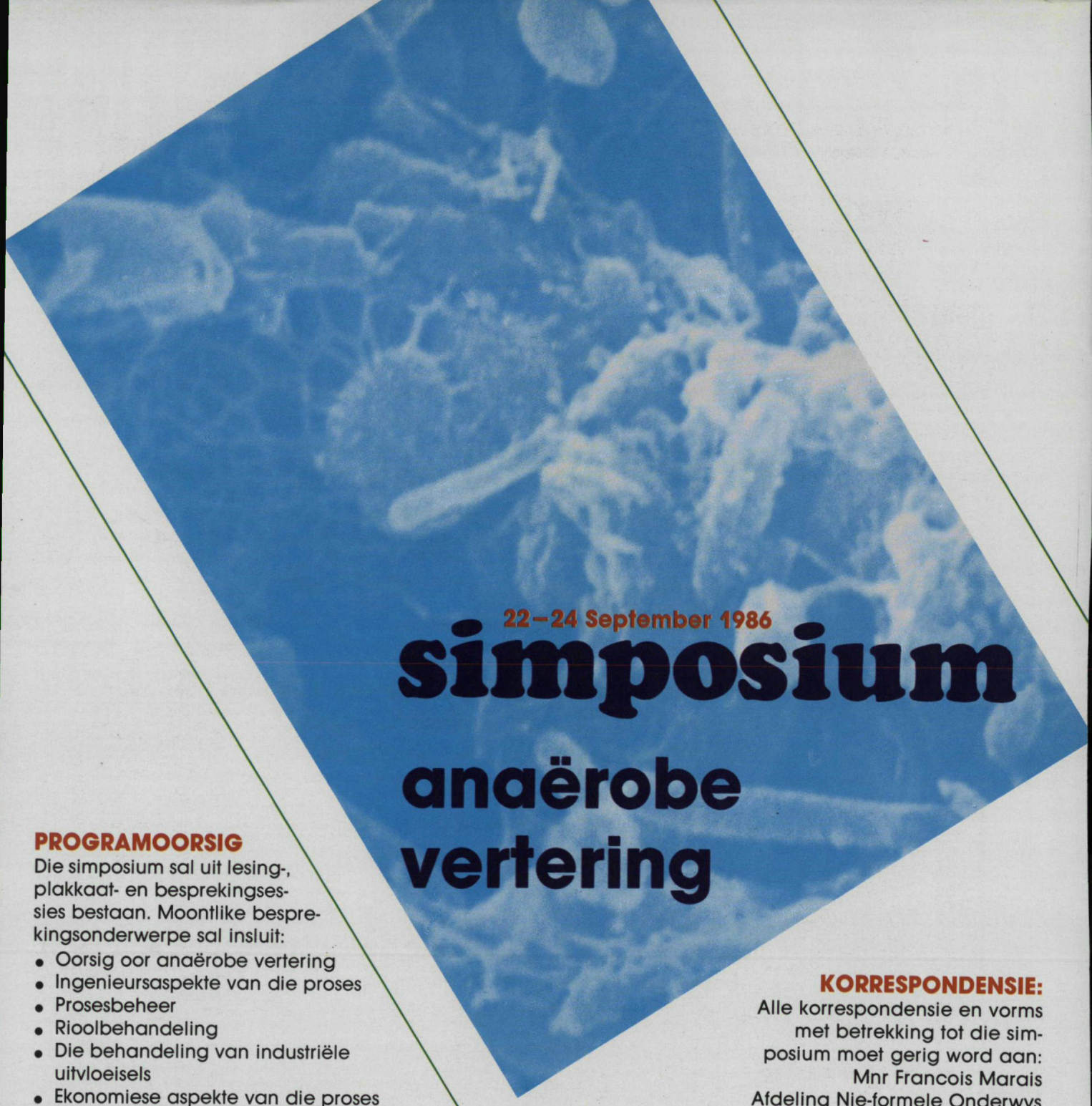
SA waterbulletin

VOLUME 12 No 2 MEI/MAY 1986

IRRIGATION
SCHEMES PUT IN PERSPECTIVE

URBANIZATION
EFFECTS INVESTIGATED

FOSFATE
NEDERLAND SE BELEID MISLUK



22–24 September 1986

simposium

anaërobe vertering

PROGRAMOORSIG

Die simposium sal uit lesing-, plakkaat- en besprekingsessies bestaan. Moontlike besprekingsonderwerpe sal insluit:

- Oorsig oor anaërobe vertering
- Ingenieursaspekte van die proses
- Prosesbeheer
- Rioolbehandeling
- Die behandeling van industriële uitvloeisels
- Ekonomiese aspekte van die proses
- Die vertering van landbou-afval
- Mikrobiologie van die verteringsproses
- Biochemiese aspekte
- Opberg en gebruik van biogas

Die reëlingskomitee onderhandel ook om enkele vooraanstaande nasionale en internasionale navorsers te betrek by die simposium.

KORRESPONDENSIE:

Alle korrespondensie en vorms met betrekking tot die simposium moet gerig word aan:

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BLOEMFONTEIN 9300
SUID-AFRIKA
Tel: 051-70661 X 425
Teleks: 267666

Voltooi ook die antwoordkaart in die Bulletin.

LOKAAL EN DATUM VAN SIMPOSIUM

Die Anaërobe Verteringsimposium sal gehou word by die Universiteit van die Oranje-Vrystaat, Bloemfontein, Suid-Afrika.

VOORLOPIGE KOSTES:

Voorlopige kostes beloop ongeveer R80–R100 maar sluit nie verblyfkostes in nie.

Departement Mikrobiologie
Universiteit van Oranje Vrystaat
Bloemfontein

Nasionale Instituut
vir Waternavorsing
WNNR

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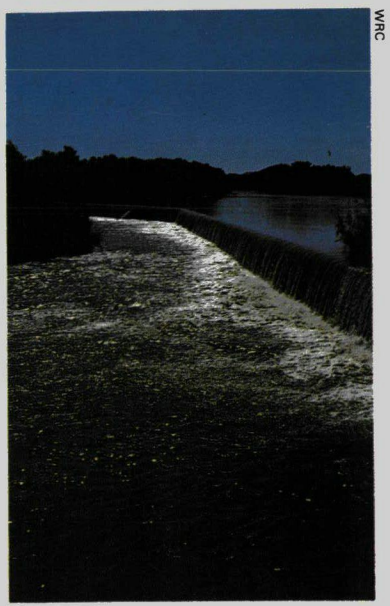

WRC

Diversion weir in the Great Fish Irrigation Board area.

SA Waterbulletin **is a quarterly magazine on water and water research published by the South African Water Research Commission (WRC), a statutory organization established in 1971 by Act of Parliament.**

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Ed. Secretary: Rina Human

SA Waterbulletin **is 'n kwartaallikse tydskrif oor water en waternavorsing wat uitgegee word deur die Suid-Afrikaanse Waternavorsingskommissie (WNK), 'n statutêre organisasie wat in 1971 by Wet gestig is.**

Intekening is gratis. Stof in dié publikasie weerspieël nie noodwendig die oorwoë menings van lede van die WNK nie, en mag hergebruik word met erkenning van die bron.

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INHOUD

Van links: mnr J Clarke, besturende direkteur IBM, dr JP Kriel, voorsitter WNK, en mev Booysen (Universiteit van Natal).

Van links; mev Van Wyk, mnr JG Brand (WNK-kommissielid) en mev Brand.

Mnr JG du Plessis, direkteur-generaal, Departement van Waterwese en mev Immelman.

Mnr WL van Wyk (WNK-kommissielid) en mev Du Plessis.

Van Links: mnr GCD Claassens, adjunk-direkteur-generaal, Departement Waterwese, mev Claassens en dr DW Immelman, direkteur-generaal, Dept van Landbou-ekonomie en Bemarking.

Die nuwe rekensentrum vir waternavorsing (RSWN) is op 6 Mei vanjaar met 'n feestelike onthaal in Pietermaritzburg deur die voorsitter van die Waternavorsingskommissie, dr JP Kriel, geopen.

Dié sentrum wat met 'n skenking van altesaam R7 miljoen deur IBM Suid-Afrika tot stand gekom het, sal deur die Universiteit van Natal gehuisves en bedryf word. Die WNK se bydrae tot die projek beloop nagenoeg R1,9 miljoen.

Vir meer inligting oor die rekensentrum lees die RSWN se eerste nuusrief wat by hierdie Bulletin ingesluit word.

Mnr Neville Davies, IBM, (links) saam met mnr en mev Dave Cousens, WNK.

Mnr en mev Mark Dent, Universiteit van Natal.


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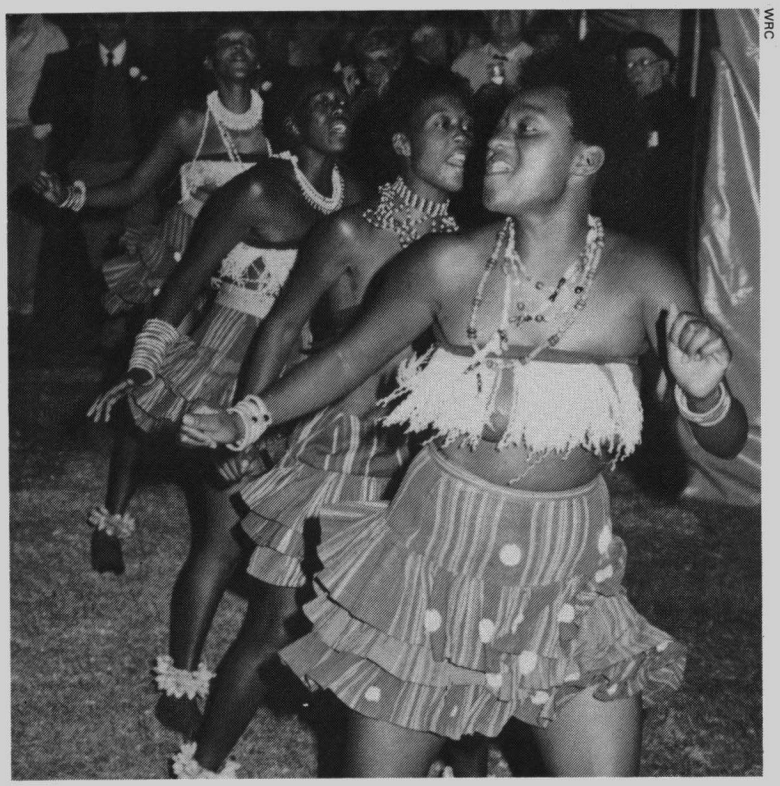
From left: Mr N Grant (Simonstown Municipality), Mr S Wood (Milnerton Municipality), Mrs J Wood, Mrs H Crawford, Mr J Crawford (Queenstown Municipality).

Traditional hosts, Everite, sponsored the main social function during the 1986 Municipal Engineers Conference held in Randburg from 13 – 15 May. The function was held at Gold Reef City with typical South African Zulu dances.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Dancers.


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Mr Max Hammerer, Seba Measuring Techniques, Austria.


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From left: Mr B Luck (Westville Municipality), Mr C Viljoen (Ladysmith Municipality) and Mr H Duvenhage (Vanderbijlpark Municipality).

An "open day" to demonstrate the equipment and technology applicable in the control of water losses, was held on 16 May in Randburg to coincide with the conference of the SA Institute of Municipal Engineers. Participants in the project, Johannesburg City Council and Castle Brass Holdings of Krugersdorp, demonstrated to delegates South Africa's leadership in water loss technology. Mr Max Hammerer of Seba Measuring Techniques in Austria explained the philosophy of leak detection.

Canal Irrigation Schemes in perspective (by HC Chapman)

Water is Life! This often used cliché becomes something of a misnomer when the salt concentration in the water exceeds the salt tolerance of the crops being irrigated.

As reported in the February 1986 issue of *SA Waterbulletin,* a new project with the firm Murray, Biesenbach & Badenhorst will further study the problem of salination in an irrigated area served by a canal system. This project is located on the Robertson Canal in the Breede River Valley and encompasses an irrigated area of approximately 1 000 ha representing about one third of the total area served by the canal.

There are very few practices in life where there is only one way of achieving the objectives, and irrigation is certainly no exception. Method of farming, age of the distribution system, infrastructure, availability of water, crops etc. all contribute to make each irrigation scheme unique to its own set of circumstances which in turn determines the level of sophistication required. The question then arises, how to determine where the optimum level of sophistication lies for a particular scheme.

Although it therefore appears not to be feasible to compare schemes with different degrees of sophistication, it could nevertheless be of great value to study and evaluate the different techniques being applied in different irrigation areas. Such a study could confirm what to do or, equally likely, what not to do under a given set of conditions. With this in mind a visit was arranged to see first hand the practices being implemented at the Gamtoos Government Water Scheme and the Great Fish Irrigation Board.

These two schemes were chosen because of their great dissimilarity and the fact that they are in relative close proximity to each other; the Gamtoos being at Patensie in the Eastern Cape and the Great Fish being located in the Cradock region. As regards levels of sophistication, the Robertson Canal probably slots in somewhere between these two.

Early irrigation activity in all three river valleys dates back to the 19th century with the Breede River (Robertson) Irrigation Board being proclaimed in 1898. In the Great Fish valley the Grassridge Dam (1924) on the Brak River and Lake Arthur (1924) on the Tarka River,

Paul Sauer Dam, heart of the Gamtoos GWS.

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are two of the oldest irrigation dams in the country.

A constant reminder to early irrigation in the Gamtoos Valley is an ingeneous tunnel which was completed in 1845. Requiring nearly three years to complete, the tunnel was the brainchild of William Philip, the local padré at the Hankey mission station. Using hand labour supplied by the local Hottentot population, the tunnel was used to divert water from the Gamtoos through the mountain (thus bypassing a large loop in the river), to irrigate lands above the river some 3 km downstream from the diversion point. By travelling only 200 m through the hillside a considerable saving in altitude was achieved and used to good advantage. The tunnel is no longer in use as a new canal scheme now serves this land adequately. Subsequently, other examples of tunnelling through hills to save altitude have been built both here and in other parts of the country.

MODERN TECHNOLOGY COMES TO IRRIGATION

In 1969 the Paul Sauer Dam on the Kougha River was completed and the Gamtoos Government Water Scheme (GWS), one of the most elegant irrigation schemes in the country, came into being.

The scheme itself, which replaced a number of minor irrigation boards, comprises a main canal of 96 km of canals, tunnels and siphons, five branch canals totalling a further 30 km, and 96 km of pipelines and is unique in many respects. Essentially Gamtoos is an automatic system which means that irrigators need not request water in advance as is the case with most other large schemes. By merely opening a control valve at will, the irrigator gets water on demand.

Throughout the entire scheme, all water abstracted from the canal passes through 150 mm diameter water meters, similar to the domestic type of water meter used in urban areas. In all, there are approximately 700 water meters installed in the valley each of which is read fortnightly.

The meters operate satisfactory for about seven to eight years after which time cleaning and servicing is required. This is being done on a

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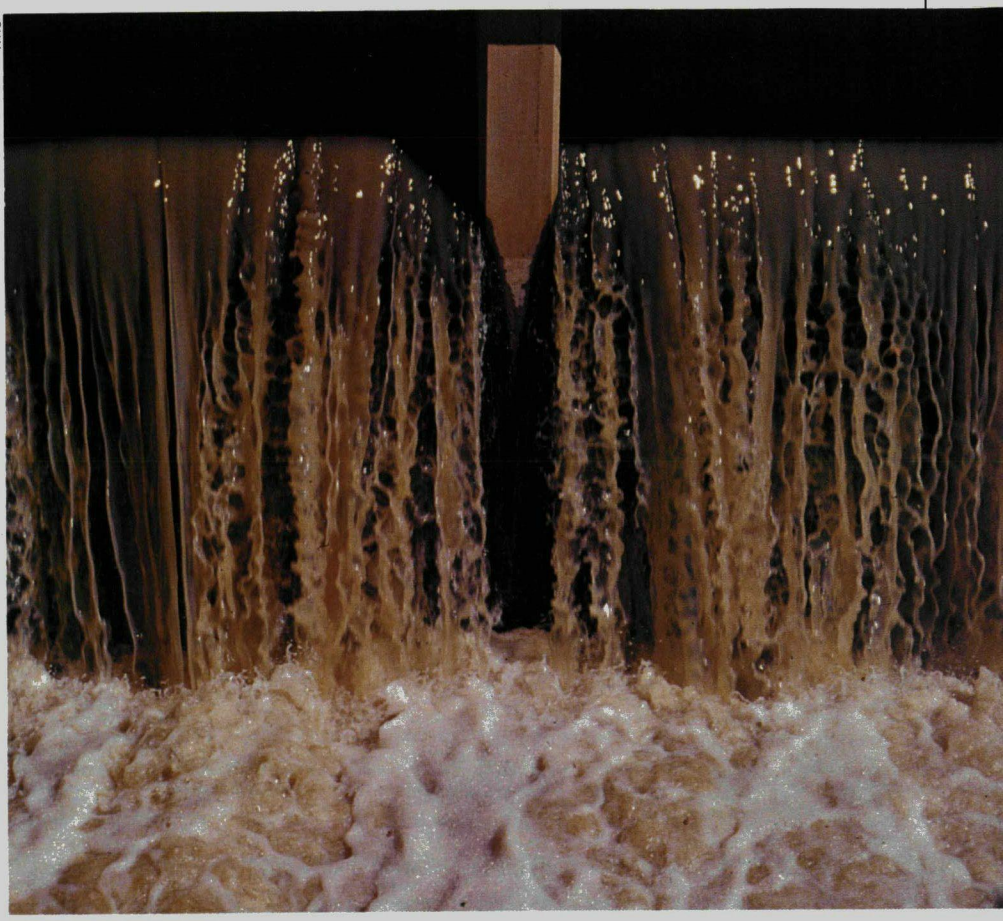

ORP water arriving at the head of the Fish River.

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The Turner gate, a locally designed automatic compensating demand sluice maintaining constant canal water head in Gamtoos GWS.

routine basis. Accuracy is said to be less than two per cent error and canal losses are minimal as all canals are concrete lined and fairly recently constructed. As a result total losses are thought to be below five per cent.

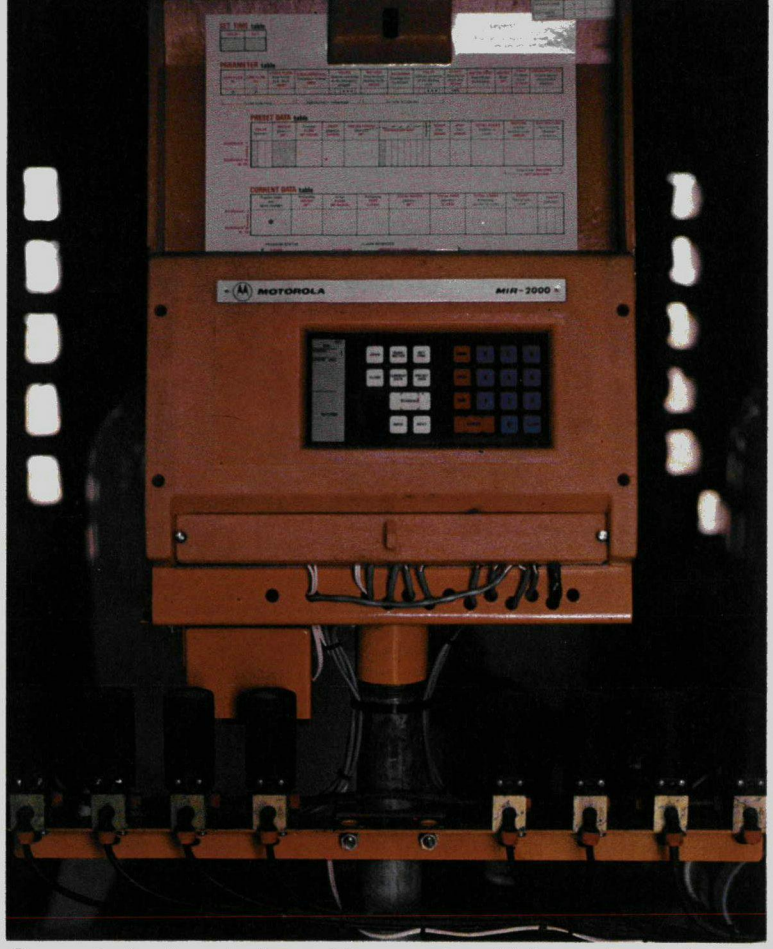
The volume of water in the main canal is measured in the usual manner by means of a Parshall flume and an OTT recorder.

Upon leaving the dam the water first passes through a generating plant with a maximum capacity of 5.28 KVA, which is sold to ESCOM.

The various canals serve a total scheduled area of just over 7 000 ha producing mainly citrus, tobacco, vegetables, wheat and lucern. In all there are approximately 200 farmers operating 1 700 farms of which the largest are between 100 – 120 ha in extent. A number of different irrigation methods are used, including sprinkler, rotating boom, centre pivot, micro and flood. The normal water quota is 8 000 m^3/ha per year. However should the irrigator employ a more efficient system of application, considerable savings can be achieved. This surplus is then available for irrigating non-scheduled lands. One farmer, who has installed a computer controlled micro-mist system, has reduced his annual application to 4 000 m^3/ha. The balance is used for cash crops. When restrictions were imposed in 1985 his normal farming practice was unaffected.

Apart from a levy on scheduled land, irrigators pay 1.39c/m^3 for irrigation water. If there is water available they can purchase water in excess of this quota at an additional cost of 0.2c/m^3 for the first 1 000 m^3, 0.4c/m^3 for the next 1 000 m^3 and 0.6c additional for a further 500 m^3, after which no further excess purchases are permitted.

The one single factor which has made this scheme justifiable is the supply of water to Port Elizabeth which consumes 60 per cent of the water. This also explains why water is released to the extent whereby irrigators can receive water on demand. All excess canal water flows direct into Loerie Dam situated at the terminal of the Gamtoos Canal system. When full, Loerie Dam contains 14 days supply for Port Elizabeth.



Computerised control panel for a water efficient micro-irrigation system in the Gamtoos GWS.

An irrigation scheme of a completely different character is the Great Fish Irrigation Scheme.

This scheme extends a total length, as the crow flies, of approximately 150 km from Grassridge Dam in the north, to a point some 30 km south of Cookhouse.

Water imported from the Orange River Project (ORP) is the single most important source of water and as there is negligible scope for the further development of any local water resources, the future of the region is clearly dependant on the ORP.

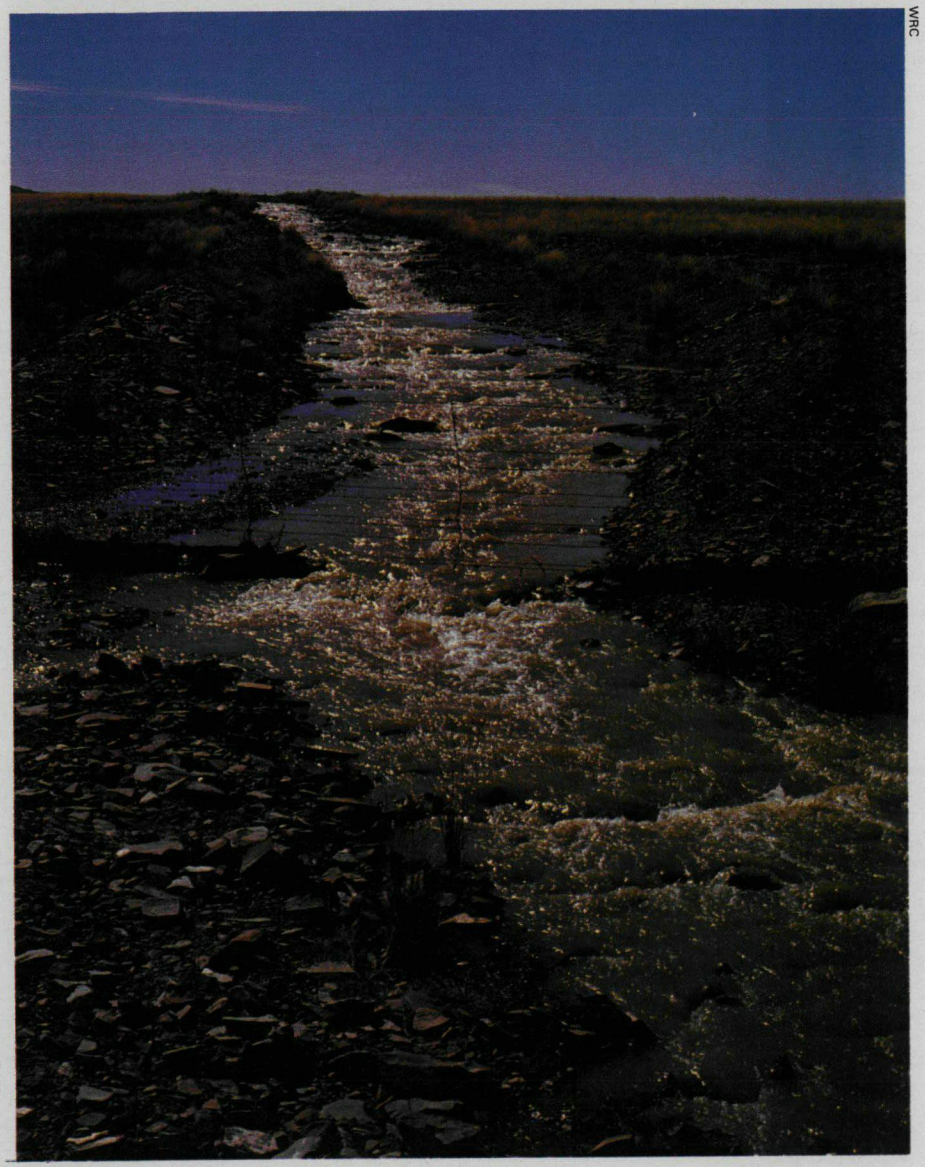
This scheme differs from the Gamtoos, which is a GWS with no irrigation boards active in the valley, and the Robertson Canal which is totally under the control of the Breede River Water Conservation Board (BRWCB), in that there are a total of 14 irrigation boards operating separately within the area, plus a few private irrigators. In all, the scheduled areas total some 31 000 ha and potential expansion could add a further 20 000 ha.

In order to make provision for this potential expansion, a new outlet structure has been constructed at Grassridge Dam which will boost releases from 17 cumecs to a full capacity of 60 cumecs.

Underground water resources are significant and many towns in the region are dependant on boreholes for their water supplies. Some irrigators use ground water to supplement their canal water quotas.

In the Great Fish Irrigation Scheme the usual quota is 13 500 m^3/ha/year. Most of the canals and branch canals serving the area are earth canals with thick vegetation covering the banks. Local irrigation boards believe that the advantages of vegetated banks, such as, reduced evaporation due to the shady conditions keeping the water cool, banks re-inforced with mature root structures and extremely difficult access through the undergrowth to the canals, together, offset the disadvantage of increased transpiration.

Measurement of the water leaving the canals is crude, compared to other schemes such as the Gamtoos where every drop of water is metered, in that a sluice is opened for a fixed period of say 96 hours every two weeks. No recording or measuring devices are installed and the amount of water leaving the main canal is determined by the size of the sluice opening and the water level in the main canal. Irrigators have to submit a request for water at least a week beforehand so that



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Private irrigator, upstream of the Great Fish Irrigation Board, using a sub-standard distribution canal.

an adequate quantity of water can be released in time. Because of the vast expanse of the scheme, demand irrigating direct from the main canal as practiced in the Gamtoos Scheme, is not feasible in the Great Fish. In addition, the lack of automatic control sluices and the fact that all excess water at the end of the canal system is wasted to sea, makes demand irrigation impossible.

In the Breede River Valley, although the Greater Brandvlei Dam has only recently been completed (1984), the four irrigation canals are all very old.

The major problem facing the BRWCB is that of water quality. Although the Breede River, in its natural state, contains water of a very high quality, upstream abstractions of good quality water combined with diverse inflows of saline water lower down, together result in an unacceptable deterioration in the streamwater quality.

After irrigation, some of the water finds its way through the soils back to the river and in so doing dissolves some of the many salts which have accumulated in the soil and transports them to the stream bed. This phenomenon soon renders the river water useless for further use as the levels of salinity can rise to levels in excess of 3 000 mg/ℓ which cannot be tolerated by most crops. To counter this, ''freshening'' water is released from Brandvlei Dam during the summer months. However, more water needs to be released than is required to supply the irrigation canals, which means a net waste of excess water to sea.

In winter, river flows rise considerably and despite the generally low TDS concentrations at these high flows, the total salt load transported actually increases and the majority of salt movement takes place during the winter months.

Unfortunately, research into the origins of saline runoff has been unable to ascertain the proportional contribution of natural groundwater salinity and irrigation return flow, to river salinity.

The extent to which increased irrigation has led to an actual increase in return flow volume is also uncertain. Virgin soils in the region are inherently saline so that, in future, as irrigation is expanded into the veld, higher salt production can be expected.

The success of freshening releases from Brandvlei Dam can be measured by the TDS levels in the Robertson and other canals. The aim

of the BRWCB is to maintain the TDS level in the Robertson Canal at below 150 mg/ℓ and, except for occasional exceedance, this had been achieved consistently.

The total scheduled area served by the Robertson Canal is 2 758 ha and the annual irrigation application of approximately 800 mm is applied at a rate of 0.472ℓ/s/ha. An allowance of 25 per cent is made for losses in the canal which has a capacity of 1.37 cumecs.

The principle applicable to the Robertson Canal, (as for other BRWCB canals) is an adequate head of water in the canal by abstracting more water than is actually necessary for irrigation, the excess being returned to the river at various reject points. Thus the amount of water abstracted at the canal diversion intake bears no relationship to the actual amount of water supplied to the irrigators. The Board also adds an amount of 5 per cent to the 0.472ℓ/s/ha to allow for measurement inaccuracies at the farm off-take sluices.

Because of the age of the canal, many of the sluices leak at a significant rate and the accurate measurement of canal flows is a major headache for both the Department of Water Affairs and the BRWCB. The method of supply adopted for most farmers is continuous flow where the sluice gates are set at 0.472ℓ/s/ha.

A few farmers, still get their water on a rotational basis. However this method is expected to disappear completely in the near future as it requires large on-farm storage facilities.

In both cases quotas can be reduced by either reducing the water level in the canal or by adjusting the farm off-take sluices.

To measure flow in the canal it was thought that twice weekly current metering would suffice. Unfortunately, however, these measurements were extremely erratic in practice and consequently the rating curve method of flow estimation had to be used. Unfortunately there are many missing observations, but approximate quantities of water abstracted are nevertheless indicated.

The quality of the water at the Robertson Canal intake is one of the factors used to determine the amount, if any, of freshening water to be released from Brandvlei Dam. As there is no data to support the theory that saline water builds up at any particular point in the river, such as behind weirs, the practice of releasing large slugs of freshening water was dropped in favour of a smaller but continuous flow, in order to dilute TDS in the river to more reasonable concentration levels. This is particularly relevant where river salinity increases due to diffuse, highly saline, inflows.

Peak period for freshening water is October to December when the irrigation season is at its highest and the abstraction of higher quality water upstream reaches a peak.

CONCLUSION

It is a known fact that the levy per unit area on scheduled land does not encourage irrigators to improve water efficiency. This will only be achieved when the levy is based on a unit volume of water. Optimisation of irrigation water will not only lead to improved and increased crop yields but will also result in reduced saline return flows from lands to the stream — and hence improved water quality.

Although the system of water on demand, using accurate water meters as practised in the Gamtoos GWS, is an ideal situation, each scheme has to be developed to satisfy its own requirements taking both financial and water economy into account.

The Great Fish Scheme, in spite of an extremely elaborate system of water supply is hamstrung by the sheer physical extent of the area and the large number of irrigation boards in operation. Furthermore the extensive nature of the farming pattern in the valley makes it unlikely that any upgrading of the supply canals can be economically justified in the near future.

The reluctance of farmers to having their irrigation water supplies metered is probably not as strong as previously assumed. However, metering should not be implemented indiscriminately, but should be conditional on local circumstances such as cost of water supply and availability, soil characteristics, irrigation practices, crops, and downstream use of stream water.

BETER RIGLYNE VIR BESPROEIING

Navrae by 'n aantal boere wat drupbesproeiing toepas het gedui op 'n aantal vrae wat nog nie beantwoord is nie. Verbeterde riglyne vir doeltreffende drupbesproeiing van die tweede belangrikste groentegewas in die RSA, naamlik tamaties, word tans deur die Departement Plantproduksie van die Universiteit van Pretoria nagevors.

Watertekorte gedurende die afgelope paar jare het die noodsaaklikheid beklemtoon van navorsing wat daarop gemik is om die doeltreffendheid van waterverbruik by besproeiing te bevorder. Die kennis is ook nodig vir groenteproduserende gebiede, soos die Noord-Transvaal, wat tans onder ernstige droogtes gebuk gaan.

DRUPBESPROEIING VAN GROENTE

Waar die Department Plantproduksie reeds die waterbehoeftes van tamaties, kopkool en stambone ondersoek het, moet hierdie inligting nou vir gebruik by drupbesproeiing aangepas word. Laasgenoemde tegniek word reeds suksesvol by tamatieverbouing toegepas. Die navorsingsprojek het ten doel om 'n intensiewe studie van die gewenste skedulering van besproeiing te maak, en om deur middel van koöperatiewe navorsing, wetenskaplik gefundeerde besproeiingsprogramme in die praktyk te toets en te bevorder.

VOORDELE

Voordele van drupbesproeiing sluit onder andere in dat beter beheer oor watertoediening uitgeoefen kan word en dat dit ook oor die moontlikheid beskik om ander aspekte van gewasverbouing te verbeter, bv. plantvoeding, onkruidbeheer en aalwurmbeheer.

Die navorsing, wat deur die Waternavorsingskommissie gefinansier word, sal oor 'n tydperk van vyf jaar teen 'n totale koste van R705 000 uitgevoer word.

DWA DISSATISFIED WITH COMPLIANCE

At the second open meeting of the Institute of Water Pollution Control's Working Committee for Nutrient Removal recently held at the CSIR, Mrs Maria Oliveria disclosed the Department of Water Affairs' displeasure with the poor compliance with the phosphate standard by effluent discharges in sensitive catchments.

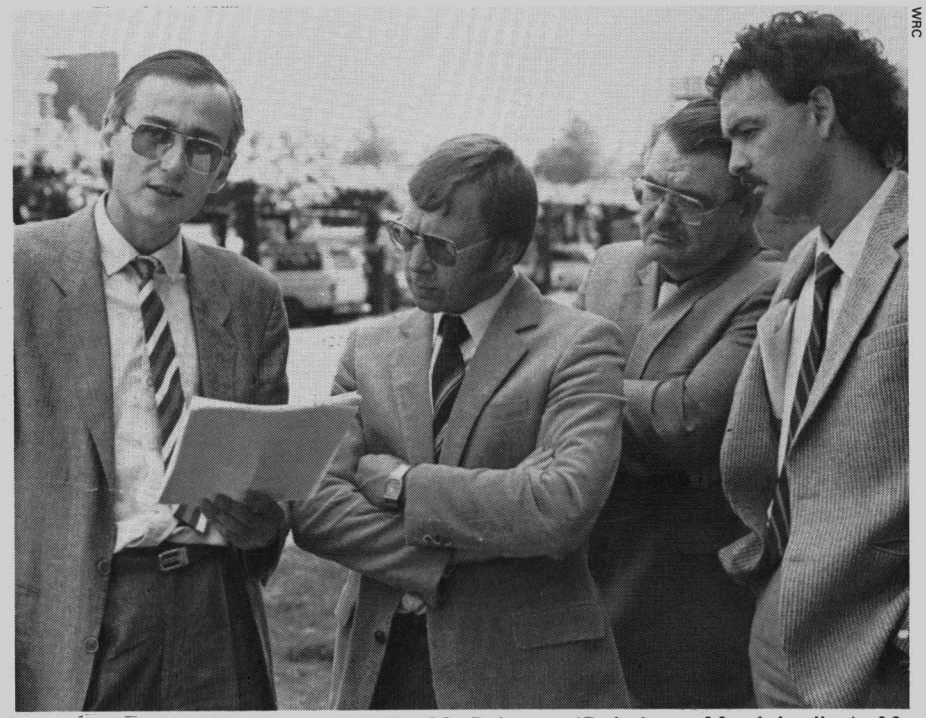
She said the Department was putting into motion a programme to establish to what extent affected discharges are complying with the phosphate standard. Dischargers will be requested to monitor their final effluent on a daily basis. They will have to take grab samples during peak flow as well as record the flow-rate and time of sampling.

In addition, a composite sample (24 hour samples) taken on a different day each week, has to be analysed and the flow of effluent being discharged on each day has to be recorded. Mrs Oliveira said this detailed monitoring programme will continue until further notice.

According to Mrs Oliveira this action has been necessitated by the extremely poor compliance with the standard to date. She said that the effluent phosphate standard had been introduced in August 1980 and dischargers had been given five years of grace. However, now six months after the August 1985 deadline, compliance was still very poor. She indicated that those not complying could be prosecuted in terms of the Water Act of 1956. Culprits could face high fines equivalent to the money saved by not implementing the standard.

The meeting also discussed the progress being made with producing and utilising volatile fatty acids for enhancing biological phosphate removal in activated sludge processes. Speakers on this topic included Miss ES Mostert (National Institute for Water Research), Mr H Nicholls (City Council of Johannesburg) and Dr J Barnard (PGJ Meiring and Partners).

A third topic discussed by the Working Committee was problems experienced with chemical phosphate removal.



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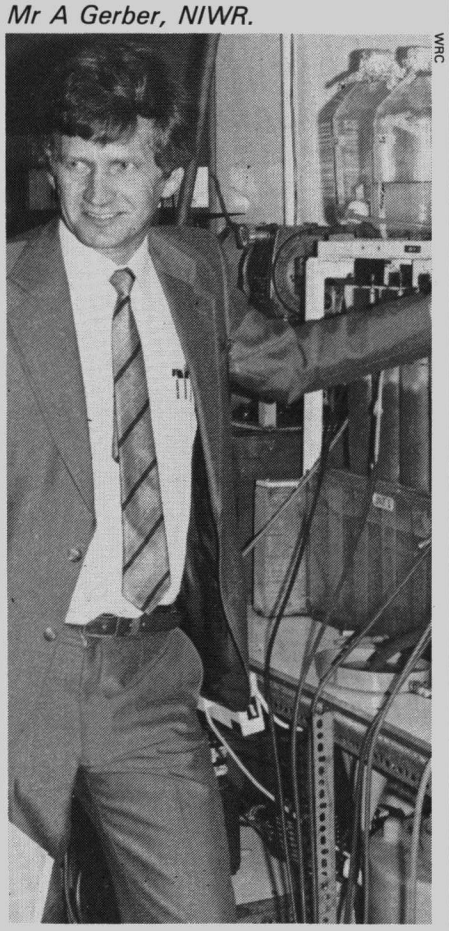
From left: Mr G Schilling (NIWR), Mr D Louw (Boksburg Municipality), Mr D Engels (Vereeniging Municipality) and Mr L Uys (Witbank Municipality).

The meeting was followed by a technical visit to the laboratories of the National Institute for Water Research. The following topics were discussed or demonstrated:

- ☐ The role of basic research in solving the mechanism of biological phosphate removal;
- ☐ Chemical fractionation of P-compounds in activated sludge;
- ☐ Integrated chemical-biological nutrient removal: principals and operation of mobile pilot plant;
- ☐ Biological sulphate removal, including some results and future prospects in sulphur production;
- ☐ Batch studies on effect of short-chain carbon compounds on biological phosphate removal; and
- ☐ Continuous-flow studies on biological phosphate removal in volatile fatty acid enriched sewage.

Anybody wishing to join the Working Committee should contact its Chairman, Dr Herman Wiechers (c/o Water Research Commission, PO Box 824, Pretoria 0001).

Mr A Gerber, NIWR.



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FOSFAATPLAN MISLUK IN NEDERLAND

Nuwe planne is in Nederland bekend gemaak om die lastige algprobleem in dié land se mere en riviere die hoof te bied. Die regering se huidige fosfaatbeleid wat daarop gemik was om te verhoed dat nog fosfate in die omgewing vrygestel word, het nie die gewenste uitwerking gehad nie, aangesien daar alreeds te veel fosfaat in omloop was. Met die slagspreuk 'red wat nog te redde is' werp die Nederlanders nou in nege nuwe navorsingsprojekte alles in die stryd om die euwel van fosfaatbesoedeling hok te slaan.

Volgens die Nederlandse tydskrif H_2O is die grootste bron van fosfaatbesoedeling in Nederland rioolwater wat elke jaar nagenoeg 9,5 miljoen kg fosfaat in die omgewing laat beland, asook wasmiddels wat Nederland se water jaarliks met tot ses miljoen kg fosfaat verryk. Die bydrae van die landbou word op minstens 2,2 miljoen kg per jaar geskat. Hierbenewens is daar sekere gebiede soos die Veluwe-streek, byvoorbeeld, waar na raming 80 persent van die fosfate van plase met 'n groot oorskot dieremis afkomstig is.

Kragtens wetgewing wat in 1979 uitgevaardig is moes alle wasmiddels in 1985 fosfaatvry gewees het terwyl alle rioolwaterbehandelingsaanlêe in sensitiewe opvangebiede, wat ongeveer een derde van die land beslaan, met ekstra toerusting toegerus wees ('n sogenaamde derde stap) om fosfate uit die afvalwater te verwyder.

Die hoeveelheid fosfate in wasmiddels is al met ongeveer 40 persent verminder. Die fosfaatvrye wasmiddels wat egter tot dusver deur seepfabrikante ontwikkel is, kon nog nie as plaasvervangers gebruik word nie aangesien hulle gewoonlik meer nadele vir die verbruiker en die omgewing ingehou het as die seeppoeiers met fosfaat.

Die markaandeel van fosfaatvrye wasmiddels met NTA as die belangrikste fosfaatvervangende middel is tans so vyf tot tien persent. Dié seep werk uitstekend maar die uitwerking van 'n grootskaalse storting van NTA op die omgewing is nog nie heeltemal bekend nie.

Van die ander vereiste in die wetsartikels oor fosfate, naamlik die verwydering van fosfate uit rioolwater, het bitter weinig van gekom. In 1979 is nog 1,1 miljoen inwonerekwivalent (die gemiddelde vervuiling per inwoner) se fosfate verwyder, terwyl daar in 1985, pleks van die verwagte 5,5 miljoen, hoogstens 0,75 miljoen inwonerekwivalent se fosfate uit die rioolwater gehaal is.

Die belangrikste redes hiervoor is volgens die Nederlanders die feit dat hoewel fosfaatverwydering tegnies uitvoerbaar is dit nie so belangrik vir waterkwaliteit is nie. As daar eers 'n grens van tweetiende milligram fos-

faat per liter water bereik is, speel verdere fosfaattoevoer nie meer 'n rol nie en die water word nie groener nie.

Voorts is daar gevind dat by rioolwaterbehandlingsaanlegte waar 90 persent van alle fosfate chemies verwyder is monsters van die waterkwaliteit oor die afgelope tien jaar weinig verandering getoon het. Daarby kom ook nog die koste van fosfaatverwydering wat in Nederland 'n verhoging in koste van nagenoeg 25 persent meebring.

Om 'te red wat nog te redde is' het die Nederlanders besef dat die algprobleem op 'n integrale manier aangepak moet word. Hulle het nege mere uitgekies, met 'n min of meer geïsoleerde ligging, wat nie heeltemal met fosfate verryk is nie en daar wil hulle probeer om met elke middel tot hulle beskikking die water se kwaliteit weer te herstel.

By een van die mere, die Geerplas, is vasgestel dat die bodem van die meer baie fosfaat, afkomstig van vroeëre stortings, bevat. Derhalwe is besluit om die meer se bodem 25 sentimeter diep uit te bagger. Geen afvalwater sal ook weer in die meer toegelaat word nie. Skoon water wat ingelaat word om die watervlak te handhaaf, sal eers deur 'n vleiland vol riete en biesies gestuur word sodat die plante alle fosfate kan verwyder.

By 'n ander meergebied, die Nieuwkoopse plassen, is die inkomende water die grootste bron van fosfaatbesoedeling. Hierdie water sal opgevang en om die meer gelei word. Die fosfate sal daarna ook uit die water gesuiwer word. Waterskeidings sal tussen die meer en die omliggende landbougebiede opgerig word sodat geen fosfate wat van die landerye afspoel in die meer kan beland nie.

By die Randmere word die probleem aangepak deur fosfaatverwydering toe te pas en gedurende die wintermaande die mere met fosfaatarm, kalkryke water skoon te spoel.

Benewens hierdie maatreëls ondersoek die Nederlanders ook die moontlikheid van aktiewe biologiese beheer of sogenaamde biomanipulasie. Daar word, byvoorbeeld, na algvreters gesoek. 'n Groot probleem is egter dat die blouwier wat in troebel, eutrofe water floreer in min waterorganismes se smaak val, en daarom woeker hy ongehinderd voort. Gelukkig is onlangs ontdek dat die klein krefie *Daphnia hyalina,* wat skaars 'n millimeter groot is, hierdie lang, draadvormige alge eet.

'n Ander moontlikheid is die gebruik van mossels, veral die driehoeksmossel. Die aantal mossels kan vermeerder word deur meer vasklouplekke van hout, klip en skulpe vir die mossels aan te bring. Mossels filtreer die water en kan op die manier die alge uitsif en beheer.

Fosfaatbesoedeling vanaf veeplase bekamp

Nuwe riglyne vir die gebruik van veemis as bemestingstof is onlangs vir boere in Nederland bekend gemaak.

Volgens die Nederlandse tydskrif H_2O is die maatreëls daarop gemik om die hoeveelheid fosfaat wat deur middel van bemestingspraktyke in die grond en waterbronne beland, te beperk. Die riglyne bepaal hoeveel kilogram fosfaat, wat in mis voorkom, op landerye gebruik mag word. Die uitgangspunt is dat daar nie meer fosfaat via die mis in die grond moet beland as wat die grond en die gewasse daarop kan verwerk nie.

Vanweë die opnamekapasiteit is die hoeveelheid mis vir akkerlande, weiveld en mielielande verskillend bepaal. Vir akkerlande is die norm 125 kilogram fosfaat per jaar, vir weiveld 250 kilogram en vir mielielande 350 kilogram.

Op grond van hierdie hoeveelhede kan bereken word hoeveel ton vloeibare mis, asook vaste mis, 'n boer wat byvoorbeeld lêhenne en braaikuikens aanhou op die verskillende soorte grond mag uitry.

Vir vloeibare mis is dit 14 ton op akkerlande, 28 ton op weiveld en 40 ton op mielielande. Vir vaste mis is dit respektiewelik 4,4; 8,8 en nege ton.

Volgens mnr JW Funke, spesialiskonsultant van die Waternavorsingskommissie, is die hoeveelheid nat hoendermis wat boere in Suid-Afrika op landerye mag strooi, waar mielies en koring verbou word, 37 ton per hektaar. Dit is gelykstaande aan die nat mis van nagenoeg 950 lêhenne en verskaf 200 kilogram stikstof (N) per hektaar vir 'n gemiddelde gewasopbrengs van agt ton per hektaar.

Boere in Nederland sal vanweë hierdie nuwe fosfaatbeperkings jaarliks met 'n misoorskot van 12 miljoen ton bly sit.

Indiërs omskep waterhiasinte in papier

Navorsers by die streekslaboratorium in Jorhat, Indië, het onlangs vasgestel dat waterhiasinte wel vir die vervaardiging van papier en karton gebruik kan word.

Die proses wat ontwikkel is om die hiasinte in papier te omskep kan groot voordele inhou vir lande met 'n gebrek aan geskikte materiaal vir die maak van papier, veral as hulle terselfdertyd geteister word deur 'n oorvloed van hierdie berugte watervuilgoed.

Op grond van die positiewe resultate is begin met die bou van 'n volskaalse aanleg vir papiervervaardiging by die streekslaboratorium in Hyderabat.

Meer inligting oor dié interessante ontwikkeling kan verkry word vanaf die National Research Development Corporation of India, 61 Ring Road, Lajpat Nagar III, New Delhi 110 024, India.

EFFECTS OF URBANIZATION ON CATCHMENT WATER RESOURCES INVESTIGATED

The Water Research Commission has recently entered into an agreement with the Water Systems Research Programme (WSRP) of the University of the Witwatersrand, to carry out research into the effects of urbanization on catchment water resources in South Africa. The project will run for a period of five years at a total cost of approximately R1,25 million.

Previous studies including those by Professor David Stephenson, Director of the Water Systems Research Programme, have indicated that the urban development of catchments can lead to a changed hydrological response.

Reasons for possible changes in runoff due to urbanization are many and varied. Increased impervious areas, which inhibit infiltration, lead to larger volumes of direct runoff. The smoothing of surfaces decreases the capacity of depression storage and coupled with the provision of concrete-lined pipes and channels, increases stormwater flow velocities. This in turn shortens the response time of urbanised catchments, making them more sensitive to shorter duration, higher intensity rainfall events. The provision of concrete-lined channels in major watercourses reduces the flow area with a similar reduction in the available in-channel storage of these watercourses, resulting in higher peak flowrates at the downstream end and less infiltration.

In addition to quantity changes, indications are that urbanization also causes a deterioration in the quality of stormwater runoff. Not only is there a pollution load in the atmosphere which is washed out or settles out onto the catchment surface to be carried away when storms occur, but there is also wash-off of waste deposits and other dirt which is either spilt or intentionally stored in the catchment.

This research project will assist in an understanding of urban hydrology and also provide tools in the form of monitoring systems and models for assessing such effects elsewhere. Urban drainage models currently available on micro-computers will be used such as WITWAT, ILLUDAS and WAMM (Wits Antecedant Moisture Model). Existing models for predicting flow in storm water drainage networks and from urban subcatchments will be extended to include flow routing in channels, as well as two-stage drainage systems and storage.

RUNOFF PEAKS

With regard to the control of runoff from urban catchments, the inclu-

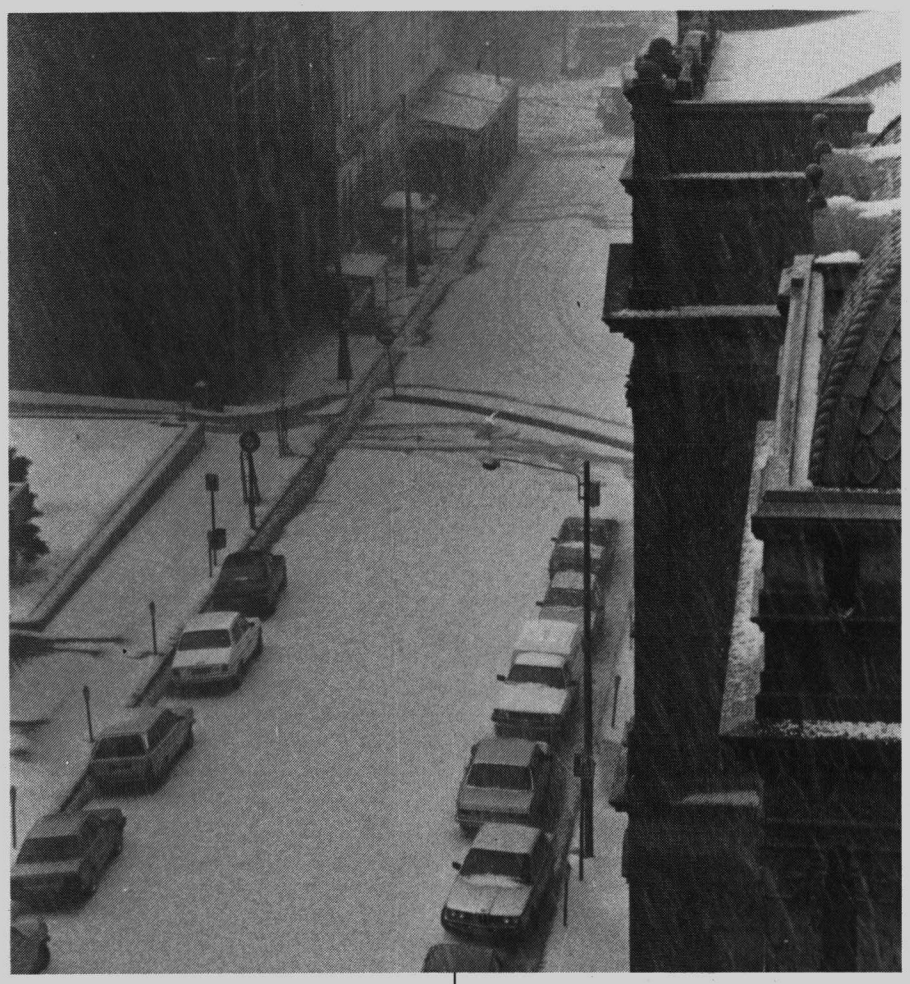
sion of detention or retention facilities as an integral part of the drainage system has been found to be one of the most effective means of controlling peak runoff rates. In some parts of the world, the use of storage is mandatory. Although storage obviously reduces peak runoff and total surface runoff, there is no indication of its effect on total catchment water balance and yield, including sub-surface components. However, some reservation has been expressed by Professor Stephenson regarding retention facilities. These can become a public nuisance causing unacceptable problems regarding odour, aesthetics and pestilence and therefore retention facilities should be carefully planned before they are implemented.

Other methods employed to control runoff peaks include two-stage drainage systems, pervious, surfaces and channel retardation.

Recognition of a two-stage drainage system has led to a fresh approach in urban drainage design. Generally, stage one of this approach requires that a man-made drainage network consisting of pipes and channels, caters for the more frequent events (e.g. up to the 5-year event) and that provision be made for the less frequent events by making use of second stage non-structural drainage paths such as streets and stream banks. Consequently, township layouts must be designed in such a way as not to restrict the second stage, major drainage system.

This research project intends to investigate the effect of these and other urban catchment management alternatives on total water resources of urban areas. This includes the effects on runoff volume and pattern in comparison with natural catchments.

A spin-off of the research will be the ability to predict changes in runoff hydrographs as catchments become developed. This will affect flood levels along urban water courses which in turn will restrict development along streams. Data for such a comparison will largely be gathered in the two sister catchments of Sunninghill and Waterval Trust Farm in Sandton, just north of Johannesburg. This will be in addition to the catchments of Montgomery Park and Hillbrow, in Johannesburg, which are at present being monitored by the WSRP in terms of an earlier WRC project investigating urban hydrology and drainage.



BENEFITS

In addition to meeting the stated objectives, the research will have many spin-offs for hydrologists, water resource engineers and town planners.

Water resources engineers will be able to assess, with greater accuracy, the changes in runoff from urban catchments including total runoff and catchment yield as well as runoff patterns in time.

Stormwater designers can assess the peak flows and hydrographs volumes form developed catchments.

Development can be guided to maximize water harvesting or to maintain the hydrological regime of catchments, as desired.

Designers can assess flood levels in urban areas which is of particular relevance to property developers, and municipal and provincial bodies.

Planning models will become available for assessing the effects of urbanisation and studying alternative stormwater management practices.

The efficiency of various catchment management procedures can be assessed, e.g. detention storage, seepage pits, flood attenuation and two-stage drainage systems.

Stormwater designers can assess the relationships between rainfall, runoff, soil moisture, and return periods for urban catchments.

Groundwater levels can be anticipated and methods of groundwater recharge and borehole management may result.

Technology for monitoring of rainfall, runoff and water balance will be improved.

Availability of data relating to parameters such as antecedent moisture conditions, cover permeability, storage and retention and detention facilities will assist hydrologists and drainage engineers.

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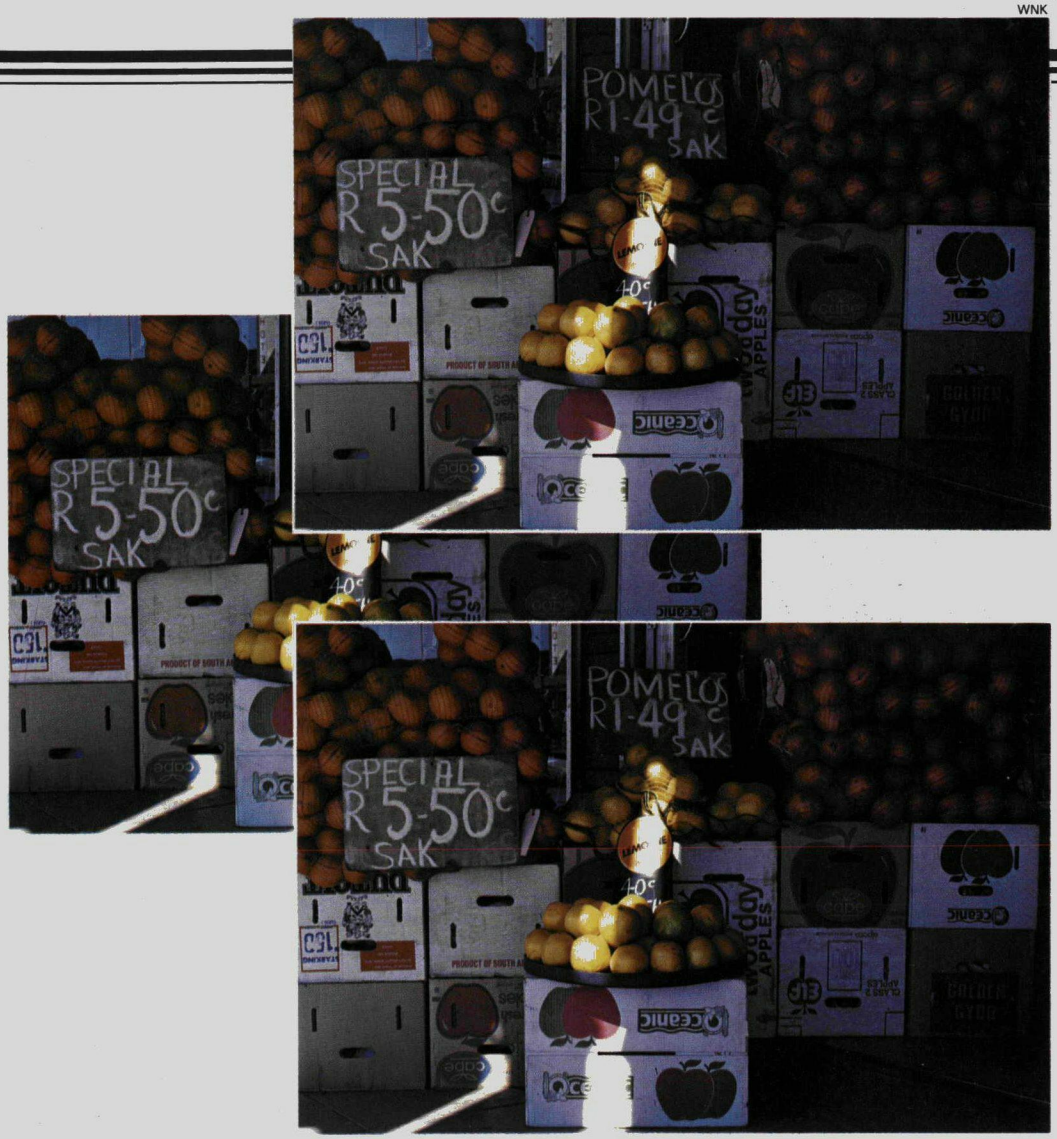

EFFEKTE VAN CHEMIESE STOWWE IN WATER ONDERSOEK

'n Wetenskap waar Suid-Afrika nog 'n stap of wat agter die res van die wêreld is, is die tosikologie. Laasgenoemde is 'n vakgebied wat die negatiewe effekte wat 'n chemiese stof op plante, diere en mense het, waarneem en ondersoek.

Mnr Ockert Fourie, 'n toksikoloog by die Departement van Gesondheid, is tans besig met 'n doktorale studie om onder andere vas te stel wat die invloed is van chemiese stowwe in voedsel en water in Suid-Afrika op die gesondheid van die mens.

Mnr Fourie sê hy het aanvanklik gekyk na die voedselsoorte wat in Suid-Afrika beskikbaar is en watter van hierdie wel deur die mens ingeneem word. Uit beskikbare studies blyk dit dat daar ongeveer 500 verskillende voedselprodukte is wat daagliks in die Republiek geëet word.

''Ek het die voedselprodukte geneem, dit statisties ontleed en persentasiegewys bereken hoeveel van elke produk die gemiddelde blanke persoon in Suid-Afrika verbruik. Hieruit kon ek die voedselsoorte in 11 verskillende kategorieë deel,'' sê mnr Fourie.

Die 11 kategorieë is: vleis; melk en melkprodukte; groente; vrugte; graankosse; enige vorm van drinkgoed; eiers; vette en olies; vis; sop; en suiker en suikerlekkernye.

Analises wat op die voedsel gedoen word, is ten opsigte van residue van verskeie insektemiddels in die landbouchemikaliebedryf, asook 'n paar swaar metale.

Die navorsingsprogram word oor vier seisoene uitgevoer en is geografies by 13 punte oor die hele land versprei. Die voedsel word ingesamel soos wat 'n huisvrou dit van die rakke af in 'n winkel sou koop. Wanneer die voedselprodukte ontvang word, word aparte

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monsters sowel as saamgestelde monsters van al die voedselsoorte geneem, waarna dit in die 11 kategorieë verdeel word.

Die voedselsoort word eers rou geanaliseer waarna 'n tweede saamgestelde monster geneem word wanneer die projek tafelgereed is. Na die voorbereide monster geanaliseer is, word die porsie wat daagliks deur 'n persoon ingeneem word, ook geanaliseer. Volgens mnr Fourie is die doel van die twee aparte analises om vas te stel of daar enige kontaminasie of verliese plaasgevind het as gevolg van die voorbereidingsproses.

Mnr Fourie beklemtoon verder die noodsaaklikheid daarvan om water ook te analiseer. Amerikaanse statistiek toon dat die Amerikaanse publiek se dieet gemiddeld uit 20 persent water bestaan. Dit sluit koffie, tee, koeldranke en alkoholiese dranke uit. Indien laasgenoemde bygereken word, bestaan die gemiddelde dieet uit ongeveer 40 persent water.

Statistiek ten opsigte van waterinname in Japan toon aan dat die gemiddelde Japanees se dieet uit ongeveer 32 persent water bestaan.

Hieroor sê mnr Fourie: "'n Mens kan derhalwe onmoontlik 'n studie van hierdie aard ondersoek en nie die wateraspek ook byreken nie. Water analises word dus in aanmerking geneem tydens die hele projek vanaf die monsterneming, die voorbereidingsprosesse tot by die resultate.

"Ek wil derhalwe aan die einde van die studie kan aantoon watter chemiese stowwe die mens inneem asook hoeveel daarvan deur middel van water is en hoeveel deur middel van voedsel," sê mnr Fourie.

Ten opsigte van die water wat gebruik word sê mnr Fourie dat die navorsing in hierdie stadium nog konsentreer op water vanuit Kaapstad afkomstig. Dit lê egter die basis om navorsing in ander streke van die land ook te doen.

"Drie van die seisoene is reeds afgehandel," sê mnr Fourie. "Wanneer die hele projek afgehandel is, sal 'n mens die resultate kan vergelyk met die van ander lande asook met die standaarde wat die Wêreldgesondheidsorganisasie (WGO) vir chemiese stowwe in voedsel en water voorstel."

Mnr Fourie se studie handel verder ook oor akute vergiftiging deur die gebruik van landbouchemikalieë asook 'n ondersoek na vergiftigingsgevalle om die oorsake van die vergiftiging te probeer vasstel.

Alge is goud werd

Amerikaanse wetenskaplikes het ontdek dat sekere algsoorte gebruik kan word om goud wat in water opgelos is te herwin.

Volgens die jongste nuusbrief van die IAWPRC het navorsers by die departement chemie aan die Universiteit van Nieu-Mexiko vier soorte alge geïdentifiseer wat die potensiaal toon om goud uit water te verwyder. Van hierdie vier het die alg *Chlorella vulgaris* homself as die doeltreffendste bewys.

Dit is algemeen bekend dat aansienlike hoeveelhede opgeloste goud in die waterkanale van Nieu-Mexiko voorkom — op sommige plekke tot 'n paar dele per biljoen. Tekens van goud is ook gevind in water wat van nywerheidsafvalhope en uitgewerkte myne afkomstig is. Daar word geglo dat met die tegniek wat tans ontwikkel word, miljoene rande se goud herwin kan word.

Chemiese reseptors op die selwande van die alge bind die goud en kan tot tien persent van die alg se droëmassa versamel. Hierdie eienskappe van die alge funksioneer ongeag of die alg lewendig of dood is.

In een praktiese herwinningsmetode wat tans ontwikkel word, word die dooie organismes fyngemaal en die klein deeltjies aan polimeerkraletjies geheg. Die krale word dan in kolomme gepak waardeur die vloeistof wat die opgeloste goud bevat, gestuur word. Die algselle absorbeer die goud terwyl die krale verstopping voorkom. Die algselle kan oor en oor gebruik word sonder enige waarneembare verlies aan doeltreffendheid.

Navorsers beweer dat kralekolomme wat op die regte manier gerangskik is in enige vloeiende water gebruik kan word. Die proses kan uiters kostedoeltreffend wees, aangesien dit basies 'n goedkoop tegnologie is wat gebruik word om 'n duur metaal te herwin.

HYDROLOGICAL SCIENCES SYMPOSIUM

Rhodes University • Grahamstown

(Sept 6th — 9th 1987)

South African National Committee for the International Association of Hydrological Sciences

Ground Water Division of the Geological Society of South Africa

The Symposium combines the Biennial Symposium of the Ground Water Division of the Geological Society of Southern Africa and the Third National Hydrological Symposium of the South African National Committee for the International Association of Hydrological Sciences (SANCIAHS).

DATES

Registration: Sunday 6 September 1987.

Papers: Monday and Tuesday 7 and 8 September

Excursions: Wednesday 9 September to areas of water resource interest in the Eastern Cape.

THEME

The overall theme of this combined **SANCIAHS** and **Ground Water Division** symposium is Southern African Resources. The theme recognises that all aspects of the hydrological cycle need to be considered in the solution of water resources problems.

CALL FOR PAPERS

Prospective authors are invited to submit abstracts for consideration on any topic that is relevant to Southern African Water Resources. A limited amount of space will be made available for poster paper presentations.

Papers will be presented in parallel sessions with plenary sessions at the beginning and end of the Symposium. Abstracts of 1 typed page may be submitted at any time before the deadline of **31 January 1987.**

Authors will be notified as soon as possible, and not later than **1 March 1987,** whether their papers have been accepted. Authors will be informed of the required format for publication, and finished copies of the papers must reach the organising committee by **30 June 1987.**

PUBLICATION OF PROCEEDINGS

The proceedings will be pre-published and one copy will be supplied to each registered participant at registration.

POST SYMPOSIUM TOURS

Two alternative excursions will be offered:

1 Ecca research catchments, Fish River interbasin transfer schemes, lower Fish River irrigation, coastal dune aquifers.

2 Coastal dune aquifers, Lower Sundays River irrigation schemes, Uitenhage artesian area.

SOCIAL PROGRAMME

A programme for accompanying persons will be arranged together with a Cocktail Party and Symposium Dinner for all interested participants.

ACCOMMODATION

University residence accommodation has been reserved and there are several hotels in Grahamstown. Those requiring hotel accommodation are advised to book early.

REGISTRATION FEE

The Registration Fee will be approximately R100 for participants in the Symposium. Detailed information about fees for tours, accompanying persons and accommodation costs will be included in the second circular.

GRAHAMSTOWN

The University City of Grahamstown is in the heart of 'Settler Country' midway between East London and Port Elizabeth. There is much of historical and cultural interest in Grahamstown and the surrounding district. The scenic attractions of the Eastern Cape Coast and of the Winterberg and Amatole mountains are within easy reach of Grahamstown.

INFORMATION AND REGISTRATION

To ensure your place at this important symposium and to receive further information please complete and return the postcard in this issue of *SA Waterbulletin to.*

Organising Committee
Hydrological Sciences Symposium
Department of Geography
Rhodes University
P.O. Box 94
Grahamstown, 6140

SYMPOSIUM ADMINISTRATION TELEPHONE NUMBER 0461-24014 • UNIVERSITY TELEX NUMBER 244211 SA
SYMPOSIUM ORGANISING COMMITTEE: MR ANDREW STONE, DR DENIS HUGHES AND MRS JENNY KING

Symposium on water quality management

The IAWPRC (International Association on Water Pollution Research and Control) Specialist Technical Group on Systems Analysis in Water Quality Management is presenting a symposium and exhibition on systems analysis in water quality management.

The symposium will take place in London (UK) from 30 June — 2 July 1987 and is called Watermatex 87.

The objectives of the symposium are to provide a bridge between theory and practice in the application of systems analysis in water quality management.

An exhibition will also be held during the symposium. It will focus on customised computer software for the storage, retrieval, analysis, manipulation and presentation of data and information for decision making in planning, environmental impact assessment and operational water quality management.

Papers

Authors are invited to submit papers on any of the topics in the main theme, special sessions or workshops. Submit the proposed paper title and a 1 000 word abstract as soon as possible.

The Programme Committee will notify successful authors by 1 September 1986. Full papers will be required by 30 November 1986. It is intended that the papers to be presented will be available in book from at the symposium.

Abstracts should be sent to: Dr MB Beck, Watermatex 87, IAWPRC, 1 Queen Anne's Gate, London, SW1H 9BT, England. Tel: 01-222 3848, Telex: 918518 WASSOC.

Persons wishing to receive IAWPRC information on a regular basis should contact:
Dr Dirk Grobler, PO Box 395, NIWR CSIR, Pretoria 0001. Tel: (012) 86-9211.

Symposium ★ Symposium ★ Symposium

AUTOMATIC WEATHER STATIONS & DATA LOGGING SYSTEMS

Pretoria 11 & 12 November 1986

Early in 1983 the "Co-ordinating Committee for Climatological and Weather Observation Projects and Practices" (C3WP2) was established to co-ordinate the gathering of meteorological data, the standardisation of observations and the most economical use of resources in South Africa. The C3WP2 is chaired by the Weather Bureau and includes representatives from various scientific organisations and Government Departments who have an interest in meteorology and climatology.

One of the specialist working groups, namely "Instrumentation and Methods of Observation" identified a need for a forum to discuss automated collection of meteorological observations. A recommendation to organise a workshop symposium on automated data logging systems was endorsed by the main committee of C3WP2.

The Weather Bureau, in association with the Atmospheric Sciences Division of the National Physical Research Laboratory, and the Soil and Irrigation Research Institute, has undertaken to organise the symposium.

TOPICS: The following topics addressing, inter alia, current practices, lightning protection, development and standardisation, will be discussed:

- ★ **SENSORS**
- ★ **DATA COMMUNICATION AND PROCESSING**
- ★ **DATA LOGGERS AND POWER SUPPLIES**

Specialists in the field of data automation will be invited to form small working groups under the three above-mentioned topics. The specialist groups will convene prior to the commencement of the workshop.

WHO SHOULD ATTEND? Only persons actively involved in the development, manufacturing or deployment of automatic weather stations and data logging systems should attend.

Suppliers of relevant equipment will be invited to exhibit the latest versions of their systems.

The PROCEEDINGS and recommendations of the symposium will be published by the Weather Bureau as a Technical Paper.

ENQUIRIES:
Symposium Secretariat S409, CSIR, PO Box 395, Pretoria 0001.

Telephonic enquiries:
Mr KE Estié (SAWB) (012) 61-2491/2; Dr G Held (CSIR) (012) 86-9211 x 3464/5; Mr JF Erasmus (SIRI) (012) 28-4048 x 336.

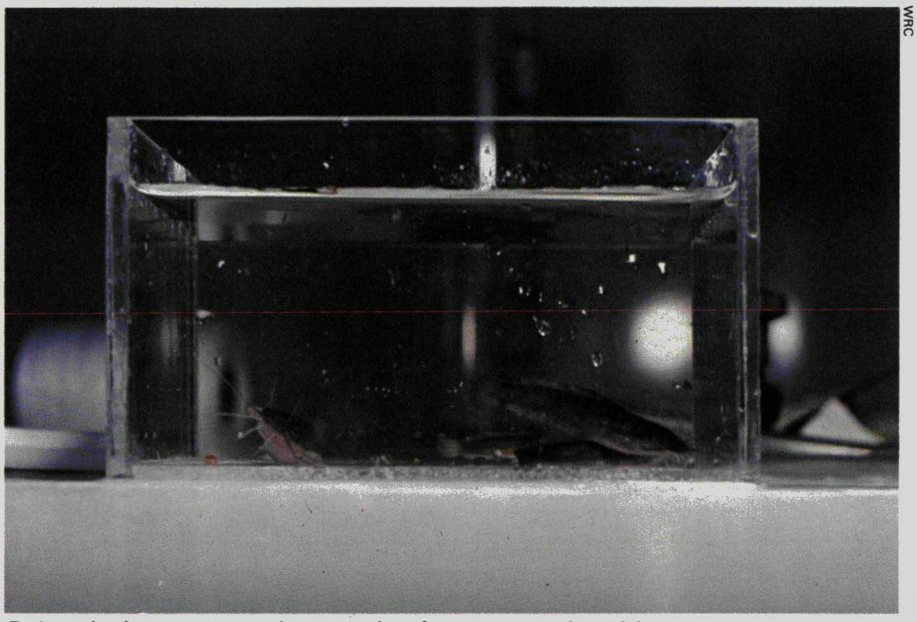
VUURWERKE MET NYWERHEIDSAFVAL

Wetenskaplikes by die Russiese Instituut vir kragingenieurswese het 'n vernuftige tegniek ontwikkel om van vloeibare nywerheidsafval ontslae te raak. Oppervlakmiddels word by die water in slakke, emulsies en harse gevoeg om 'n vlambare skuim te vorm. Die skuim brand baie maklik en niks bly omtrent oor nie. Dit word bereken dat dié behandelingsmetode net 'n derde soveel as die konvensionele hittebehandelingstegnieke kos.

VISSPERME BEVRIES VIR KUNSMATIGE TELING

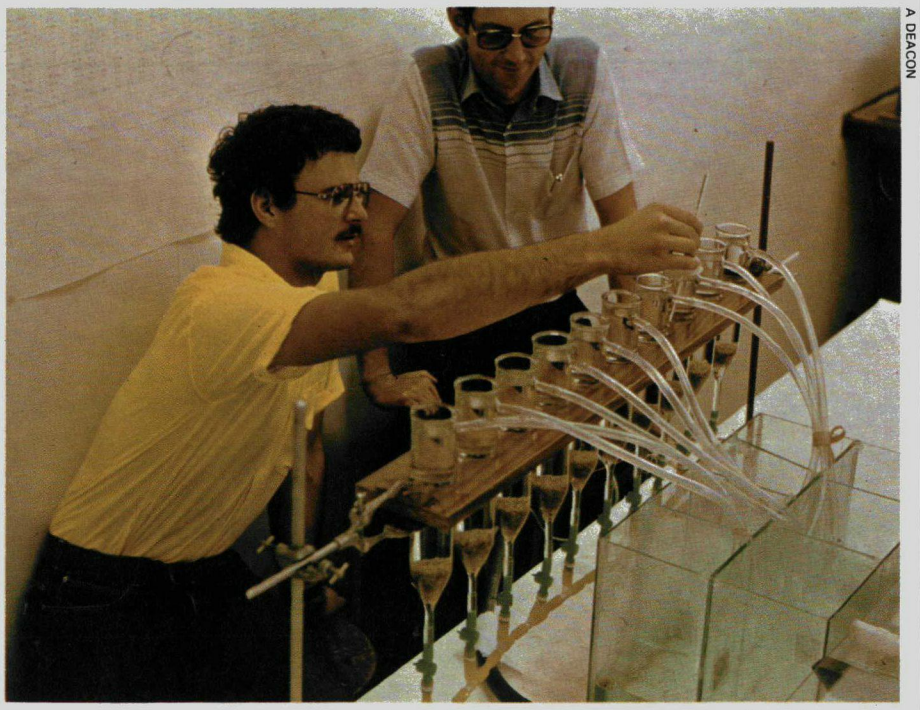
Die langtermyn kriobewaring van vissperme kan 'n belangrike rol vervul in die massaproduksie van geskikte visspesies vir akwakultuur in Suid-Afrika. Navorsing op hierdie gebied word tans deur die Departement Dierkunde aan die Randse Afrikaanse Universiteit gedoen waar hulle spesifiek konsentreer op die bewaring van babersperme.

Volgens dr Johan van Vuren, 'n dosent aan dié Departement, word goeie kwaliteit vleis van die eetvis deesdae skerp beklemtoon. Deur middel van kriobewaring is dit moontlik om die visse wat oor goeie eienskappe beskik se sperme te gebruik vir genetiese manipulering. Kriobewaring dui op die bewaring van vissperme by lae temperature. Dr Van Vuren sê hoewel hulle slegs op die baber konsentreer, beoog hulle om dit verder uit te brei na die forel, tilapia en geelvis.



WRC

Babervissies wat met bewaarde vissperme gebroei is.



A DEACON

Broeitregters waarin die eiers tydens die eksperiment uitgebroei is. Van links: Mnr Gert Steyn, doktorale student aan die RAU, en dr Johan van Vuren dosent aan die Departement Dierkunde.

Die belangrikste aspekte by die bewaring van vissperme is die verdunningsvloeistof wat gebruik word om die vissperme mee te verdun asook die tempo waarteen hierdie sperme bevries word.

'n Verdunningsvloeistof bestaan uit twee komponente, 'n kriobeskermer en 'n krioverlengstof. Dr Van Vuren verduidelik dat die doel van die kriobeskermer is om die spermmembraan te beskerm tydens bevriesing. Die bevriesingstempo moet van so 'n aard wees dat kristalle wat die membrane kan beskadig nie gevorm word nie.

"Die drie beskermstowwe wat ons die meeste gebruik is gliserol, DMSO en methanol. Ons het gevind dat waar DMSO en methanol sekere nadelige uitwerkings gehad het op die oorlewing van die sperme, gliserol die belowendste resultate getoon het," sê dr Van Vuren.

Ten opsigte van krioverlengstowwe sê dr Van Vuren dit verskaf waarskynlik energie sodat die sperm kan oorleef. Verlengstowwe wat gebruik word, is melk, vissaline en glukose. Die samestelling word bepaal deur die bestanddele van die vloeistof waarin die sperme normaalweg in die organisme voorkom.

Met die voorbereiding van krioverlengstowwe word die biochemiese eienskappe van die semen voortdurend in ag geneem sodat daar 'n toename in die oorlewing van die sperme na kriobewaring is. Meer aandag moet egter aan die doeltreffende gebruik van glukose tydens die bewaring van die spermselle gegee word.

'n Verdere belangrike aspek is die verhouding van die verdunningsvloeistof tot die spermselle. Tot

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PO Box 94
GRAHAMSTOWN
6140

Insert to *SA Waterbulletin* May 1986

HYDROLOGICAL SCIENCES SYMPOSIUM

Rhodes University — Grahamstown

6 — 9 September 1987

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dusver is gevind dat 'n verhouding van een milliliter spermselle tot 1 milliliter verdunningsvloeistof die beste resultate lewer.

"Die bevriesingstempo is krities vir die oorlewing," sê dr Van Vuren. "Aanvanklik het ons eers van 'n droëys-alkohol mengsel gebruik gemaak, maar die bevriesingstempo was met hierdie metode moeilik kontroleerbaar. In teenstelling met soogdiere is die sperme van varswatervis meer sensitief vir temperatuurverlaging."

Tans word gebruik gemaak van 'n programmeerbare bevriesingsapparaat wat uit 'n stikstoffles, lugdrukpomp, bevriesingskamer en 'n mikrorekenaar bestaan. Omdat invoerkostes so hoog is, het die elektronika werkswinkel van die RAU, 'n soortgelyke apparaat as dié wat in ander lande gebruik word, ontwerp en gebou. Stikstof word onder druk uit die stikstoffles in die bevriesingskamer geforseer teen 'n tempo waarby die rekenaar geprogrammeer is. Om by lae temperature te kan funksioneer reguleer 'n spesiale gasklep die stikstofvloei.

Die bevriesingstempo wat die beste resultate lewer verskil van vissoort tot vissoort en tempo's kan dienooreenkomstig geprogrammeer word.

RESULTATE

Wat die bevrugting betref sê dr van Vuren dat in teenstelling met die eerste poging waar 'n 11,3 persent sukses met bewaarde spermselle behaal is, 'n onlangse proefneming 50 persent suksesvol was.

Bogenoemde resultate is verkry met sperme wat vir 14 dae bewaar is. In teenstelling hiermee is 41 persent bevrugting van eiers behaal met sperme wat vir 16 maande in vloeibare stikstof gestoor is. Hierdie sukses was nietemin slegs 10 persent swakker as wat met vars semen verkry is.

Dr Van Vuren sê navorsing op hierdie gebied gaan in die toekoms daarop gemik wees om, in die eerste plek, babers kunsmatig buite die natuurlike broeiperiode te teel en, in die tweede plek, uit te brei na eksperimente op die genetiese manipulasie van ander potensiële varswatervisse. 'n Verdere gevolg van hierdie navorsing is die daarstelling van 'n spermbank vir benutting in toekomstige teelprogramme.

World Bank contributes to computer programs

As a tangible contribution to the International Drinking Water Supply and Sanitation Decade, a package of ten programs with supporting material in English is being made available by the UNDP/World Bank Interregional Project INT/81/047 to qualified planning and design agencies and educational institutions working in developing countries. The programs are designed to perform a variety of tasks including the design of piped-waterdistribution networks, the design of sewage collection systems, statistical analysis, mathematical optimization, and financial screening. The programs are intended for use by practicing engineers or by engineering instructors and their students.

FEATURES:

The computer programs are available as complete packages which include:

- Three 5¼ inch flexible diskettes containing all of the programs.
- User instructions.
- Program listings.
- Sample problems with input data and output.
- References to textbooks and other source material.

The larger design programs are menu driven and provide for easy entering, storing, editing, and updating of data. The smaller programs may be used alone or easily incorporated into user-written routines for special needs. With one exception, they are written in BASIC language which is widely used and easily understood; one is written in FORTRAN. All the BASIC programs employ a structured format which makes it easy to follow their logic and design. This is particularly important should individual users want to modify the programs to meet their particular needs; it also facilitates program maintenance. Two programs, "LOOP" and "BRANCH", are provided in compiled BASIC form to speed program execution time.

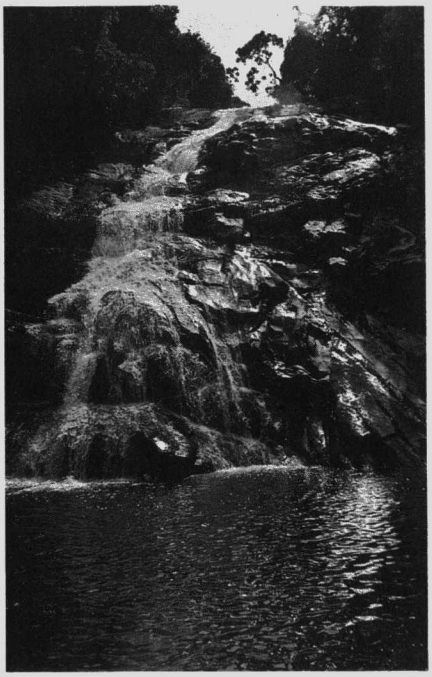
The compiled versions cannot be read or modified by the user. However, a listing of the uncompiled BASIC versions of the two programs is provided for those interested in the program structure and for those who may wish to modify the programs for use with other microcomputers.

The programs currently available will not run on other types of microcomputer. A user may wish to transfer the programs on to suitable diskettes for other microcomputers by entering the program listings of the uncompiled versions into the computer manually and making any necessary changes for its version of BASIC or FORTRAN.

The programs are being distributed, free of charge, on a limited basis to government ministries planning agencies, and other public sector institutions working in developing countries, as well as to multilateral and bilateral donor agencies and universities and training institutions involved in the sector. It is expected that the programs will also be made available in due course for purchase from the World Bank to all other interested organizations.

The programs are intended for use by experienced planners, design engineers, or engineering instructors; they presume that the user is familiar with such specialized topics as hydraulics, mathematical optimization techniques, regression analysis, and present value discounting techniques. The user instructions are limited to information about the programs and are not intended to inform the inexperienced user on such things as how to layout and design a pipe network or how to perform statistical regression analysis.

Enquiries: The Project Manager, UNDP interregional Project INT/81/047, Water Supply and Urban Development Department, The World Bank, 1818 H Street, N.W., Washington DC 20433 USA.



SALINITY NEWS

During the last three years the Hydrological Research Institute has, on behalf of the Department of Water Affairs, undertaken a number of investigations into existing and envisaged water resource salinity problems. Current trends in the requests for such investigations would seem to indicate that the work of the Institute's salinity team will continue for many years to come.

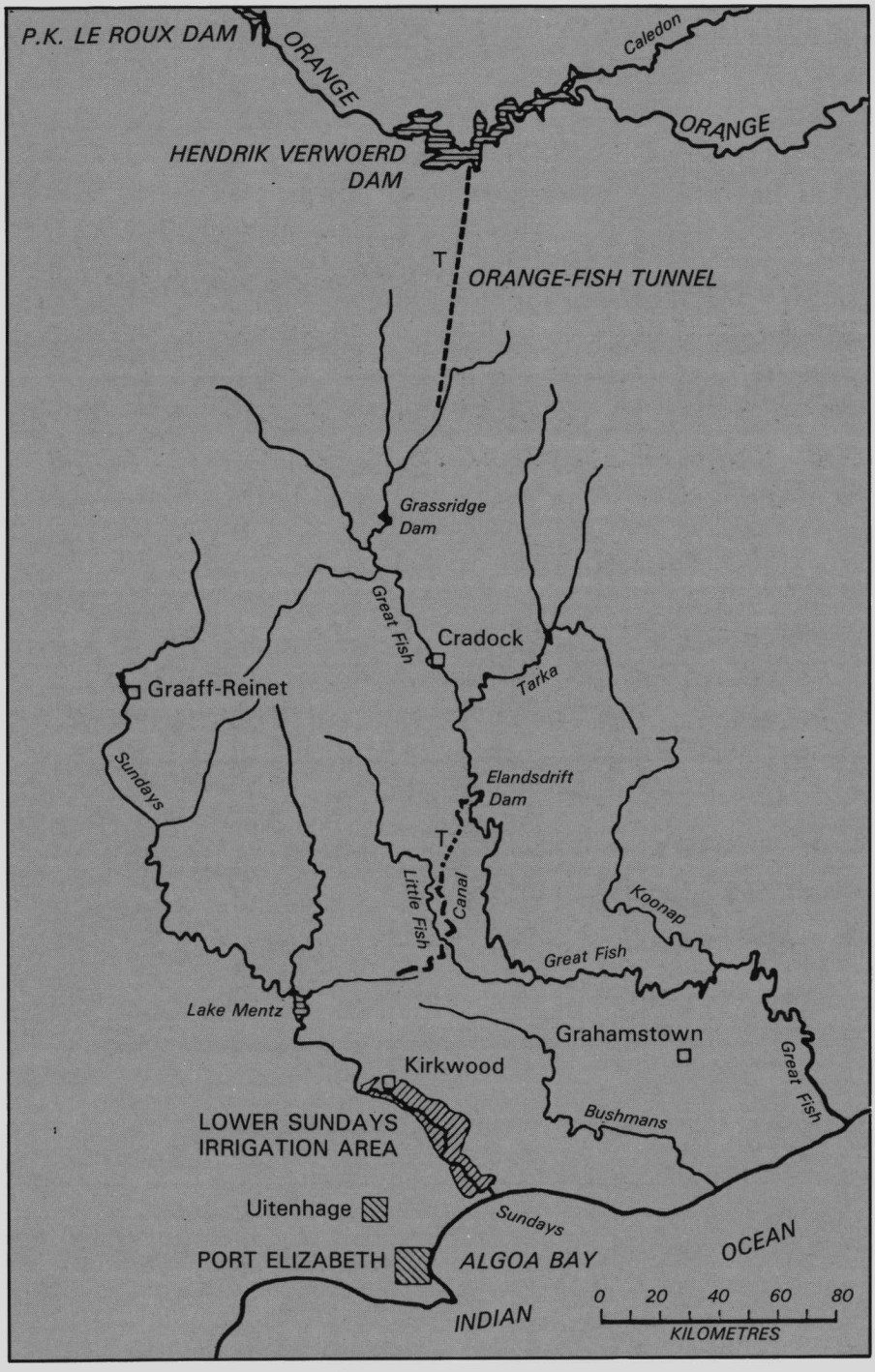
The purpose of SALINITY NEWS is to provide scientists, engineers and interested persons with a regular update of the scope and status of the Institute's salinity research. Further information on any of the projects and reports referred to in SALINITY NEWS can be obtained from:

The Director,
Hydrological Research Institute,
Private Bag X313, Pretoria 0001.

LOWER RIET RIVER: PREDICTION OF FUTURE SALINITY LEVELS

The Riet River Settlement of the Northern Cape is scheduled to receive water from the Orange River in 1987 via the Orange-Riet Canal, currently under construction. Detailed salinity investigations were launched in the catchment at the end of 1985 in an attempt to estimate the short and long term changes in river water quality resulting from the expected increase in irrigation development. The purpose of these predictions is to determine whether or not the irrigation return flows would be beneficial or detrimental to, further downstream expansion of irrigation activity. An additional objective of the study was to assess, in terms of expected water quality, two alternatives for balancing dam storage: i.e. a dam in the Riet River versus a suitably located pan.

The study was hampered by the lack of historic hydrological data for the catchment, thus the predictions relied heavily upon information collected during fieldwork. This included sampling soils, groundwater and surface water. Data processing and detailed modelling assisted in the final estimates of future water quality. The results of this study together with recommendations for future catchment monitoring, are contained in a recently completed report.



Schematic layout of the Orange — Fish — Sundays River System.

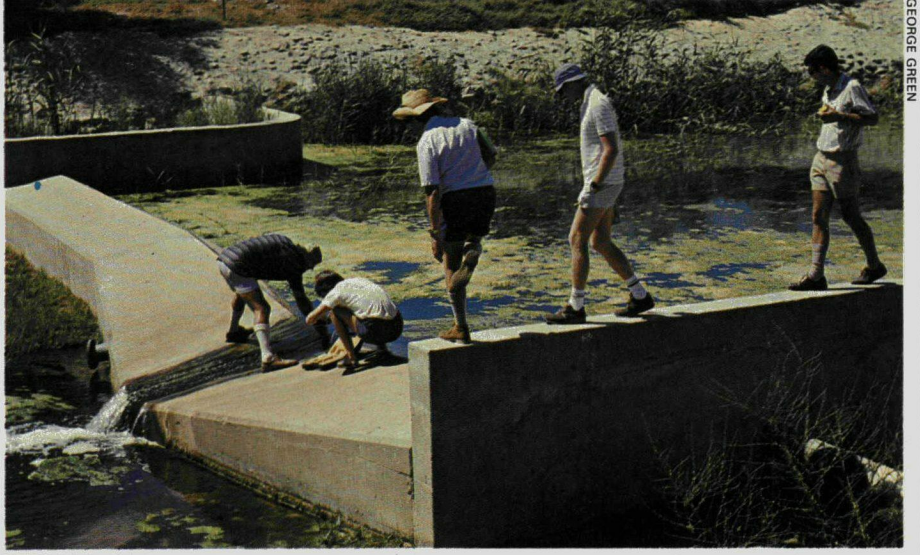
LOWER SUNDAYS RIVER: SALINITY INVESTIGATIONS

The Department of Water Affairs proposes to augment future water supplies to the Port Elizabeth metropolitan area with water from the Orange River via the Fish River, Lake Mentz and the lower Sundays River. Part of this inter-catchment transfer comprises a 57 km stretch of the lower Sundays River from the Korhanesdrift diversion weir (north of Kirkwood) to the proposed abstraction point near Addo.

The salinity of this stretch of river is known to be high and it was felt that this could threaten the quality of future supplies to Port Elizabeth. In 1984 the Hydrological Research Institute (Cradock) in colaboration with the Hydrological Research Unit of Rhodes University, established a surface and groundwater monitoring programme. This consisted of three river flow gauging sites, ten river sampling points, and six groundwater monitoring wells. The aim of this network was to assist in determining the magnitude and extent of the lower Sundays River salinity problem, together with the possible effects, if any, of future irrigation expansion.

A considerable amount of data was collected during the study. This was duly processed on a micro computer and stored on diskette. Future water quality predictions were made using statistical models which related irrigation development to return flow volume and salt load.

The lower Sundays River salinity study was documented and completed at the end of 1985.



GEORGE GREEN

GEORGE GREEN

Top: H4M18 measuring weir on the Poesjenels in the Breede River Valley.

Bottom: Efflorescence in the Poesjenels River-bed.

BERG RIVER: HYDRO-SALINITY MODELLING

The water resources of the lower Berg River comprise fresh water draining the upland Table Mountain Sandstone areas and saline water draining the lowland areas which are largely underlain by Malmesbury Shale. In future it is intended to utilise increasingly more of the upland fresh water resources. It is also intended to develop the remaining resources in the lower Berg River for urban supply to the Saldanha-Atlantis area.

MODEL

A detailed hydro-salinity model of the Berg River catchment has been set up to assist in the design and scheduling of future water resource developments and to ensure that a suitable supply water quality is maintained. The model used was a modified version of the FLOSAL monthly model developed by the NIWR for the testing of water planning alternatives in the Orange-Fish/Sundays transfer scheme.

The specific aims of the modelling exercise were firstly, to determine the water quality at three proposed dam sites in the lower Berg River subject to a side variety of upstream abstraction scenarios. Secondly, to evaluate the effectiveness of possible measures aimed at alleviating prospective salinity problems.

The modelling work was completed at the end of 1985. The results are currently being documented in a two volume joint report between the HRI and the Department's Directorate of Planning.

BREEDE RIVER: IRRIGATION RETURN FLOW RESEARCH

The Department of Water Affairs is attempting to determine whether increases in irrigation development will have an adverse effect on the water quality of the Breede River at the furthest downstream irrigation water diversion point which is supplied from the Greater Brandvlei Dam.

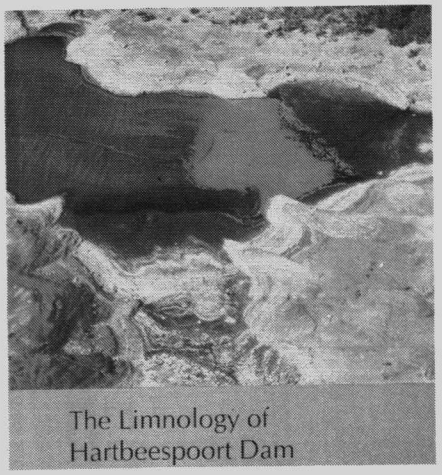
Following an assessment in 1984 of existing knowledge on the Breede Rivers's salinity problems, it was decided that a greater research emphasis must be placed on both the flows diverted to, and returned from, the various irrigation schemes served by the Breede River. This new emphasis has prompted the Water Research Commission to fund a short term project on the feasibility of measuring the flow of water and solutes through an irrigation scheme. The area chosen forms part of the Robertson Irrigation Area, which is adjacent to that stretch of the Breede River in which the most severe deterioration in water quality occurs.

The HRI is closely involved with the Robertson project, and is committed to providing certain facilities and information. In this regard it has established a Field Centre at the farm Lorrain, just outside of Robertson. The field centre which includes a fully equipped laboratory, is managed by the Institute's Western Cape Field Technician.

The HRI intends conducting detailed river salinity studies in the Breede River during the 1986-87 irrigation season. This work is designed to complement the WRC's Robertson Project.

THE LIMNOLOGY OF HARTBEESPOORT DAM

by the National Institute for Water Research



As the population of South Africa expands and simultaneously living standards and expectations increase, ever greater demands are made on the limited water resources of the country. It has recently become apparent to planners that water resources can be limited not only by quantity but also by quality, due to impairment by mineralization and by the consequences of nutrient enrichment or eutrophication.

In the past, South African limnologists and water planners have tended to follow the philosophy of the northern hemisphere with regard to eutrophication. This philosophy is that eutrophication is undesirable and must be done away with, principally by limiting the input of phosphorus to the aquatic environment. It resulted in much research to prove that eutrophication could be eliminated by reducing the quantities of phosphorus reaching surface water. Simultaneously, a related question was of paramount importance to water resource managers — what is the maximum amount of phosphorus that may be allowed to enter a standing water body without its becoming eutrophic? Research on this question has been carried out in many parts of the world, including South Africa, where work sponsored by the Water Research Commission was reported on by Walmsley & Butty (1980). Features common to the world-wide results are that the effects of a given annual load of phosphorus are modified by the mean depth and hyrology of the receiving body of water. However, none of the predictive relationships established have a statistically satisfactory predictive capability.

The starting point for the studies presented in this report was that the imprecision surrounding 'black-box' models of eutrophication was in part due to a lack of understanding of the quantitative functioning of standing water ecosystems. An improved understanding would be useful in planning the active, informed management of a eutrophied water body, both to derive benefit from its enhanced productivity and to ameliorate its undesirable characteristics. Moreover, this greater knowledge of functioning should yield important leads to the refinement of empirical models of the relationships between nutrient load and trophic status.

This study was structured around a simulation model of ecosystem functioning in terms of phosphorus cycling. A preliminary model was built before research and monitoring commenced, using the extensive but patchy existing data on the dam. In this initial phase the model helped clarify and identify key research questions.

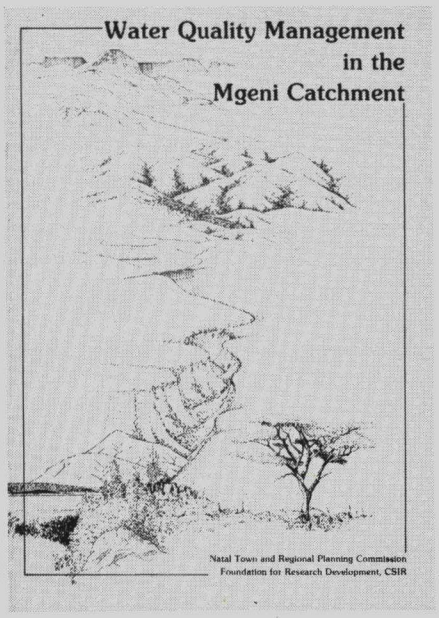
In the next phase of the study variations in the properties of the dam and those used to drive the model or to validate its output were monitored. At the same time many of the rates at which processes built into the model took place were measured. The preliminary model was frequently modified and updated as more knowledge became available and, where necessary, the research programme was modified. The model played a key role in research management and helped ensure that the diverse team research on different components of the ecosystem produced results which could be inter-related.

This report is written for a wide readership, ranging from specialist scientists to decision takers and managers. This has been taken into account in the structuring and style of this document. It could well be that the chapters on methods and the limnology of the dam are of little interest to some readers concerned mainly in management. The chapters have been written to be read individually, if necessary.

1985 269 pages
Price: Free of Charge
ISBN 7988 3590 7
Available from: The Foundation for Research Development, CSIR, PO Box 395, Pretoria 0001.

WATER QUALITY MANAGEMENT IN THE MGENI CATCHMENT

edited by CM Breen, EGJ Akhurst and RD Walmsley

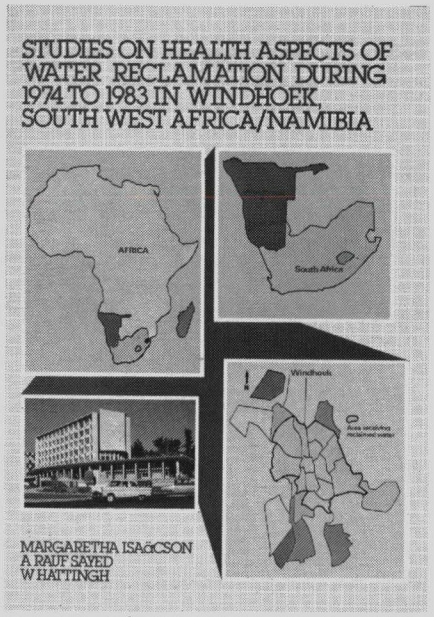


The Mgeni River is a vital water resource for the Province of Natal and consequently all activities and developments which might influence the quality of its water and usage require careful planning and co-ordination. The Town and Regional Planning Commission and the Inland Water Ecosystems Section of the CSIR's Foundation for Research Development have supported water quality-oriented research on the Mgeni River System for the past two decades.

This report contains the Proceedings of a Workshop, carried out under the auspices of the two organizations whose objectives were to evaluate the research findings and develop a regional planning strategy for the protection and management of water quality in the Mgeni Catchment. Attended by scientists, planners, engineers, water users and

administrators, the workshop has made an invaluable contribution to regional planning and development in Natal, not only delineating critical areas of the catchment where urban and industrial development should be limited, but also by recommending procedures whereby successful co-ordination and management of the catchment can be achieved.

1985
Price: R2,75 (incl.) 27 pages.
ISBN: 0 909232 42 3
Available from: The Natal Town and Regional Planning Commission, Private Bag 9038, Pietermaritzburg 3200.



HEALTH ASPECTS OF WATER RECLAMATION

In 1969 the city of Windhoek introduced water reclamation for potable use as a means to supplement water supplies during a period of prolonged drought.

This was the first system of its kind in the world and presented a unique opportunity to study the effect, if any, of the use of reclaimed water on a population.

The water reclamation system at Windhoek is based on extensive pilot scale research by the National Institute for Water Research, and the water continually met stringent chemical and microbiological standards. Nevertheless, questions are being posed by certain members of the international scientific community as to the advisability of using a polluted source for the production of drinking water. For this reason the Water Research Commission contracted the South African Institute for Medical Research in 1974 to conduct a long-term epidemiological study in Windhoek.

The importance of epidemiological studies in such situations was emphasized by two developments in the following year, 1975. Firstly, an expert committee of the World Health Organization called for epidemiological studies to be carried out before any supply of polluted water was to be used as a source for potable water. Secondly, the South African Department of Health drew up guidelines for the reclamation of water for unrestricted reuse from treated waste water, in which it is stipulated that epidemiological studies must precede and follow the introduction of such water for potable use.

This document is an overview of the studies carried out over a decade in Windhoek to assess both the short-term and long-term effects of exposure to potable water reclaimed from treated waste water.

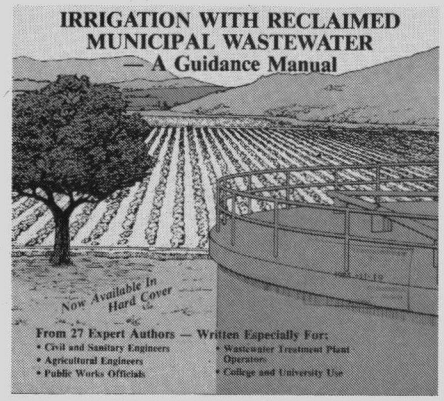
1986
Price: Free of charge
ISBN: 0 908356 40 4
Available from: The Water Research Commission, PO Box 824, Pretoria 0001. Tel: (012) 28-5461.

IRRIGATION WITH RECLAIMED MUNICIPAL WASTEWATER — A GUIDANCE MANUAL

Edited by G Stuart Pettygrove and Takashi Asano

This Guidance Manual is for use in the planning, design, and operation of agricultural and landscape irrigation systems using reclaimed municipal wastewater.

It is written for civil and sanitary engineers, and agricultural extension workers and consultants. The manual is also useful as a reference for public works officials, municipal wastewater treatment plant operators, and for college and university use. Several chapters were written specifically for California readers in the USA, but much of the Guidance Manual is applicable to arid and semi-arid environments outside of California.



The emphasis in this manual is on the beneficial use of reclaimed wastewater for agricultural and landscape irrigation. In this respect, it differs from publications such as the U.S. Environmental Protection Agency's *Process Design Manual — Land Treatment of Municipal Wastewater.* For example, this Manual emphasizes irrigation for the purpose of optimizing crop production; therefore, it includes detailed instruction in the calculation of crop water requirements. Furthermore, the benefits and limitations of using reclaimed municipal watewater for agricultural and landscape irrigation are discussed, as are other topics of special interest, including water management for salinity and sodicity control, and economic and legal aspects of reclaimed wastewater irrigation.

The Manual is a result of the cooperative effort among the University of California, the California State Water Resources Control Board, and other agencies and consultants, and represents the collective effort of 27 authors and several staff members over a period of two and a half years.

Please note, the Manual, is an exact reprint of a report by the same title, first published by the State of California in July 1984. Republication has been undertaken to make this significant report available worldwide in an enduring hardbound format for general and reference use.

1985 518 pages
Price 34,95 US $
ISBN 0 87371 061 4
Available from Lewis Publishers Inc., 121 South Main Street, PO Drawer 519, Chelsea, Michigan 48118.

BOREHOLE PUMP PROTECTION UNIT

A simple and effective method of protecting a borehole pump against dry running is now offered by Matheson & Bremner, the borehole pump specialists.

Borehole pumps are lubricated by the pumped water during normal pumping, thus when the capacity of the pump exceeds the borehole's capacity, the pump bearings and rotating element could seize causing the motor to overheat and burn out.

Matheson & Bremner now supply an electronic relay which is able to detect any change in the motor's power factor, which varies in proportion to the loading. The relay can be set by the user to suit any particular motor rating on standard 220 or 380 V supplies. When tripped the unit will restart the pump after a preset time delay, selectable by the user. This can range from a few minutes to several hours depending on the particular borehole's recovery time. Forgetting to open the discharge valve will also affect the loading on the motor and thus automatically stop the pump.

The phase angle relay can be provided for a new installation, or it can be retrofitted to any existing borehole installation in a matter of minutes, as the unit is introduced to the electrical circuit on the surface. No changes or alterations to the pump installations are necessary.

The relay can also be adapted for standard tank filling, emptying, pressure sensing and a host of other typical pump control applications.

The unit costs about R150 list, and is available through any one of the 80 M&B Pump Distributors throughout Southern Africa.

Enquiries: M&B Pumps, PO Box 104, Isando 1600, Tel: (011) 609-8260.

SUBMERSIBLE PUMPS

The Kyokuto range of submersible pumps previously distributed by Hugh Mellor are now available from Matheson & Bremner and their Distributors throughout South Africa.

The Kyokuto series are manufactured in Japan and approved by Flygt, Sweden, the international market leader for submersible pumps. The model L version is suitable for manual operation, while the model LA comes complete with two floatswitches for automatic liquid level control.

The pumps are supplied with integral motors, with Class E insulation and rated at 250, 400 or 750 W, suitable for connection to a 220 V single phase or 380 V three phase supply.

Capacities cover up to 350 ℓ/m for a head of 3 m, or up to 80 ℓ/m for a head of 16 m.

All models have double mechanical shaft seals as well as dust seals, motor protection is built-in, and 6 m of connecting cable is provided.

Enquiries: Matheson & Bremner, PO Box 104, Isando 1600, Tel: (011) 609-8260.

LEVEL MEASUREMENT

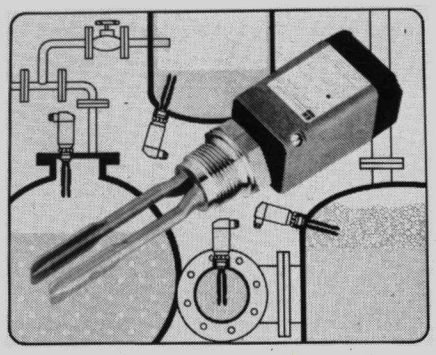
On display on the Endress + Hauser stand at Instr '86 will be the Nivosonic FMU 420 non-contact continuous level measurement system using ultrasonic sensors and microprocessor control. It is applicable to tanks with liquids and silos containing abrasive materials such as basalt, coal, gravel, sintered iron ore, coke, etc. When measuring the level of liquids, it performs well with highly viscous materials, those which tend to form deposits, in agitators and in multi-purpose vessels with changing products.

Outputs are universally applicable for indication, control and alarm units. Signal outputs available are 0 — 10 V, 0/4 — 20 mA and two adjustable set point signals.

Adjustments on the control panel are made to suit conditions in the tank/silo including the programmable elimination of spurious signals and a selectable time-constant for exponential smoothing. Comparison of actual echoes and microprocessor-treated echoes is possible using an oscilloscope.

The Nivosonic controller stores all important values in memory: level, preset limit values, temperature at the sensor and echo amplitude. Interference-free transmission of signals between sensor and control module is via an unscreened three-core cable allowing economic installation.

Enquiries: Endress & Hauser (Pty) Ltd, PO Box 783996, Sandton 2146, Tel: (011) 802-5620.



SWITCH SUCCESS

The big surprise of 1985 for Endress & Hauser one of Europe's leading level control equipment manufacturers was the success of their simple liquiphant FTL 160 level-limit switch designed as a low cost replacement for float switch applications. This simple device has outsold all other sophisticated capacitance, pressure sensor, vibration, gamma radiation, ultrasonic, microwave or electromechanical systems during the past year.

Liquiphant has no moving parts, is maintenance-free, simple to install, requires no adjustment and operates with millimeter precision. It has been installed to determine the level of such materials as foodstuffs, paints, and liquids of all description and operates reliably up to viscosities of 2 000 mm/s. Streams and turbulence do not affect it so it can be installed directly in mixing tanks and

pipes. It is robust, compact, immune to vibration and shock, and can be installed in any orientation.
Enquiries: Endress & Hauser (Pty) Ltd, PO Box 783996, Sandton 2146, Tel: (011) 802-5620.

NEW RAPID SLUDGE DEWATERING SYSTEM

Conventional drying beds would be much more widely used were it not for the lengthy dewatering time, due to lack of drainage at the base of the sludge blanket, the effect of precipitation, restricted use in winter, and the large surface area of land required.

The rapid sludge dewatering system (RSDS) overcomes all these objections with a simple vacuum system employing a new technology for a non-blinding filter plate, using as little as three per cent of the land area of drying beds, with dewatering in less than 24 hours.

The process consumes little electrical power, requires low doses of polymer, and has virtually no maintenance compared with mechanical dewatering systems.

The overall costs per tonne of dry solids in terms of capital investment and operating costs are lower than mechanical systems, drying beds or lagoons.

*GENERAL INFORMATION

RSDS uses a straight forward system for sludge dewatering and thickening which is not only very competitive in capital cost but enjoys very low operating costs. The process deals with most types of waste water sludges, potable sludges and industrial sludges. The overall costs per tonne of dry solids are in most cases the lowest of any dewatering process.

*VERSATILITY

Each system is custom designed to meet the requirements of the sludge in question and samples of sludges are tested in the laboratory and on-site demonstrations can be conducted with a portable plant.

The system operates in the open air from −30°C to +45°C, although in cold climates a light cover is usually provided to facilitate operators comfort.

Because the system can accept sludges with a solid content as low as 0,1 per cent conventional thickeners can be eliminated, thus reducing the capital cost of the overall plant. In some cases sludges can be dewatered to autothermic point, which when heavy metals are present means that the cake can then be incinerated without need of additional fuel.

Some 140 installations were completed in overseas countries in the three years up to June 1984 from as small as 40 kg d.s./day to as large as 24 tonnes/day. At the end of the process, filter cake can be removed by front-end loader, by vacuum or for small installations with a shovel.

*LOW CAPITAL COST

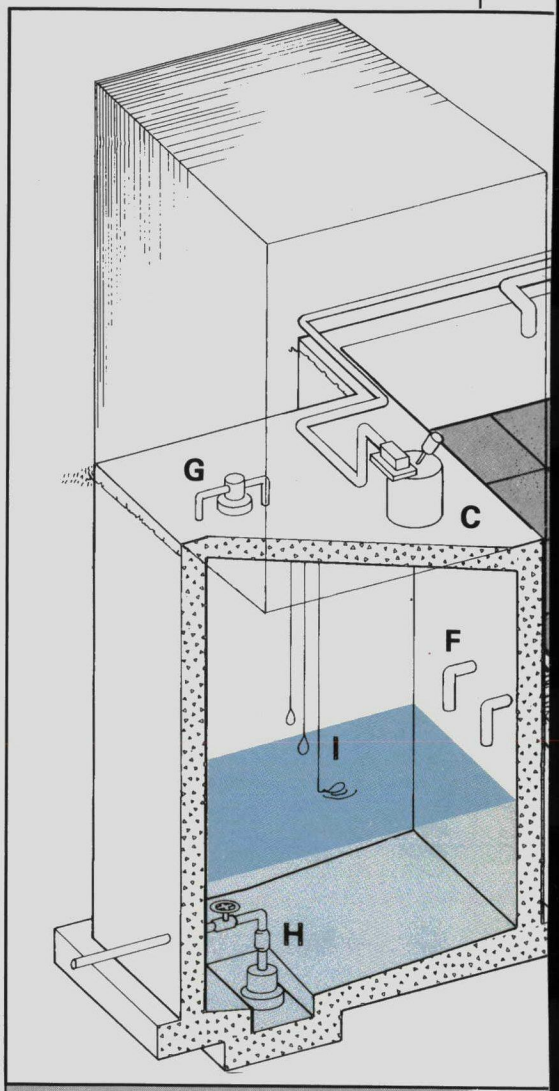
Small installations for up to 1 500 population equivalent can be provided turn-key in a 20' or 40' container. It is only necessary to connect the electric power, the sludge feed line and the filtrate line. Larger installations have a concrete bed(s) constructed in which the filter plates are installed. There are only two moving parts — the small vacuum pump and the centrifugal sump pump. These are both provided in duplicate for 100 per cent mechanical/electrical back-up. Where existing drying beds are in use some 3 — 7 per cent of the area can be converted to RSDS.

*LOW LABOUR AND MAINTENANCE COSTS

The system operates unattended except during the fill cycle and also during cake removal. For plants less than one tonne dry solids/day, typically 6 — 7 man hours per week are required. The system operates at double depth unattended over the week-end. Maintenance of pumps is typically every 5 000 operating hours or every 18 months.

*LOW ENERGY AND CHEMICAL COSTS

The centrifugal filtrate pumps operate on-demand from float switches and likewise the vacuum pumps operate on-demand from vacuum pressure switches. The overall electrical consumption is only around 7 — 10 kWh per tonne dry solids.



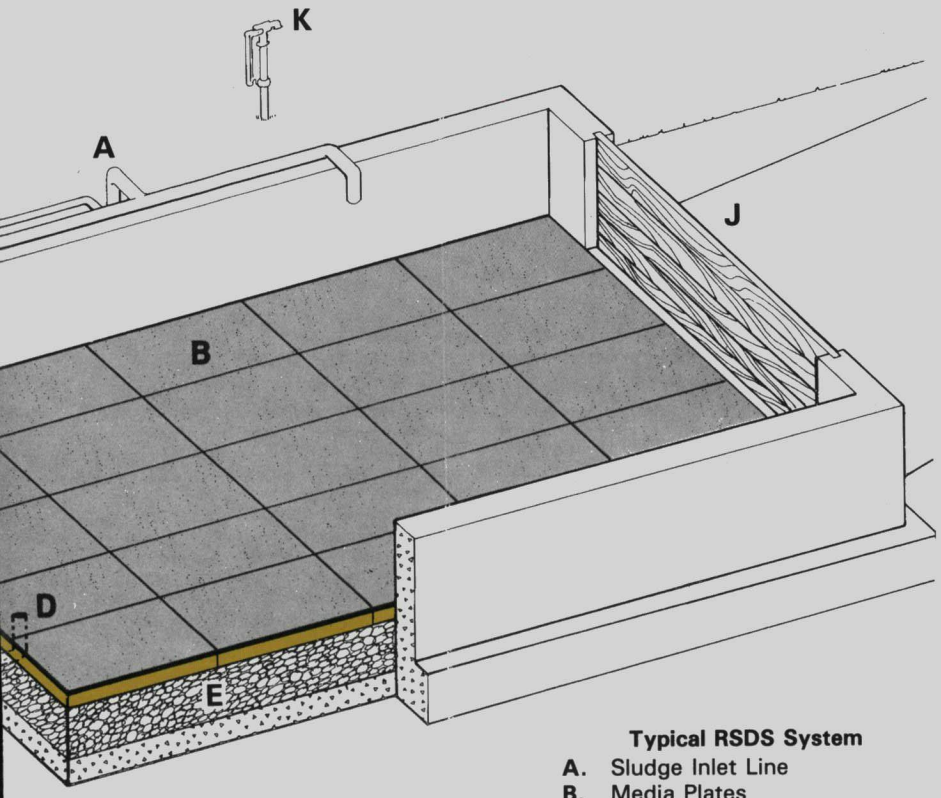
How the RSDS system works

Sludge is discharged onto media plates (B) through inlet line (A). Polymer from polymer system (C) is injected into sludge in inlet line and rapidly mixed with sludge. Floc is formed. Gravity dewatering begins as the bed is filling. Filtrate flows down through plates, under drain support plenum (E) and along tank bottom to filtrate line (F). Gravity

Most organic sludges require low doses of a flocculating agent. Experience has shown that where mechanical equipment has been replaced by RSDS, substantial savings in chemical conditioning costs have been made.

*CAKE AND FILTRATE QUALITY

Due to the low polymer sheer of the process the integrity of the floc is maintained in the cake for several



Typical RSDS System

A. Sludge Inlet Line
B. Media Plates
C. Polymer System
D. Wash Water Drain
E. Plenum
F. Filtrate Line
G. Vacuum Pump
H. Filtrate Pump
I. Level Controls
J. Stop Planks
K. Water Source

dewatering continues after bed is filled to maximum liquid level. The conditioned feed is then shut off.

Vacuum pump (G) is started, creating vacuum in sump and under media plates. Supernatant may be withdrawn simultaneously with vacuum dewatering, using optional supernatant withdrawal device. Filtrate pump (H) discharges with level controls (I).

When cake cracks and vacuum is lost, vacuum pump is shut off. Stop planks (J) are removed and cake is unloaded from media plates. Plug on wash down drain is removed and plates are hosed with water from water source (K). Wash water discharges to sump for removal. When washdown is completed, washdown plug is closed, stop planks are replaced and system is ready for next cycle.

weeks after removal from the RSDS bed. Thus the sludge will continue to dewater when stacked on hard-standing. The suspended solids in the filtrate are extremely low — beter than any mechanical process. Usually less than 30 mg/ℓ but can be as good as 5 mg/ℓ.

***THE FILTER PLATE AND CLEANING**

Between each operation the filter plate is purged with high-pressure water which removes all trace of the cake. At certain long intervals the system is cleansed with a de-greasant or other proprietary material.

***BACKGROUND OF RSDS DEVELOPMENT**

The process was developed from a Military Application which permitted the 5 mm of standing surface water to be eliminated from airstrips where aquaplaning was experienced during the monsoon season.

The top surface of the filter plates has a hardness of 9 on the Moh Scale and front-end loaders up to 2 tonnes total weight may be driven on them.

Enquiries: Bill Shone, Babcock Ames Crosta, PO Box 4561, Johannesburg 2000, Tel: (011) 833-4311.

SELF-PRIMING PUMP

A versatile side-channel centrifugal pump with an extremely wide range of applications is available from M & B Pumps and their Distributors.

The SERO range of centrifugal pumps are self-priming even up to 8 m which makes them ideal for conditions where air may be injected into the system or pumping volatile fluids. Flow does not cease abruptly even in the event of partial cavitation.

Capacities up to 600 ℓ/m and heads up to 300 m are available.

The SERO series are designed for clean or slightly contaminated liquids without abrasive material or solids and can be used for pumping anything from acids to oils foodstuffs to varnishes, salt water to pharmaceutical products.

They are currently operating in sprinkler systems, fire fighting, refineries, sea-water hydrophor and boiler-feed plants.

The construction of the side channel pumps is based on standardised modules thus ensuring a variety of designs to cover numerous requirements and helping stock availability.

Enquiries: M & B Pumps, PO Box 104, Isando 1600, Tel: (011) 609-8260.

BAIE DANKIE

In 'n artikel oor die toeslikking van damme wat in die Februarie-uitgawe van die SA Waterbulletin verskyn het, word mnr AF Ellis, hoof-ingenieur van die Departement van Waterwese, as die bron van die inligting aangegee. Die Departement het intussen laat weet dat mnr E Braune, direkteur van die Hidrologiese Navorsingsinstituut, ook 'n groot bydrae gelewer het met die verskaffing van die feite. *SA Waterbulletin* wil hiermee vir mnr Braune baie dankie sê vir sy hulp.

LSSA

The annual congress of the Limnological Society of Southern Africa will be held at the Safari Hotel, Windhoek, from 30 June to 4 July 1986. The theme will be *'Aquatic Ecosystems'.*
Enquiries: S Bethune, Chairman, Local Organising Committee, c/o Department of Water Affairs, Private Bag 13193, Windhoek, 9000, SWA/ Namibia.

HYDROLOGICAL SCIENCES

The second scientific assembly of the International Association of Hydrological Sciences will take place in Budapest, Hungary, from 2 to 10 July 1986.
Enquiries: Dr A Szöllösi-Nagy, Executive Secretary 2nd IAHS Scientific Assembly, Water Resources Research Centre (VITUK) H-1453, Budapest, PO Box 27, Hungary.

AQUATIC PLANTS

A conference on research and applications of aquatic plants for water treatment and resource recovery will be held from 20 to 24 July 1986 in Orlando, Florida, USA. Papers invited. *Enquiries:* Dr Wayne H Smith, Chairman, Aquatic Plants Conference Steering Committee, University of Florida — IFAS, McCarthy Hall, Room G040, Gainesville, FL 32611, USA.

AQUACULTURE

A symposium on aquaculture in South Africa will be held from 23 to 24 July 1986 at the Rand Afrikaans University, Johannesburg.
Enquiries: Miss M Robertse, Foundation for Research Development, CSIR, PO Box 395, Pretoria 0001.

SLUDGE AND SOIL

A pre-IAWPRC conference on the use of soil for treatment and final disposal of effluents and sludge will be held in Salvador from 13 — 15 August 1986.
Enquiries: Mr AMP Silva, Cetrel, Km 19 da BA. 536, Estrada de Camacari, Monte Gordo Camacari, 0453 Salvador, Bahia, Brazil.

IAWPRC

The 13th IAWPRC biennial international conference will be held in Rio de Janeiro, Brazil, from 17 August to 22 August 1986.
Enquiries: IAWPRC, 1 Queen Anne's Gate, London SW1H 9BT, England.

WATER VIROLOGY

A specialised seminar on water virology, associated with the 13th IAWPRC biennial conference will be held from 17 to 22 August 1986 in Rio de Janeiro, Brazil.
Enquiries: Dr WOK Grabow, National Institute for Water Research, CSIR, PO Box 395, Pretoria 0001.

MACROPHYTES

A post-IAWPRC conference seminar on the use of macrophytes in water pollution control will be held in Sao Paulo from 24 to 27 August 1986.
Enquiries: Mr FM Wiendl, Seminar on the Use of Macrophytes in Water Pollution Control, Cena Caixa Postal 96, 13400 Piracicaba, Sao Paulo, Brazil.

MARINE DISPOSAL

A post-IAWPRC conference seminar on the marine disposal of wastewater will be held in Rio de Janeiro from 25 to 27 August 1986.
Enquiries: Dr RG Ludwig, c/o ABES, Avenida Beira-Mar 216-13° andar, 20021 Rio de Janeiro — RJ, Brazil.

COAL AND WATER

The tenth International Coal Preparation Congress will be taking place in Edmonton, Alberta, Canada, from 31 August to 5 September 1986.
Enquiries: DW Horsfall (SA Correspondent). The South African Coal Processing Society, PO Box 61457, Marshalltown, Johannesburg 2000, Tel (011) 638-5447.

ANAEROBIC DIGESTION

A three day symposium on anaerobic digestion will be held at the University of the Orange Free State in Bloemfontein from 22 to 24 September 1986. Papers and exhibits are invited.
Enquiries: Mr Francois Marais, Non-formal Education, PO Box 4345, Bloemfontein 9300, Telephone: (051) 70661 x 425.

WATER MANAGEMENT

An international symposium on water: data processing and decision making will be held from 1 to 3 October 1986 in Montpellier, France.
Enquiries: Société Internationale de Congrès et Services, 337 rue de la Combe Caude, 34100 Montpellier, France.

WATER SUPPLY

A conference on Resources of Southern Africa II will be held at the College of Education, Johannesburg, from 12 to 14 November 1986.
Enquiries: Symposium Secretariat S. 400, CSIR, PO Box 395, Pretoria 0001, Tel: (012) 86-9211 x 2286.

CLIMATE RESEARCH

A conference on the mechanisms of interannual and longer-term climate variations will be held in Melbourne, Australia, from 8 to 12 December 1986. The conference has been timed to follow the Second International Conference on Southern Hemisphere Meteorology, to be held from 1 to 5 December 1986 in Wellington, New Zealand.
Enquiries: The organizing Committee Chairman, Dr Michael J Coughlan, Bureau of Meteorology, PO Box 1289K, Melbourne, Victoria, 3001 Australia.

CISTERN SYSTEMS

The third international conference on rain water cistern systems will be held in Khon Kaen, Thailand, from 14 to 16 January 1987.
Enquiries: Secretary Technical Committee, Third International Conference on Rain Water Cistern Systems. Faculty of Engineering, Khon Kaen University, Khon Kaen (40002), Thailand.

STABILIZATION PONDS

A conference on recent research on wastewater treatment in waste stabilization ponds will be held in Lisbon, Portugal, from 22 to 25 June 1987. Papers invited.
Enquiries: Professor DD Mara, WSP-Lisbon 1987, Dept. of Civil Engineering, University of Leeds, Leeds LS29JT, England.

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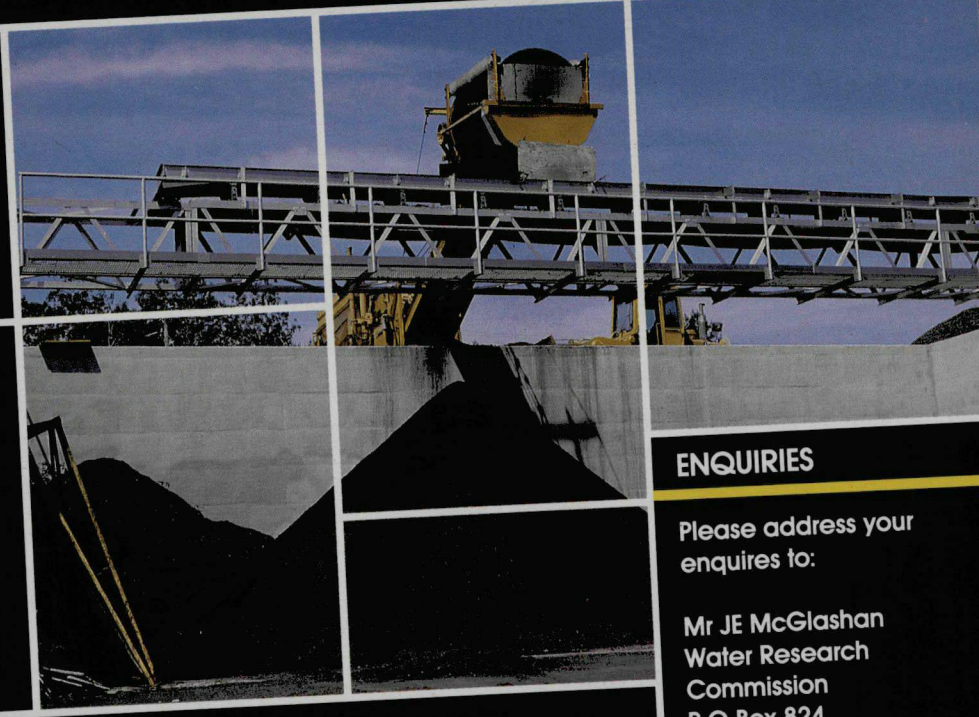

TECHNOLOGY TRANSFER

Seminar and Demonstration

FORCED AERATION STABILISATION (COMPOSTING) AND DISINFECTION OF SEWAGE SLUDGE

PROGRAMME

08h30 – 09h00:
Registration

09h00 – 10h00:
Overview of Sludge Treatment Processes.
JE McGlashan

10h30 – 11h00:
Forced Aeration Stabilisation: Overseas Practice.
JH Nell.

11h00 – 11h30:
Design and Cost of Forced Aeration Stabilisation Unit Operations.
WR Ross.

11h30 – 12h00:
Operation and Control of Forced Aeration Stabilisation Unit Operations.
JH Nell.

12h00 – 12h30:
Agricultural Utilisation of Stabilised and Disinfected Sewage Sludge.
AM Kitshoff.

12h30 – 14h00:
Lunch.

VENUE

Seminar:
Bellville Civic Centre.

Demonstration:
Bellville Sewage Works.

TRANSPORT

Transport from the seminar to the demonstration will be provided.

REGISTRATION FEE:

R10. Payable to the National Institute for

ENQUIRIES

Please address your enquires to:

Mr JE McGlashan
Water Research Commission
P O Box 824
PRETORIA
0001
Tel: (012) 28-5461

or

Mr WR Ross
National Institute for Water Research
P O Box 109
SANLAMHOF
7532
Tel: (021) 97-6181

REPLY CARD

Please complete the reply card in the bulletin.

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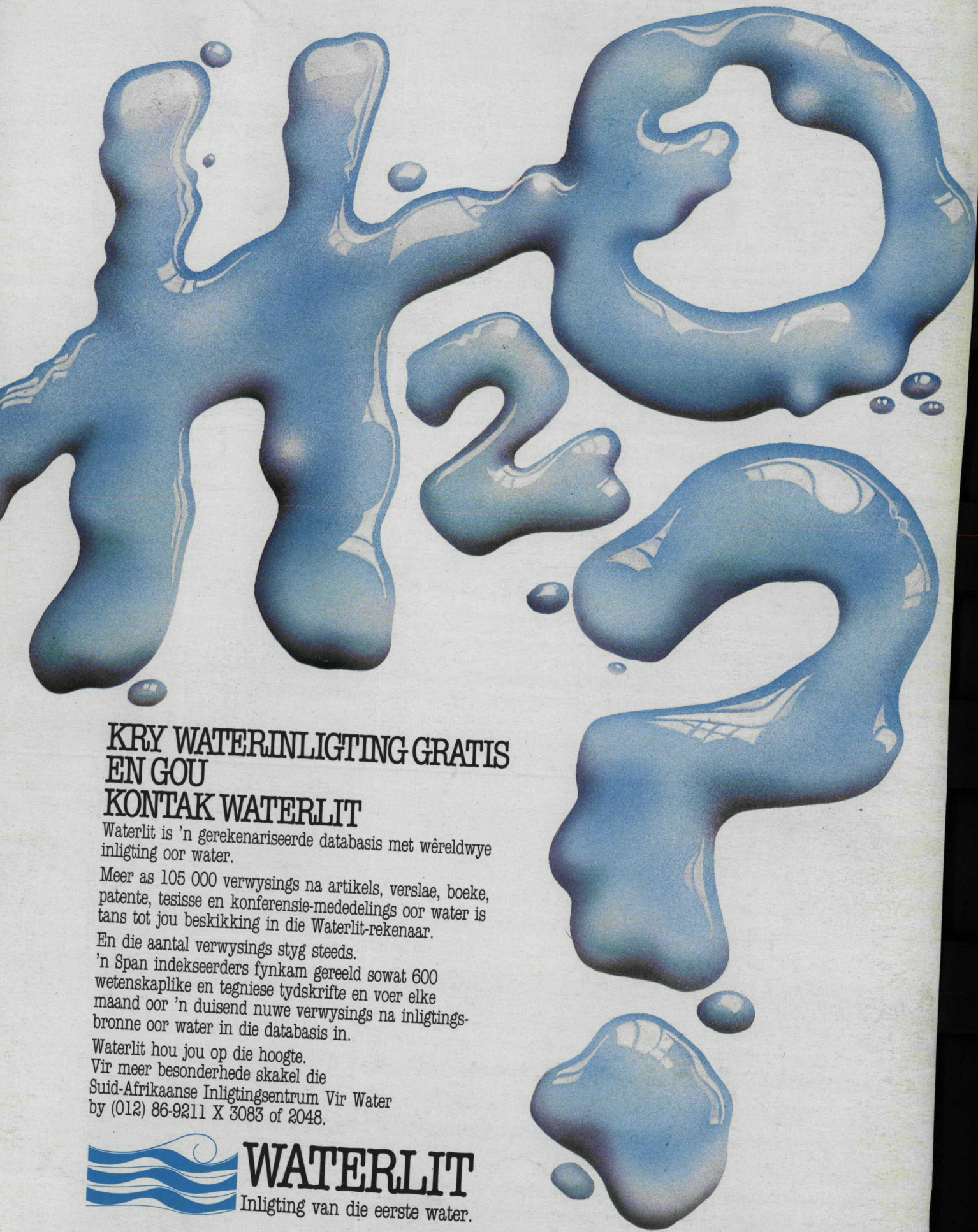

KRY WATERINLIGTING GRATIS EN GOU KONTAK WATERLIT

Waterlit is 'n gerekenariseerde databasis met wêreldwye inligting oor water.

Meer as 105 000 verwysings na artikels, verslae, boeke, patente, tesisse en konferensie-mededelings oor water is tans tot jou beskikking in die Waterlit-rekenaar.

En die aantal verwysings styg steeds.
'n Span indekseerders fynkam gereeld sowat 600 wetenskaplike en tegniese tydskrifte en voer elke maand oor 'n duisend nuwe verwysings na inligtingsbronne oor water in die databasis in.

Waterlit hou jou op die hoogte.
Vir meer besonderhede skakel die Suid-Afrikaanse Inligtingsentrum Vir Water by (012) 86-9211 X 3083 of 2048.

WATERLIT
Inligting van die eerste water.