

THE HYDROLOGICAL SOCIETY OF S.A. INC.

C/o Water Resources Branch
Box 1751, Adelaide, S.A. 5001

NEWSLETTER NO. 53

AUGUST 1987

GUEST EDITORIAL

THE TYRANNY OF GRANT-DRIVEN RESEARCH

As a member of CSIRO's newest Division - Water Resources Research, I have been involved in developing research projects for the Perth-Adelaide-Canberra based Division. To aid in development of these projects three senior members of the Division visited agencies interested in water resources in all States of Australia. A summary of their responses makes interesting reading and has provided valuable input in developing our research programmes. For those interested this summary is available from me.

Most water authorities indicated that universities, CAE's and CSIRO should be involved in basic and long-term strategic research. The goal of doing this type of research fits within the preconceptions of most researchers in the above organisations, but research funds are shrinking and to carry out research it is becoming increasingly necessary to seek funds, usually for short term research, from user agencies or institutions like AWRAC. For example, my guess is that in the fairly near future the CSIRO Division of Water Resources Research will be required to generate 25-30% of its total budget from contract research.

Most researchers would agree that a level of 25% for contract- or market-driven research is not unreasonable, however, the reality is rather different. Servicing this level of funding from contract research will take probably about 60% of the research manpower of a group. Thus the work of a research group will be greatly distorted by what appears to be a relatively minor source of funding and plans for long-term basic or strategic research cannot be fulfilled.

A strong emphasis on market-driven research started in the UK in the early 1970's with the advent of Lord Rothschild.

Institutions which were well known for their international leadership in research have now "mined" their research base and have become essentially consulting organisations in direct competition with private organisations set up for this purpose. Should research, and in particular hydrological research, travel this road in Australia ?

A recent paper suggested that the doubling of atmospheric CO₂ which is likely to occur in the next 50 years may bring about an increase in catchment yield of between 40 and 90%. Impacts of such an increase on water resources planning are obvious but will market-driven contracts fund research in the broad area of climatic change ?

Graham Allison

FIRST STEPS TOWARD A NATIONAL IRRIGATION EQUIPMENT TESTING FACILITY IN S.A.

Over the past ten years there has been a rapid increase in the range of irrigation equipment available to farmers. Much of this technology has been adopted by irrigators in their conversions from furrow and overhead sprinklers to low-level sprinklers, microjets and drippers. However, the lack of performance data on this equipment has resulted in inefficient water use with resulting water-logging and salinisation effects. As a result, in late 1981, the South Australian Department of Agriculture established procedures to evaluate a range of irrigation products in a project managed under the River Murray Irrigation and Salinity Investigation Program (RMISIP).

One of the aims of the RMISIP project was to provide irrigators with an objective evaluation of commonly used sprinklers as a basis for efficient on-farm application. The RMISIP project, operated at the Loxton Research Centre, has generated information in a number of related areas. It has developed :

- methodology for testing sprinklers
- computer based technique for evaluating performance
- an assessment of instrumentation needed to undertake testing of irrigation emitters
- performance data on microsprinklers
- performance data on a number of under- and over-canopy sprinklers

Although the RMISIP project terminated in June 1985, testing has continued at Loxton partly with funding support provided by the Commonwealth Government under the Federal Water Resources Assistance Program. The South Australian Department of Agriculture also offers a contract testing service at Loxton to manufacturers, designers and end-users of irrigation equipment.

Arising out of the RMISIP project and the contract testing service, a case has been developed to establish an Australian Irrigation Equipment Testing Facility (AIETF) as a joint government/industry enterprise. It is expected that AIETF will lead to the following :

- increased efficiency of water use by irrigators
- reduced wasteful water application
- improved product quality
- provision of accurate data for manufacturers product bulletins
- increased interest in improved irrigation systems

It is also expected that the facility will assist exporters of irrigation equipment. The Irrigation Association of Australia has indicated its support for the concept. Additional support is also being sought from the water industry.

The Commonwealth Government has offered South Australia assistance for the development of AIETF under the Federal Water Resources Assistance Program. Feasibility studies are now being prepared

Project Leader : K.A. Watson, Senior Irrigation Adviser, Leader Irrigated Crop Management Services, SA Department of Agriculture, Loxton Research Centre, Loxton

ARTICLES FROM VARIOUS SOURCES ...

SOME HISTORICAL RECOLLECTIONS

Contributed by Claus Schonfeldt

10 YEARS AGO

April 1977. The National Committee publishes its revised metric edition of Australian Rainfall and Runoff. This was the first revision since the original 1958 edition.

The Committee was particularly keen to emphasise what ARR was not to be used for, namely : "This edition of Australian Rainfall and Runoff has been prepared with knowledge of the uses to which its previous editions have been put, and a deliberate attempt has been made during its preparation to eliminate the code of practice concept from its contents. The publication has not been prepared as a code, nor is it considered desirable that for hydrologic analysis and design the concept of an Australia-wide standard or code be promulgated. Such a document can only hinder the application of sound, creative and efficient engineering concepts to hydrologic analysis and design."

20 YEARS AGO

The Murray Darling Basin was in the grip of a drought which resulted in SA receiving a restricted supply of water and experiencing higher than normal salinities.

Whilst flows had been less and salinities higher in the past (the river stopped flowing in 1914) the consequences of the 1967/68 drought were far more widely felt because of the extent of development that had grown to depend on the river. This drought thus became the impetus for a review of water allocation policy and for river salinity management.

5 YEARS AGO (nearly!)

It might not seem that long, but it was almost 5 years ago that SA felt the impacts of two extreme natural phenomena within the space of two weeks. The Ash Wednesday Bushfire and the North Barossa Valley flooding. Statistically both were (extremely) rare events and by virtue of this it is difficult to be precise about their recurrence intervals.

The peak rainfall intensities centred on the Dutton region. The storms were extremely efficient yielding about 70% PMP for a 2 hour duration. Average precipitation for the 2 hour duration was 232 mm (1 km²), 212 mm (5 km²), 204 mm (10 km²) and 183 mm (50 km²). This represents the maximum recorded 2 hour intensity in SA. In contrast, the previous maximum for the Adelaide City region was recorded in 1925 when 166 mm (2 km²) fell representing 65% PMP.

The return period of the 1983 flood flow at Nuriootpa has been estimated at between 200 and 600 years.

The fortunate feature of the 1983 storm event was that it did not cause more damage than eventuated. Had this storm been centred over the Adelaide Hills, say First Creek, the damage would have probably been catastrophic. As it was there were heavy rainfalls in the First Creek catchment, which washed the ashen catchment clean and deposited black mud in several homes adjacent to Hazelwood Park.

RIVER MURRAY WATER RESOURCES MANAGEMENT REVIEW

This review, about the future management of the River Murray, is hot off the E&WS Department presses. The foreword to the review, presented by the Minister of Water Resources, is reproduced below.

"It is widely recognised that the River Murray is South Australia's most important water resource. The River is a vital water supply source for over one million South Australians and, with its associated floodplain and wetlands, it is one of this State's foremost environmental assets. It also provides an attractive focus for recreation and tourism.

Planning and management of these resources has a high priority within this State and, with the recent establishment of the Murray Darling Basin Ministerial Council, the way has been opened to improve management further at the Basin level.

The River Murray Water Resources Management Review is a significant step forward in planning for improved management of the River. It identifies the problems and opportunities requiring closest attention in the immediate future - salinity mitigation, wetland management and water allocation - and provides a broadly based and logical framework for addressing these issues over the next five to ten years.

I urge you to examine this review and make comment. Written comments can be sent to the Chief Executive Officer of the Engineering and Water Supply Department."

The Hydrological Society Committee considers it to be appropriate for the Society to respond to the invitation to comment. It intends to prepare a coordinated Society response and requests all interested members to forward any comments they wish to be incorporated into this response to the Assistant Secretary, Mr. C. Schonfeldt, C/o E&WS Department, GPO Box 1751, Adelaide, by mid-September. Copies of the review can be obtained through Mr. J. Barratt at the Water Resources Branch of the E&WS Department on 227 2603.

INTERNATIONAL SYMPOSIUM ON 'WATER FOR THE FUTURE' Rome, 6-11 April 1987

The symposium was convened jointly by the International Association of Hydrological Sciences (IAHS) and the International Association of Hydraulic Research (IAHR), and organised by the National Research Council of Italy and the University of Rome, in cooperation with WMO, FAO, UNESCO and UN Department of Technical Cooperation and Development. The participants numbered approximately 200 from 33 countries. The best known international hydrologists included Prof. Dooge (Ireland), Prof. Yevjevich (USA, statistics), Prof. Herschy (UK, hydrometry), Prof. Nash (UK, 'Nash liner cascade') and Prof. Kundzewicz (Poland, Hydrology 2000). There were three participants from Australia : Prof. Tanner (Department of Classics, The University of Newcastle), Mr. H. Bandler (Civil and Environment Consultant, NSW) and Mr. V. Kotwicki (Engineering and Water Supply Department, Adelaide).

A total of 106 papers were presented at the symposium, of these 45 at the hydrology sessions and 61 at water resources sessions, covering advancements in data capture and manipulation, impact of advances on water development and management, the thrust of thought in contemporary hydrology, urban and rural water developments, water law, policies and institutions, aspects of managing existing water resources systems, future water resources management challenges, groundwater developments, future water resources developments and alternative water developments.

The proceedings of the symposium were pre-published in two volumes : 'Water for the Future - Hydrology in Perspective' (IAHS Publication No. 164) and 'Water for the Future - Water Resources Development in Perspective' (IAHR Publication).

The South Australian paper 'On the future of rainfall-runoff modelling in arid areas - Lake Eyre case study' presented with the aid of 80 slides was very well received. Following a 30 minute presentation, numerous questions were asked from the floor. It implies that we have something to show overseas : this fact is probably not fully appreciated. As isolation quells motivation, opportunities to contact the outside world (through relevant symposia, workshops and the like) should never be missed.

Vincent Kotwicki

FROM THE HYDROLOGICAL TRAPS ...

IRRIGATION TECHNOLOGY WORKSHOP

(Reporter : T. Thompson)

The formation meeting for the Murray-Darling Ministerial Council in November 1985, recognised the growing realisation of the need for a coordinated approach across the Murray-Darling Basin to resolve common problems. The meeting formed a number of Working Groups including one to "review the technology available for improved on-farm water use efficiency and incentives and disincentives for farm-based measures in salinity and drainage control in irrigation areas of the Murray-Darling Basin".

A workshop on irrigation technology transfer organised by the Working Group was held at Yanco, NSW, 28-30 July 1987. Objects of the Workshop were :

- (a) To bring together extension, research, consultant, industry and farmer representatives actively involved in the transfer of irrigation technology for the improvement of water and land management on the farm.
- (b) To exchange information and ideas on :
 - (i) The key irrigation technology that needs to be transferred and the current status of transfer or adoption.
 - (ii) The current problems of and barriers to technology transfer from the development to the adoption phases.
 - (iii) The appropriate methodology, programmes and organisational structures to promote the transfer of technology including planning, implementation and evaluation.
 - (iv) Areas of irrigation technology which require further research and development to facilitate the information transfer and problem solving processes.
 - (v) The impact of future developments in technology and government financial and other policies on technology transfer and transfer services.

Your reporter attended the Workshop which he found most valuable. (H.S.S.A. members wishing to hear more of Tony's impressions are invited to ring him on 227 3122. Ed.)

LEIGH CREEK ROAD

(Reporter : R. Saunders)

Flooding on the Hawker-Leigh Creek road in February 1985, December 1986 and February 1987 has caused major damage.

As some pipes and culverts that had been designed for a 20-year return period flow were overtopped on each occasion, an investigation is under way to further investigate the hydrology of the area. RORB calibration carried out on the Windy and Emu Creek catchments indicates reasonable losses, but very low storage (K_C) values. For this reason design flows may be far higher than previously thought.

The investigation will continue with research of historical records and further analysis, leading to a decision on the upgrading of pipes and culverts, or other works as required.

SALTIA CREEK

(Reporter : R. Saunders)

The Highways Department recently designed an interesting flood mitigation project which also contributed to cost savings in major new roadworks.

Stirling North township, near Port Augusta, is situated in the delta of Saltia Creek which has a catchment of 107 square kilometres mainly within the Flinders Ranges. The Department designed a \$1.4 m diversion channel skirting the east of the town to protect it from frequent and devastating floods.

The channel was constructed by the City of Port August with Government subsidy assistance. Excavation of the channel, approximately 3 km long and with a 55 m base width, was carried out in conjunction with the construction of a new road overpass of the ETSA spur railway to the power station, so that excess spoil could be used for embankments.

The new channel and associated levees provide protection for an extreme flood with rainfall equivalent to one-third of maximum probable precipitation, and now provide for normal residential development within the town.

STUART HIGHWAY

(Reporter : R. Saunders)

Drainage design has recently been completed on the 755 km stretch of the Stuart Highway from Pimba to the Northern Territory Border.

In all, there were 22 bridges, 44 large culverts and over 700 minor structures (pipes up to 1800 ϕ and culverts up to 1200 x 900) designed for catchment areas ranging in size from 2380 km² down to a few hectares.

One of the most difficult aspects of the design was the acquisition of basic data with which to undertake hydrologic calculations. Although design rainfall estimation is reasonably well covered in AR&R (1977), the lengths of records of the available stations are short. Large scale topographic mapping of the north of SA (1:100,000 or larger), is virtually non-existent. Recorded streamflow data are non-existent.

For the very large number of minor catchments, the Rational Method was used, while the runoff routing programme RORB was preferred on the larger catchments where bridges or large box culverts were proposed.

RORB was preferred over other synthetic hydrograph techniques due to the availability of limited locally (i.e. SA) derived calibration data and the less demanding topographic data requirements; ideal in areas where such data are, to say the least, limited.

This stretch of highway is by far the longest continuous length of road in SA to have the waterways designed by a small specialist group to a uniform standard using a consistent set of techniques. The long-term performance is awaited with interest.

RESERVOIR DESTRATIFICATION STUDY

(Reporter : Ross Stevens)

Montgomery Hosking Stone Pty. Ltd., in association with Jorg Imberger and John Patterson at the Centre for Water Research (CWR), University of Western Australia, have been engaged by the Engineering and Water Supply Department to undertake a study of alternative methods of destratifying the Myponga Reservoir. The investigation is to focus on two alternative methods of destratifying the reservoir :

- (a) by mechanical mixers (axial flow pumps); and
- (b) by bubble plume.

A numerical simulation, DYRESM, developed at the CWR has been used for the study. Based on a review of the latest destratification techniques, and of theoretical and experimental work on bubble and pump generated buoyant jets, algorithms for pumps and bubble plumes have been written and incorporated into DYRESM. The study will be completed in August 1987.

WOOLPUNDA GROUNDWATER INTERCEPTION SCHEME (Reporter : X.P. Sibenaler)

Hydrogeological field investigations associated with the Woolpunda Interception scheme have essentially been completed with the recent termination of the 8 month pumping trial.

While the hydrogeological response was generally satisfactory, the magnitude of the long-term chemical precipitation within the pipeline network has yet to be confirmed. To this end pumping from the trial well is being maintained at lower discharge rates in order to simulate the retention time expected in the scheme pipeline.

A Cabinet submission for the scheme approval is currently being prepared by the E&WS Department and a decision on whether it will be implemented is expected before February 1988.

GREAT ARTESIAN BASIN

(Reporter : R. Aldam)

Investigations into the structural control of artesian spring discharge in the SW margin of the GAB have been carried out with consultant geologist/geophysicist Kuang Koo Sing. A data base is being set up on a PC to handle recent and historic information which has only recently been integrated.

TATIANA PROCLAIMED REGION

(Reporters : M.H. Stadter, A. Love)

An assessment of groundwater availability within different parts of the proclaimed region was made and a report outlining the results has been prepared for the E&WS Department. The results indicate that groundwater use has reached an acceptable level of extraction in parts of the region and further irrigation development could be considered. However high salinity irrigation returns may mitigate against development in some areas. Some additional investigations have been recommended.

LOCHIEL TRIAL PIT

(Reporter : P. Redman)

The excavation of the trial pit and extraction of a coal sample has now been completed. Dewatering of the pit has been stopped after a period of approximately 8 months of operation. Coffey and Partners in conjunction with the Coal Resources Branch of the Electricity Trust of South Australia are currently assessing the extensive instrumentation data.

FROM THE SECRETARY ...

In the flurry of activity leading up to the Annual General Meeting the Committee's task of putting together a list of Honorary Life Members has not yet been completed. This will be a priority for the 1987/88 Committee. In the meantime any further nominations for Honorary Life Membership should be submitted to the Secretary.

For the first time in several years we have an election for membership of the Committee. It is unfortunate that two aspiring Committee members will be disappointed. However it may well be that the new Committee will co-opt additional assistance to undertake special tasks.

The forthcoming Barossa Valley tour should prove both an interesting days revelation of the hydro-geology and hydrology of the area, and a chance to spend some time meeting other members of the Society on an informal basis. Please mark in your diary the days Thursday 15 October for the evening meeting and Sunday 18 October for the tour. Details are given in the attached sheet.

The Ian Laing Prize for students engaged in hydrology will be awarded during the Annual General Meeting to Mr. Peter Szabo who is a final year student in the Bachelor of Engineering course in Civil Engineering at S.A. Institute of Technology. The review committee considered that his academic record in his last years, particularly in subjects relevant to hydrology and his enthusiasm for his project make him a worthy recipient. Well done and thanks also to the others who applied.

This year has taught me a great deal about the arts and ardour of being a Secretary. The changeover to Incorporated status has caused a few hiccoughs notably in the supply of Hyd.Soc. stationery, however the system has settled down. Anwen Aukland has now entered all the Membership records on DBASEIII which makes the changing of addresses and adding of new members much easier.

MISSING NEWSLETTER BACK-COPIES

The Society Library is missing back-copies of two Newsletter issues, Nos. 19 and 24 circa 1973/74. If you locate these in your archives please contact C. Schonfeldt 227 2787 and he will arrange a photocopy for the library.

REMAINING MEETINGS - 1987

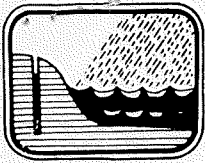
August 27 : ANNUAL GENERAL MEETING including election of Executive Committee for 1987/88 and presentation of Ian Laing Prize followed by technical session : "South Australia's Water Management Strategy", Mr. Jim Killick, Manager, Water Resources Branch, E&WS

October 15/October 18 : Barossa Valley Hydrogeology/Hydrology. This is a meeting format which is new to the Society. All details are given on the sheet enclosed with this Newsletter.

November 26 : "Limnology of Mount Bold". Speaker : to be announced

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EDITOR : John R. Argue (Tel. 343 3131)
C/- School of Civil Engineering
S.A. Institute of Technology
The Levels, S.A. 5095
FAX : (08) 349 6939



HYDROLOGICAL SOCIETY OF S.A. INC.

BAROSSA VALLEY

MORE THAN A TOURIST OUTING –

A REGION OF DIVERSE HYDROLOGIC INTEREST

MEETING : 15 OCTOBER

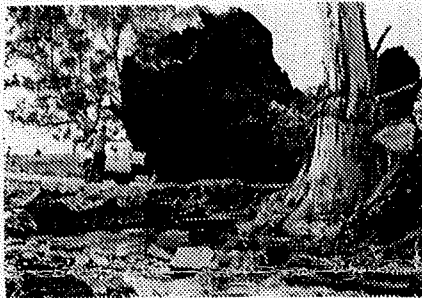
SITE VISIT : 18 OCTOBER

**'NORTH PARA OPEN
SEWER – A SERIOUS
HEALTH HAZARD'**

THE BUNYIP
15 MAY 1985

(See Overleaf for details)

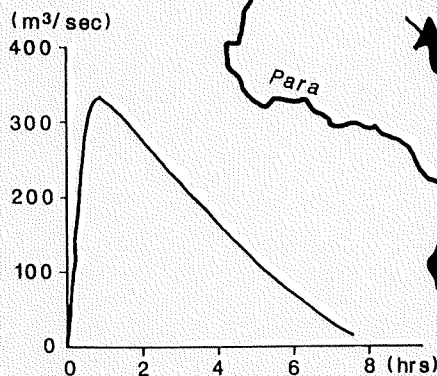
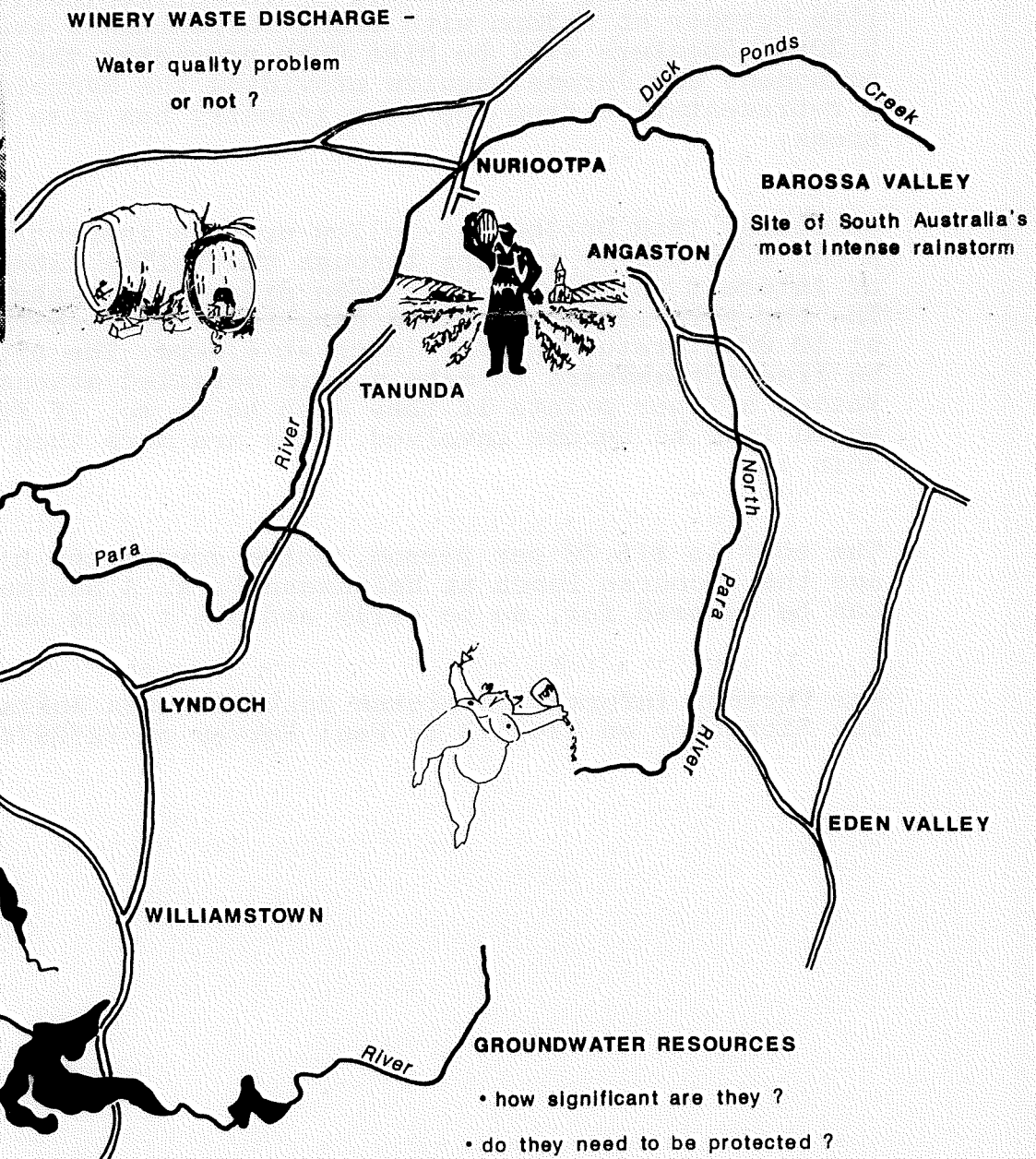
FACT OR FICTION ?



Massive tree trunks
like matchsticks in
1983 flood

WINERY WASTE DISCHARGE –

Water quality problem
or not ?



GROUNDWATER RESOURCES

- how significant are they ?
- do they need to be protected ?
- is salinity a problem ?
- what is the major recharge mechanism ?

THE BAROSSA VALLEY FROM A HYDROLOGIC VIEW POINT

Here is an ideal opportunity to gain an appreciation of the Barossa Valley from a hydrologic point of view.

A general meeting will be held at the Waite Institute on Thursday 15th October at 6.30pm with light refreshments available from 5.30pm. Speakers will be Mike Cobb providing the hydrogeologic component and Jerome Maguire providing the hydrologic component. A representative from the wine industry has also been asked to speak.

On Sunday 18th October, a follow up site inspection is planned. A bus will convey members through the Valley, stopping at points of interest which will have been discussed at the earlier meeting. The bus will leave Heinemann Park (just outside Tanunda) promptly at 10.00am, returning for lunch at 1.00pm. The afternoon will then be free for members to make a more detailed assessment of the Valley's finer points if they wish to do so. If families would like to become involved, they are more than welcome to join in.

The cost is \$15.00 per person, which covers the hire of the bus and the 3 course lunch at Heinemann Park. A maximum of 50 people can be catered for, so be early and don't miss out.

For further information please contact Anwen Aukland on 2273660, Zac Sibenaler on 2747573 or Paul Harvey on 2272976.