THE HYDROLOGICAL SOCIETY OF S.A. INC.

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

NEWSLETTER NO. 67

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GUEST EDITORIAL

Protection of water resources in S.A.

by David Cole*

Effective water resources management is of vital significance to the socio-economic and environmental well-being of South Australia.

The introduction of the Water Resources Act 1990 raises some significant issues regarding the legal mechanisms for protecting the quality of water resources. The previous Water Resources Act 1976 contained, in section 61, the following provision:

> ".. a person shall not, unless he is so authorized by or under this Act or any other Act, cause, suffer or permit any waste to come into contact directly or indirectly with waters".

The definition of 'waste' was as follows:

> ".. any matter or thing whether in the solid, liquid or gaseous state which if added to any waters may cause any interference with the physical, chemical or biological properties of water which may render it less fit for any purpose for which it may be used by man, animal, fish, plant or other organism ".

The new Act, in section 43 constitutes it an offence to dispose of or permit the escape of any material directly into surface or underground water if the material degrades the water. Section 44 addresses the indirect discharge of material to water.

Under section 42(1) material is taken to have degraded water if:

> (a) the use or enjoyment of the water by a person who is entitled to use or enjoy it is detrimentally affected by the presence of the material, or
>
> (b) the presence of the material in the water is likely to have a detrimental effect upon any animal, plant or other organism.

This applies generally throughout the state.

Under section 42(2) material is taken to have degraded water within a water protection area if the quality of the water is detrimentally affected as the material disperses through or over it even if the detrimental effect is subsequently diminished.

The change in terminology in section 42 raises some significant evidentiary issues in the case of future prosecutions under the new Act.

In contrast with the former section 61 and the definition of waste the new provisions appear to introduce considerably more opportunity for scientific dispute.

The former definition of waste was couched in terms of matter or thing which ***may*** cause interference with properties of water which ***may*** render it less fit etc.

The new provisions appear to require proof , by the prosecution, that entry of the material to the water *in fact* resulted in a detrimental effect.

> **The statutory focus appears to have shifted from the notion of risk to actual contamination.**

This issue is complicated by the different definitions of degradation that apply within a water protection area and more generally throughout the state.

Within a water protection area there is no distinction drawn between impact on human use and impact on animals, plants or other organisms. It simply needs to be established that the quality of the water has been detrimentally affected.

Under the more general provisions applying throughout the state where the impact is on human use it needs to be established that there *is* a detrimental effect. However where the impact is on animals, plants or other organisms it suffices to establish that the presence of the material is *likely* to have a detrimental effect.

What does this infer for future prosecutions?

In addition to a general State policy of prosecuting for pollution offences only as a last resort, it is generally accepted that, evidentiary difficulties have contributed to a reluctance to prosecute for acts that have allegedly polluted water resources.

Bearing in mind that the prosecution is required to prove its case beyond reasonable doubt, it would appear that the new water quality provisions have introduced even further obstacles to the successful prosecution of those whose activities deleteriously affect the state's water resources.

Arguably, current concerns at the degree of environmental degradation in Australia and globally, should result in government policies and legislation that limit the scope for alleged offenders to exploit scientific dispute and escape fundamental objectives of legislation designed to protect the state's critical natural resources.

The new Act seems to offer little support to this direction.

*** About the author**

David Cole is a lawyer and environmental planner. He is a principal of his company, Cole Associates. He has practised for more than ten years throughout Australia, specialising in environmental and social impact assessment, environmental law and environmental policy analysis.

David is a member of the Advisory Board of the Environmental Law and Policy Unit at the University of Adelaide and is Deputy Chairman of the Native Vegetation Authority.

He is currently environmental consultant to the Planning Review.

PAUL WINS IAN LAING PRIZE

The 1990 Ian Laing prize was awarded to Paul Pavelic from Flinders University.

Paul completed a B.Sc. Degree in 1988 and postponed further study until starting the Hydrology Honours course late in 1989. Paul's thesis is on the effects of lucerne in reducing groundwater accessions in mallee lands of south western NSW.

In addition to this project Paul was awarded an AWRAC Summer Scholarship at the Centre For Groundwater Studies. For this he completed a project on recharge beneath open woodland in south western NSW, supervised by Glen Walker.

Paul's academic record, his research and his enthusiasm for hydrology make him a worthy recipient of the prize from a strong field of candidates.

ARTICLES .....

WATER FOR THE COORONG

[Reporter : Richard Clark]

A study which looks at the feasibility of freshening the Coorong by directing water from the River Murray into it has been undertaken as part of a series of studies aimed at exploring management options for the Coorong system.

A draft report has been prepared. It concludes that at certain times of the year a persistent flow towards the closed end of the Coorong must exist. This is due to favourable combinations of wind, evaporation and rainfall which constitute the driving forces of the Coorong salinity 'engine'.

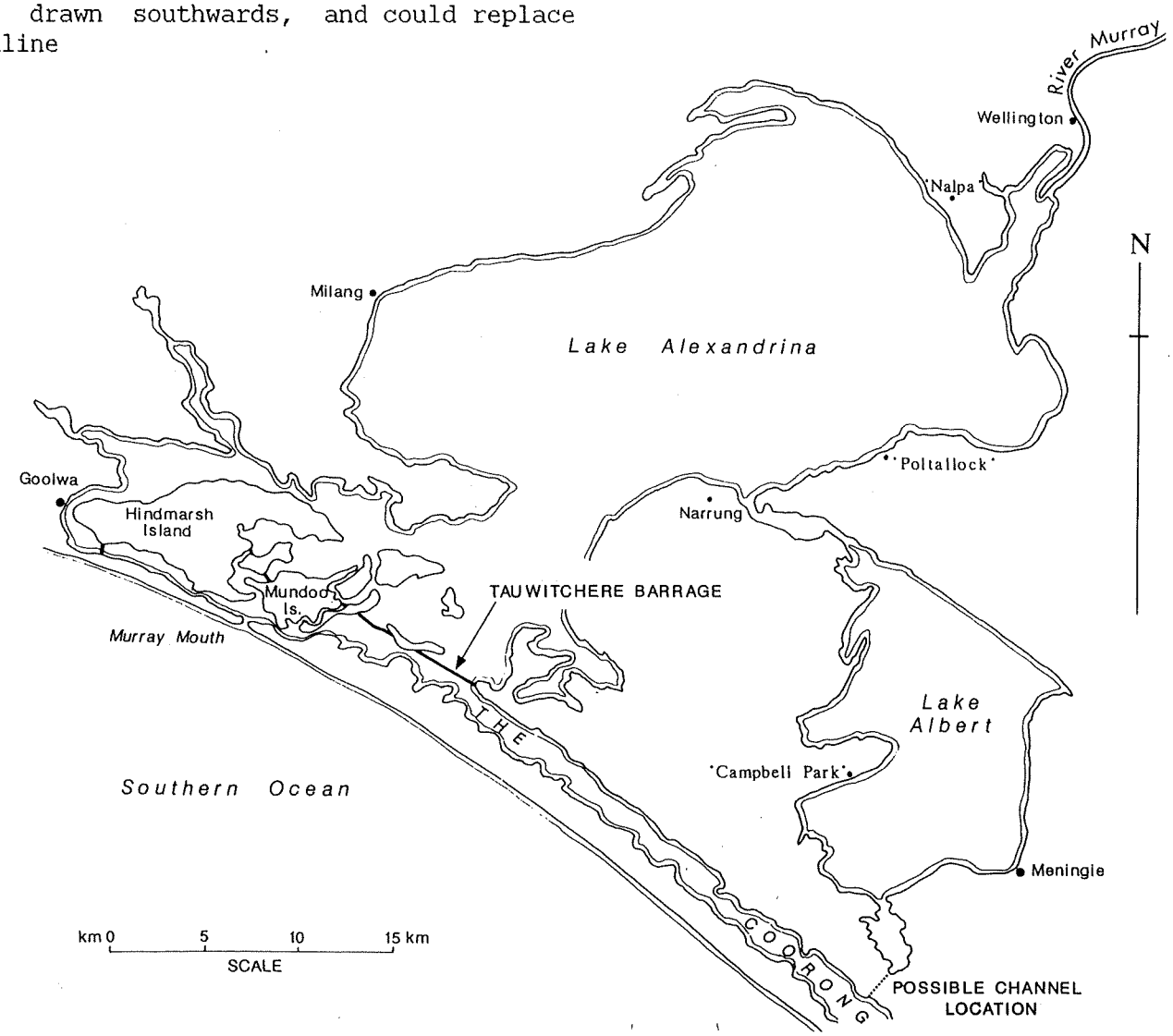
By releasing water from the Tauwitchere barrage at such times, fresh water could be drawn southwards, and could replace saline water which would otherwise be drawn in from the sea.

Operation in this way would produce significant freshening but would require a relatively sophisticated real time monitoring system.

A Lake Albert channel could be operated in a similar manner, would be more hydraulically efficient, would have additional benefits for the salinity of Lake Albert but would also be more costly.

Whilst this work indicates that freshening is feasible the desirability of this still needs to be addressed.

This work and its implications will be receiving attention from the Coorong and Murray Mouth Working Group.



A PROPOSAL TO REUSE EFFLUENT FROM THE MURRAY BRIDGE SEWAGE TREATMENT WORKS

[Reporter : Rick Desmier]

The increasing occurrence, within the Murray Darling Basin, of algal blooms, particularly those producing toxins, has given impetus to the development of a nutrient management strategy by the Murray Darling Basin Commission [refer Newsletter No. 66].

South Australia is seeking to reduce nutrient inputs into the river within its sphere of control. A prime focus is the effluent from sewage treatment works and common effluent drainage schemes. Alternative means of disposal are actively being sought.

The Murray Bridge sewage treatment plant currently discharges approximately 1000 ML of treated and chlorinated effluent into the river annually. Some of the options available for total disposal of the effluent flow by irrigation have been examined.

A variety of crops, pastures and woodlots have been considered and their ability to accommodate the flows and utilize the nutrients have been studied.

The usual approach to effluent reuse would be to select a high water use crop and design an irrigation scheme that utilises an additional lagoon for the storage of surplus winter flows. At Murray Bridge, however, the soils, other than in the floodplain, are mainly deep sands or sands overlying limestone and therefore the construction of a large storage facility to handle the winter flows would be disproportionately expensive because of the sealing requirements.

A cropping programme was designed that would permit disposal by irrigation throughout the year without the need to store winter flows.

Gross margin calculations and estimates of nutrient removal by the crops indicated that eucalypt woodlotting would not be a financially viable enterprise and furthermore the removal of nutrients under a woodlot would be low in comparison with the other cropping practices considered.

The preferred cropping programme devised for the reuse scheme at Murray Bridge consists of 75ha of lucerne grown as a hay crop together with 86ha of cereals grown for grain. Irrigation would be applied by a 43ha towable centre pivot capable of watering four circles.

A share farming arrangement with a local landowner has been recommended as the preferred method of site management. It is estimated that the capital and operating costs of the scheme can be recovered from the returns from crop sales as well as providing a worthwhile income to the sharefarmer. The net cost of the disposal scheme will therefore equate to the capital and operating costs of delivering the effluent to a suitable reuse site from the treatment works.

The EWS is currently seeking expressions of interest from local landowners in entering into an agreement to utilise the effluent.

Membership fees

Membership fees, again set at $10, are now due.

Unless you relish the thought of Bill Lipp forceably extracating payment from you with his modified gauging propeller as you are strung out helplessly across the Gumeracha travellerway you'd better post the cheque in now.

Yes ..... last year Bill 'managed' to get every member fully paid up, and that's no mean feat considering that some members were several years in arrears.

THE 'WRIGHT' STUFF

Chris Wright accepted the position of Honorary Secretary of the Society in 1986 after a short stint as committee member. Chris had just been through the rigours of the certificate of hydrology course at the University of NSW and was probably incapable of rational thought! Whatever the reason, I'm sure he was quite unaware as to how long this new challenge would last.

Recently the Society has either initiated or been involved with several ventures in which Chris has had a pivotal role. Of these ventures perhaps the most important and having the greatest impact on the Society was the Australian Rainfall and Runoff Workshop held in early 1989. What made this so important to the Society's functioning was the large (relative to previous ventures) profit it generated. This has placed the Society in the comfortable position of being able to bring to fruition several ideas which had been submitted over the years.

The two key ones are

* increased prize money for the Ian Laing Prize, and

* financial assistance for the Scientific Expiditions Group, in particular the Gammon Ranges project.

Chris's participation in and enthusiasm for both activities has been an inspiration. In particular he has involved himself in all aspects of SEG since its inception including acting as leader on several expeditions.

In summary Chris has been a very active committee member during a demanding period of the Society's evolution. Past and current committee members have appreciated his untiring help and energy.

Should he choose to divert all his energy into his house extension which is his current project it wouldn't surprise to find it covering half of Blackwood.

Good luck and thank you Chris.

Fred Leaney (on behalf of all members)

HAPPY BIRTHDAY

About 50 members and partners braved a cold winters night to celebrate the Society's 21st birthday celebrations at the Stoneyfell Winery complex on Wednesday 1 August.

To complement a pleasant meal in convivial surroundings the diners were treated to three speakers during the course of the evening.

Kym Read filled in between soup and main with a dissertation from Skip Tonkin, one of two Life Members of the Society, on his views of the Society.

Bob Culver, the Society's inaugural chairman, provided a most entertaining re-enactment of the Society's first meeting, in his inimitable style. He reminisced about the Society's founding members which boast several well known names. The impressive thing as far as I was concerned was the number of inaugural members - about 120. Since then we've 'grown' to about 170; but after all it's quality not quantity isn't it.

John Holmes, the other Life Member, wrapped up the formal part of the evening with some interesting statistics on the Society's membership and its evolution.

The words that were repeated time and again during the evening were 'multi-disciplinary' and 'non-learned' in describing the Society's philosophy for membership. The Society's openess to anyone with an interest in hydrology and water resources irrespective of education or profession is its greatest strength and is in no small measure responsible for its dynamism.

The founding fathers should be congratulated on their foresight in establishing this philosophy, which in my view, should never change. The focus the Society provides has made easier the task of formulating a multi-disciplinary approach between government, research institutions, industry and the community to solve hydrologic and water resources management problems.

Long live the Society and all who sail in her.

Peter Smith (Chairman)

LETTERS ....

It's not often that letters to the editor arrive, so when they do it's something to celebrate, especially when the letter is as congratulatory as the one from the British Hydrological Society.

Dear Claus,

According to your Newsletter No. 65 your Hydrological Society celebrates its '21st' this year. On behalf of the BHS main committee and the BHS membership I am writing to express our congratulations and good wishes for the next 21.

BHS has, at present, 4 members in Australia, but none in your part of the country. However, if any of your members are coming to the UK over the next year or so, we would welcome their making contact with one of our main committee. If they are likely to be here for our third national symposium in September they may wish to contribute a paper.

With best regards,

Allan Lambert

President, BHS

Thank you very much Allan. The Society is grateful to you for taking the time to write to us.

Allan sent some fliers for the symposium but this was held on 16-18 September so it's a bit late for this newsletter. If anyone attended, the Hydsoc committee would be interested in hearing from you. There were some interesting concepts, such as hydrologic games as well as interesting topics, such as 'Do flood hydrographs contain old or new water?'

The Hydsoc committee can also supply you with BHS main committee contacts.

HELP ....

In going through our records it is evident that somehow no copies of Newsletter No. 19 from early 1973 were kept. If anybody has been diligent enough to keep back copies of our wonderful newsletters could you please contact Paul Harvey (226 2502) to arrange for us to get a copy of the missing number.

PROCEEDINGS AVAILABLE ....

The proceedings of the Wetlands For Wastewater Management seminar held in May are now available. For those who could not attend this successful 'sellout' seminar the four papers by top interstate authors make interesting and informative reading.

Anybody wishing to purhase a copy please forward $10 to Paul Harvey, Scientific Services Group, GPO Box 1751, Adelaide. This covers printing and postage costs.

NEW MEMBERS ....

MW Temme	City of Happy Valley
MA DeHeus	City of Happy Valley
R Stoeckler	DC Barossa
JH Collett	City of Noarlunga
DR Mathews	City of Noarlunga
S Clarke	Hosking,Fargher, Freeman, Fox
FD Koolen	DC Angaston
ML Duthy	CSIRO
J Mazzone	CSIRO
AK Kennett-Smith	CSIRO
PJ Thorburn(student)	CSIRO
G Uyttenhove	Dept of Road Transport
DG McCarthy	Dept of Ag.
BR Brzezicka	EWS
AR Turnbull	past Ian Laing prize winner
E Young	Dept of E&P

1990/91 COMMITTEE

At the AGM in August the following committee members were elected : -

Peter Smith (Chairman)	274 7691
Paul Harvey (D/Chairman)	226 2502
Fred Leaney (Secretary)	274 9396
Bill Lipp (Treasurer)	343 2264
Anwen Aukland (Membership)	274 7521
Chris Purton	223 5583
Angus Simpson	228 5874
Geoff Fisher	226 2621
Richard Clark	226 2532
Ross Stevens	267 3177

Claus Schonfeldt (ex officio as the Newsletter editor) 226 2499
.. facsimilie 226 2161

NEXT NEWSLETTER

The next edition of the newsletter will be published in February 1991. That gives you plenty of time to put pen to paper, or in modern jargon, fingers to keyboard.

I am particularly interested in short articles which would have general appeal. Those that tell of personal experiences are perfect and if you could include a photograph all the better.

If you have any suggestions for improving our newsletter I'd be pleased to hear from you and if the funds and technology available to us allow I will endeavour to accommodate.

Editor

CRC PROPOSAL FOR AN AUSTRALIAN CENTRE FOR GROUNDWATER STUDIES IN ADELAIDE

A proposal under the Cooperative Research Centres program for an Australian Centre for Groundwater Studies has been prepared for submission to the Office of the Chief Scientist in the Department of the Prime Minister and Cabinet.

The joint venture will be made between:

CSIRO Division of Water Resources
Flinders University School of Earth Sciences
Engineering and Water Supply Department of SA
SA Department of Mines and Energy
SA Department of Agriculture

while links with other organisations on a project by project basis will be encouraged.

Basically the research programs are:

1. Salinity and Groundwater Contamination: Prevention and Remediation

1.1 Stream and dryland salinity
1.2 Groundwater contamination

2. Sustainable use of Groundwater Resources

2.1 Understanding groundwater systems
2.2 Quantitative methods for effective management

3. Wastewater reclamation

3.1 Wetland filters and artificial recharge of stormwater
3.2 Land treatment and artificial recharge of effluent

If successful the CRC will provide a world class centre directing research to applied problems and providing postgraduate education in these areas.

The Dead Sea isn't all NaCl

Prof. Dick White, Faculty of Education, Monash University reports on a swim in (or should that be on) the Dead sea.

"It is difficult to float upright in this liquid of relative density 1.235, as your feet keep coming up, but when you do your arms can be lifted completely clear of the water which then comes to a little below the armpits. Lying down, head, shoulders, feet and knees can be above the surface.

The taste of the water is very astringent, rather than salty. You have to be careful not to get it in your eyes. While I was there a man put his head under, and screamed with the burning pain. People rinsed his eyes with mineral water.

The water feels oily on the skin. It dries quickly, leaving a strong deposit, but in more humid conditions might remain damp as magnesium chloride is very deliquescent. After swimming it cannot be towelled off, but showers are provided at some beaches.

The concentration is increasing. Water is being taken at an increasing rate from the Sea of Galilee and the Jordan, so that the surface of the Dead Sea has dropped 15 metres in 20 years. The southern section is now dry. The water is close to saturation for some salts, so we might soon have the world's largest supersaturated solution here. My fantasy is that one day someone will jump in and set off a massive instantaneous crystallization.

The composition of the solutes is quite different from that of the oceans. See the table. To make your own approximation of Dead Sea water, in one litre of water dissolve 7g of KBr, 370g MgC12.6H20, and 87gNaCI.

Note the large proportions of magnesium, potassium and bromine. Chemical works by the Sea extract these elements and others. Some bromine escapes into the atmosphere and can be seen venting from an exhaust chimney. The large quantities of sodium chloride that are recovered are a waste product. It would cost more to ship the salt than the current price at which it can be sold. In any case there is a whole hill of rock salt beside the Sea, a salt dome with pillars (one of which may be Lot's wife) and caves. It is dry enough here for stalactites and stalagmites of salt to form in the caves.

This is a fascinating part of the world, chemically as well as geologically, to say nothing of historically and politically.

Ionic Concentrations in the oceans and Dead Sea

Concentrations (g/1)

	Oceans	Dead Sea
Na^+	10.9	40
Mg^{2+}	1.3	43
Ca^{2+}	0.4	17
K^+	0.4	7.6
Cl^-	19	218
Br^-	0.06	5
SO_4^{2-}	2.6	0.6

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DID YOU KNOW : The Sechi disk is a simple, but subjective means of determining the turbidity of a body of water. It is progressively lowered until it cannot be seen, that depth being an indicator of clarity.

The Sechi depth for the Blue Lake is about 16 metres which is dramatically greater than other water bodies in South Australia. Mt. Bold for example is only about 1.5 metres on a clear day.