THE HYDROLOGICAL SOCIETY OF S.A. INC.

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

NEWSLETTER NO. 64
APRIL 1990

GUEST EDITORIAL

A NEW WATER TECHNOLOGY CENTRE FOR SOUTH AUSTRALIA

The Australian Irrigation Technology Centre (AITC) was established at The Levels, north of Adelaide in South Australia, in September 1989 to become the national centre for the development of irrigation technology, bringing the highest standards to the Australian irrigation industry.

Irrigation technology centres have already played a significant role in improving practices and raising technical standards in the irrigation industries of many other countries. Especially prominent have been the centres established in the United States and Israel.

The potential for similar benefits from such a centre in Australia was seen in 1983. There were extensive investigations into the proposal, and in 1989 the AITC was established as an independent organisation.

Building on the experience of overseas centres, and with the benefit of the extensive, world-recognised research done at the S.A. Department of Agriculture's Loxton Research Centre, the AITC will be developed as a technically advanced facility. It will contribute to the Australian irrigation industry from six principal activities.

- Establishing standards
- Device-testing services
- Developing irrigation equipment
- Compliance-testing and certification
- Contract research into irrigation technology
- Education and training services

In co-operation with the irrigation industry, AITC will play a leading role in developing standards for irrigation equipment and practices. The standard will be based on international standards, but will be written specifically for Australian conditions.

Other than the testing work done at Loxton, there has been little independent testing of irrigation equipment in Australia. Now irrigators, designers, manufacturers and importers will be able to get information from independent tests on the full range of irrigation equipment - from pumps, valves and filters to drippers, micro-sprays and sprinklers.

As a research institute AITC will work with equipment manufacturers to develop new devices with better performance, particularly suited to Australian irrigation conditions.

Manufacturers, designers and irrigators will be able to send equipment to AITC for compliance testing. Testing may include granting of a certificate that indicates the equipment has been tested under rigorous conditions and complies with the relevant standard.

AITC will also conduct research into general irrigation technology issues on behalf of public and private sponsors.

AITC will not be an educational facility, but it will be able to co-ordinate the resources of institutes, colleges and universities to provide product-oriented training courses that will meet the needs of the irrigation industry.

AITC is a totally independent body. Its operating costs will be met from the fees charged for its services.

Because of its structure, AITC will be able to operate without any dependence on either public or private organisations. However, AITC will always seek to work with institutions and organisations where expertise already exists by taking a co-ordinating role, and seeking to become involved only when it can genuinely add value to client services.

AITC will operate across the whole of Australia from its base in South Australia, by forming relationships with organisations in other parts of Australia to act as field centres. Ultimately, field centres will be sited to serve both the urban and rural irrigation markets.

Field centres will vary in size and type. Some, such as Loxton Research Centre, may carry out their own device testing; others will act as local contact points for the flow of information to and from AITC.

Construction of the AITC testing facility adjacent the South Australian Institute of Technology School of Civil Engineering laboratory block at The Levels is nearing completion. Mr. Jeremy Cape has been appointed the Centre Manager and the laboratory staff are now being appointed. AITC is now able to undertake testing of devices and welcomes comment and contact from industry participants.

AITC is committed to providing a technically superior service, designed to meet the needs of the whole Australian irrigation industry.

TONY READ

QUERY FROM I.E. AUST. NATIONAL COMMITTEE ON WATER ENGINEERING

The National Committee wish to hear from any engineering practitioners or others concerning "any matters that are not adequately covered in the third edition of Australian Rainfall and Runoff - 1987". This is part of an on-going commitment recognised by the National Committee to keep the document up-to-date.

The N.C. is particularly - and primarily - concerned about rainfall information contained in Chapters 2 and 3 and its use in the procedures described in other chapters.

Any members of HSSA who wish to respond to this invitation are asked to contact Kim Read (Tel. 223.5583), Chairman of the National Committee, or Trevor Daniell (228.5333), Civil Engineering Department, University of Adelaide.

HSSA SUPPORT FOR INVESTIGATOR CENTRE

Recently preliminary plans for a hands-on science and technology centre in Adelaide were announced. This centre, to be called "the Investigator Science and Technology centre", will be located in the International Pavilion at the Wayville Showgrounds.

The Investigator organising committee are now seeking sponsorship and assistance in the preparation and maintenance of interactive exhibits which demonstrate a specific scientific principle. Any exhibit will have to be eye-catching, clearly demonstrate a fundamental principle or process of science or technology to children and adults alike, and be able to be repeated regularly. It is likely that to prepare and maintain an exhibit will cost many hundred and maybe in excess of one thousand dollars, as well as considerable time and effort, depending on the type of exhibit.

ARTICLES ....

Your committee believe that this may represent a unique opportunity for the Society to fulfil its stated objectives relating to the dissemination of information and education in the field of hydrology. The Society has some funds available and has a wealth of expertise and ideas within its membership.

The Society has already indicated to the organising committee that we may be interested in participating in this project. The committee is now seeking suggestions from you for a suitable hydrologically-based interactive exhibit which the Society could sponsor.

If you have any suggestions, are keen to be involved or want to know more about this exciting project, please contact Paul Harvey (work, 226.2502, or home, 272.4091). There is a prize for the most innovative and original idea submitted by the end of April 1990.

UNDERGROUND STORAGE FOR TOKYO STORM WATER

A $12 billion project, arguably the world's most costly urban storm water retention system, will be built in Tokyo, starting this year, to prevent flooding during heavy rainfalls.

The first phase of the innovative project that will build a 30 km tunnel, 12.5 metres wide, at a depth of 40 metres underground, is to be completed by 1992. Phase One of the system will store 240 ML of stormwater in a 2.4 km tunnel to be excavated underneath the Kanda River in the metropolitan area. The entire project is not due to be finished until after the turn of the century.

The Tokyo metropolitan government devised the plan in order to help drain storm runoff into Tokyo Bay. Since most of Tokyo is paved, rainwater cannot seep directly into the soil, causing rivers in the urban area to flood very quickly during heavy downpours. After the Handa River overflowed six years ago causing much damage, the government began widening some of the nine rivers in the Tokyo area, as well as constructing detention storage ponds for storm runoff. The aim was to have the system handle a rainfall intensity of 50 mm/h.

However, sky-rocketing land prices made it difficult to buy land for flood prevention measures. The planned deep underground tunnel system will cross all of the nine rivers in the Tokyo area before draining into the Bay. Drainage pumps will divert and convey excess stormwater through the underground canal when the surface rivers threaten to flood in major storms.

Deep Is In

Not only stormwater systems are to be moved deep underground in downtown Tokyo and the other major cities of Japan. The national government has developed plans and is enacting legislation to allow for the construction of deep underground subways, roadways, sewer and water pipes. In all the cases under discussion, going underground to a depth of about 50 metres has been advanced as a solution to land price problems. A restriction on the private ownership of underground land that would change the ownership provision of the Japanese Civil Code, forms part of the government's comprehensive land reform measures that are presently before the national Diet (parliament).

At present, the sub-surface depth of sewer and water pipes ranges from two to 10 metres, and underground metro-rail systems crisscross the city about 20 metres underground. The plans are to lay new pipes and dig subway tunnels at a depth of about 50 metres underground if the law is passed, in order to avoid costly compensation and lengthy bickering with owners. Last year, a panel of expert advisers concluded that it is technically feasible to build subways and utility tunnels as deep as 70 metres below ground level without affecting surface structures.

A building boom in underground walkways within the most congested central business districts is also on the cards. As a first step, the Construction Ministry plans to build underground walkways at three major intersections in Tokyo, Hiroshima and Sendai next year. In the case of Tokyo, the Toranomon underpass will connect with two subway lines and protect government employees in the various ministries located above from inclement weather throughout the year.

(Reprinted with editorial alterations from Public Works Around the World, Vol. 4, No. 1, January 1989)

DRYLAND SALINITY IN SOUTH AUSTRALIA : Report on Technical Forum at AMF

On 14 February 1990 about 150 persons concerned about dryland salinity in South Australia attended a seminar which introduced the State's technical strategy on dryland salinity to a wider audience. The event was jointly organised by : State Dryland Salinity Committee, The Hydrological Society of S.A., Soil Science Society of SA & CSIRO - Centre for Groundwater Research.

The Director General of Agriculture opened the forum and introduced proceedings with the sobering thought that salinisation affects an estimated 220,000 ha in SA at a cost of about $27 million in lost agricultural production. He also stated : *"The South Australian Government is vitally concerned about land degradation, especially dryland salinity, but recognises the need to focus its approach to ensure the best use of available resources"*. In addition : *"Without a major Community effort it will not be possible for government agencies alone to tackle dryland salinity"*.

To this end, a composite Landcare strategy is evolving in South Australia.

The forum yielded a tidy profit which will be used as seed money for future information dissemination.

The Strategy

Goal

Develop and implement programs to minimise the physical and economic impact of dryland salinity on the State's soil, water and vegetation resources.

Five components to the strategy have been identified and include

- Monitoring
- Hydrogeological Investigations
- Off-site Treatment Options
- On-site Treatment Options
- Education and Extension.

The Monitoring component identifies the need to complete a land capability inventory of the State to determine areas affected by or at risk of salinisation. It also indicates the need to establish a network of observation wells, to provide predictions of salinisation trends and establish a system of stream gauging and salinity observation stations and relate the data to changes in land use.

The second component identifies the need to develop a broad hydrogeological understanding of all major areas of the state affected by dryland salinity. More intensive investigations (including modelling) are then required to detail casual mechanisms and provide direction for the formulation of appropriate management options.

The Off-site and On-site Treatment Option components recognise the need to increase plant water use and minimise groundwater recharge. On-site treatments are also required to enable landholders to improve production from areas already affected by salt.

The final component recognises the need for on-going education and extension programs to improve landholder understanding of the processes leading to dryland salinisation and methods to control the spread or rehabilitate affected areas.

The Strategy also recognises the need for community action, for without community involvement government agencies cannot address the problem of dryland salinity.

DRYLAND SALINITY

[Contributed by B. Van der Wel]

As part of the South Australian Dryland Salinity Strategy, Dr. David Williamson of the CSIRO Division of Water Resources and the Scientific Services Branch of the Engineering and Water Supply Department, have estimated the salt loads carried by South Australian streams. The purpose is to assess whether salinisation of surface water runoff is increasing. Considering the cost of salinity to water consumers and the expenditure on works to control salinity in the River Murray, it may be possible to implement more cost-effective control of the salinity of water supplied to consumers in Adelaide, by instituting salinity programs in the local catchments.

Clearance of native vegetation and its replacement by shallow-rooted crops and/or fallowing will result in increased recharge to the groundwater table. The rising groundwater mobilises salts which have accumulated in the soil profile below the root zone from salts deposited in rainfall in eons past. This process is accelerated by inefficient irrigation. The rate at which the water resource is affected depends on the scale of the groundwater basin, and ranges from hundreds of years for the Mallee basin (affecting the River Murray) to a year or so for much smaller basins.

Rainfall salinity was found to vary from 12 to 50 mg/L in the Mount Lofty ranges, and decreasing inland, although other researchers obtained values at the lower end of this range. Stream salinities varied from 100 mg/L to 60,000 mg/L, with streams in the more arid areas generally having the higher salinities. For each stream, salinity decreases with increasing instantaneous flow, indicating a dilution of saline groundwater by the relatively fresher surface runoff.

RIVER MURRAY FLOODPLAIN PROJECT

[Reporter : Peter Dillon]

It has long been recognised that a large proportion of the increase in salinity of the River Murray in South Australia is due to natural groundwater inflows. In recent times it has become clear that salt accessions to the river are not uniform in time, and depend on groundwater discharge to the alluvial floodplains and the flow history of the river.

In periods of "normal" flow a large majority of the saline groundwater flow discharges to the floodplains where the salt is concentrated in the unsaturated zone by the native vegetation (predominantly Black Box; *Eucalyptus largiflorens*, River Red Gum; *E. camaldulensis*, and lignum; *Muelenbeckia cunninghamii*). Following a flood event, the surface and groundwater which entered the floodplain alluvium during the period of high flows returns to the streams, taking with it large volumes of salt which were stored within the floodplain alluvium.

This process continues until the groundwater level beneath the floodplain returns to its pre-flood elevation, which in some cases may take up to two years. Furthermore, in many areas significant salt accessions from the floodplains also occur during periods of "normal" stream flow. An understanding of the salt balance of the floodplains is important for providing good estimates of stream salinity which are vital for the assessment of various management schemes. This project is aimed at studying the build-up of salt within the floodplains, and its transport into the streams following flood events and in periods of "normal flow".

The ratios of salt exported by a stream to salt load input from the rainfall varied from 0.5 to 8, with the majority being greater than 4. Ratios less than 1.0 indicate an accumulation of salt in the catchment, which is considered unlikely in the long term, and is probably a result of the limited data available and the calculation methods. The lower ratios are from catchments with large areas of native vegetation or pine forest. Any ratio in excess of 2.0 is considered to be indicative of salinisation occurring and to be capable of improvement.

It was also found that salt export was not only a groundwater problem. Salt export was dependent on rock type (weathering of those of the Kanmantoo Group yielding higher salinity), on rainfall (the higher the rainfall the higher the salt output), and on solution by erosion. Sources of salt other than rainfall were indicated by the ratio of chloride to total dissolved solids. For some streams this ratio was much lower than rainfall which is of the order of 0.4 to 0.5 in coastal areas due to its origin in sea-spray. The trend of salinity over time was estimated, but few were statistically significant.

As a result of this study, a number of additional flow-gauging stations will be installed with continuous salinity monitoring. Further investigations of priority catchments are underway with the aim of trialling various control options such as re-vegetation of recharge areas and growing high water use crops such as lucerne.

The Chowilla Anabranch region, north of Renmark, has been selected for detailed study. It is envisaged that a conceptual model of part of this area will facilitate the transfer of the results to other floodplain sites, and so enable the prediction of salt accessions to the River Murray for given periods of "normal" flow and/or for a given size flood event.

The team researching this topic includes Glen Walker and Ian Jolly (CSIRO), Jorg Hacker and John Bennett (Flinders University), Mike Smith, Ken Smith and Peter Stace (E. & W.S., Berri), and Steve Barnett (SADME, Adelaide).

STORMWATER QUANTITY/QUALITY PROJECT AT GLENELG

[Contributed by Bill Lipp]

The establishment of the first urban stormwater monitoring station in S.A. is now close to reality. Detailed data on both quantity and quality of urban stormwater flows may be available in the latter part of this year.

The steering committee set up in February 1988 has now identified the majority of funding sources and is finalising details of the gauging network and monitoring programme. The committee consists of representatives from Dept. of Road Transport, E. & W.S. Department, Bureau of Meteorology, South Australian Institute of Technology, University of Adelaide, Local Government, Consulting Engineers and the Australian Centre for Water Treatment and Water Quality Research. Its convener is Dr. D. Mulcahy (School of Chemical Technology, South Australian Institute of Technology).

The catchment to be used in the programme is located in the suburbs of Glenelg, Glenelg East and Glengowrie. The total catchment area is only 1.82 square kilometres in keeping with the project's aims of obtaining data on small catchments.

The outfall for the catchment is the Patawalonga Basin which was once a popular water recreation area, but due to pollution problems is now unfit for recreational purposes.

Three monitoring stations will be set up within the catchment with each sub-catchment being nested within the next larger one. This arrangement should provide data on quality/quantity interactions and storage effects occurring through the catchment.

The measuring equipment to be installed will be state-of-the-art technology. It is proposed that flow depth and velocity will be continuously measured with a pressure transducer and an ultrasonic flow velocity sensor. From these two parameters the flow rate can be easily calculated. Such devices offer minimal resistance to the flow and avoid the problems associated with installing some form of hydraulic control within the pipe. Such instrumentation has a claimed accuracy of $\pm$ 1 - 2%. Prospective flow measuring devices will be tested at the S.A.I.T. Water Engineering Laboratory to confirm or reject such claims.

Detailed continuous measurement of most water quality parameters is not economically feasible. Instead, the frequency and type of sampling will depend on the particular water quality investigations being undertaken from time to time.

Rainfall will be measured at six pluviometers within the catchment.

The quantitative results will be used to investigate ROC/loss values and catchment response times, and also to calibrate rainfall/runoff computer models being used in urban drainage design. If the project runs long enough it may be possible to develop a regional flood estimate method for the Adelaide urban area.

Qualitative results will be used to test stormwater quality computer models and aid the possible development of new models appropriate to Australian and S.A. conditions. Specific studies into particular water quality indices will also be conducted for short periods during the life of the project.

The combining of the quantity/quality aspects has not only meant cost savings, but has brought together various organisations with an interest in stormwater. This combination complements the growing recognition of the connection between stormwater quality and quantity.

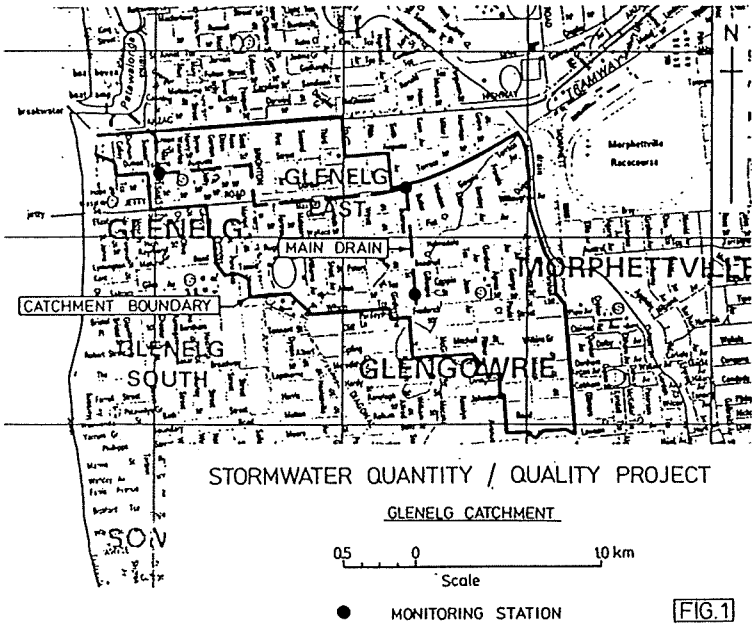


FIG.1

FROM THE HYDROLOGICAL TRAPS ....

GAMMON RANGES RAINFALL PROJECT

Members will have read earlier accounts of the Scientific Expedition Group's project to locate a pluviometer and logger on the top of the Gammon Ranges, to record rainfall over a 10-year period. The rain gauge has now been operating for 18 months and gathered unique data in March 1989 during the "Big Wet", when nearly 400 mm of rain was recorded during a single month.

Five trips are scheduled each year to service the pluviometer and recover the data. Those who have taken part include Geologists, Botanists, Biologists, Meteorologists, and even a Marine Sedimentologist! Photographic records are taken at a series of monitoring points to see how the vegetation changes in response to bush-fires, rainfall and the depredations of feral rabbits and goats. Growth changes are already evident and the project should expand our understanding of this remote area considerably. Other projects include rainwater sampling for chloride levels, fall-out sampling, water quality from water-holes, and collecting aquatic invertebrates from the water-holes. On the last trip, all we found in the water-holes were frogs, which appeared to have eaten all the invertebrates!

The next phase of the project is to set up two more pluviometers, one on the slopes of the ranges, and one on the edge of the plains. As time goes by, it should be possible to determine the relationship between rainfall magnitude, frequency and altitude. A major problem which will have to be faced is the very patchy distribution of most storm activity. However, provided the period of record is sufficiently long, the overall pattern should become clear. We do not, unfortunately, have any pluviometers on the east side of the ranges, which might throw some light on the variation in oreographic effects between east and west.

At present the data logger in service is a MACE Type 77 supplied by the E. & W.S. Department. It has served us well. A second instrument which Gordon Stanger of Flinders University installed, has not been so successful. With the aim of installing 3 identical units, we have approached MACE, and have been offered three of their new Type 88 loggers at a very attractive price. With the assistance of the Department of Agriculture which will install one of the instruments, plus contributions from other interested groups, it is hoped that the new loggers will be in place by September this year.

The Hydrological Society has provided support to the project through the efforts of several members, in particular Paul Harvey, John Waterhouse, Chris Wright, and Andy Telfer, and has provided a grant of $900 this year. One of the aims of the project is to introduce Secondary and Tertiary Students to undertaking scientific research in the more remote parts of Australia. The last trip, in February, was organised and run by three students and a graduate geologist, with only Chris Wright representing the older (and somewhat slower) generation. In July of this year, a full expedition of 6 leaders and 24 expeditioners will be spending 12 days in the Gammons, undertaking scientific works of various types, and trying to keep warm in sub-zero temperatures in the Flinders winter nights.

There are still a few places for leaders, so if any Hydsoc members are interested they should contact Chris Wright on 366.2269 (work) or 278.8818 (home). Great interest has been shown by Dr. Reg Sprigg of Arkaroola, and Warren Bonython, who is the President of the Scientific Expedition Group and first climbed the Flinders Ranges before many of us were born!

The first annual report for the project is expected to be available in August 1990.

IRRIGATION PROJECTS IN THE MOUNT LOFTY RANGES

[Reporter : Chris Purton]

Over the past few years a strong upward trend has been noticeable in the construction of farm dams in the Mount Lofty Ranges. These dams are designed to supply irrigation water to high value crops which are intended for the export market. B.C. Tonkin & Associates have performed a number of feasibility studies on catchment runoff yield, optimum dam size and irrigation potential for clients intending to grow high quality wine grapes or cut flowers. Many of these studies have proceeded on to the design and construction phase. Dam storage capacities have typically ranged from 100 ML to 400 ML.

Construction has just commenced on the most recent of these projects - a vineyard in the high country near the head-waters of the South Para River and Jacob Creek. Two new dams will be constructed and a third dam will be repaired. The total storage capacity of the three dams will be 530 ML.

STABLE ISOTOPES IN THE RIVER MURRAY - INDICATORS OF IRRIGATION RETURN WATER

[Reporters : Andrew Herczeg and Jim Simpson]

A major cause of the large downstream increase in salinity of the Murray River is related to irrigation practices. A large fraction of the drainage system in areas within 20 km of the River Murray and adjacent to major tributaries now has a runoff and groundwater recharge cycle fundamentally different from the natural system prevailing prior to irrigated agriculture. The soil and water conditions established by this new balance of water and salt will govern the future of irrigated agriculture in Australia during the next century which have important ramifications for the water quality of the River Murray.

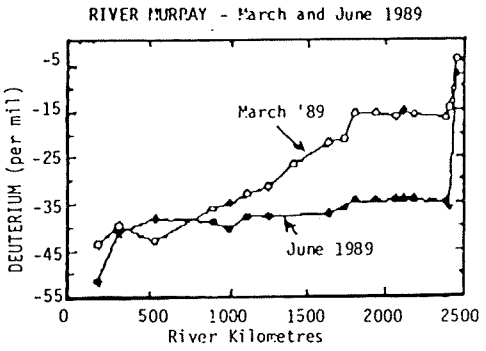
The aim of this project is to quantify the amount and location of input of saline irrigation return water to the River Murray and assess its relative importance to the increasing salinity of the River, and to apply the results of this study to help reduce return of saline irrigation drainage water to surface waters in the Murray-Darling Basin.

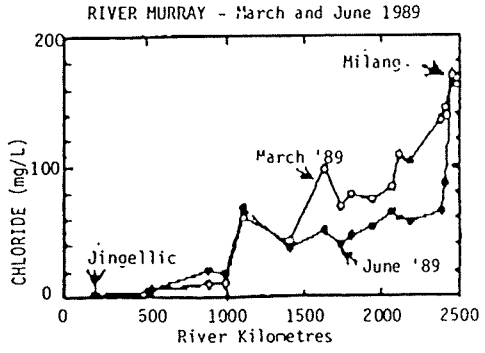
When water evaporates, if preferentially leaves behind the heavier isotopes of the water molecule (deuterium and oxygen-18). Because irrigation drainage waters are always evaporated to some degree, this process leaves an isotopic signature or tracer that is much more sensitive than chloride concentration. The stable isotope composition of water from irrigation areas is typically enriched in stable isotopes of water in the order of 20 parts per thousands in deuterium relative to input water. This represents about a 30 - 40 percent loss of water by evaporation alone.

In co-operation with EWS, RWC, DWR-NSW and MDFRC, we now have about 14 months of samples from 27 stations along the River Murray and major tributaries. Samples from December 1988 to June 1989 have already been analysed as a reconnaissance exercise to test the feasibility of our approach. The results from the months of March and June 1989 shown below demonstrate the large difference between the late summer and onset of high runoff. When combined with chloride data from the same sampling period, important information regarding the location and amount of significant groundwater and irrigation return flows can be gained.

It is critical to note that although groundwater input causes substantial increases in River salinity, it does not perturb the stable isotopic composition of the River water. The amounts of water are too small, and the isotopic composition is in the opposite direction to the observed changes.

Plots of deuterium and chloride along the main axis of the River Murray for the months of March and June 1989. The steady increase in deuterium at the end of summer was due to evaporation within the River and its tributaries plus irrigation return water. The signal was completely swamped by June following heavy rain in the eastern states. Chloride concentrations for the same months display increases due to groundwater plus irrigation return flows.





MONASH EFFLUENT RE-USE STUDY

[Reporter : Adrian Hall]

The District Council of Berri recently commissioned B.C. Tonkin & Associates to investigate the feasibility of re-using septic tank effluent from the Township of Monash (population 263), for the irrigation of ovals and a playground during the 9 hot weather months, and for disposal to plantation strips during the 3 cold weather months of each year.

Council had already prepared plans for a Septic Tank Effluent Disposal (STED) scheme for Monash, using a conventional disposal scheme for the effluent - i.e. by pumping to the existing Glossop Township effluent lagoons some 4 km distant. As an alternative, it was proposed that the effluent collected from the STED scheme should be treated on site, blended with water from a nearby E. & W.S. Caisson (which collects irrigation drainage flows prior to pumping out to the Noora evaporation basin), and re-used for irrigation.

A soil survey report was prepared by the Loxton Research Centre. Backhoe test pits were dug, and soil profiles identified. Irrigation application rates (including leaching factors) were assessed, and it was recommended that water table levels should be regularly monitored by test wells, to ensure that the creation of perched water tables was avoided.

Tonkin & Associates have concluded that the septic tank effluent is capable of being treated to environmentally acceptable standards, using a reasonably simple on-site treatment process involving aeration, settlement, filtration, UV disinfection and post-chlorination. E. & W.S. caisson water can be blended in-line, at an appropriate dilution ratio, to provide sufficient supply for the irrigation of 5.0 ha of largely turfed area within the Township of Monash.

A report on the proposal will be presented to the District Council of Berri who will pass it on to various government authorities for approval.

SAMPSON : A NEW WATER QUALITY MODEL

[Reporter : B. van der Wel]

The Scientific Services Branch of the Engineering and Water Supply Department in conjunction with the Civil Engineering Department of the University of Adelaide is developing the water quality model SAMPSON for use on personal computers. This model will provide improved prediction of continuous water quality in streams from the continuous water flow record at gauging stations, using sporadic water quality samples for calibration. A continuous water quality record is necessarily the basis for the accurate determination of the amount and timing of pollutant loads from non-point sources, now South Australia's major pollution problem, due to the dependence of water quality on current and antecedent flow.

Non-point pollution of surface water flows includes dissolved and eroded material in surface runoff and groundwater seepage. Of major concerns are salinity, turbidity, colour, nitrogen and phosphorous. Improved estimation of pollutant loads will better enable the assessment of the effectiveness of pollution control measures and trends.

The proposed model is based on an existing model NUTMOD previously prepared by Clark and Crawley (Engineering and Water Supply Department Lib Ref 87/16) using mean daily flows rather than instantaneous flow. Because South Australia's water courses have highly variable daily flows, NUTMOD required a complicated procedure to estimate the representative daily concentration in cases when the instantaneous flow at the time of the water quality sample differed significantly from the mean daily flow. It is hoped to overcome this problem by using shorter time steps which constitute the digitised 'continuous' record. NUTMOD also incorporated a store of pollutant, which is added to at a constant rate but depleted by runoff. The runoff concentration is proportional to the quantity in the store and a power function of the flow. The optimum value of these variables was determined by a simplex method.

The SAMPSON model will retain the basic concept of NUTMOD and its optimisation routine, but will incorporate additional variables. Those under investigation include the slope of the flow hydrograph, a lag between flow and pollutant concentration, and separation of base flow and surface runoff.

RADAR RAINFALL MEASUREMENT

[Reporter : Richard Clark]

After having read in some depth on the matter, I am of the opinion that the reported accuracy of radar as a means of adding information to the accurate spatial measurement of rainfall is due largely to the large scale of the radar systems being used.

The weather radar systems used, and being developed, by the Bureau of Meteorology (and others) tend to be long range, high powered and designed for multiple purposes. These design factors appear to me to be likely to seriously compromise the ability of the systems to measure rainfall as it actually falls onto the surface of the earth within small project areas, that is, this side of the sight horizon and free of ground clutter.

Do any readers have any experience or views on the actual or potential performance of cheap, shorter range marine or airborne radar systems which might be suitable for rainfall measurement? I would be pleased to hear from anyone with such knowledge.

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GPO Box 1751,
ADELAIDE SA 5001.

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Fax (08) 226.2161

SECRETARY'S NOTES

Programme of meetings for this year will be as follows :

April 19	*Gawler River flood plain mapping.* Speaker : Ken Potter, Lange Dames & Campbell.
May 8	*CHAOS* (topic of the year). Speaker : Tony Roberts, Senior Lecturer, Dept. of Applied Maths., Adelaide University.
June 14	*Microbiology in Groundwater.* Speaker to be advised.
August 9	*Blue Lakes Limnology.* Speaker : P. Harvey et al.
October 11	*Tatiara Groundwater Basin. What's Going On?*
November 29	*Clay Mobilisation.* Speaker to be advised.

Note that an additional meeting on Chaos has been arranged, since this subject is of particular interest.

The society has been asked to sponsor the International Conference on Groundwater, to be held in Adelaide in 1993/94. This is a long way ahead, but promises to be a major event with wide interest from overseas. The Committee has agreed in principle to the sponsorship. Dr. Peter Dillon of CSIRO is the co-ordinator.

WORKSHOP ON APPLIED CHEMICAL AND ISOTOPIC GROUNDWATER HYDROLOGY

The Centre for Groundwater Studies will be conducting a Workshop on Applied Chemical and Isotopic Groundwater Hydrology on May 22 and 23, 1990, at the CSIRO laboratories in Urrbrae. It will be led by Professor Emmanuel Mazor who is on sabbatical from The Weizmann Institute of Science, Rehovot, Israel. The Workshop will cover :

- hydraulic interconnections
- suggested flow directions
- establishing flow regimes (porous vs. conduit controlled)
- identifying mixtures of groundwaters and defining the end-members
- establishing the degree of drainage in large, confined systems.

The registration fee of $200 for the 2 days includes lunch, morning and afternoon tea and all written materials.

For more information contact :

Mr. Joe Mazzone or Dr. Andrew Herczeg
Centre for Groundwater Studies
Private Bag No. 2
Glen Osmond SA 5064
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John Argue has been editing our newsletter since August 1985 and will be retiring after the AGM this year. We owe a great deal to his dedication to the task, and to the efforts in expanding the content and scope of the newsletter. The Committee is considering a replacement and would welcome volunteers. Any offers please speak to the Secretary on 366.2269, or the Chairman on 274.7691.

At the meeting on the Gawler River flood plain mapping, on 12th April, Ken Potter will be talking about the estimation of flood flow rates and return periods, and the techniques for determining the areas inundated. Proposals for development of the flood plain and provisions for drainage have received considerable opposition from would-be developers. Ken should have some useful insights regarding the interplay between politics and common sense.

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