR IAH PRESIDENCY-COUNCIL ELECTIONS

by Michael Knight

As member of IAH you may recall that the May IAH International Newsletter indicated a timetable for Council elections. We are now in the nomination period and voting begins in February 1996. Australian IAH Newsletter earlier this year indicated that I had been invited to nominate for the Presidency and had accepted. Our National Executive thought it would be useful to provide some further information.

I am looking forward to the elections that will culminate in the poll declaration at the IAH meetings held in conjunction with the International Geological Congress in Beijing, China in August 1996. The period of Presidency will run for 4 years from that time.

I would enthusiastically apply my energy and experience to serve IAH as an effective President. I see the Presidency as helping develop the Profession and facilitate IAH membership growth in the following regions that I believe are strategic for IAH over the coming years.

- Eastern Europe
- South-East and South Asia and
- Parts of Africa
- Latin America

In Latin America I would work to develop close cooperative links with ALHSUD.

Clearly these activities also provide an opportunity to establish good relationship links between IAH Australian members and professionals contacted in these countries. The result will be another step towards internationalising IAH Australia in a real sense. Nominations require a brief statement describing the nominee's professional experience and work for IAH. The following is the statement sent to the IAH Nominating Committee;

IAH PRESIDENTIAL NOMINEE

Michael J. Knight BSc, PhD (Melb), FGS, MIE Aust, MIAH

I am currently Director of the National Centre for Groundwater Management and Australia's first Professor of Hydrogeology at the University of Technology, Sydney (UTS). My hydrogeology experience is 24 years in Australia and Papua New Guinea.

During 1975-95 I exercised leadership in hydrogeological research, teaching and consulting at the University of NSW and UTS. This included developing, with colleagues, Australia's first hydrogeology Masters Program. My research includes salinity, chlorinated hydrocarbon behaviour and landfill leachate modelling. Publications number 84, consulting reports 100, and grants \$4 million.

My considerable involvement in IAH over 12 years has included: being a Foundation member of the Australian Chapter in 1983; National Chairman (1990-94) and member/chairman of NSW State Committee; member, IAH Commission on Education and Training; participant in IAH Council meetings; and leading roles in several IAH International Groundwater Conferences. I am currently extending my service activities to SE Asia and the Pacific.

My positions at UTS are strongly supportive of these activities.

EDITORIAL COMMENT

We've got to the third issue of the Newsletter for 1995, and hopefully I will have time and energy remaining to do a fourth. It is encouraging that there is increasing interest in the Newsletter, and gradually submissions are starting to be received. For the last issue 425 copies were successfully mailed out, and about 25 returned, due to incorrect address.

Included in this issue is more on conferences and workshops. There is a continual, if not increasing number being planned both in Australia and internationally. In Brisbane in 1996 we will have two international conferences that will include specialist sessions on hydrogeology/hydrology, the Western Pacific Geophysical Meeting in July, and the Mesozoic Geology of the Eastern Australian Plate in September.

There are a few more paid advertisements and notices in this issue, and we will be pleased to accept further ones in the future. This is an effective way of off-setting printing and mailing costs of the Newsletter. We have received a few positive comments from members in isolated locations, and overseas, who consider that the Newsletter helps keep them current with happenings in Australia.

As you will see we are still very generic with our newsletter, calling it Newsletter. Still I've met numerous people in the bush with dogs named "Dog". Our request for a name for the Newsletter is still on, so feel free to send in your suggestion or comment (see below). Please remember that contributions are sought and anything on hydrogeology is welcome and of interest. Thanks to John Bradd NSW Department of Land and Water Conservation (Hydrogeology Unit) for his article on the dryland salinity map; a useful and informative contribution. I'm sure that most state/territory departments are producing new maps and reports, and we would be happy to include lists of them, or abstracts.

The best way to send Newsletter items is direct to me 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). Don't need bromides, just a good clear copy. To:

Malcolm Cox

IAH Newsletter Editor

School of Geology, QUT

GPO Box 2434

Brisbane, QLD, 4001 tel: (07) 864 1649 fax: (07) 1535 email: m.cox@qut.edu.au

IAH-Australia Secretary's Notes:

The National Executive meet on 11 July, 1995, and covered 21 items on the agenda. The next meeting for September is cancelled due to DPI-Water Resources moving.

There has been a steady stream of the gold membership renewal forms coming through the mail for some time now, but there are a lot more still to come. All of the amendments and enquiries have been attended to, although they may not yet be resolved. With such a mobile membership, it is a constant job making amendments. If you have any changes to make, just fax/phone me so I can update the records immediately.

The response to the request for sponsorship of members in developing countries has been excellent, with several full sponsorships and numerous \$10 partial sponsorships being paid so far. At its next meeting, the Sponsorship Committee will be determining how these funds will be distributed.

IAH Australia will be incorporated in Queensland in the near future. The Incorporation Committee is investigating whether this will be adequate to cover all other branches, or if separate action needs to be taken for each branch.

Robert Ellis

REPORTS FROM IAH BRANCHES

AUSTRALIAN CAPITAL TERRITORY

A new *Geological Atlas of the Officer Basin in South Australia* was released by AGSO and SADME earlier this year. It contains revised groundwater maps of the Basin as follows:

Plate 6 - Near Surface Cross-sections, seismic lines 1, 5 and 6

Plate 7 - Near Surface Cross-sections, seismic lines 3 and 4

Plate 8 - Palaeodrainage

Plate 9 - Groundwater Systems, scale 1:1 million

Plate 10 - Groundwater Salinity, scale 1: 1 million

A total of 30 Plates are included in the Atlas, which is obtainable from the AGSO Sales Centre, Box 378, Canberra 2601. Individual Plates are \$30 each, and the entire Atlas is \$1000. It is also available in digital format as ARCINFO coverages.

Papers on Australian (or Asian or Pacific) hydrogeology are wanted for Hydrogeology Journal, the quarterly journal of the Association. If you need help or advice in preparing or submitting a manuscript, then contact one of the Associate Editors:

Gerry Jacobson, AGSO, Box 378, Canberra, ACT 2601
(phone 062-499758, FAX 062-499970)

or

Lloyd Townley, CSIRO, Private Bag, P.O., Wembley, W.A., 6014
(phone 09-3870329, FAX 09-3878211)

An International Conference on Water and the Environment will be held in Kathmandu in the second week of April, 1996. The Conference is partly sponsored by AGSO and by the Nepal Chemical Society. For information or discussion of possible contributions contact;

Gerry Jacobson, AGSO, Box 378, Canberra, ACT 2601
(phone 062-499758, FAX 062-499970)

or

John Bauld, AGSO, Box 378, Canberra, ACT 2601
(phone 062-499778, FAX 062-499970).

N.S.W. News

New Department

A new Department has risen out of the ashes of former Departments (Water Resources, Conservation and Land Management and part of Public Works) as a direct result of Labor coming into power in NSW. Called the Department of Land and Water Conservation (DLWC) it is to provide an integrated focus on land and water management according to the Minister responsible, Kim Yeadon.

The new Director General is Dr. Col Gellatly formerly from Premiers Department while Peter Millington ex-Water Resources is the Deputy Director general.

The merger of Departments will causing some major changes in how and where business is done. Region centres will be Tamworth, Dubbo, Grafton, Orange Wollongong, Maitland and Deniliquin. The location of Head Office will be in Sydney at a location to be worked out. In the interim, Head Office is in Bridge Street in the old Lands Department Building.

Of particular interest to IAH members is that John Verhoeven (JV) a former Principal Hydrogeologist in Water Resources has been promoted to Director Total Catchment Management. This is seen by many as a key area in DLWC and we can expect to here a lot more of JV.

Groundwater work within the new organisation is likely to occur in several Program areas. Most of the work will have a regional focus, requiring more hydrogeological staff in the Regions but a core group providing technical services is also likely to remain in Sydney.

Large Groundwater Remediation System Returned on at South West Rocks

Groundwater Technology has recently commissioned an array of 100 sparge wells at South West Rocks on the mid north coast of NSW in a coastal sand dune aquifer. This system is believed to be the largest system of its type in Australia and compliments the existing groundwater pump and treat, and above ground engineered soil treatment cells that provide the integrated remediation systems of soil and groundwater at this former petroleum terminal.

The current "in situ" systems extend beyond the terminal boundaries beneath a public road and a strip of residential land. Extensions are planned to address further dissolved contamination beneath adjoining private land and nature reserve land further to the north and downgradient of the source. All sources have been removed, the engineered biopile has been remediated to clean fill levels within 12 months, the groundwater pump and treat system has pumped more than 15 megalitres of contaminated water from the shallow aquifer in 12 months for air stripping and reinjection, while the sparging system (treating the deeper groundwater within and beneath the coffee rock layer) is expected to be operational for 12 to 18 months.

Final site remediation should allow residential redevelopment of the site. This is an example of integrated remediation systems addressing both soil and groundwater systems being the key to accelerated clean up of contaminated sites.

Australian Association of Contaminated Land Consultants (AACLC)

Consultant groups in Sydney are currently meeting regularly to formalise a new association specifically to address contaminated site initiatives within government, universities and industry. Several models are proposed including affiliation with AWWA, ACEA and EMIAA, however an independent association is now the most likely outcome. Principal aims are to:

- provide a forum for member companies to develop discuss and respond to strategic issues that affect the contaminated land consultancy industry;
- establish a working relationship with regulatory authorities and other relevant agencies which will facilitate early, constructive consultation with the AACLC on proposed regulations, guidelines and other key issues;
- encourage and assist in the development and maintenance of high standards in the industry;
- promote the independent and professional practice of contaminated land consultancy and promote and develop the interests of all members;
- advise on and, where appropriate, improve professional standards through education and any other means; and
- provide information (or assist other organisations in providing information) to outside parties interested in the contaminated land consultancy or industry.

Watch these pages for further developments, founding members and office bearers.

National Centre for Groundwater Management University of Technology, Sydney

The Centre's Post-graduate Programs are continuing very actively in 1995. By September twelve successful candidates will graduate and fond farewells were given to students in specialist programs for geologists and engineers from Libya and Philippines. Enquiries are now coming for next year.

Salinity research in the Wellington area (Merrick/Milne-Home and students) has shown that magnetic methods are useful and can illuminate basement structure well. These structures in turn relate to groundwater flow and surface scalds. Centre staff (Milne-Home/Knight/Lertsirivorakul) are also involved in salinity research in North-East Thailand. Our major drilling program was completed in the first half of this year. The tree water use studies are at an advanced stage and suggest that water use by Eucalypts exceeds that of mangos which is in turn greater than mulberries (for silk industry). In the mulberry studies we

found that the stumps transpire even when pruned of all leaves! Hydrochemical studies are continuing and include trying to find reasons for high nitrate levels that at some locations exceed 1000 mg/l!

Our research on chlorinated hydrocarbons in the Botany Sands aquifer has completed its preliminary stages and has covered biotransformations (Walsh), sorption properties (McLaughlan), geophysics (Merrick) and other field tests (McLaughlan). Data processing is continuing. Michael Knight presented a paper at the 26th IAH Congress in Edmonton, Canada, on bacteria behaviour in a landfill leachate field experiment. Michael was also able to participate in the IAH Council meeting with John Hillier and this was a useful follow up to the Water Down Under Council last November.

Michael has also recently completed the review consultancy and Olympic Village site at Homebush for the Department of Defence. The NSW State Government recently purchased the land and the rehabilitation responsibility from the Commonwealth. All looks on track for the 2000 Olympics. Noel Merrick has completed a second update and post-audit of the Lower Namoi Valley groundwater model for the Department of Land and Water Conservation. This model has been used to set a revised groundwater allocation policy in the valley.

GWW Groundwater Software for Windows (latest version)

Available from: Paolo Romano

Fax 0011 1 212 9631270

Phone 0011 1 212 9638588

Email romano@un.org

Dryland Salinity Hazard Map of NSW

John Bradd, Department of Land and Water Conservation - Hydrogeology Unit

The first edition of a Dryland Salinity Hazard map for the State of NSW has been completed. Its primary purpose is to provide information at the State/Murray-Darling Basin level on the extent and severity of salting within different regions of NSW as well as predict areas with high potential for future salting. The Murray-Darling Basin Commission requires information at this scale in order to determine which projects should be funded and their priority. It is also useful in estimating the potential cost of dryland salinity. The NSW Dryland Salinity Hazard map is the first to be produced for the State of NSW. It is the first of its kind in terms of methodology used to create the map based on a combined statistical "weights of evidence" approach and GIS overlay technique. This map should not be considered static but rather a first edition that can be modified relatively easy on the GIS as more data becomes available for land attributes throughout the State.

Observations of dryland salinity occurrence showed that relationships exist between the occurrence of salinity and the interaction of particular land attributes and environmental features. The weights of evidence method as applied to spatial data is dependent on having a response variable or map (in this case, the dryland salinity occurrence map as seen in Figure 1) and several predictor variables or maps that relate to dryland salinity.

The predictor maps chosen for relating to dryland salinity in NSW were geology, soils, land use, rainfall, natural vegetation, groundwater resources, and landforms. These are the broad scale features that were found to be most responsible for the occurrence of dryland salinity from the reconnaissance site investigation studies. To decrease the complexity and number of possible combinations in the final overlay map, some classes with no, or negligible, dryland salinity occurrence were combined before performing the weights of evidence analysis.

The dryland salinity hazard index has been categorized into four groupings of probability ranges; low, moderate, high, and very high. A black and white draft version of the map is presented in Figure 2. There was over 250,000 land attribute combinations possible with associated probabilities for NSW. The probability range for all these combinations was between 0 and 0.75 as calculated from the weights of evidence method. Initially, the four categories were chosen by equally dividing this probability range. In doing this, it was found that many of the current occurrences of dryland salinity fell within the low index category. To incorporate more land attribute combinations, the moderate probability range was decreased to 0.01 to capture approximately 500 more combinations. 55% of the current mapping (ie. mapped) dryland salinity occurrence was found to lie on land attribute combinations with probabilities ranging from between 0.01 and 0.75. GIS processing time made it difficult to decrease the probability range any further. Nevertheless, probabilities below 0.01 were considered too low. This simply means that those areas that lie within the low dryland salinity hazard index category are not exempt from possible future occurrence of dryland salinity. Rather, this category defines the land attribute combinations that have the lowest probability or likelihood of its occurrence relative to other land attribute combinations.

Dryland salinity has the potential to occur in a large area across the upland areas of NSW. Currently, approximately 250km² of NSW is affected by dryland salinity. The NSW Dryland Salinity Hazard map predicts that 50,000km² of land has the potential of being affected by dryland salinity that lies within the moderate to very high category. Areas of major concern that have a high to very high dryland salinity hazard index are found in a north-south belt just north of Canberra (Yass River Valley), and in the southwestern part of the Lachlan River catchment, east of Wagga Wagga in the Murrumbidgee River catchment, and east of Dubbo in the Macquarie River catchment. It is suggested that these areas should be closely monitored for potential changes in the hydrological balance if dryland salinity has not already occurred in parts of these places.

The physiographic and land attribute combinations that have the highest probabilities and hence greatest potential for dryland salinity to occur in the future, were found to be variations between only a few classes within the different attribute maps. These were generally Ordovician or Silurian fractured rock sediments (and occasionally granites) from the geology map, yellow and red texture contrast soils from the soils map, limited grazing and cropping from the land use map, the rainfall zone between 600-700mm of rain per year from the rainfall map, low hills and ridges from the landform map, groundwater of low to moderate yield and water quality between 1000-3000mg/L from the groundwater resource map, and grasslands of 30-70% cover from the natural vegetation map.

The NSW Dryland Salinity Hazard map is available through the Hydrogeology Unit of the Department of Land and Water Conservation. For more information contact John Bradd (02) 895 7706.

QUEENSLAND BRANCH

Meetings for 1995

The IAH-Qld Branch meetings on the second Tuesday in the *even* months, at 5.30 pm for a 6.00 pm start.

Meeting 8 August, 1995

The meeting was held at DPI-Water Resources, with a turn up of 14 people.

Unfortunately the guest speaker could not attend due to illness.

In place of a formal talk there was a round table discussion of groundwater activities in Queensland, and some of the existing and foreseeable problems. This proved to quite useful and of interest.

October Meeting

This meeting has been cancelled due to the planned move and restructure of the DPI-Water Resources. The move is from the city centre to Indooroopilly, to a large DPI complex in a semi-bushland setting, which is about 6 km (direct) southwest of the city. The arrangements for a venue for future meetings is now under discussion

WESTERN AUSTRALIAN BRANCH

REORGANISATION OF THE WATER INDUSTRY

Following the planned separation of the water utility from the Water Authority of Western Australia, the government has decided to amalgamate the Hydrogeology and Groundwater Resources Branch of the Geological Survey, the Water Resources Division of the Authority, and the Waterways Commission into a new commission, to be effective from January 1st 1996.

The amalgamation is being overseen by the Water Industry Restructuring Implementation Group, headed by former Minister of Mines Peter Jones, and is being managed by a steering committee of the three organisation heads, Tony Laws, Brian Sadler and Bruce Hamilton, under the chairmanship of Ken Webster. Some twenty project teams have been set up to deal with such matters as strategic direction, structure, resourcing, assets, accommodation, management, and IT structures.

The water utility is being restructured and `downsized' to concentrate on core business, with much of the work previously done by employees being outsourced to private contractors through competitive tendering. The modus operandi of the new commission will not be clear until the appointment of a Chief Executive Officer.

WORKSHOP ON GROUNDWATER QUALITY MANAGEMENT IN DEVELOPING COUNTRIES

A highly successful workshop for delegates from developing countries was held at CSIRO in Perth during the week 18-21 April 1995. The workshop was sponsored by the (British) Commonwealth Science Council and UNESCO, and run by the Centre for Groundwater Studies and CSIRO Division of Water Resources.

Attendees from developing Commonwealth countries in Africa and Asia/Pacific presented case studies from their own countries and lecturers from Australia, New Zealand and the United Kingdom gave instruction on management techniques.

Delegates were also invited to a meeting of the WA branch of IAH immediately after the workshop on Wednesday 19 April where a presentation was given by National President John Hillier on "Groundwater Development and Consequent Problems-the IAH Position".



January - March 1995
Volume 12, Number 1

The Director
SOPAC Secretariat
Private Mail Bag
GPO, Suva, FIJI
Phone : (678) 381377
Fax : (679) 370040

ADVERTISEMENT

CALLING ALL THOSE WORKING IN THE GROUNDWATER FIELD

The Australian Branch of the International Association of Hydrogeologists, (IAH), is interested in sponsoring those trained in the field of hydrogeology in developing countries of the South Pacific to become members of IAH.

Membership includes an entitlement to receive the Hydrogeology Journal and all IAH conference memoirs.

Anyone interested in putting their name forward should contact Derrick Depledge in the Water and Sanitation Program at SOPAC as soon as possible.

Sponsorship is normally for the full membership fee and would last for three years. Those with relevant training and involvement in the field of hydrogeology can apply. Members usually come from geological, engineering or other academic backgrounds.

WATER LOG

Kiribati, visited during 21-24 January by Derrick Depledge. Checked on the status of two ongoing projects: the UNCDF Outer Islands Community Water Supply Project and the Tarawa Water Supply and Sanitation. Resources are limited, the area of operation widespread and the team leader hard pressed. General awareness and education of the masses seen to be the greatest need in Kiribati and needs to be followed up. (SOPAC Trip Report 184)

Tuvalu, visited during 24-30 January by Derrick Depledge to check on the status of the UNCDF Tuvalu Community Water Supply Project. Water quantity on Tuvalu not a problem. UNCDF project on course for completion. Sanitation and promotion of sanitary practices are areas where Tuvalu may need assistance. (SOPAC Trip Report 183)

Tahiti, visited during 25-27 January by Ed Burke mainly for a series of meetings regarding the formation of a Water Utilities association modelled on the Pacific Power Association (PPA), and possibly having its inaugural meeting in Tahiti, as the PPA did. (SOPAC Trip Report 185)

Cook Islands, visited during 28 January - 1 February by Ed Burke. Various water supply intakes were visited during the familiarisation trip and discussions were held with various departments including the Minister of Works on how best WASP can serve the Cook Islands with their water supply projects. (SOPAC Trip Report 186)

Vanuatu, visited during 12-14 February 1995 by Ed Burke. Also a familiarisation trip where WASP could assess Vanuatu needs while meeting with government officials and visiting water supply units. It was noted that Vanuatu has no sanitation systems except for the newer hotels. Requests for assistance are recorded in more detail in SOPAC Trip Report 187.

Solomon Islands, visited during 14-19 February 1995 by Ed Burke. Familiarisation and introductory trip for WASP with meetings and discussions conducted with government officials like Stephen Danitofea, Permanent Secretary for the ministry under which water resources matters are addressed. Their problems seem to span the whole spectrum from lack of suitable legislation to lack of suitable transportation for drilling crews. Donn Tolia was thorough and prepared for Ed's visit. A list of their requests for assistance is recorded in more detail in SOPAC Trip Report 188.

Papua New Guinea, visited during 19-23 February 1995 by Ed Burke. Introductory visit for the WASP group by the Project Manager. Coordination of water sector activities in PNG seem to be lacking but a Water and Sanitation Committee exists and a number of people from various water agencies meet now and then so they are not completely cut off from each other. Their list of requests for assistance is recorded in SOPAC Trip Report 189.

Western Samoa, visited during 13-20 March 1995 by Ed Burke. Introductory visit for the WASP group by the Project Manager with a round of meetings with government officials and aid agencies based in Apia. Also met with Trevor Sankey of the UNESCO office and visited SPREP. A couple of field trips were made to catchment sites. Their requests for assistance is recorded in more detail in SOPAC Trip Report 194.

Groundwater Exploration. This level of activity, and technology, is currently seen in many parts of Australia as a result of the on-going drought conditions. The sixteenth century woodcut shows a range of water-finding activities. The location appears to be an alluvial terrace or flat in which there may be shallow unconfined groundwater. This scene has a modern analogue, A: consulting hydrogeologists determining test site; B: hydrogeologist calibrating instrument; C: field technician establishing test pit (another to right rear); D: field technicians logging pit material (looks like water-worn rounded gravels, of pebble to cobble size, that tend to be flat suggesting sedimentary rocks, and fluvial transport, but doesn't appear to be much material of sand size). Note the field equipment on tree in right front, including a very practical bushknife. The two gentlemen on the left are probably the land-owners. The fire in the right rear is presumably for the field team to dry off at after they locate the water.



UPCOMING CONFERENCES

MESOZOIC GEOLOGY CONFERENCE, BRISBANE

23-26 September, 1996

Following is a flyer for the Mesozoic Geology Conference. The Conference is being hosted by the Queensland Division of the Geological Society of Australia (GSA), and the IAH-Australia. IAH has accepted an invitation to be sponsor and organiser of one session. The preliminary programme outline has three streams (A: Geotectonics; B: Mineral Resources; and C: Groundwater, Coal and Petroleum).

Within each of these are three full day sessions, and Session C1 is proposed as

Hydrogeology of Mesozoic Basins:

groundwater occurrence, geochemistry, genesis, and environmental considerations of groundwater use

We still need more papers in this session. Please consider a contribution and refer to the conference information following.

MESOZOIC GEOLOGY OF THE EASTERN AUSTRALIA PLATE

23-26 September 1996
Sheraton Brisbane Hotel & Towers

The Technical Conference

MESOZOIC 96 will be an international conference held over three days to discuss the geological evolution and economic potential of the Mesozoic rocks of the eastern Australia Plate. Explorationists and researchers are invited to participate.

The eastern Australia Plate, preserved in and around the Tasman and Coral Seas in Australia, Papua New Guinea, New Caledonia, and New Zealand, records a history of continental convergence during the Late Palaeozoic through continental breakup into the Tertiary. MESOZOIC 96 aims to bring together earth scientists from a broad range of disciplines with academic and industry perspectives to discuss current research relevant to the Mesozoic rocks of this region.

The technical program will focus primarily on the results of recent research and on the economic evaluation of Mesozoic rocks. The format will comprise plenary keynote sessions, concurrent sessions, technical poster presentations and pre and post conference excursions. The principal themes of the conference will embrace:

- The evolution of the eastern Australia Plate from Gondwanaland to continental breakup, discussing the deformation and distribution of terrains, nature and scale of magmatic events, styles of metamorphic and metallogenic pathways, and development of continental basins
- The economic potential of this region including a discussion of metalliferous deposits, gemstone deposits, industrial minerals, the formation of coal deposits, and the occurrence of hydrocarbon and water resources
- Related topics such as palaeogeography and palaeoclimates during the Mesozoic as well as a special session discussing new techniques and advances in looking through Mesozoic cover utilising geophysics, geochemistry, remote sensing, and computer modelling

Call for Papers

Paper submissions are invited for consideration by the technical program committee. Potential presenters should:

- forward a 300 word synopsis (original plus two copies)
- clearly state title of presentation
- clearly indicate whether synopsis is for a paper or poster presentation
- include co-authors' names, affiliations and addresses for correspondence
- advise details for presenter(s) if not the author
- complete and return the attached form to the conference secretariat

As an indication of support and commitment to the conference, all presenters are required to register for the conference.

Papers & Posters

Accepted authors will be required to submit an extended abstract (comprising six A4 pages including tables, figures, diagrams and references) for publication in the conference proceedings volume. This volume will be distributed to delegates at the conference. Deadline dates are as follows:

- 1 November 1995 Paper/poster synopses submitted in triplicate
- 1 December 1995 Notification of acceptance
- 30 June 1996 Extended abstract submitted in triplicate

Posters will be an integral part of the program. Posters will be on display on the day of discussion.

Excursions

Excursions are being planned to complement the conference themes. These are planned to address the following topics:

- Mesozoic related gold deposits in eastern Australia
- Energy resources and sedimentology of Mesozoic basins
- Relationships between the Mesozoic geology of eastern Australia, New Zealand and Papua New Guinea
- Mesozoic volcanism in eastern Australia
- Gemstones (diamonds, sapphires and opals)
- Local tours (one-two days) within the Brisbane region

Indicate your interest in attending an excursion by ticking the box on the attached form and returning the form to the secretariat.

Trade Exhibition

Extensive and interactive, the trade exhibition will be an integral part of the conference. Displays will span all sectors of the industry including exhibitors from equipment suppliers, government departments, consulting services, gemstone companies, academic institutions and kindred scientific and professional bodies. The exhibition will also provide delegates with a unique opportunity to examine and test the latest developments in instrumentation and computer systems.

The trade exhibition will be located adjacent to the session rooms. To acknowledge the trade exhibition's importance, the conference program will be structured to ensure delegates have ample time to inspect the exhibition.

To ensure your organisation does not miss out on this excellent marketing opportunity, complete and return the attached form.

Conference and Exhibition Secretariat

For further information, contact:

MESOZOIC 96
PO Box 1280, MILTON QLD 4064, AUSTRALIA
Tel: (07) 369 0477 Int: (+617) 369 0477
Fax: (07) 369 1512 Int: (+617) 369 1512

*After 1 July 1995, please include an additional 3 after the area code.

Further Information

- Please add my name to the conference mailing list to receive further information as it becomes available.
- Please send me further information about excursions.
- Please provide trade exhibition details.
- Please provide information about becoming a member of:
GSA GSNZ PESA IAH

Synopsis Submission

- My PAPER synopsis and two hard copies are attached
- My POSTER synopsis and two hard copies are attached

Title (Prof/Dr/Mr/Mrs/Ms/Miss).....Surname.....
Given Name.....
Organisation.....
Position.....
Postal Address.....
Suburb/City.....
State.....Country...../Pcode.....
Tel (work) ().....Home ().....
Fax ().....

1996 WESTERN PACIFIC GEOPHYSICS MEETING

Brisbane, July 23-27, 1996

Sponsored by the American Geophysical Union

This is the fourth in the series of conferences held by the AGU to encourage international cooperation between AGU members and members of other geophysical societies in the western Pacific region. The format of the conference is similar to AGU's annual meetings and contributions on any topic in geophysics is encouraged, but more in-depth discussion of issues of regional interest is encouraged.

Hydrology Program

Program Chairs: Warren Bond, CSIRO Division of Soils, GPO Box 639, Canberra, ACT 2601, Australia.
tel: +61-6-246-5948, fax: +61-6-246-5965, email: w.bond@cbr.soils.csiro.au
Jim Davis, US Geological Survey, 345 Middlefield Road, Menlo Park, CA 94025, U.S.A.
tel: +1-415-329-4484, fax: +1-415-329-4453, email: jadavis@rcamnl.wr.usgs.gov

Special Sessions: A number of special sessions have been organised, as listed below. Suggestions for additional special sessions are welcome until October 20 and should be sent to the Program Chairs.

H01 Estuarine Wetland Hydrology

Convenors: Philip Binning and Garry Willgoose

H02 Hydrobiochemical Processes in Riparian Zones

Convenors: Cathy Wilson and Peter Hairsine

H03 Field Measurement of Soil Characteristics that Determine Chemical Transport

Convenors: Brent Clothier, Art Warrick, and Keith Smettem

H04 Soil Moisture: Measurement, Modelling and Scaling

Convenors: Garry Willgoose and Andrew Western

H05 Subsurface Hydrological Responses to Land Cover and Land Use Changes

Convenors: Makoto Taniguchi and Hamish Cresswell

H06 Use of Natural Tracers for Determining Groundwater Flow

Convenors: Peter Cook, Andrew Herczeg, and Malcolm Cox

H07 Assessment and Provision of Environmental Flow Requirements

Convenor: Robert Argent

H08 Land-Surface Aspects of Continental-Scale Hydrology Projects

Convenors: Alan Hall and Tony Jakeman

Contributed Papers: As well as contributions to special sessions, papers dealing with any aspect of hydrology are invited. The first call for papers will be published in the AGU's weekly publication *EOS* on September 10, and the final call on December 5.

Non-AGU Members: Copies of the calls for papers, containing full details of the special sessions and abstract submission information, should be requested directly from: American Geophysical Union, 1996 Western Pacific Geophysics Meeting, 2000 Florida Avenue N.W., Washington, DC 20009, U.S.A.; fax: +1-202-328-0566. Further information will also be available from the AGU's World Wide Web home page: <http://earth.agu.org/kosmos/homepage.html>. Alternatively, contact one of the Program Chairs.

Deadlines: First call for papers published in EOS	Nov 8, 1995
Submission of new special sessions	Oct 20, 1995
Final call for papers published in EOS	Dec 5, 1995
Abstract submission	Mar 15, 1996

Further Information: For details of the special sessions, or other information, contact the Hydrology Program Chairs Warren Bond or Jim Davis at the addresses given above.

**XI International Conference on
COMPUTATIONAL METHODS IN WATER RESOURCES**
Cancun, Mexico, July 23-26, 1996

This conference is the eleventh in a series organized biennially alternating between America and Europe. The conference, which will take place at Cancun, Mexico in July 22-26 1996, will be a forum on the latest developments and applications of computational methods in surface and subsurface hydrology, including mathematical and numerical modelling of physical, biological and chemical processes related to water as well as the associated topics, such as algorithmic methodologies, parameter estimation, software development and so on.

ORGANIZING COMMITTEE

Alvaro A. Aldama, Mexican Institute of Water Technology
Javier Aparicio, Mexican Institute of Water Technology
Carlos A. Brebbia, University of Portsmouth
William G. Gray, University of Notre Dame
Ismael Herrera, National University of Mexico
George F. Pinder, University of Vermont

The conference will be composed of papers presented by authors as well as invited lectures presented by prominent scientists in the field.

DEADLINES

Receipt of abstracts:	October 1, 1995
Notice of acceptance:	November 15, 1995
Receipt of manuscripts:	January 31, 1996

Abstracts should be submitted to:

Dr. Alvaro A. Aldama or Dr. Javier Aparicio
Mexican Institute of Water Technology
Paseo Cuauhnahuac 8532
Jiutepec 62550 Mor.
MEXICO

tel: (5273) 193742 or (5273) 194341

fax: (5273) 193422 or (5273) 194341

Mail: aaldama@tlaloc.imta.mx or E-Mail: aparicio@tlaloc.imta.mx

Abstracts should be no longer than 300 words and should contain the following:

- Title (20 words or less)
- Author(s), affiliation and complete address
- Paper abstract

Only abstracts received on or before October 1, 1995 will be considered for possible acceptance. All manuscripts accepted are expected to be presented at the conference.

REGISTRATION AND PAYMENT

The registration fee is 250 US Dollars if paid on or before May 15, 1996 and 300 US Dollars thereafter. Fee includes conference attendance, lunches, coffee breaks, social events and a copy of the proceedings. Accompanying person fee is 150 US Dollars which includes social events.

**INTERNATIONAL CONFERENCE ON MUNICIPAL AND RURAL WATER
SUPPLY AND WATER QUALITY**
28-30 May, 1996, Poznan, Poland

This XIVth conference continues on from previous national conferences, and will develop the international interaction especially in the emerging free-market economies of Central and Eastern Europe.

The particular topics of concern are:

- surface water monitoring and treatment
- disinfection by-products
- advanced oxidation processes
- innovations in traditional treatment
- water distribution system problems
- removing pollutants from contaminated soil and groundwater
- water marketing, form and ownership of waterworks
- management and standardisation in waterworks
- process control and automation
- ground water quality, control and remediation
- micropollutants: occurrence and removal
- biological processes for water treatment
- corrosion: occurrence and prevention
- drinking water and health

Fees- authors: \$US 250; participants: \$US 300; students: \$US 150

Language- in Polish and English, with simultaneous translation

Deadline- receipt of abstracts: 30 August, 1995

notification of acceptance: 15 October, 1995

receipt of papers for final review: 15 January, 1996

Information from:

Dr Jan A Oleszkiewicz

Environmental Engineering, Dept of Civil Engineering

University of Manitoba, Winnipeg

Canada R3T 2N2

tel: (204) 474 8722

fax: (204) 261 9534

**IAH COMMISSION FOR GROUNDWATER IN URBAN AREAS ON
INTERNET**

This Commission is run by IAH-International and aims to advance scientific understanding of the interactions between groundwater and the urban environment, and to improve the hydrogeological basis which underlies the relevant aspects of policy making and management in urban areas.

Members of the IAH Commission of Groundwater in Urban Areas and other IAH members can now use the internet to communicate with each other and discuss any topic related to groundwater in urban areas on the network. A mailing list server at CSIRO Division of Water Resources manages the urban groundwater email list "urban_gw@adl.dwr.csiro.au"

To subscribe to the list send a message to the listserver address:

mailist@adl.dwr.csiro.au

saying in the body of the email text:

subscribe urban_gw

The subscription request will be approved by the owner of the list. You can at any time remove your name from the list.

For further information contact,

Dr Claus Otto, CSIRO Division of Water Resources,

Private Bag, PO Wembley, WA, 6014

Tel. (09) 387 0200, Fax (09) 387 8211

email: "claus@per.dwr.csiro.au"

AUSTRALIAN GROUNDWATER SCHOOL
1995
BRISBANE

Over many years the Australian Groundwater School has proven to be an excellent professional support to many people including: groundwater managers, consultants, mining companies, hydrogeologists, land care officers and environmental officers.

The Australian Groundwater School is 2 weeks of concentrated study. In the first week the fundamentals of groundwater science, technology and management are presented in 20 interactive sessions. The second week consists of workshops directed at specific areas of interest. It is a well regarded response to industry needs and is presented by lecturers from the industry.

27 November to 1 December, 1995

Fundamentals of Groundwater Science, Technology and Management
(various presenters)

4 to 8 December, 1995

Applied Groundwater Flow Modelling
(Lloyd Townley and John Doherty)

For further information contact:

Trevor Pillar
Centre for Groundwater Studies
PMB 2 Glen Osmond SA 5064

tel: (08) 303 8753 fax: (08) 303 8750 email: gws@adl.dwr.csiro.au

International Symposium
ARTIFICIAL RECHARGE OF GROUNDWATER
Helsinki, Finland, 3 - 5 June 1996

Finnish Environment Agency organizes an international symposium "Artificial Recharge of Groundwater" in Helsinki, Finland 3 - 5 June, 1996. The symposium is part of Nordic Hydrological Programme 1995 - 1996.

The main topics are:

- The current situation and future trends of artificial recharge; - Design and operation of artificial groundwater plants; - Artificial groundwater quality aspects; - Technical research methods and mathematical modelling in artificial groundwater investigations.

Participants intending to participate the symposium are invited to contact the Organizing Committee. The abstracts (maximum 200 words) should be received by 15 October 1995. Authors will be notified of acceptance by 15 November 1995. The papers will be published in the NHP Report Series. The official language of the symposium is English.

Anna-Liisa Kivimäki or Tuulikki Suokko

Finnish Environment Agency

P.O.Box 140 FIN-00251

Helsinki FINLAND

tel: +358 0 40300443 or tel: +358 0 40300440

fax: +358 0 40300491 or fax: +358 0 40300491

E-mail: Anna-Liisa.Kivimaki@vyh.fi or E-mail: Tuulikki.Suokko@vyh.fi

COOPERATIVE RESEARCH CENTRE FOR CATCHMENT HYDROLOGY WORKSHOP, FEBRUARY 1996

The Cooperative Research Centre for Catchment Hydrology is proposing to run a 4-5 day workshop on measurement techniques in catchment hydrology. It would be pitched at an introductory level, aimed at students, technicians, junior researchers and newcomers to catchment hydrology process measurement. Our intention is to hold a practical, hands-on course where workshop participants are introduced to a spectrum of measurement methods and shown how to apply these in the field. In addition to holding a workshop, we would like to produce a handbook which can serve as a 'first stop' reference text for people being introduced to process measurement in catchment hydrology. The workshop fee would be modest so that we can obtain as wide a cross-section of audience as possible.

Before offering this workshop we wish to ascertain the level of interest in such a course. We are inviting your comment on our proposal which is detailed below. The workshop would be held at Melbourne or Monash University in February 1996.

The workshop would be offered in a modular format so that participants can select which modules they wish to attend. Each module would last between a half and full day and would be run by an acknowledged expert in the field. Presenters would be drawn from CSIRO, the Universities and industry. In addition to practical instruction, workshop participants would receive detailed notes covering theory and application of the techniques discussed. The modules we intend to offer are:

1. Soil moisture and water table measurement

- time domain reflectometry (TDR); - neutron moisture meters (NMM's); - the capacitance method; - laboratory determination of soil moisture content; - tensiometers; - suction lysimeters.

2. Soil permeability measurement

- disc permeameters; - well permeameters; - bore hole tests.

3. Soil salinity measurement

- electromagnetic induction methods; - soil EC sensors; - laboratory determinations.

4. Evaporation measurement

- the Bowen ratio technique; - the eddy correlation method; - weather stations; - sapflow measurement; - humidity dome measurements.

5. Leaf area index measurement

- LICOR plant canopy analyser; - sunfleck ceptometers; - PAR sensors.

6. Streamflow measurement

- gauging structures (weirs, flumes); - water level measurement techniques; - flow velocity measurement; - combined water level/velocity measurement.

7. Water quality measurement

- temperature; - EC; - turbidity; - water chemistry.

Workshop convenors are Dr Rob Vertessy, CSIRO Division of Water Resources, and Dr Q.J. Wang, CRC for Catchment Hydrology
Department of Civil and Environmental Engineering
University of Melbourne, Parkville, Vic., 3052
Tel: (03) 9344 4480 Fax: (03) 9344 6215
Email: qjwang@aqua.civag.unimelb.edu.au

AUSTRALIAN PRODUCED SOFTWARE

*Contribution from
Lloyd Townley, CSIRO Division of Water Resources, Perth*

FLOWTHRU

An interactive program for calculating groundwater flow regimes near shallow surface water bodies

FLOWTHRU provides a general framework for classifying groundwater flow patterns near surface water bodies. The program recognises a large number of distinct flow regimes (seventeen flow-through, eleven discharge and eleven recharge flow regimes) which can occur under different regional flow and recharge conditions. Although developed with shallow lakes in mind, the program can also be applied to wetlands, rivers, streams, canals, channels, and drains.

The main uses of the program are:

- (i) for determining the depths of groundwater capture zones near shallow water bodies (analogous to the problem of wellhead protection), and
- (ii) as an educational tool, to allow users to visualise flow patterns near surface water bodies.

FLOWTHRU is the basis for and is supported by a recent journal paper:

Nield, S.P., Townley, L.R. and Barr, A.D. (1994), A framework for quantitative analysis of surface water - groundwater interaction: Flow geometry in a vertical section, *Water Resources Research*, 30 (8), 2461-2475.

Current research is focusing on extending the concept of FLOWTHRU to account for seasonal fluctuations, using a periodic finite element model known as AQUIFEM-P.

FLOWTHRU is available for 386 PCs with coprocessors, 486 PCs and Macintosh computers. FLOWTHRU is currently available for single users only, but a networkable version will be available shortly. The current cost is US\$300, or \$A300 to purchasers within Australia.

FLOWTHRU can be obtained by contacting:

Dr Lloyd Townley
CSIRO Division of Water Resources
Private Bag
PO Wembley WA 6014
Australia

Telephone: +61-9-387-0329
Fax: +61-9-387-8211
E-mail: lloyd@per.dwr.csiro.au

THE SCIENTIFIC SOFTWARE GROUP
World-Wide Web site for environmental software and publications.

Also in the works for SSG's catalogue is the full listings, as they appear in the printed catalogue, in electronic format. DAEM will be processing the catalogue to be posted on the Internet in .pdf format. The PDF will be readable with a free run-time version of Adobe Acrobat. Adobe Acrobat is apparently being integrated into the Q4 Netscape release, so the catalog can be viewed directly through Netscape a page at a time. The next step should be online secure transaction ordering and same hour downloading of purchased software.

You can visit our site at:

<http://www.access.digex.net:80/~scisoft>

and see our on-line catalogue of more than 150+ software packages and technical publications.

Our free catalogue is available from us at:

SCIENTIFIC SOFTWARE GROUP

P.O. Box 23041

Washington, D.C. 20026-3041

tel (703) 620-9214

fax (703)620-6793

DAEM address:

Douglas Garnett-Deakin

Draper Aden Environmental Modeling Inc.

2206 South Main Street

Blacksburg, VA 24060

tel (540) 961-DAEM (3236)

fax (540) 552-0291

e-mail: ddeakin@daem.com

URL <<http://www.daem.com/daem/>>



**THE UNIVERSITY OF
NEW SOUTH WALES**

**Centre for Postgraduate Studies
in Civil Engineering**

**Graduate Course in
Environmental Hydrology &
Water Resources**

26 February - 14 June 1996

This course in Environmental Hydrology and Water Resources is suitable for engineers, surveyors, agricultural scientists, meteorologists, foresters, soil conservationists and hydrogeologists. It is particularly convenient for students who are unable to spend one or two years in Sydney to complete normal graduate degree studies in hydrology. Students can elect to specialize in either surface water hydrology or groundwater hydrology.

The Course may be undertaken as a full time 15 week program in its own right or it may be taken as the first part of a Master of Engineering Science or Graduate Diploma program, both of which have stringent entry requirements.

Course Fee: \$4,995.

Course Director: A/Prof Ian Cordery

Tel: (02) 385 5024 Fax: (02) 385 6139

For further information and brochures:

Mrs Liza Lim

Tel: (02) 385 5080 Fax: (02) 385 6139

Mail: Centre for Postgraduate Studies

School of Civil Engineering

The University of New South Wales

Sydney NSW 2052

**POST GRADUATE COURSES
IN GROUNDWATER MANAGEMENT**



University of Technology, Sydney

THE NATIONAL CENTRE FOR GROUNDWATER MANAGEMENT

THE NATIONAL CENTRE FOR GROUNDWATER MANAGEMENT (NCGM) at the University of Technology, Sydney is recognised by the Federal Government through the Land and Water Resources Research and Development Corporation as a National Centre for Training, Research and Consultancy in Groundwater and Environmental Applications.

A range of postgraduate programs is being offered currently:

Master of Science (Research and Coursework) and Ph.D.; Master of Engineering – Course Work and Research degrees); Graduate Diplomas (Science or Engineering); Graduate Course (15 weeks) Coursework Degrees are 1 year Full-time or Part-time mode and other possibilities available.

Coursework topics covered include: Hydrogeology, Groundwater Modelling, Hydrogeochemistry, Surface Hydrology and Groundwater, Geopollution Management, Contaminated Site Management, Groundwater Geophysics and Remote Sensing of Groundwater Resources, Computing for Groundwater Specialising.

Study areas include:

Groundwater Contaminant Transport Modelling; Quality and Quantity Optimisation Strategies for Water Resource Development; Waste Management and Groundwater; Contaminated Land Evaluation and Rehabilitation, Biodegradation of Chlorinated Hydrocarbons; Practical Areas of Hydrogeology including Geophysics, Hydrochemistry and Microbiology aspects; Bore Fouling and Maintenance; Land and Groundwater Salinity.

Professor Michael J. Knight (Director)

Contaminated Sites; Chlorinated hydrocarbons (DNAPL) contamination in soil and groundwater; (LNAPL) interactions with DNAPLS; Design of Safe Land Based Waste Management Systems

Mr Noel P. Merrick, Senior Lecturer in Groundwater Modelling

Groundwater Modelling; Optimisation techniques (technical and economic coupling); Groundwater geophysics applications to mapping contaminant plumes

Ms. Kayleen Walsh, Environmental Microbiologist

Biodegradation of Chlorinated Hydrocarbons and Pesticides.

Dr. William A. Milne-Home, Senior Lecturer in

Hydrogeology
Flow and Solute movement (pesticides) in the unsaturated zone; Dry land salinity and its management

Dr. Robert G. McLaughlan,

Lecturer in Contaminant Hydrogeology;
Adsorption/Desorption Processes for Chlorinated hydrocarbons; Risk assessment/legal issues and auditing of contaminated sites; Fouling/corrosion of groundwater bores and pipes.

Mr. Rungruang Lersirivorakul, Hydrogeologist

Salinity, groundwater relationship, tree water use, salinity origins, modelling.

Graduation Rate and Employment

In 1995, 12 candidates have graduated with the majority gaining employment within a short time of gaining their qualifications.

For Application and Information contact:

Professor Michael J. Knight

Director

National Centre for Groundwater Management

University of Technology, Sydney, PO Box 123

Broadway NSW 2007

Phone: (02) 330 1984

Fax: (02) 330 1985

THE UNIVERSITY OF WESTERN AUSTRALIA
SENIOR LECTURER IN HYDROGEOLOGY
(REF: A62/95)
DEPARTMENT OF GEOLOGY AND GEOPHYSICS
(CENTRE FOR GROUNDWATER STUDIES)

The Centre for Groundwater Studies in Perth is part of a new collaborative venture involving The University of Western Australia, CSIRO Division of Water Resources, The Water Authority of Western Australia, The Geological Survey of Western Australia, and The Ministry of Planning.

The Department is seeking a Senior Lecturer committed to developing a programme of research and teaching in hydrogeology, in collaboration with our partners in the Centre for Groundwater Studies. This is a three-year fixed term position with excellent prospects for continuation. The successful candidate should have a doctorate and a proven record of research and publication in the field of hydrogeology, specialising in one or more of the following areas: (i) low-T aqueous geochemistry/contaminant transport; (ii) geophysics in groundwater evaluation; (iii) quantification of fluid flow and recharge. The applicant will be required to develop and teach undergraduate and postgraduate courses in hydrogeology, to supervise honours and postgraduate research students, and to co-ordinate activities of the Centre for Groundwater Studies within the University.

Applications must address the selection criteria and applicants with teaching experience are requested to submit a teaching portfolio as part of their application.

For further information and copies of the selection criteria please contact the Head of Department, Dr D.W. Haig
telephone (09) 380 3532 or fax (09) 380 1037
email dhaig@uniwa.uwa.edu.au.

SALARY RANGE: Lecturer Level C A\$51,692-\$59,605
CLOSING DATE: 10 November 1995

Written applications quoting reference number, telephone number, qualifications and experience and the names, addresses (including Email) and fax/telephone numbers of three referees should reach the Director, Human Resources, The University of Western Australia, Nedlands WA 6907, by the closing date.

**ASCE Geotechnical Engineering Seepage/Groundwater Modeling
Software Web Pages.**

These pages are a part of the ASCE Geotechnical Engineering Division software web pages on World Wide Web Site and are located at:

<http://www.et.byu.edu/~asce-gw/>

These pages have been designed to allow any interested party to create a link pointing to web pages that describe seepage/groundwater modeling software. If you do not have any existing web pages describing the software, feel free to use the create link form to compose a web page that will be stored at the host site. After a link has been created, you can edit a link, or delete a link as you please.

Rus Berrett
GMS Software Manager
300 Clyde Buiding
Brigham Young University

geosrus@et.byu.edu
<http://www.et.byu.edu/~berretr/>
tel: 801-378-5713
fax: 801-378-2478

Instrumentation for Civil Engineering, Environmental and Mining applications

- Hydraulic & Pneumatic measuring systems & Tunnel Monitoring Instrumentation
- Sliding Micrometers, Clinometers, Inclometers
- Piezometers, Pressure Cells, Settlement Cells
- Groundwater Monitoring & Sampling Systems
- Gas sampling equipment
- High Pressure Dilatometers, Self-boring Pressure meters
- Borehole & Pipeline TV Inspection Systems

GEOTEST INSTRUMENTATION

GE00001

454 Waverley Road, East Malvern, Vic. 3145.
PHONE: (03) 9572 3399 FAX: (03) 9572 3444

RedR

RedR AUSTRALIA NEEDS HYDROGEOLOGISTS

RedR Australia is a group of "Registered Engineers for Disaster Relief": It is affiliated with RedR International and the Founding President was Prof Fred Hollows. Gerry Jacobson at AGSO has been in contact with this group and they wish to have more hydrogeologists listed on their Register for emergency and relief work in various parts of the world.

The contact person who can provide further details of RedR and its needs is:

Kate Gordon
Programme Manager RedR Australia
3 Cumberland St, The Rocks,
PO Box 6 Millers Point
NSW, 2000, Australia
tel: (02) 251 5506

fax: (02) 251 5526



ROCKWATER

**POSITION AVAILABLE
FOR A**

SENIOR HYDROGEOLOGIST

Rockwater seeks to employ a hydrogeologist with five or more years practical experience. It will be advantageous if you have worked on developing water supplies or dewatering, for mining projects. Experience in groundwater environmental studies and numerical modelling would be beneficial.

This is a great opportunity to be part of a very active, successful consultancy based in Perth. The previous incumbent was with us for 10½ years; the other seniors in the firm have been Rockwater staff for 7 and 15 years.

The position carries excellent remuneration, generous superannuation payments, Perth location, with opportunity for field trips. Most projects are located in Western Australia and Northern Territory; occasionally we work in the other Australian states, Asia and Africa.

Hydrogeologists interested in the position are invited to apply in writing to:

Dr Roger Passmore
Rockwater Pty Ltd
94 Rokeby Road
SUBIACO WA 6008

COMPANY PROFILE

Rockwater is a firm of consultant hydrogeologists, specializing in developing groundwater supplies and conducting groundwater-related investigations.

We commenced operations in 1974 and have worked in most states of Australia, New Zealand, Asia and Africa. We actively seek international projects, for which links may be formed with engineering and similar organizations.

Rockwater is totally independent and privately owned. The company is engaged specifically only in groundwater consulting and has no other business interests. We are recognised as groundwater specialists by relevant Government Departments and Water Authorities.

Groundwater operations are supervised from headquarters in Perth, Western Australia. In-house services include numerical modelling, plotting, well-logging, and geophysical surveys. The firm has representation in Adelaide and Darwin.

NEW MEMBERS

We are pleased to welcome the following new members who have recently been accepted into the IAH.

Boyd Dent	NSW	Lazarus Leonhard	WA
Brian Foley	VIC	John Leonard	VIC
Rowena Gale	VIC	Geoff Naderbaum	VIC
Jay Gomboso	ACT	Bharat Patel	QLD
Richard Green	NSW	Charles Poynton	WA
Ben Hopkins	NSW	Colin Walker	WA
Ben Sturgess	QLD		

A full and updated Australian membership list will be printed in the last newsletter of the year.

COMPETITION FOR NEWSLETTER NAME

We have had a variety of suggestions about a name for the Newsletter, but others keep coming in, so we'll keep listing them. So keep sending them. Maybe for beginning 1996 we will select a name, but in the meantime see how inventive hydrogeologists can be.

- David Holmes and colleagues Water Authority WA:
 - Aquanet
 - Recharge
 - Australia Hydro News
- Gary Dawson and colleagues Qld Water Resources:
 - Sub-surface Talk
 - Hydro Info
 - The IAH Exchange
 - The IAH Informer
 - Permeate
 - Sub-surface Informer
- Elsewhere in Qld DPI:
 - Transmissivity
 - Hydroletters
 - Hydro News
 - Hydro Net
- Other Qld suggestions, students and consultants, can't remember who,
 - Gradients
 - The Hydraulic Head
 - Throughput
 - Flow On
- Others NSW and Vic, anonymous,
 - Fluid Facts
 - The Piezometer
 - Wet Net
 - Diffusion
- Maj Asef Atham, Minenco, Brisbane:
 - The Transmissive Medium
 - The Preferred Flowpath
 - "IAH" Australian Hydrogeological Informer
 - Flow Path
 - Darcy's Lore
- The following suggested titles were immediately declared ineligible by the Newsletter Editor:
 - Watery Words
 - Boring News
 - News of Bores
 - Cone of Depression
 - Pore Space
 - Void Report
 - Wat News

Family Name Title:

Given Names

Organisation

Mailing Address

Postal Code COUNTRY
(please provide a mail address that will be relatively permanent)

Telephone

Fax

Email

Qualifications Highest Degree..... Year Awarded

Institution.....

Other Qualifications.....

Fields of Interest in Hydrogeology.....

Type of Membership Applied For [tick]
Member (\$80) [] Student Member (\$50) [] Corporate Member (\$400) []
Sponsorship Scheme
Member, partial sponsor (\$90) [] Member, full sponsor (\$130) []

Organisation or corporate sponsor (\$50) * [] Sponsored Member []
* per person

I hereby apply for Membership of the IAH
signed..... date

Nominating Members:
name (print)signed..... date

name (print)signed..... date

Students:
Statement by supervisor. The above applicant is currently enrolled in the course in the
School/Department of.....at

Supervisor:.....(signed).....(print)(date)

IAH-AUSTRALIA

AUSTRALIAN NATIONAL CHAPTER

INTERNATIONAL ASSOCIATION OF HYDROGEOLOGISTS

Application for Membership

Complete the information required on the reverse and send the form to the Secretary (or Liaison Officer) of your State or Territory Branch

The IAH

The International Association of Hydrogeologists is a professional association for those within disciplines related to groundwater, its occurrence, utilization, testing and management. IAH is a scientific and educational organisation that is truly international, and was established to foster closer ties, cooperation and information exchange related to the study of groundwater. IAH is non-government and non-profit and has over 3000 members internationally from around 120 countries. The Association is affiliated with the International Union of Geological Sciences (IUGS), and was founded during the 20th International Geological Congress in 1956.

By its statutes the IAH is an association of individuals and corporate members, and not a federation of national committees. National groups do, however, organise local meetings and other activities. A proportion of the national membership subscriptions goes to the local organisation to support these activities, the remainder to the international body. The country of the international secretariat is changed every several years.

The IAH publishes the *Hydrogeology Journal* and various workshop and conference proceedings.

Main objectives of the IAH

promote	international and national cooperation between involved scientists and engineers
sponsor	international and national technical/management meetings and symposia on hydrogeology
publish	hydrogeological reports, papers and maps
establish	investigation commissions and working groups to report on special topics
encourage	the international application of relevant approaches and techniques for the benefit of the hydrological and human environment

Membership Requirements

IAH will accept as individual members anyone directly or indirectly engaged in study or research on, or management of water in its various forms related to hydrogeology, if sponsored by two members in good standing. Companies and research organisations can apply for corporate membership.