SA waterbulletin

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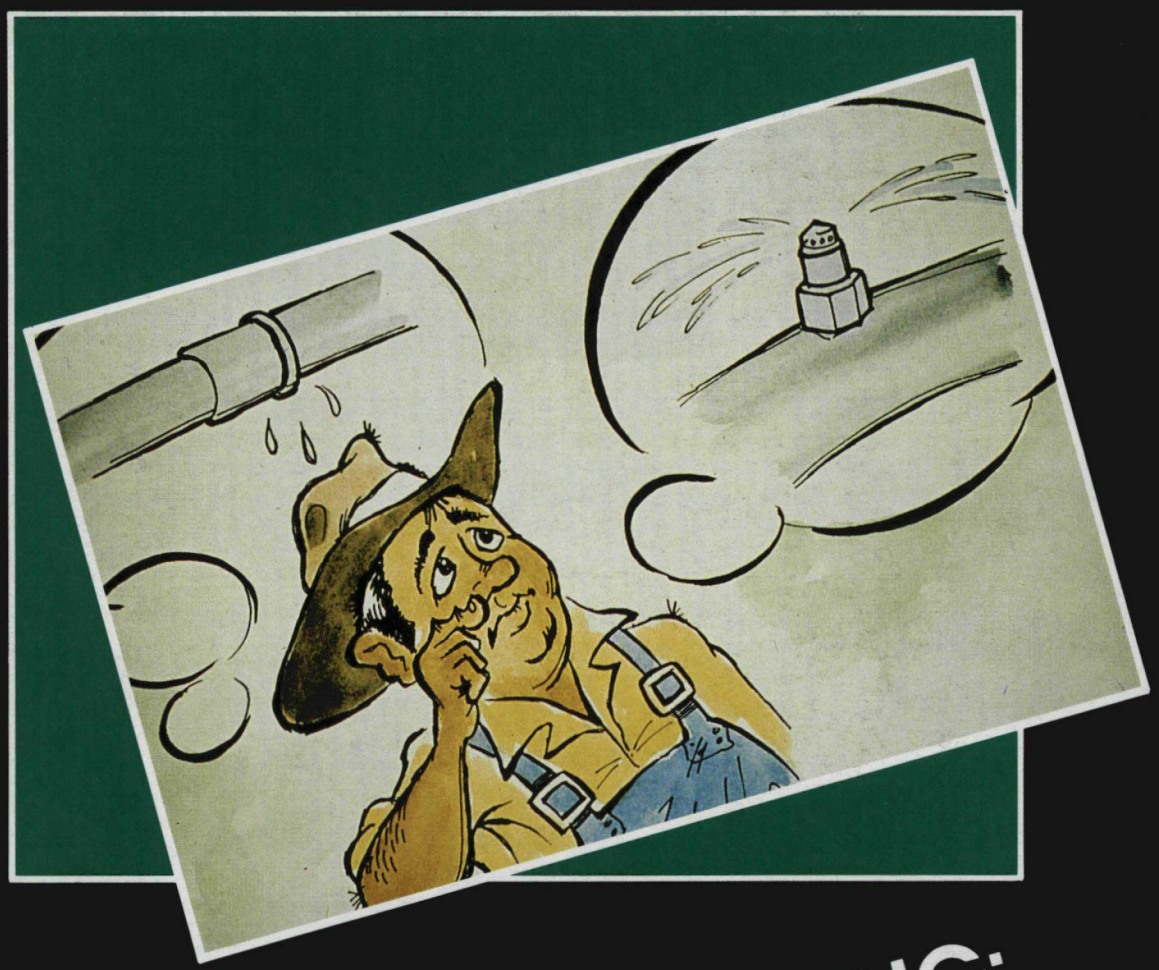

DRUPBESPROEIING:
Wêreldtendense

ABATTOIRS:
Waste-water treatment processes

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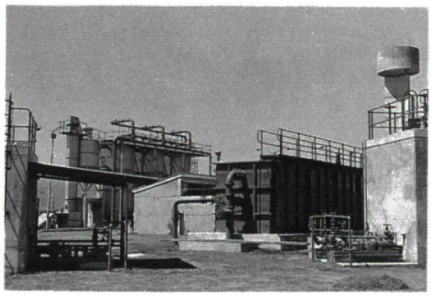
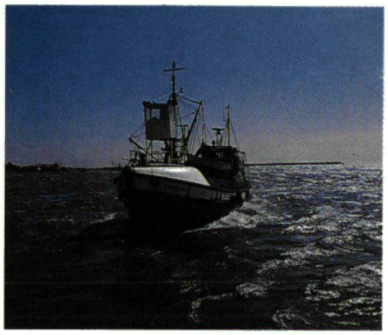
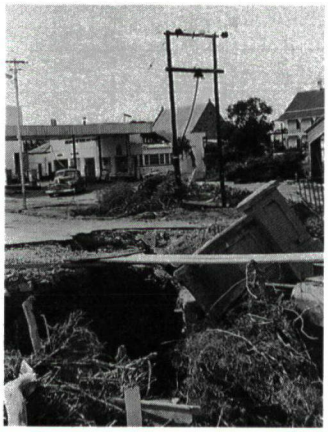


A GUIDE FOR THE PLANNING, DESIGN AND IMPLEMENTATION OF A WATER RECLAMATION SCHEME

A SURVEY OF WATER AND EFFLUENT MANAGEMENT IN THE FISH PROCESSING INDUSTRY IN SOUTH AFRICA

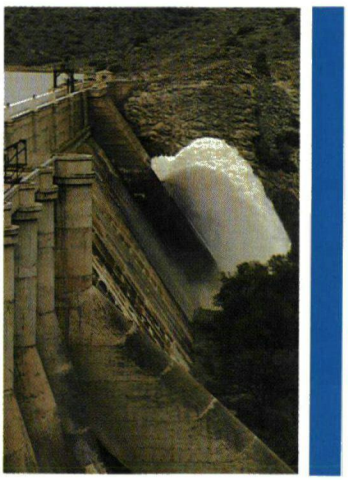


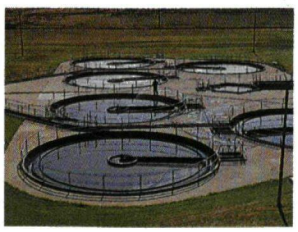
GUIDELINES FOR ASSESSING FLOOD DAMAGE IN SOUTH AFRICA



CHEMICAL CONTROL OF THE WATER HYACINTH ON HARTEBEES-POORT DAM

STUDIES OF MINERALIZATION IN THE GREAT FISH AND SUNDAY RIVERS VOL I & II





NUTRIENT REMOVAL FROM MUNICIPAL EFFLUENT

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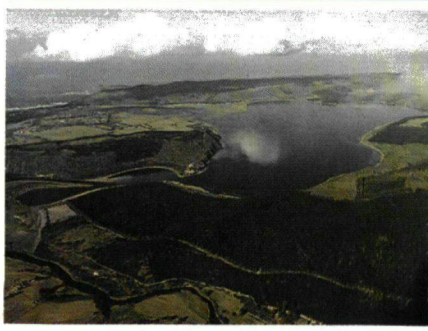
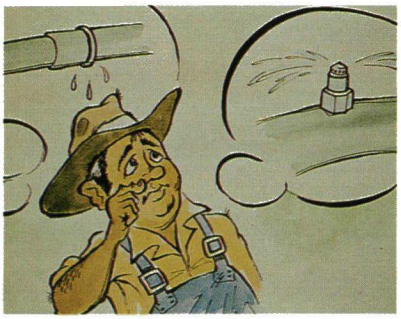


THE ECOLOGY OF SWARTVLEI: RESEARCH FOR PLANNING AND FUTURE MANAGEMENT

VOLUME 12 No 4
NOVEMBER 1986

SA waterbulletin



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inhoud

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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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Die eerste GJ Stander Gedenklesing is in September by die WNNR-konferensiesentrum in Pretoria gehou. Tydens die geleentheid het dr JP Kriel die lesing gelewer en het dr KL Cochrane die toekenning ontvang vir die mees belowende jong wetenskaplike vir 1985/86. Die lesing sal elke twee jaar plaasvind en word deur die Nasionale Instituut vir Waternavorsing aangebied.

WNK

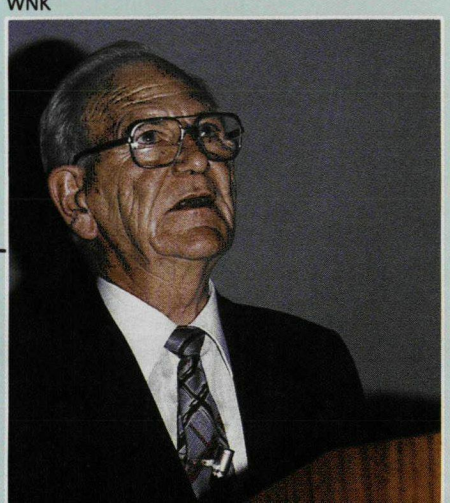
Dr Gerrie Stander, eerste Direkteur van die NIWN en voorheen ook Voorsitter van die WNK.

WNK

Mev Carrie Stander oorhandig die sleutel van die kas waarin dr Stander se persoonlike versameling is aan dr Daan Toerien, Hoofdirekteur, NIWN.

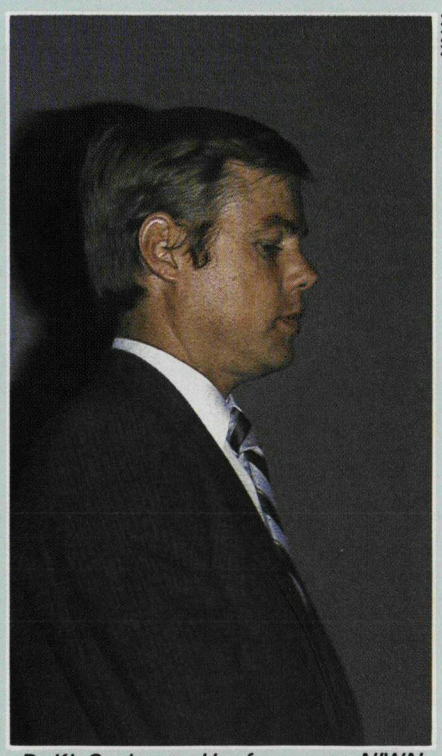
WNK

Van links: Dr Daan Toerien, mev Carrie Stander, dr Gerrie Stander en dr Jacques Kriel by dr Stander se persoonlike versameling wat hy aan die NIWN geskenk het. Die versameling bevat onder andere dr Stander se medaljes wat hy vir sy prestasies in die waterveld ontvang het.



WNK

Dr Jacques Kriel, Voorsitter van die WNK.



WNK

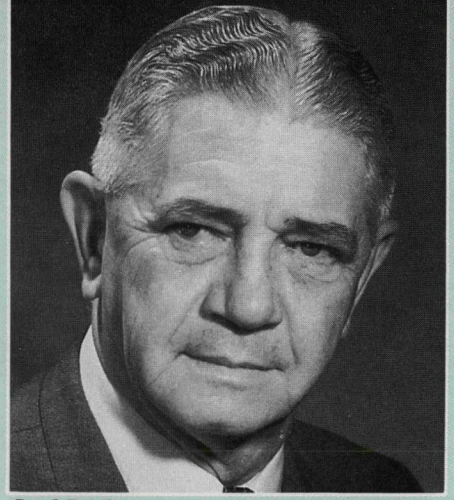
Dr KL Cochrane, Hoofnavorser, NIWN.

Die samestelling van die Waternavorsingskommissie is onlangs deur die Minister van Landbou-ekonomie en van Waterwese, mnr JJG Wentzel, in oorleg met die Kabinet hersien. Die hersiening vind elke drie jaar plaas.

Van die nege lede waaruit die Kommissie tans bestaan, is een nuwe lid gekies en ses heraangestel.

Die termyn van die lede wat ampshalwe in die WNK dien, naamlik, die uitvoerende direkteur van die Waternavoringskommissie en die direkteur-generaal: Waterwese is nie geraak nie.

Mnr GCD Claassens, Adjunk-direkteur-generaal, Departement van Waterwese.



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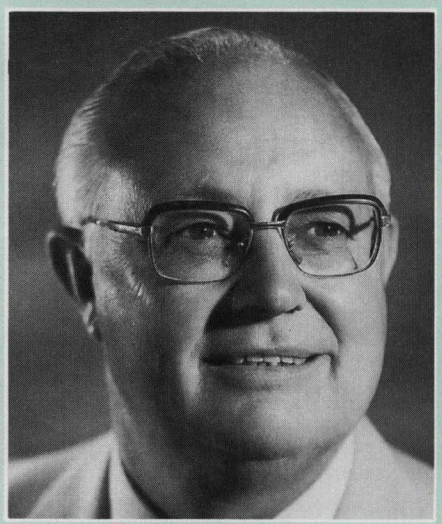
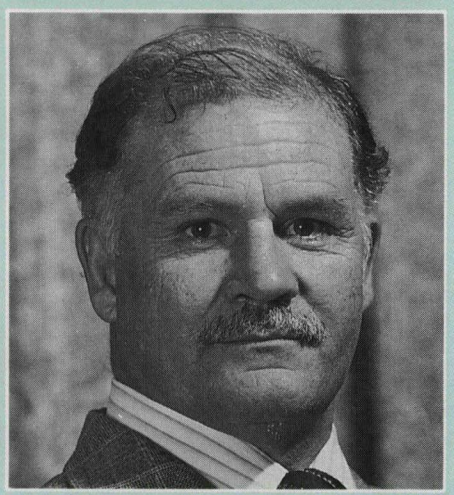
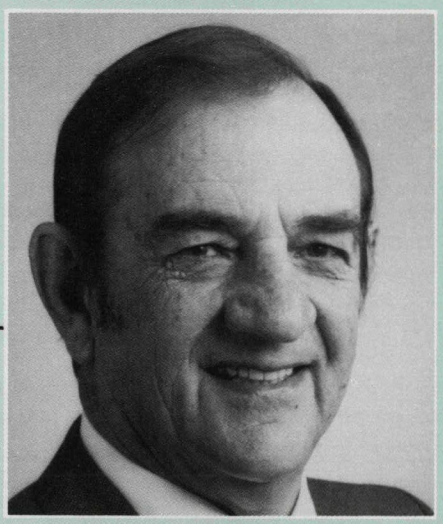


Mnr JG du Plessis, Direkteur-generaal, Departement van Waterwese.

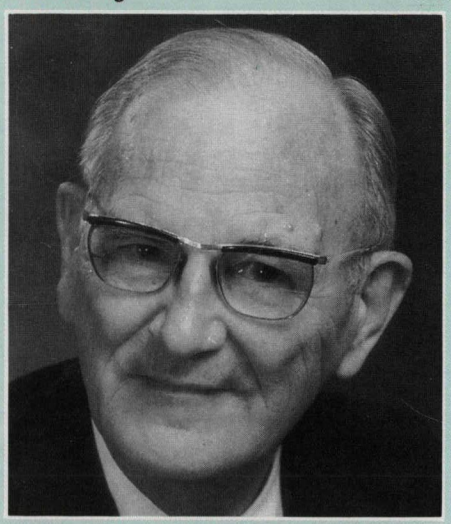


Dr DW Immelman, Direkteur-generaal, Departement van Landbou-ekonomie en -bemarking.

Mnr AJ Raubenheimer (DVD), voormalige Minister van die Departement van Waterwese en ook voorheen Voorsitter van die Komitee vir Beplanning en daarna die Komitee vir Ekonomiese Sake van die Presidentsraad.



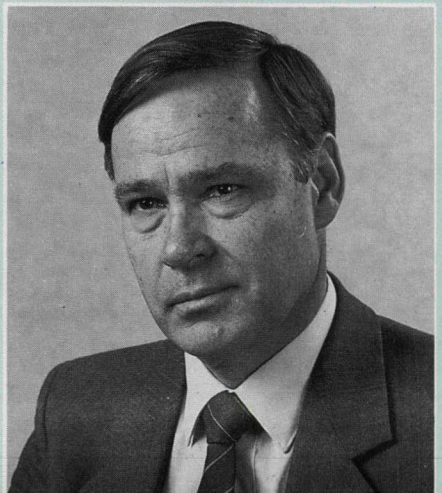
Mnr PE Odendaal, Uitvoerende Direkteur, WNK.

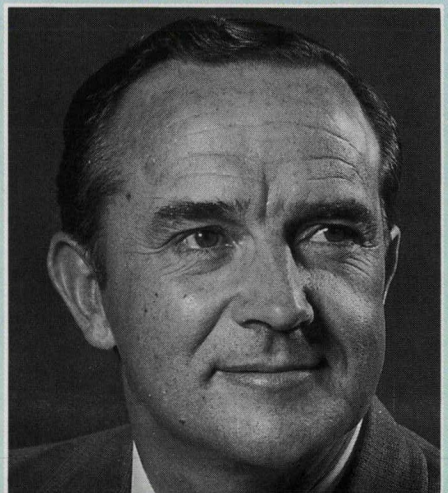


Dr JP Kriel, Voorsitter, WNK.

Dr CF Garbers, President, WNNR.

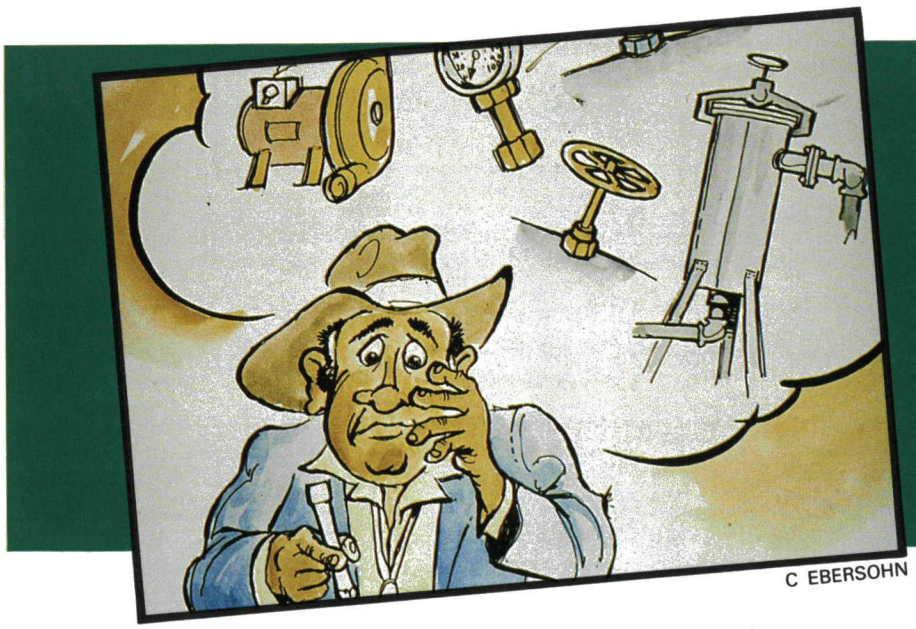
Dr WL van Wyk, voormalige Adjunk-direkteur-generaal, Departement van Mineraal- en Energiesake.





DRUPBESPROEIING

GOEIE RESULTATE NEEM WÊRELDWYD TOE



Dwarsoor die wêreld is daar 'n bestendige groei in die gebruik van drupbesproeiingstelsels. In Suid-Afrika het die oppervlakte onder drup- en mikro-besproeiing toegeneem van 1 persent van die totale besproeide area in 1976 tot 8 persent in 1984. 'n Ander goeie voorbeeld is Hawaii.

In 1970 word 48 000 hektaar suikerriet besproei – 90 persent deur voorbesproeiing en 10 persent deur sprinkelbesproeiing. In 1984 word daar egter 45 400 hektaar suikerriet besproei waarvan 84 persent deur drupbesproeiing is. Dit het in Hawaii ook geblyk dat drupbesproeiing 22 persent hoër opbrengste lewer, asook 26 persent hoër produksietempo's. Verder is die doeltreffendheid van toediening verbeter van 35 persent vir voorbesproeiing tot 80 persent vir drupbesproeiing. Weens die laer energie- en arbeidsbehoeftes van drupbesproeiing is die produksiekoste ook verlaag.

Hoewel die moontlike voordele, beperkings en slaggate van drupbesproeiing teen hierdie tyd goed bekend is, is daar nog baie probleme wat navorsing vereis. Volgens mnr David van der Merwe, hoofadviseur van die Waternavorsingskommissie (WNK), wil dit voorkom of navorsing oor fasette van drupbesproeiing nie sy regmatige aandeel in die besproeiingsnavorsingspoging van Suid-Afrika kry nie.

Mnr Van der Merwe het verlede jaar die derde internasionale drupbesproeiingskongres in Amerika bygewoon. Die tema van die kongres was *Besproeiing in Aksie* en 'n wye oorsig oor die nuutste navorsingsresultate, toerusting en gebruike van drupbesproeiing is gegee. Daar is 160 referate gelewer.

In sy verslag oor die kongres het mnr Van der Merwe etlike interessante wêreldtendense uitgewys en ook 'n aantal aanbevelings gemaak vir toekomstige navorsing oor drupbesproeiing in Suid-Afrika.

Hy sê die drie navorsingsprojekte oor besproeiing wat tans deur die WNK gefinansier word, hou verband met navorsingsbehoeftes wat ook deur die kongres geïdentifiseer is. Die WNK-projekte, wat direk of indirek te doen het met drupbesproeiing, is:

- ☐ Die ontwikkeling van nodige apparaat en programme om die werkverrigting van besproeiingstelsels te monitor en te bestuur.
- ☐ Die ontwikkeling van prosedures vir die keuse van geskikte besproeiingsmetodes en die ontwerp van besproeiingstelsels.
- ☐ Navorsing oor drupbesproeiing van tamaties.

Mnr Van der Merwe wys verder in sy verslag op etlike areas waar navorsing nog verder uitgebrei kan word. Hulle is:

- ☐ Realistiese metodes moet ontwikkel word om die tyds- en ruimtelike variasie van grondvog onder drupbesproeiing vir verskillende toestande te voorspel.
- ☐ Bepaling van die minimum en optimale gedeelte van die grondvolume wat vir verskillende gewasse natgemaak moet word.
- ☐ Ontwikkeling van nutriëntbestuursnorme vir gewasse onder drupbesproeiing.
- ☐ Ontwikkeling van bestuursnorme vir die toediening van ander chemiese stowwe deur 'n drupbesproeiingstelsel. Tans is daar min middels wat spesifiek geregistreer is vir toediening deur drupstelsels. Tog is die moontlikhede groot vir bestryding van byvoorbeeld plantsiektes wat deur die grond oorgedra word.

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- ☐ Syfering- en logingstempo's in die wortelsones onder drupbesproeiing moet geëvalueer en beheer word.
- ☐ Vermindering van die kapitale koste en vereistes vir instandhouding van drupbesproeiingstelsels deur die betroubaarheid en leeftyd van onderdele te verbeter. Daar is ook 'n behoefte aan vereenvoudigde drupbesproeiingstelsels met die oog op die gebruik daarvan in ontwikkelende lande.
- ☐ 'n Kritiese vergelyking van al die beskikbare gerekenariseerde ontwerpmetodes vir Suid-Afrikaanse toestande.
- ☐ 'n Aantal navorsingsbehoeftes oor drupbesproeiing is tydens 'n werksessie van die Koördinerende Komitee vir Besproeiingsnavorsing geïdentifiseer. Hierdie navorsingsbehoeftes is nie net plaaslik van belang nie, maar sal ook internasionale impak hê. Die prioriteitsgradering wat aan hierdie navorsingsbehoeftes toegeken is, regverdig spoedige uitvoering daarvan.

Van die verskeie waarnemings wat mnr Van der Merwe gemaak het, beskou hy die beter beheer en outomatisering van die frekwens en hoeveelheid van watertoedienings deur drupbesproeiingstelsels as een van die belangrikste tendense op hierdie gebied. Nog 'n duidelike tendens is die gelyktydige toediening van bemesting-stowwe en plaagbeheermiddels.

Hy wys egter daarop dat daar ook by drupbesproeiing geen plaasvervanger vir behoorlike ontwerp, installering, instandhouding en bedryf is nie.

Oor die gehalte van drupbesproeiingstelsels meen mnr Van der Merwe dit kan verbeter word deur gedurende die ontwerpstadium meer op optimisering te konsentreer.

"Die gerief van vinnige en akkurate ontwerpsprosedures is belangrik, maar kan sekondêr word indien die risiko verbonde aan die uiteindelike gebruik van die stelsel onaanvaarbaar hoog word," beklemtoon mnr Van der Merwe.

Die toediening van chemiese stowwe deur drupbesproeiing is 'n praktyk wat vry algemeen voorkom. Referate wat tydens die kongres oor hierdie onderwerp gehandel het, het gefokus op praktiese aspekte soos:

- ☐ Die praktyk sal slegs 'n sukses wees indien die stelsel as besproeiingstelsel al die vereistes van uniformiteit en tempo van toediening nakom.
- ☐ Die stowwe moet oplosbaar wees om verstopping te voorkom. Dit moet nie met mekaar reageer nie en ook nie die onderdele van die stelsel aanval nie.
- ☐ Skedulering van beide besproeiing en toediening van die stowwe stel groter bestuursvereistes.
- ☐ Geen afloop vanaf die besproeide gebied na ander gebiede mag voorkom nie. Na toediening moet die stelsel op 'n veilige plek gespoel word.
- ☐ Algemene veiligheidsmaatreëls moet verskerp word.

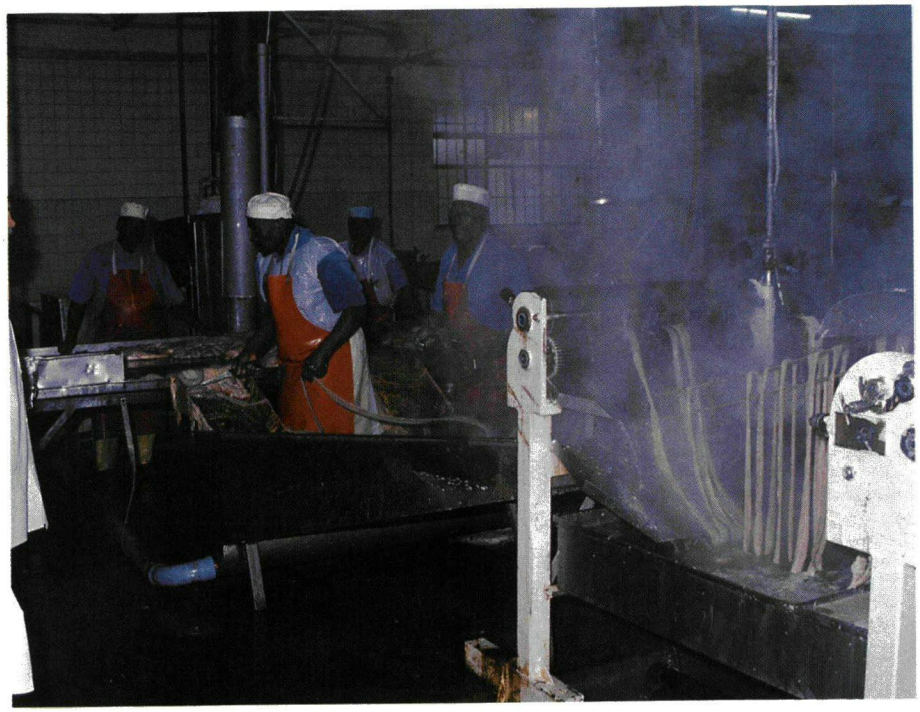
"Interessante resultate oor 'n ondersoek na die effek van oorskakeling van vloedbesproeiing na drupbesproeiing is gerapporteer," sê mnr Van der Merwe. Die ondersoek is op 'n gevestigde sitrusboord wat vir 16 jaar vloedbesproei is, uitgevoer. Daar is dus na gedeeltelike benatting van die grondoppervlakte oorgeskakel wat 'n verandering in vogverspreiding en wortelontwikkeling tot gevolg gehad het.

"Die effek van oorskakeling op die boomontwikkeling en opbrengs was weglaatbaar klein oor die ondersoekperiode van ses jaar.

Oor die korttermyn, gedurende die eerste jaar van oorskakeling, is ook geen nadelige effekte waargeneem nie. Na die tweede jaar het die bome met gedeeltelike oppervlaktebenatting, met ander woorde dié onder drupbesproeiing, minder gereageer op verdere watervermindering. Hierdie bome het egter ook gunstiger reageer met verhoging in die watertoediening en bemesting. Hierdie ondersoek toon dus aan dat die oorskakeling nie met 'n tydelike benadeling van die boord gepaardgaan nie," sê mnr Van der Merwe.

"Die algemene slotsom is dat drupbesproeiing vir hoë-inkomste gewasse ekonomies geregverdig kan word sonder dat die gebruik daarvan noodwendig skouspelagtige produksieverhoging tot gevolg moet hê," sê mnr Van der Merwe. "Vir gewone akkergewasse daarenteen is 'n betekenisvolle verhoging in produksie 'n voorwaarde voordat drupbesproeiing aanbeveel kan word. Die mate van produksieverhoging wat dit vir laasgenoemde tipe gewasse sal regverdig, sal van die betrokke omstandighede afhang."

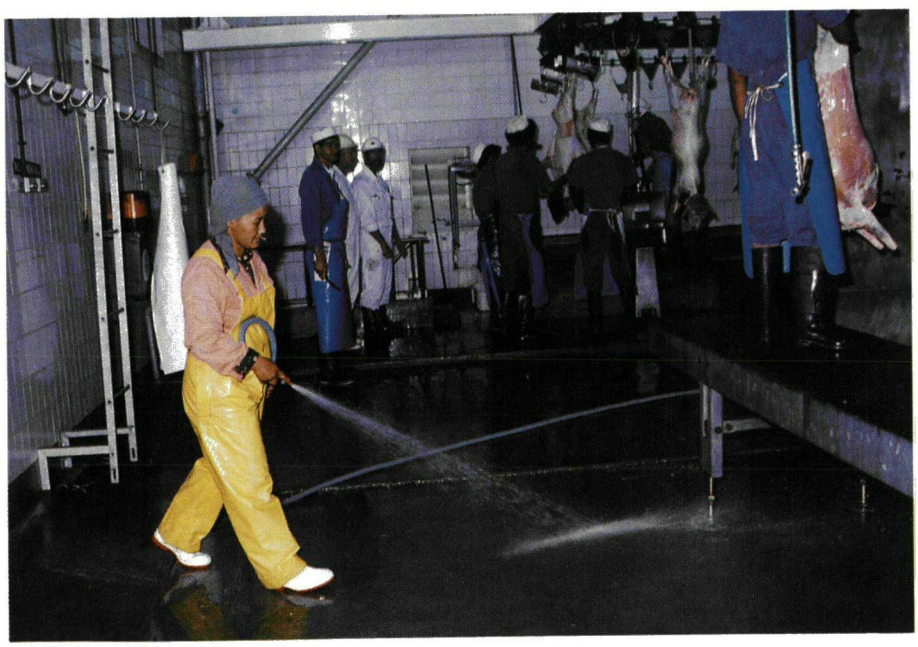
C EBERSOHN



Demo shows how water can be saved from abattoir drains

Research sponsored by the Water Research Commission has shown that approximately 40 per cent of the water demand at red meat abattoirs could be satisfied by using membrane processes to reclaim water from effluents generated in the abattoirs.

These effluents when treated by membrane processes like reverse osmosis or ultra-filtration not only produce renovated water but proteins and fats are also recovered for rendering and the organic loads to sewage treatment works are reduced. The Water Research Commission recently joined with consulting engineers Binnie & Partners and the Cape Town Municipality to host an open day at the Maitland Abattoir in Cape Town. Delegates from the meat processing industry were treated to a demonstration of the latest techniques and results in the optimisation of water and waste water management in abattoirs.



In the Republic of South Africa 300 red meat abattoirs slaughter nearly 12 million animals each year using 7 million $m^3$of water in the process. At the same time they discharge more than 5 million m^3 of waste water for treatment at municipal and other works. This waste water carries with it something like 18 000 tons of carbonaceous matter and 3 000 tons of nitrogen – valuable assets if it can be recovered.

Previous investigations into treatment techniques for strong organic effluents indicated that the meat processing industry has the potential for saving considerable quantities of high quality water and significantly reducing the pollution loads discharged in its waste waters.

To identify in more detail the patterns

of water usage and effluent generation within the industry, a number of surveys were carried out at various red meat and poultry processing abattoirs. A series of pilot-scale effluent treatment trials were also carried out at red meat and poultry abattoirs to determine experimentally the applicability of various physical and chemical treatment techniques for these effluents.

Combining the findings from the water usage surveys and these preliminary effluent treatment studies, it was concluded that membrane processes could produce a treated effluent quality suitable for selective reuse within abattoirs, and that the industry could satisfy a substantial proportion of its water demand by these means. Accordingly, longer-term trials were instituted to establish membrane life and performance when operating on abattoir effluents on a daily basis over an extended time period.

WATER USAGE AND EFFLUENT GENERATION

In red meat abattoirs, water usage per cattle unit (CU) slaughtered was found to range from 1,23 to 10,0 m^3 per CU. An intensive survey at a selected abattoir gave the following breakdown of the overall water usage:

Hot Water Generation	35%
Meat Processing	19%
Cooling and Refrigeration	12%
Lairages	12%
Amenities	12%
Steam Raising	5%
Vehicle and Yard Washing	5%

The effluent volume generated from red meat processing was found to be around 72 per cent of the water intake. Specific pollutant loads discharged in the abattoir waste water were typically 7,5 kg COD/CU and 1,2 kg Settleble Solids (SS)/CU. Solids from the rough offal area were around 4,3 kg/CU.

At poultry abattoirs processing from 1 000 to 70 000 birds/day, measured water usages for processing ranged from 11,4 to 16,1ℓ/bird. The waste-water volume generated was typically 83 per cent of the water intake for all purposes, and specific pollutant loads discharged averaged 18,9 g COD/bird and 5,8 g SS/bird.

EFFLUENT TREATMENT STUDIES

Various physical and chemical effluent treatment processes were investigated on pilot-plant scale on both red meat and poultry abattoir effluents. Processes tested, included static screening, chemical dosing, filtration through boiler ash, dissolved air flotation, ultrafiltration and reverse osmosis. Overall conclusions as to the efficacy of the process for the treatment of abattoir effluents are as follows:

STATIC SCREENING on pilot scale and full scale at two red meat abattoirs, using tangential wedgewire screens of 0,7 mm nominal aperture, gave a minimum of 30 per cent reduction in the SS load in the abattoir waste water at inlet weir loadings from 16 to 20 m^3/h per metre of screen width. Rotary versions of such screens are also available, and some form of suitable screening is recommended as a generally beneficial pre-treatment process for all abattoir waste waters.

CHEMICAL DOSING of effluents from red meat abattoirs, using acidic or protein-specific coagulants, was found to be effective for precipitating proteinaceous materials. The best chemical efficiencies were obtained using either sodium hexametaphosphate (at pH4) or ferric chloride (at pH 5,5). Typically 10 to 12 grams of soluble COD were precipitated per gram of these chemicals dosed. Following protein precipitation at low pH, *filtration* through alkaline boiler ash was found to be a useful neutralising process.

DISSOLVED AIR FLOTATION of chemically dosed red meat abattoir effluents gave similar results on pilot scale and full scale. Optimum protein precipitation was obtained using around 160 mg/ℓ of sodium hexametaphosphate, under which conditions from 60 to 75 per cent SS removal efficiency and 70 to 85 per cent COD removal efficiency were obtained at hydraulic surface loading rates ranging from 1,27 to 1,65 $m^3/m^2.h$. At higher loading rates, or when using less suitable coagulants such as ferric chloride, COD and SS removal efficiencies were reduced to typically 50 per cent removal. Monitoring of a fullscale *induced air flotation* plant at a poultry abattoir showed that the process could reduce the COD load in abattoir waste water by up to 60 per cent. In all cases, the recovered float materials (precipitated proteinaceous solids) were suitable for rendering to animal feed with nett profitability.

Membrane Processes were applied to effluents from both red meat and poultry abattoirs to assess the suitability of such processes for treating these effluents and in addition for recovering permeates of reusable quality for selected applications. On red meat processing effluents, ultrafiltration gave a permeate quality of typically 500 mg COD/ℓ and 1000 mg TDS/ℓ, while the permeate quality from *Reverse Osmosis* was typically better than 50 mg COD/ℓ and 100 mg TDS/ℓ. For both processes, the membranes could be successfully cleaned, i.e. the permeate flux could be effectively restored, by using cleaning solutions of caustic soda and detergent. A major conclusion from these preliminary membrane trials was that approximately 40 per cent of the water demand at red meat abattoirs could be satisfied by reusing the permeates from these membrane processes in selected applications. Similarly promising conclusions were drawn for use of membrane processes for effluent treatment or water renovation, at poultry abattoirs. As a result of the promise shown, the current series of long-term membrane trials was instituted at Maitland Abattoir to assess membrane life and overall process cost effectiveness over a realistically extended period of operation.

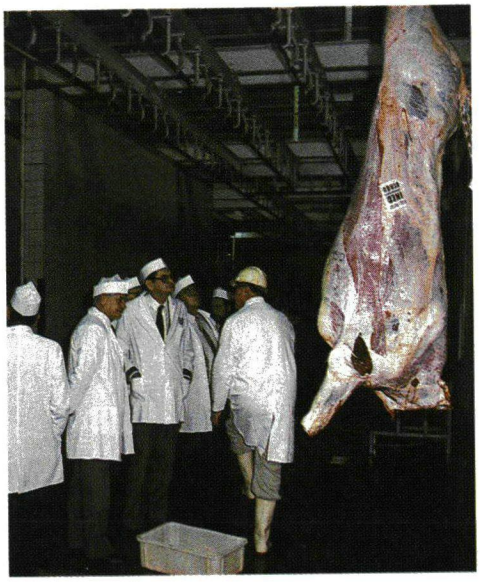
CURRENT PROJECT STATUS

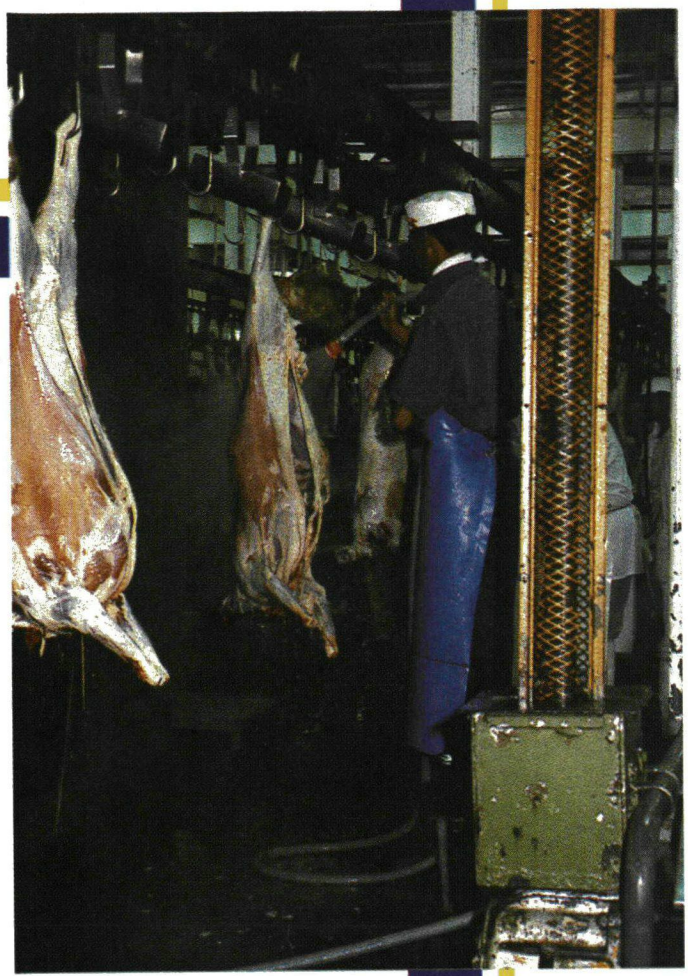
To date, over the course of the project to optimise water and waste-water management in the meat processing industry, water usage and effluent generation at abattoirs has been characterised, effective effluent treatment processes have been proven on pilot scale, membrane processes which produce treated effluents of reusable quality have been established, and suitable opportunities for the reuse of this renovated water have been identified.

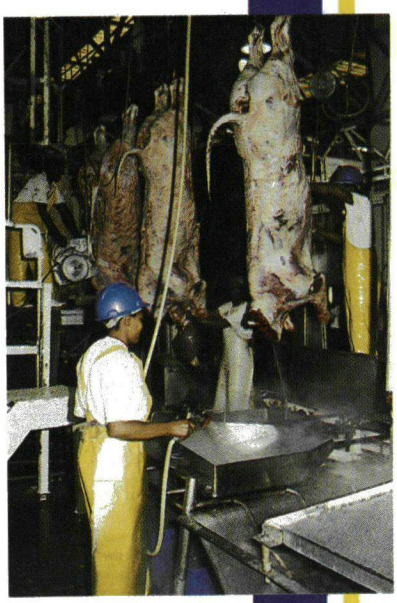
The current trials being carried out at Maitland Abattoir are designed to test the long-term stability of both ultrafiltration and reverse osmosis processes operating on abattoir effluents. A target of 3 000 running hours for each type of membrane has been set, equivalent to 18 months operation for a full-scale plant operation for 8 hours per day. Over the course of the experimental running period, operating conditions and cleaning routines for the membranes are being optimised. Simultaneously, any progressive decline in membrane performance, as indicated for example by an irreversable decline in permeate flux or rejection, will be used to extrapolate the predicted effective life of the membranes in full-scale application.

Currently a total of around 2 500 running hours has been accumulated on a single set of membranes for each process. Overall there has been no observable deterioration in the respective quality or rate of production of renovated water from either membrane operation.

ABATTOIRS







Waste-water treatment processes

Waterlit toon sy staal

'N Britse navorser het in 'n onafhanklike ondersoek bevind dat die Suid-Afrikaanse databasis Waterlit in verskeie opsigte beter presteer het as die Engelse watergerigte databasis Aqualine en die Amerikaanse databasis Water Resources Abstracts (WRA).

Mnr Rob Collis, 'n student aan die City University in Londen se departement van inligtingswetenskap, het vir sy MSc-verhandeling, Waterlit met Aqualine en WRA vergelyk en tot die gevolgtrekking gekom dat Waterlit in literatuursoektogte 'n groter getal verwysings met meer toepaslike inligting oplewer as die ander twee databasisse tesame.

Mnr Collis het twaalf retrospektiewe literatuursoektogte vir die ondersoek gebruik wat gesamentlik deur die Water Research Centre in England (wat vir die bedryf van Aqualine verantwoordelik is) en die Suid-Afrikaanse Inligtingsentrum vir Water (wat vir Waterlit verantwoordelik is) voorgestel is. Die onderwerpe is op die oomblik van belang vir waternavorsers in die waterveld en het gewissel van die konstruksie van latrines in ontwikkelende lande tot by die gesondheidsimplikasies wat 'n rol kan speel by die storting van riooluitvloeisels in die see.

Die literatuursoektogte is beperk tot Engelstalige dokumente wat sedert 1980 geïndekseer is en is tegelykertyd op al drie databasisse onderneem. Die terugvoering wat so verkry is, is gebruik om 'n vergelyking te tref tussen die aantal verwysings wat by elke databasis oor elkeen van die verskillende onderwerpe beskikbaar is. Die toepaslikheid van die verwysings sowel as hulle onderlinge oorvleueling is ook ondersoek.

Waterlit alleen het meer verwysings op die twaalf gekose navrae opgelewer as Aqualine en WRA tesame en wat die toepaslikheid van die inligting betref, het Waterlit ook as die oorwinnaar uit die stryd getree. Wat egter veral betekenisvol was, was die geringe oorvleueling tussen die drie databasisse.

Van die totale aantal toepaslike verwysings is 83 persent slegs by een van die drie gevind, terwyl slegs drie persent van die inligting by al drie databasisse aangetref is.

Van die 1 298 unieke verwysings – dié waaroor slegs een van die databasisse beskik het – is 60 persent deur Waterlit gelewer, terwyl Aqualine en WRA onderskeidelik vir 23 persent en 17 persent daarvan verantwoordelik was.

Volgens mnr Morkel Steyn, bestuurder van die Suid-Afrikaanse Inligtingsentrum vir Water, het die ondersoek voorts getoon dat Waterlit se gebruik van tussen 15 tot 25 sleutelwoorde om items te identifiseer, in teenstelling met Aqualine en WRA wat van uittreksels gebruik maak, nie alleen 'n goedkoper metode is nie, maar ook daartoe lei dat inligting oor publikasies waarskynlik gouer nà hulle verskyning op die Waterlitstelsel beskikbaar sal wees.

Ander interessante inligting wat met die ontleding van die databasisse na vore gekom het, is byvoorbeeld die verskillende tale waarin die inligting gepubliseer word. Op Aqualine is 90 persent van die dokumente in Engels, 4 persent in Duits, 3 persent in Frans en 3 persent in ander tale. 'n Soortgelyke ontleding van Waterlit het 90 persent Engels, 5 persent Duits en 5 persent Afrikaans, Nederlands en Frans getoon.

Die vorm waarin die inligting volgens Aqualine beskikbaar was, was 84 persent tydskrifartikels, 8 persent kongres- en simposiareferate, 4 persent verslae en 4 persent ander soorte publikasies.

Waterlit se ontleding het 80 persent tydskrifartikels, 5 persent simposiaverrigtinge en 15 persent verslae getoon.

The hidden facts

Project results surprise

WRC

Wasserwagen.

Major project results.

Suburb	Length of Mains (km)	No. of Connections	Losses m^3/h	Percent Losses
Amalgan	4.56	135	0.8	12.45
Benrose	6.75	129	0.0	–
Berea	4.24	141	2.20	26.94
Booysens Reserve	6.64	389	11.80	41.40
Denver	11.30	323	4.70	25.88
Franklin Roosevelt Park	8.99	460	51.0	72.68
Franklin Roosevelt Park Ext. 1	6.33	294	7.0	36.36
Homestead	3.4	150	2.10	25.15
Industria	10.84	196	39.80	82.65
Jeppestown	14.6	628	12.60	32.50
Jeppestown South	30.15	1 388	19.80	25.51
Johannesburg	4.05	112	13.40	74.17
Kensington	94.4	3 912	70.90	30.31
Linden	24.35	1 349	5.40	8.76
Montgomery Park	13.55	1 047	1.80	3.96
Mulbarton	30.39	940	8.00	16.99
Northcliff	67.05	1 870	19.25	19.81
Ophirton	3.82	240	3.10	23.66
Paarlshoop	5.60	175	6.5	47.13
Parkhurst	23.52	1 837	2.50	3.16
TOTAL	**374.53**	**15 715**	**282.65**	**30.15**

Costs

The registration fee will be R90,00 which will include documentation (including a copy of the proceedings) morning and afternoon teas, lunches on both days, and a social function on the evening of 15th October.

Preliminary Registration

If you are interested in attending or participating in this symposium, please complete the attached form and send to the address below before January 30th, 1987.

Miss M Robbertse
Ecosystem Programmes
Foundation for Research Development
Council for Scientific and Industrial Research
PRETORIA
0001

Tel. 869211 x 3769

NAME: ..... TITLE: .....

AFFILIATION: .....

ADDRESS: .....

.....

.....

.....

PHONE NO: .....

I intend to present a paper/poster with the preliminary title*: .....

.....

.....

.....

***Please attach an abstract** not exceeding 150 words in length. Papers will be evaluated by the Programme Committee, on the basis of the abstracts, and you will be advised of the acceptance of your presentation by the 31st January 1987.

FIRST NOTICE OF A NATIONAL SYMPOSIUM ON WETLANDS OF SOUTH AFRICA

Objectives

Loss of Wetland areas has become a matter of great concern on a worldwide basis, but in South Africa, wetlands have received little recognition as being important to the country's water resources. The purpose of the symposium will be to:

- focus attention on wetlands and their value to South Africa
- provide a forum for interaction between scientists, agriculturists, water resource planners and managers currently involved in, or interested in wetland research and management
- review the current status of wetland ecology and management in South Africa
- promote future activity in priority areas of research and management

Who should come?

Anyone involved in research or management of wetlands:

ecologists
limnologists
water resource planners
water pollution scientists
land-use planners
nature conservationists
hydrologists
foresters
agriculturists

Auspices

The symposium is being convened by the Wetlands Working Group which operates under the Ecosystem Programmes of the CSIR's Foundation for Research Development.

Date

Thursday 15th - Friday 16th October 1987.

Venue

CSIR Conference Centre, Pretoria

Format of Programme

1. Papers and posters will be welcomed on any matter relating to wetland research and management. As a guide to potential contributors the organisers envisage papers under the following topics:

   Inventorization and classification
   Wetland degradation: case studies
   Resource utilization
   Legislation
   Management guidelines
   Wetland values
   Pollution and water purification
   Surveys
   Wetland structure and function
   Nature conservation
   Hydrology
   Cost-benefit analysis

A short workshop on methods which should be used when evaluating a wetland for development purposes. Special emphasis will be given to the Mkuze swamp system.

Insert to 'SA Waterbulletin' Nov. 1986

"A leak detection programme revealed the volume of hidden leakage to be two and a half times more than the consumption in three out of 19 suburbs surveyed in Johannesburg," said Mr Charles Chapman, senior adviser at the Water Research Commission (WRC). Mr Chapman spoke at a symposium on problems with pressure pipelines recently held at the CSIR.

Mr Chapman said the WRC, Johannesburg City Council and Castle Brass Holdings got together in a project to determine accurately how much water could be measured leaking from the distribution network. The project began in November 1984 and is due for completion in November 1986.

At the outset of the project it was decided the sample size should be representative. A total of 19 areas, including some industrial and light industrial areas, were selected totalling 15 715 connections. The areas selected were 15 per cent of the Johannesburg municipal area.

Mr Chapman pointed out before testing began all known or visible leaks were repaired so that any leakage remaining would be truly "hidden leaks." All the preparatory maintenance work and updating of plans was done by Mr Tim Leonie, Superintendent of the Johannesburg Water Branch under the authorisation of the City Water Engineer, Mr Ron Knight.

Once the areas had been suitably prepared Mr Fritz Draxl's Water Management Services Division of Castle Brass Holdings moved in with their sophisticated "Wasserwagen" to do the necessary leak testing.

Of the "Wasserwagen" Mr Chapman said it is the most comprehensive of its type in the world today with electronic computerised read- and printouts for everything from the time and date to pressure, flow rate and temperature of the water. Flow rates from virtually zero up to 60 m ^{3}/h can be measured to decimal place accuracy.

"By keeping the length of the mains tested relatively short (an average of ± 1 000 m), it was possible to work during the day with only occasional night work being necessary for a few isolated areas."

Progress was far more rapid than the four to six km per day originally estimated and averaged about nine km per day. "Unlike Montgomery Park which revealed a respectable leakage loss of around four per cent, the two Franklin Roosevelt areas raised more than a few eyebrows when leakage of 72 per cent and 36 per cent for Franklin Roosevelt and Franklin Roosevelt Extension 1 respectively were recorded," Mr Chapman said.

The full results are reflected in the table.

Mr Chapman also described the calculation method. The volume of water leaking from the distribution system was compared to the total flow into the area. For this purpose the average consumption per house was obtained from municipal account records. Values of 1,09; 0,94 and 0.95 m^3/house/day were determined. Mr Chapman stressed that these results justified the assumption that a typical residential household consumes 1m^3 of water per day. In the table the number of connections, therefore, also reflects the daily consumption for the area.

"The true picture is in fact even far worse than the table suggests," Mr Chapman said. "The total consumption for Franklin Roosevelt Park Extension 1 for example equals 294 m ^{3}/day while losses equal 168 m ^{3}/day, just over half the consumption, but the percentage losses are only 36.4 per cent.

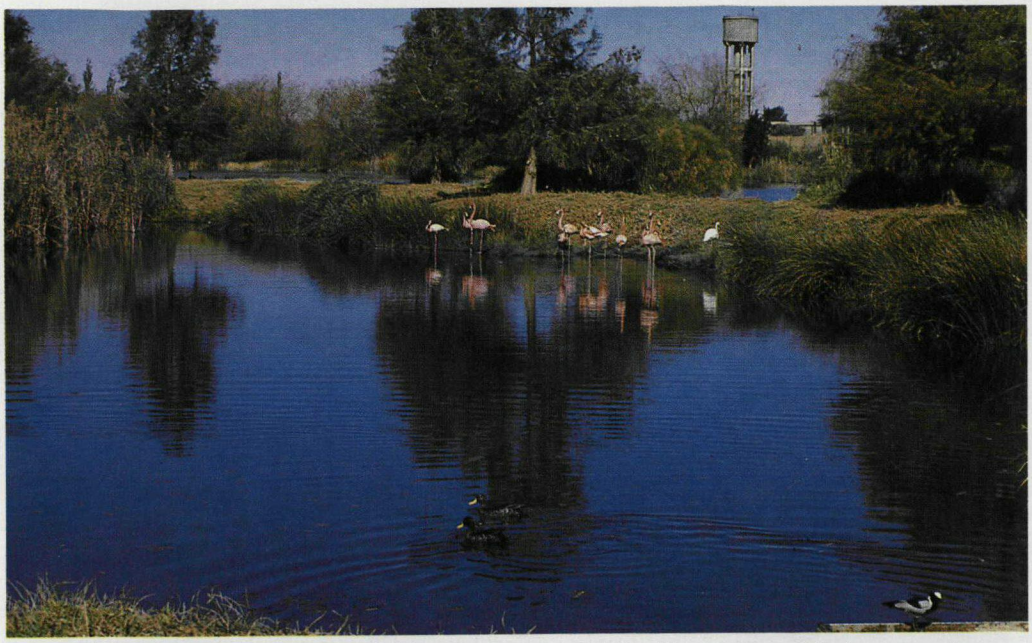
Similarly, for the suburbs of Johannesburg and Franklin Roosevelt Park, for every 100 consumed 260 m^3 are lost, but this calculates to losses of only around 73 per cent. For the full sample of 15 715 connections, the average loss value of 30.15 per cent means that for every 100 m^3 consumed, 43 m^3 leaks from the system.

If one was to extrapolate this value to cover the entire municipal area, annual water savings could be as high as 17 300 Ml. At a purchase price of R0.22/m^3, this could save R3 800 000 per annum.

A leak detection team in action.

WRC

WNK

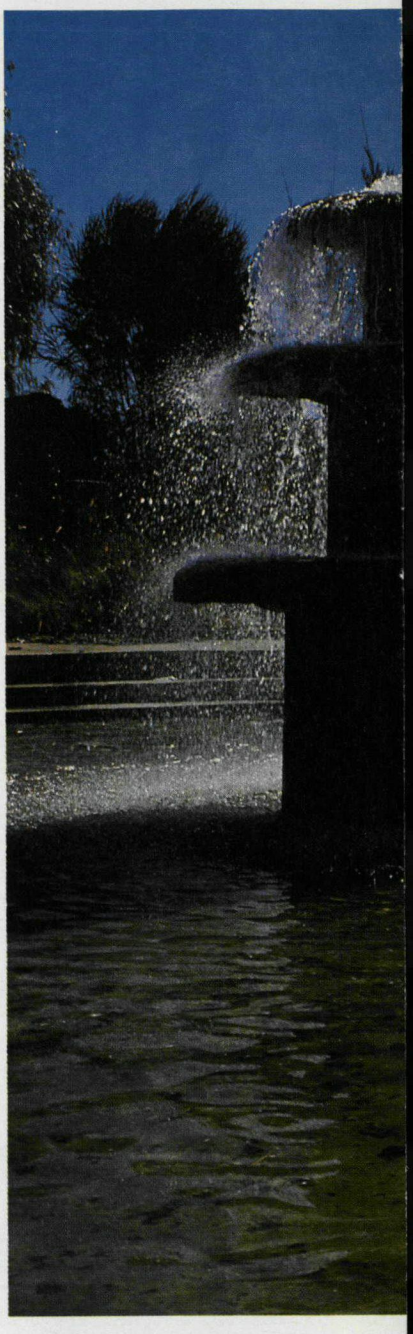


Die boorgate wat water aan Lichtenburg verskaf, lê in die dorp se wildtuin versprei.

WNK

Kuruman se bekende fontein die Oog wat in al dié dorp se waterbehoeftes voorsien.

WNK



Grondwater les

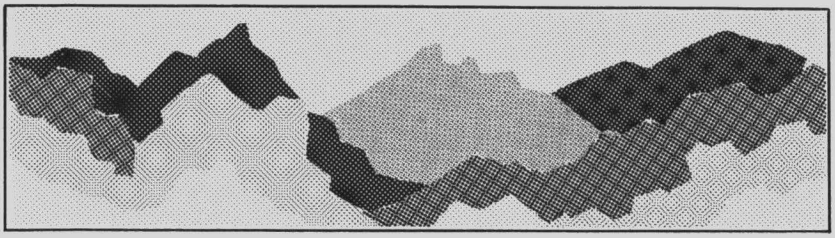
Die twee dorpe, Kuruman in die Noord-Kaap en Lichtenburg in Wes-Transvaal, is vir al hulle water van grondwaterbronne afhanklik.

By Kuruman se bekende fontein die Oog, borrel water al vir die afgelope 150 jaar wat die bron aan blankes bekend is in 'n konstante stroom uit en van waterbeperkings was daar nog nooit in die geskiedenis van die dorp sprake gewees nie.

Volgens die stadsklerk van Kuruman, mnr Van Vuuren, lewer die Oog sowat 18 miljoen liter water per dag en het ondanks die kwaai droogte in die gebied nog nie merkbaar verswak nie. Die Departement van Waterwese is tans besig om meetgeute by die Oog te installeer wat die lewering van die Oog presies sal bepaal.

In 1827 het die Britse sendeling eerwaarde Robert Moffat twee watervore van die Oog af laat grawe waardeur meer as 250 hektaar grond besproei kon word – een van die eerste besproeiingskemas in Suid-Afrika.

Vandag word die Oog se water nog steeds hoofsaaklik vir besproeiing, leiwater vir kleinhoewes rondom die dorp en vir munisipale gebruik aangewend, terwyl alle oortollige water in 'n sugvoor na die Kurumanrivier toe loop. Die munisipaliteit verkoop die water vir 35 c per kiloliter.



VYFTIG JAAR
VAN BERGOPVANGGEBIED-NAVORSING IN SUID-AFRIKA

SIMPOSIUM

SUID-AFRIKAANSE NAVORSINGSINSTITUUT VIR BOSWESE
DEPARTEMENT VAN OMGEWINGSAKE
FAKULTEIT VAN BOSBOU
STELLENBOSCH

11 - 13 NOVEMBER 1987

EERSTE AANKONDIGING

SYMPOSIUM TO MARK FIFTY YEARS OF MOUNTAIN CATCHMENT RESEARCH IN SOUTH AFRICA, STELLENBOSCH: 11 — 12 NOVEMBER 1987

SIMPOSIUM TER HERDENKING VAN VYFTIG JAAR VAN BERGOPVANGGEBIED-NAVORSING IN SUID-AFRIKA, STELLENBOSCH: 11 — 12 NOVEMBER 1987

N B Use blockletters and return to the Director: SAFRI.
L W Gebruik drukskrif en stuur terug aan die Direkteur: SANIB.

Full name/Volle naam:
Prof/Dr/Mr/Mrs/Miss
Prof/dr/mnr/mev/mej _____

Address/Adres _____

_____

_____

Postal Code/Poskode _____

Telephone number/Telefoonnommer _____

Please indicate YES/NO or furnish the required information.
Dui asseblief JA/NEE aan, of voorsien die nodige inligting.

Do you plan to attend the symposium?
Beplan u om die simposium by te woon? ☐

How many persons will accompany you?
Getal persone wat u sal vergesel? ☐

Give names/ (i) _____
Verstrek name:

(ii) _____

(iii) _____

Do you wish to present a poster?
Wil u 'n plakkaatreferaat aanbied? ☐

1 AGTERGROND

Navorsing op die hidrologie van Suid-Afrikaanse bergopvanggebiede het in die vroeë dertiger jare begin toe eksperimentele opvanggebiede te Jonkershoek naby Stellenbosch deur CL Wicht tot stand gebring is, en die eerste stroomvloeirekords is in Januarie 1937 aangeteken. Die program was oorspronklik op die bepaling van die hidrologiese invloed van plantasiebosse toegespits, maar is uitgebrei om 'n reeks gekontroleerde opvanggebiedeksperimente in fynbos-, grasveld- en keeldraende eukaliptusbosekosisteme tot in Noord-Transvaal in te sluit. Dit was ook die begin van navorsing om die ekologiese grondslag van opvanggebiedbestuur in Suid-Afrika te skep, 'n poging wat oor die afgelope dekades vinnig uitgebrei het.

Hierdie simposium word gehou om 50 jaar van opvanggebiednavorsing te herdenk, om die bevindinge van die programme saam te vat en om 'n toekomsblik van die navorsingsbehoeftes te kry.

2 TEMA "Vyftig jaar van bergopvanggebied-navorsing in Suid-Afrika"

3 DATUMS 11 — 12 November 1987

4 PLEK Simposium: Fakulteit van Bosbou, STELLENBOSCH

Velddag: Jonkershoek-bosbounavorsingsentrum, STELLENBOSCH

5 SKAKELING

(a) Simposium
Mnr DL Owen
SANIB
Posbus 727
PRETORIA 0001
Telefoon (012) 287120
Telex 320142
Telegramme Hout, Pretoria

(b) Velddag
Mnr DP Bands
Jonkershoek-bosbounavorsingsentrum
Privaatsak X5011
STELLENBOSCH 7600
Telefoon (02231) 72805
Telex Geen
Telegramme Soos bo

6 SIMPOSIUM-SAMESTELLING

Die simposium vind op 11 en 12 November 1987 plaas en die velddag op 13 November 1987. Oorsese en plaaslike deskundiges sal uitgenooi word om referate oor die volgende onderwerpe te lewer:

- Waterbronne en grondgebruikbeplanning
- Waterverbruik deur gewasse
- Evapotranspirasie in bosse
- Bebossing en watervoorrade
- Opvanggebiedbestuur

7 PLAKKAATREFERAATSESSIES

Daar sal afsonderlike plakkaatreferaatsessies op elk van die twee

dae van die simposium wees. Daar sal voldoende geleentheid wees om die plakkate te besigtig en om met aanbieders te gesels.

U word uitgenooi om aan te dui of u 'n plakkaatreferaat tydens die simposium wil aanbied.

8 VELDDAG

Dit sal op Vrydag, 13 November 1987 te Jonkershoek-bosbounavorsingsentrum naby Stellenbosch plaas vind. U sal 'n paar van die oorspronklike meetpunte in die Jonkershoekvallei kan besoek, aanbiedings van navorsingresultate uit fynbos-, grasveld- en plantasiehidrologie kan besigtig en uitstallings van moderne klimatologiese en hidrologiese toerusting kan besoek.

9 AKKOMMODASIE

Diegene wat die simposium en velddag wil bywoon, sal hulle eie verblyf- en vervoerreëlings moet tref. Inligting oor hotelle in en naby Stellenbosch sal in die tweede aankondiging verskaf word.

10 MIDDAGETES

Tydens die twee dae van die simposium sal etepakkies verskaf word. Diegene wat die velddag bywoon sal hul eie reëlings vir middagete moet tref. Piekniekgeriewe sal by die Jonkershoek-bosbounavorsingsentrum beskikbaar wees.

11 SOSIALE FUNKSIES

'n Onthaal sal op die aand van die eerste dag gehou word.

12 INSKRYWINGSFOOI

Die inskrywingsfooi is nog nie gefinaliseer nie maar word *geraam* op:

Simposium en onthaal	R55
Onthaal alleenlik	R15
Studente (sonder ete)	R5

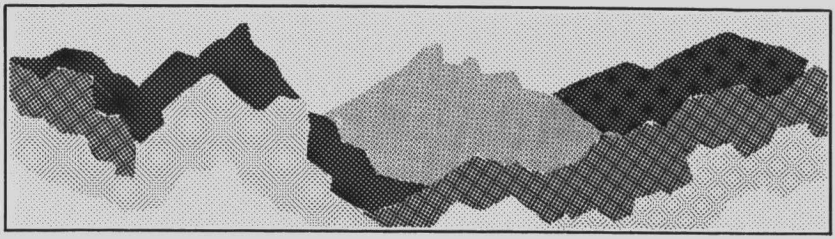
Die finale fooie sal in die tweede aankondiging verstrek word.

13 VERRIGTINGE

Die verrigtinge van die simposium sal as 'n gerefereerde, geredigeerde boek gepubliseer word.

14 ANTWOORDE

Om belangstelling in die simposium te toets, sal dit op prys gestel word indien u die ingeslote vraelys sal voltooi en voor 15 Desember 1986 sal terugstuur. Die tweede aankondiging (saam met die amptelike registrasievorms) sal gedurende Maart 1987 aan belangstellendes versprei word.



FIFTY YEARS
OF MOUNTAIN CATCHMENT RESEARCH IN SOUTH AFRICA

SYMPOSIUM

SOUTH AFRICAN FORESTRY RESEARCH INSTITUTE
DEPARTMENT OF ENVIRONMENT AFFAIRS
FACULTY OF FORESTRY
STELLENBOSCH

11 - 13 NOVEMBER 1987

FIRST ANNOUNCEMENT

Would you like to purchase a copy of the "proceedings" in book-form?
Sal u graag 'n afskrif van die "verrigtinge" in boekvorm wil koop?

☐ Number / Aantal ☐

Please indicate language preference
Dui asseblief taalvoorkeur aan

English / Engels ☐ Afrikaans ☐

RETURN BY 15 DECEMBER 1986 TO:
STUUR VOOR 15 DESEMBER 1986 TERUG AAN:

THE DIRECTOR
SOUTH AFRICAN FORESTRY RESEARCH INSTITUTE
P O BOX 727
PRETORIA 0001

DIE DIREKTEUR
SUID-AFRIKAANSE NAVORSINGS-INSTITUUT VIR BOSWESE
POSBUS 727
PRETORIA 0001

Tentative title/
Voorlopige titel: _____

_____

_____

Do you wish to display equipment or present a demonstration during the symposium in Stellenbosch?
Wil u graag toerusting tentoonstel of 'n demonstrasie tydens die simposium te Stellenbosch aanbied? ☐

Particulars/
Besonderhede: _____

_____

_____

Do you wish to be provided with a lunch pack during the symposium?
Wil u 'n etepakkie tydens die simposium ontvang? ☐

Do you wish to attend the symposium reception?
Wil u die symposium onthaal bywoon? ☐

How many persons?
Aantal persone? ☐

Do you intend to attend the field day at the Jonkershoek FRC?
Beplan u om die velddag te Jonkershoek BNS by te woon? ☐

How many persons?
Aantal persone? ☐

Do you wish to display equipment or demonstrations during the field day at Jonkershoek FRC?
Wil u graag toerusting tentoonstel of 'n demonstrasie tydens die velddag te Jonkershoek BNS aanbied? ☐

Floor space required in m^2
Vloeroppervlakte benodig in m^2 ☐

1 BACKGROUND

Research on the hydrology of South African mountain catchments began with the establishment of experimental catchments at Jonkershoek near Stellenbosch by CL Wicht in the mid-Thirties, with the first stream-flow records being registered in January 1937. This programme was originally directed at determining the hydrological influence of plantation forests, but formed the basis for a series of controlled catchment experiments in fynbos, grassland and coniferous-eucalypt forest ecosystems extending into the Northern Transvaal. It also marked the beginning of research to establish the ecological foundations of catchment management in South Africa, an endeavour which has grown rapidly over the past decades.

This symposium has been called to mark 50 years of catchment research, to consolidate the findings from the programme, and to look ahead to the needs of the future.

2 THEME "Fifty years of mountain catchment research in South Africa"

3 DATES 11 — 12 November 1987

4 VENUE Symposium: Faculty of Forestry, STELLENBOSCH

Field Day: Jonkershoek Forestry Research Centre, STELLENBOSCH

5 LIAISON

(a) Symposium
Mr DL Owen
SAFRI
P O Box 727
PRETORIA 0001
Telephone (012) 287120.
Telex 320142
Telegrams Hout, Pretoria

(b) Field Day
Mr DP Bands
Jonkershoek Forestry Research Centre
Private Bag X5011
STELLENBOSCH 7600
Telephone (02231) 72805
Telex None
Telegrams As above

6 SYMPOSIUM STRUCTURE

The symposium will take place on 11 and 12 November 1987 and the field day on 13 November 1987. Overseas and local experts will be invited to deliver papers on subjects covering the following topics:

- Water resource and land-use planning
- Water use by crops
- Evapotranspiration in forests
- Afforestation and water supplies
- Catchment management

7 POSTER SESSIONS

There will be separate poster sessions on each of the two sym-

posium days which will be organised so as to ensure sufficient opportunity for viewing and discussion with presenters.

You are invited to indicate whether you would like to present a poster during these sessions.

8 FIELD DAY

This will take place on Friday, 13 November 1987 at the Jonkershoek Forestry Research Centre close to Stellenbosch. You will be able to visit some of the original gauging stations in the Jonkershoek valley, and to see displays of experimental results of fynbos, grassland and plantation hydrology and modern instrumentation for climatological and hydrological research.

9 ACCOMMODATION

Those attending the symposium and field day should arrange their own accommodation and transport. Information regarding hotels in the Stellenbosch area will be provided at the time of registration.

10 LUNCHES

Lunch packs will be provided on the two days of the symposium. Those attending the field day should provide their own lunch. Picnic facilities will be available at the Jonkershoek Forestry Research Centre.

11 SOCIAL FUNCTIONS

There will be a reception on the evening of the first day of the symposium.

12 REGISTRATION FEES

The registration fees have not yet been finalised but they *are estimated* as:

Symposium and reception	R55
Reception only	R15
Students (without lunch)	R5

Final fees will be provided in the second announcement.

13 PROCEEDINGS

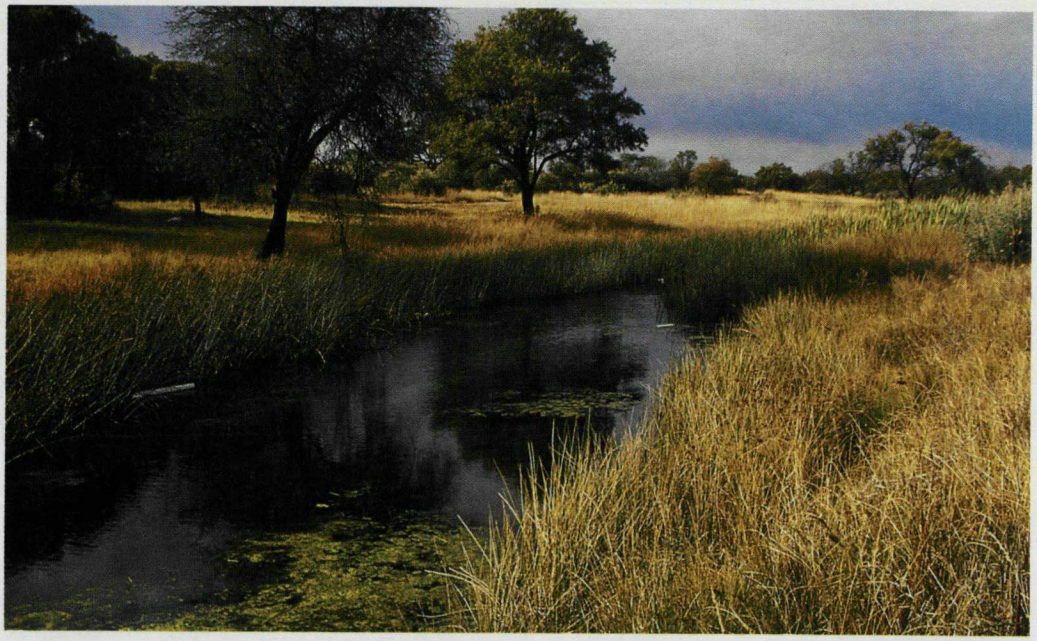
The proceedings of the symposium will be refereed, edited and published as a book.

14 ANSWERS

In order to gauge interest in this symposium it would be appreciated if the attached questionnaire could be returned by 15 December 1986. The second announcement (along with formal registration forms) will be distributed during March 1987.

'n Spuitfontein op Lichtenburg.

WNK



Kuruman se "Tweede Oog" wat langs die Vryburgpad geleë is.

WNK

Besproeiingswater vanaf die Kuruman-oog vloei verby die Moffat-sendingstasie buite die dorp.

'n GROOT dors

Die dorp Lichtenburg se watervoorraad is tans afkomstig uit 'n aantal boorgate wat in die dolomitiese gebied noord van die dorp geleë is. Die gemiddelde diepte van die boorgate is sowat 40 meter en elke boorgat kan minstens 178 kiloliter water per uur lewer. Om in die steeds stygende vraag na water te voorsien, poog die stadsraad om elke jaar een nuwe boorgat te sink en met pompe toe te rus.

Volgens die stadstesourier, mnr Theuns Holtzhausen, is die dolomitiese akwifeer waaruit die water onttrek word na berekening ongeveer 70 km^2 groot en beskik oor 'n stoorkapasiteit van meer as 22 miljoen m^3 water.

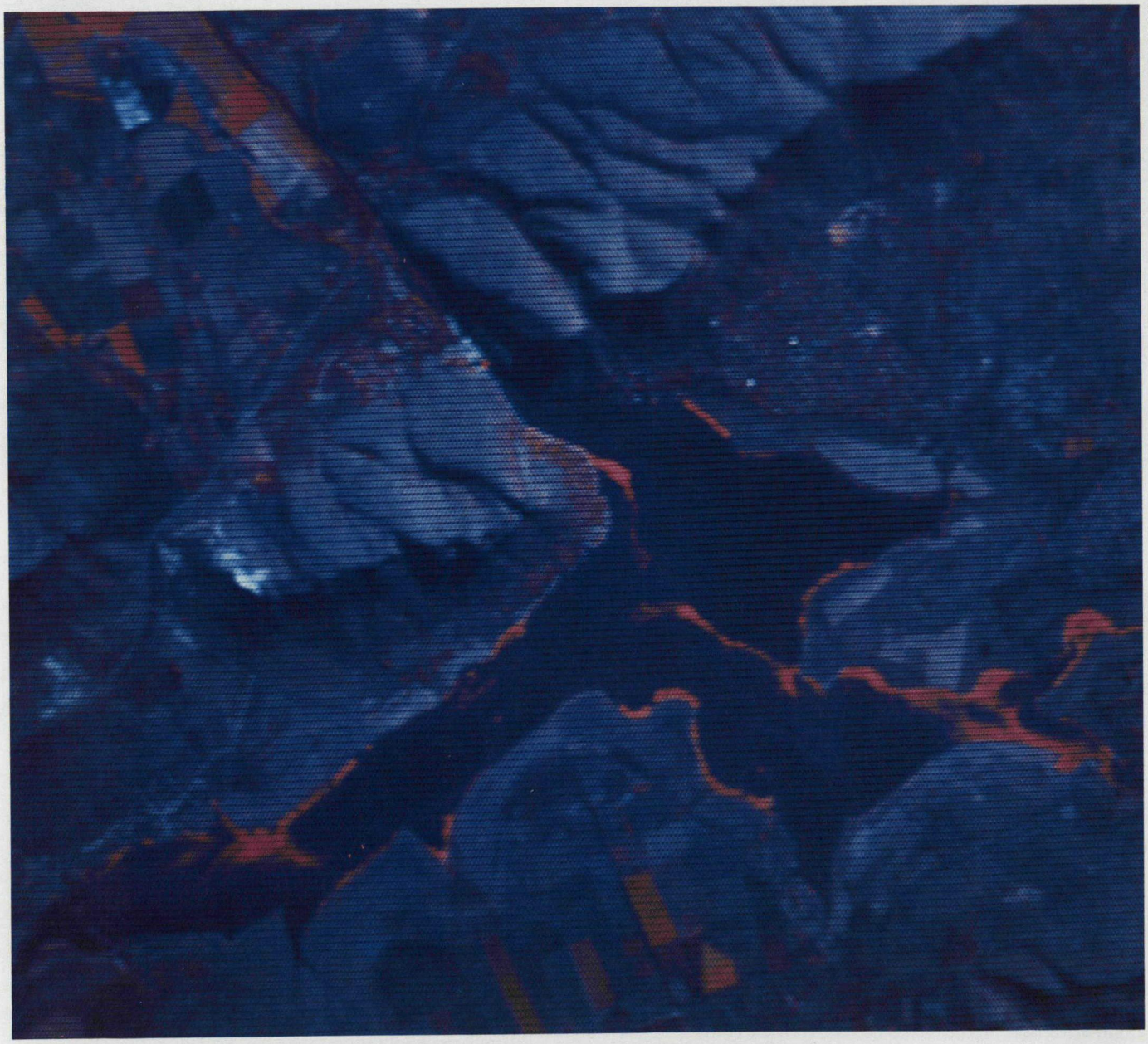
Hy sê die abnormale droogtetoestande van die afgelope vier jaar het veroorsaak dat Lichtenburg se waterverbruik geweldig toegeneem het. die waterverbruik vir 1984/85 was meer as 3,5 miljoen kiloliters wat 46,35 persent hoër is as die dorp se waterverbruik in 1980/81. Tog was dit tot dusver nog nie nodig om ernstige waterbeperkings in te stel nie en die dorpenaars is slegs verlede jaar gedurende die somermaande gevra om nie tussen 11-uur soggens en 3-uur smiddae tuin nat te spuit nie.

Die gehalte van dolomitiese water is uitstekend en slegs chlorering is nodig om dit vir huishoudelike gebruik te suiwer.

WNK

Die nuwe noordelike vleuel van die HNI.

Satellietbeelde vir Afrika



ULRICH LOOSER

Hartbeespoortdam, Maart 1984. Die bron van data is LANDSAT 5TM.

Die Hidrologiese Navorsingsinstituut (HNI) van die Departement van Waterwese is die trotse eienaar van 'n nuwe stelsel – van ongeveer 'n miljoen rand – wat satellietbeelde verwerk.

Volgens mnr Eberhard Braune, Direkteur van die HNI, is die Instituut sedert 1979 met navorsing oor die toepassing van satellietbeelde in waterbronbestuur besig. Tot dusver moes die HNI van die WNNR se fasiliteite gebruik maak by beide Hartebeeshoek en die Nasionale Fisiese Navorsingslaboratorium in Pretoria.

Omdat die WNNR reeds groot beleggings gemaak het in navorsing en toerusting vir die ontvangs van satellietbeelde het hulle die hoofverbruikers, waaronder die Departement van Waterwese, gevra om hulle eie toerusting aan te skaf om die beeldmateriaal wat by Hartebeeshoek ontvang word ten volle te benut.

Mnr Braune vertel meer hieroor: "Op die oomblik word beelde van die Amerikaanse LANDSAT satelliet hier opgevang. Elkeen van die beelde dek 'n area van 180 x 180 km en dieselfde area word elke 18 dae gedek. Die kleinste area wat nog onafhanklik op 'n LANDSAT-beeld waargeneem kon word is 80 x 80 m. In die nabye toekoms gaan Suid-Afrika waarskynlik ook inligting van die Franse SPOT satelliet ontvang met 'n resolusie van tot 10 x 10 m. Satellietbeelde bevat baie meer inligting as gewone swart en wit of kleurfotografie omdat die weerkaatsing van die aardoppervlakte in 'n hele aantal golflengtes gemeet word."

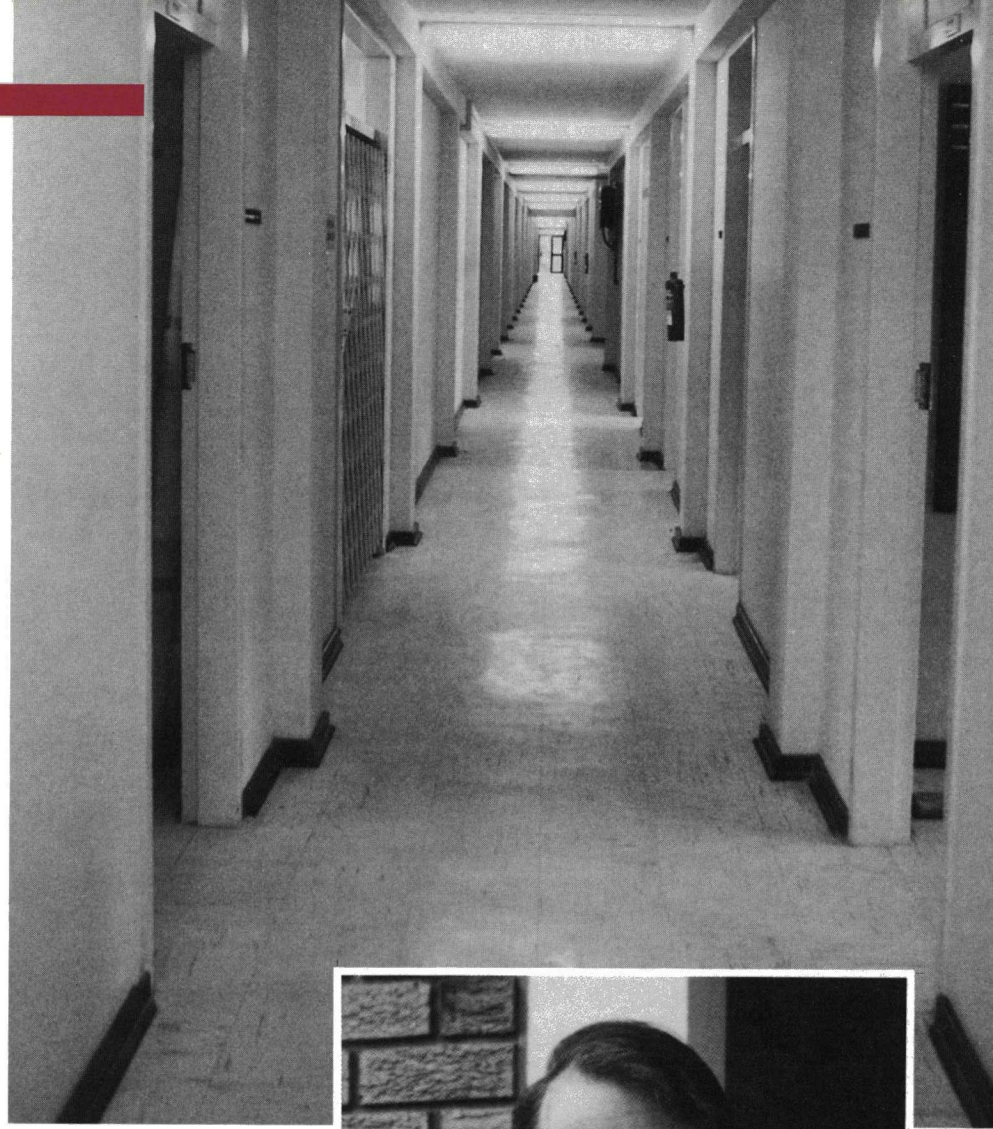
Die beeldverwerkingstelsel – basies 'n kragtige rekenaar – kan 'n satellietbeeld met miljoene deeltjies inligting doeltreffend verwerk. Net soos 'n mens lugfotografie gebruik, kan satellietfotografie ook gebruik word om 'n kombinasie van inligting te kry.

Mnr Braune sê hoewel die stelsel vir navorsing aangewend sal word, was onmiddellike toepassing die Departement se hoofmotivering om die stelsel aan te koop. Die meeste besproeiingsgrond (ongeveer 80 persent) in Suid-Afrika is in privaathande. Om waterbronne effektief te kan bestuur, veral in krisis-situasies, is dit nodig om te weet waar daar reeds bestaande besproeiingsbehoeftes is voordat van die water byvoorbeeld na ander opvanggebiede oorgedra kan word.

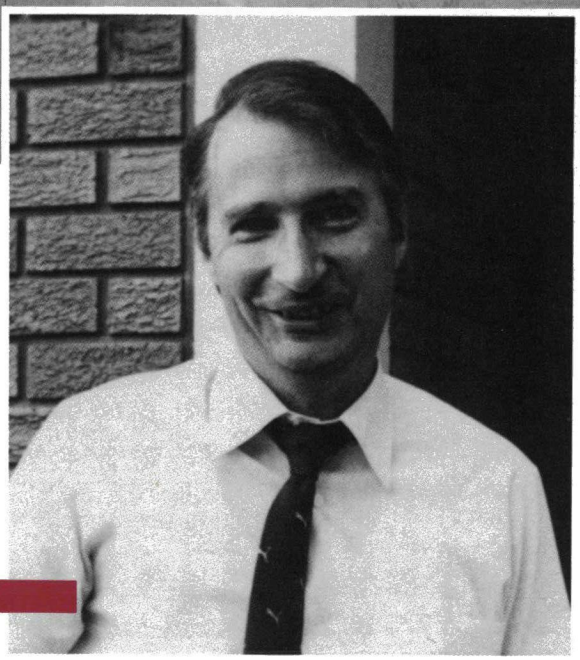
Tot dusver is baie tyd en geld aan lugopnames spandeer. Met die nuwe stelsel sal dit moontlik wees om baie van hierdie inligting oor waterbronne in 'n baie kort tyd te bekom.

Ander toepassingsmoontlikhede is:

- ☐ Kartering van bebosde areas* en ander landgebruike.
- ☐ Bepaling van vloedskade.
- ☐ Bepaling van waterkwaliteitsfaktore in opgaardamme byvoorbeeld algopbloeie of troebelheid.



'n Gang van die nuwe vleuel.



WNK

Mnr Eberhard Braune.

OPENING

Die beeldverwerkingstelsel is op 17 November 1986 tydens die amptelik ingebruikneming van die NHI se nuwe noordelike vleuel bekendgestel. Die openingstoespraak is deur die Minister van Landbou-ekonomie en van Waterwese, mnr J J G Wentzel, gelewer.

Die nuwe vleuel huisves nie net alleen die beeldverwerkingstelsel nie, maar ook laboratoriums spesiaal ingerig net vir waterkwaliteitstoetse op makro-, spoormetaal- en organiese bestanddele.

Mnr Braune sê die laboratoriums is hoogs geoutomatiseer en kan met min personeel klaarkom. Die organiese laboratorium het ook onlangs baie gesofistikeerde en gerekenariseerde ontledingstoerusting bygekry. Skeikundiges is skaars in Suid-Afrika en mnr Braune spreek die hoop uit dat met hierdie fasiliteite dit makliker sal wees om skeikundiges na die Departement Waterwese te trek.

*Fasiliteit word gedeel met Departement Omgewingsake. Hulle Bosbou Tak het reeds kaarte met bebosde areas van die hele land met hierdie tegniek saamgestel.

Aspects of water care legislation

G R BOTHA[1], J S WIUM[2] AND J J BARNARD[3]

The classification and registration of Water Care Works and of operating personnel in the RSA, training facilities and arrangements for obtaining financial assistance for training.

The simple provision of Water Care Works (ie both water treatment and wastewater treatment) in a community is not enough to ensure that the services will function effectively. Not only must one ensure that certain standards are met with regard to the processes selected, the equipment supplied and the works as a whole, but also that acceptable standards of operation of the systems are maintained.

Training of operating personnel for these Water Care Works has been severely neglected in South Africa and it was not until 1960 that the Southern African branch of the Institute of Water Pollution Control (IWPC) began to present courses for sewage works operators. Unfortunately, the courses did not receive sufficient recognition from the various educational authorities, neither were courses presented for water works operators.

In 1973 a start was made with presentation of formal "certificate" courses for operators at a number of Technical Colleges. These courses catered for both water and wastewater plant operators, but coordination was lacking between colleges as well as between the courses presented to White, Black, Coloured and Asian students; neither were they presented nor examined uniformly. These were some of the important aspects causing problems with the recognition accorded to the various certificates awarded by the individual colleges.

At about the same time a certificate course for so-called Water Care Maintenance Personnel was instituted by two Technical Colleges for Black students, namely Edendale and Shikoane Matlala. These courses were pitched at the level of trainee operators.

All the above-mentioned courses will now be phased out and supplanted by the new formal N-level courses.

In 1973 too, as a result of a long-felt need for training at the tertiary level, a National Diploma Course in Water Treatment Technology was introduced at certain Technikons. Subsequently this course was replaced by the currently presented National Water Care Diploma.

The purpose of this article is to sketch the present training situation as it affects water and wastewater operating personnel, and to provide information which, while it has greater relevance for the public sector, is nevertheless of interest to a wider audience.

After **promulgation** of the Water Act (1956) it soon became evident that many municipalities and industries could for a variety of reasons not comply with the required standards for the discharge of sewage and industrial effluents. One of these reasons was found to be a shortage of trained operators.

During 1974 the Southern African branch of the Institute of Water Pollution Control made representations to a number of State Departments regarding proposals for statutory control over the operation of water and wastewater treatment plants (Water Care Plants).

The Department of Health (now National Health and Population Development) incorporated these proposals in the Health Act (1977), in terms of which regulations for the classification and registration of works and operating personnel may be introduced. These regulations may also stipulate the minimum number of operators and their educational qualifications. Following on the re-structuring of the draft regulations for comment and the necessary amendments to the Water Act of 1956, the regulations were eventually published on 27 December 1985, in Notice R2834 in terms of the Water Act (1956):

- ☐ These regulations make it incumbent on the owners of all Water Care Works, (ie wastewater treatment works and works producing potable water and water for the food processing industry), to register these works as well as all operating personnel. Furthermore, any new works must be registered before commissioning and applications for registration must be made on the prescribed forms, which are obtainable from the Director General.
- ☐ Based on information supplied in the application form and on the prescribed criteria contained in annexures to the regulations, the works will be classified according to size

[1] Stewart Sviridov & Oliver (formerly NIWR)
[2] National Institute for Water Research (NIWR)
[3] Department of Water Affairs

and complexity and the operators in terms of their required competence. The Director General will maintain a register of all works and personnel and he will issue appropriate certificates, which must be prominantly displayed at the works. The Director General shall be advised annually of any changes in the complement of registered personnel.

- ☐ Any organisation contemplating the erection of a Water Care Works, increasing the size of an existing works or changing processes on the works, which may affect its classification must provide the Director General with the relevant information on a prescribed form in order to acquire the necessary authority (permit) in terms of Article 12A(1) of the Water Act.
- ☐ The owner of a Water Care Works shall, with effect from a date to be determined by the Minister, employ a minimum number of operating personnel having the prescribed minimum qualifications. The Director General may however under exceptional circumstances, temporarily permit the owner to employ fewer people with lower qualifications to operate the Water Care Works.

TRAINING OF OPERATING STAFF AND TECHNICIANS

On the initiative of the Southern African branch of the Institute of Water Pollution Control and the National Institute for Water Research, an 'ad hoc' committee was constituted early in 1984 for the purposes of achieving a uniform standard of training for all **operating personnel** throughout the country.

In view of the above-mentioned regulations it had become imperative to ensure a uniform standard in the training courses presented by the various technical colleges and it was therefore decided to appoint a syllabus-subcommittee to make recommendations in this regard. The subcommittee, comprising representatives from the Department of Water Affairs, the National Institute for Water Research (NIWR) and the Pretoria Central Technical College, completed its task and after incorporating suggestions from interested organisations the proposed syllabi for the N1, 2 and 3 operators' courses were submitted to the Department of Education and Culture for approval and implementation.

In terms of Examination Instruction No 35 of 1986 of the Department of Education and Culture, the following courses were approved in January 1986 and by agreement they are applicable to the training of all population groups:

Water and Effluent Treatment Practice	– N1
Water and Effluent Treatment Practice	– N2
Water Treatment Practice	– N3
Effluent Treatment Practice	– N3

Taken in conjunction with the required subsidiary subjects, these courses qualify candidates for the National Technical Certificates; NTC1, NTC2 and NTC3.

A few technical colleges have indicated that they will be prepared, for the next few years, to present the above-mentioned two N3 courses, as short courses (approximately 4 weeks duration), to accommodate candidates who qualify on the strength of having passed standard 9 or matric. Successful candidates will not obtain the NTC3 qualification, but will receive single subject recognition at the N3 level. The proposed regulations make provision for recognition of these single subject qualifications. By the same token, recognition is given to holders of the existing operators' certificates, which have in the past been awarded by techical colleges.

In the interim the syllabus-subcommittee has been reconstituted and is going ahead with the drafting of proposed syllabi for N4, 5 and 6 courses, which will in all probability also be presented by the technical colleges.

According to available information the N1, 2 and 3 courses are already, or will soon be presented by the following institutions:

Technical College Pretoria-West
Private Bag X03
PRETORIA-WEST
0117 *(Mr H L Oberholzer)*

Atlantis Technical Institute
P O Box 93
Wesfleur
ATLANTIS
7349 *(Mr S P J Ackerman)*

Technical College Durban
Private Bag 1
CONGELLA
4013 *(Mr J R Gaillard)*

Athlone Technical College
Private Bag
ATHLONE
7760 *(Mr J A Bester)*

M L Sultan Technikon
P O Box 1334
DURBAN
4000 *(Mr D H Goodes)*

Shikoane Matlala Technical College
Private Bag X4010
SESHEGO
0742 *(Mr J L Roux)*

Umlazi Technical College
Private Bag X04
ISIPINGO
4110 *(Mr A T Izaaks)*

Technical College Maitland
Private Bag X6
HOWARD PLACE
7450 *(Mr P J de Bruin)*

Other technical colleges may also decide to present these courses. One such is the Technical College of South Africa (Technisa), which will shortly begin its correspondence course and another is the SASTRI College in Durban.

According to the Classification in the above-mentioned regulations, provision is also made for recognition of the **National Diploma in Water Care** as an optional qualification for Class IV and V operating personnel, ie the senior officials.

The National Diploma is being presented by the following Technikons:

Pretoria Technikon
420 Church Street
PRETORIA
0002 *(Mr S Schwarzer)*

Technikon Northern Transvaal
Private Bag X24
SOSHANGUVE
0152 *(Mr L Bredenhann)*

According to available information the following Technikons may also be prepared to present the course if student numbers should warrant it:

Cape Technikon
P O Box 625
CAPE TOWN
8000

Technikon Witwatersrand
P O Box 3293
JOHANNESBURG
2000

FINANCING TRAINING

The importance of training has been emphasised and steps have been taken to ensure that uniform training standards are applicable throughout the country. We have also seen that a number of technical colleges are all set to present the courses and that others would be interested if the number of potential students and the availability of **funds** should warrant it.

So far as student numbers are concerned there should not be any problems because there are several thousand persons already employed in the water

and effluent treatment field who, despite considerable experience, do not have the necessary qualifications to make real progress in their careers.

Opportunities to attend the courses are necessary and the funds to make this possible; and there's the rub! Most local authorities do not have the required relief personnel nor the funds to spare people, full-time and far from home, to attend courses. Fortunately, however, prospects for a solution to their problem are presented by the Local Government Training Act, No 41 of 1985, which provides "for the promotion of the training of personnel for local government bodies and for matters connected therewith."

This Act, *inter alia,* provides for the establishment of a Training Board for Local Government Bodies, with representation by Directors-General of the Administrations of the Houses of Assembly, Representatives and Delegates, various government departments, the Director of Local Government and a number of other persons from local governmental bodies, employee organisations and the Federated Chamber of Trade Unions.

The Training Board is called upon to exercise the powers and perform the duties conferred upon it and to control the funds made available to it in terms of the Act. The main sources of funds are Parliamentary allocations and levies from local authorities that are specifically earmarked for training purposes.

The training field covered by the Board is broad and ecompasses virtually all aspects of local authority management and operations. Naturally watercare in all its facets is included in this field.

The following quotation from the Act, which deals with the utilisation of monies in the training fund, serves to illustrate the situation clearly:

"8. (1) The Training Board may, on such conditions as it may deem fit and on such basis as it may determine with the approval of the Minister and after consultation with the Co-ordinating Council, utilise the monies in the training fund for the allocation of

(a) grants-in-aid, donations or loans to any person or institution, association or body, including a local government body, which provides training or will provide training;

(b) bursaries, bursary loans or financial contributions to persons undergoing training or who will undergo training;

(c) funds for the financing of –

(i) the compiling and collecting of training courses;

(ii) general or combined recruiting actions for obtaining the services of employees for the local government sector.

(2) An application for a grant contemplated in subsection (1) shall be made in the manner and at the times, and shall be accompanied by the information, determined by the Training Board.

(3) Monies allocated in terms of subsection (1)(a) and (b) may be utilised only to defray the expenditure arising from the provision of training in terms of an approved training course.

(4) The conditions contemplated in subsection (1) may relate to any matter mentioned in section 9(2) and the fees which may be charged in respect of training which is provided.

9. (1) The Training Board may on such conditions as it may deem fit, approve a training course.

(2) The conditions contemplated in subsection (1) may include conditions relating to –

(a) the contents, nature, duration and standard of a course;

(b) the standard of education or practical experience required for admission to a training course;

(c) the qualifications and experience required of a person who provides training in terms of a training course;

(3) The Training Board may at any time withdraw or amend any condition in terms of this section."

From the above and based on discussions with officials of the Department of Constitutional Development and Planning it is evident that local authorities, which may experience financial difficulty in sending personnel to attend training courses, may apply for **financial assistance.** This may also be applied to the provision of relief personnel while key persons are away receiving training.

It is also evident that training funds may be used to improve existing training facilities and if there is a real need, to extend them. The money may also be used for the development of specific courses. Apparently it appears that these funds may not be applied for the *ab initio* development of new training centres.

Whereas the Act is specifically aimed at the promotion of training for local authority personnel, it does not make provision for the private sector. This sector should then turn to the Department of Manpower for financial support for personnel training.

Informal training is designed to assist officials already in service and who wish to improve their capabilities and promotion potential. It also has the objective of making the latest technological developments known for beneficial application.

The Training Board has specified the following requirements which must be met:

- ☐ The money may only be used for courses previously approved by the Board or its Executive Committee.
- ☐ Applications for funds must be fully motivated.
- ☐ Payment will only be made if claims have been fully specified.

Because many of the informal courses will have a practical bias, it may not always be possible to describe their content in detail, but their objectives and structure should be clearly outlined so that the Training Board can obtain a clear enough picture to make a decision.

Presently (Spring 1986) informal training has been given a higher priority than formal training because of a shortage of funds. Consequently applications for bursaries, loans, etcetera for formal education cannot receive immediate attention and in any event not before the beginning of 1987 and possibly even later. The immediate emphasis is on short-term projects aimed at improving the day to day performance of existing personnel as quickly as possible.

LINES OF COMMUNICATION

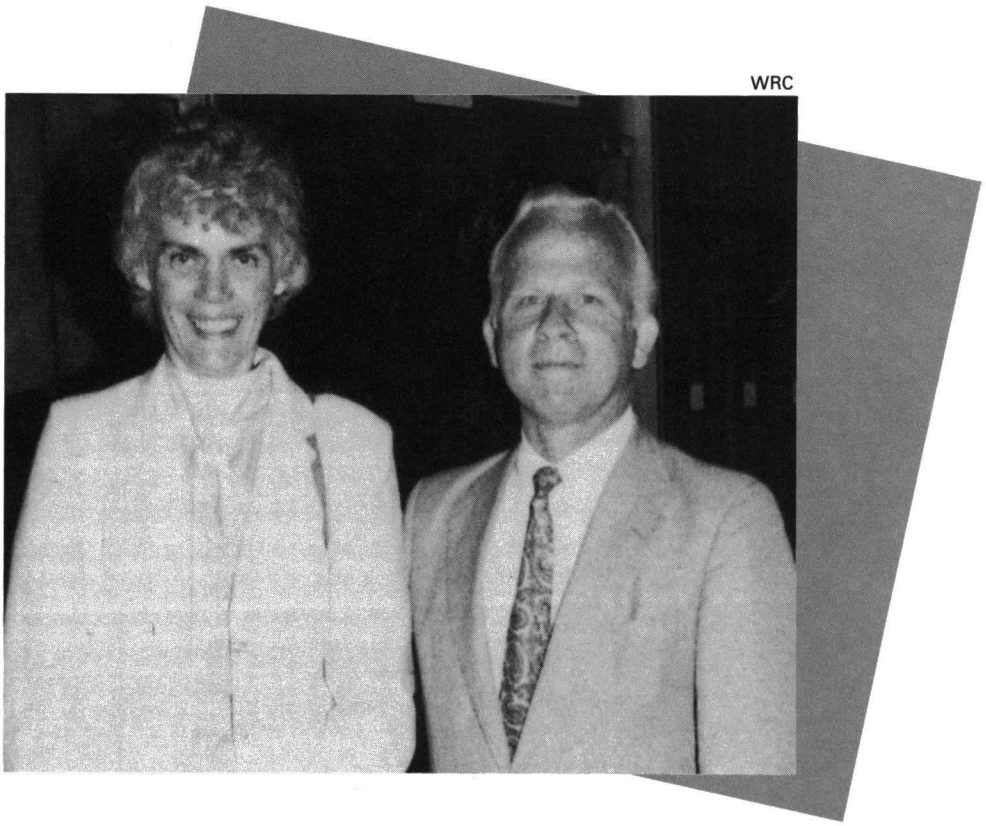
The provinces each have a Regional Training Committee, to which Sub-regional Training Committees report. The members of the regional and sub-regional committees are persons familiar with local authority affairs and others who represent various bodies within local authorities.

The **lines of communication** flow from the sub-regional to the regional Training Committees and then on to a National Co-ordinating Training Committee which reports to the Training Board and *vice versa.*

These channels of communication should be adhered to closely so that all requirements including distinctive individual requirements from the various regions, may be intercepted and provided for. It is also important that all local authorities should be aware of the Training Committees and their functions to avoid ad hoc contact with individuals. The Department of Constitutional Development and Planning has already informed local authorities fully regarding these matters, and details should be available from the various Town Clerks.

Prof Speece

His objective impressions give food for thought



WRC

Prof and Mrs Speece.

South Africa could become a leader in the field of pelletised anaerobic treatment processes. This observation was made by Prof Richard Speece from Drexel University, in Philadelphia, United States of America. Prof Speece was recently invited to South Africa by the WRC to visit research facilities and to advise on a possible future national research programme for anaerobic treatment processes. Prof Speece also attended the Anaerobic Digestion Symposium in Bloemfontein. The symposium was organised by the University of the Orange Free State and the National Institute for Water Research of the CSIR.

SA Waterbulletin spoke to Prof Speece at Jan Smuts airport just before his return to the United States.

On South Africa's position in pelletised anaerobic treatment processes, Prof Speece said Holland is the current world leader in this field, but South Africa could soon take that lead. Although the phenomenon was first observed, and subsequently researched and developed in Holland, they have not yet managed to resolve the mechanism of pellet formation. He referred to a paper delivered at the Bloemfontein symposium by Dr Richard Loewenthal on "Hypothesis for pelletisation in the upflow anaerobic sludge bed reactor" by PALNS Sam-Soon, RE Loewenthal, PL Dold and G v R Marais, all from the University of Cape Town. This paper, he said, could well be the start to unravel the mechanism of pellet formation.

Although pelletisation may offer a solution in the treatment of certain waste waters, it is probably not universally applicable. For the successful application to such waste waters a more reliable method of solids separation than the conventional clarifier is required. Solids separation using dissolved air flotation or an upflow sandfilter approach may offer solutions.

Another aspect Prof Speece commented on was the hesitancy of South Africans to publish and distribute their work more widely. "There is a tendency in South Africa towards one-way communication," he said. "South Africans are aware of international literature, but their own research findings are not known enough overseas."

Prof Speece especially referred to valuable publications such as *Water SA* and the Water Research Commission's monograph on the "Theory, design and operation of nutrient removal activated sludge processes," which in his opinion require wider distribution.

He also suggested it might be worthwhile for the WRC to prepare a pamphlet of a few pages describing the anaerobic treatment process, pointing out both its advantages and limitations. This should be distributed to municipalities and industries to make them aware of the process' potential.

"An integrated approach to anaerobic digestion in South Africa is necessary. Many municipalities do not for example know the return flow of anaerobic digesters is often the cause of many of their problems," Prof Speece said.

He also said many of the current trends in sewage purification technology in South Africa are similar to trends in the USA a couple of years ago. For example, it will be difficult to find a plant in the USA where they are not using anaerobic treatment processes – something which was common ten years ago.

On the topic of anaerobic treatment of raw waste water, Prof Speece said one could get as much as 50-60 per cent organic matter removal with anaerobic treatment upstream of aerobic treatment. It is important however, that the temperatures should not fall below an average of 20 °C. In countries like Holland this approach has not worked because of their climate, but it could be a viable option in certain areas in South Africa.

Finally, Prof Speece suggested that the long start-up periods required for the anaerobic digestion process are unacceptable in industry, and researchers should attempt to develop operational or other techniques to increase the rate of start-up. In addition micro-biologists should develop an early-warning technique to give process operators sufficient time to take corrective action before process failure.

Snuitkewer stuit water-plantkopseer op eie houtjie

CARINA CILLIERS

Die snuitkewer wat gebruik word vir die beheer van die uitheemse wateronkruid, Salvinea molesta.

Onder: 'n Larf van die snuitkewer wat ingevoer is vir die beheer van waterhiasinte. Die larf tonnel binne in die blaarsteel. Die bruin gedeelte is die verrotting van die weefsel waar die larf vreet.

CARINA CILLIERS

Dit wil nogal voorkom of waterhiasinte dalk sy moses teëgekom het. Dié keer is dit nie een of ander supersoniese masjien of bomenslike chemikalie nie, maar 'n twee millimeter snuitkewer met die onuitspreekbare biologiese naam van *Neochetina eichhorniae.*

Salvinea molesta, beter bekend as die Karibavaring, waterslaai en waterhiasinte, is uitheemse waterplante wat probleme in Suid-Afrikaanse damme en riviere veroorsaak. Volgens dr Peter Reid, Hoofhidroloog van die Departement van Waterwese, is die chemiese en meganiese beheer van sulke waterplante nie net alleen duur nie, maar versteur dit ook dikwels die ekologie. Die Departement kyk dus al hoe meer na biologiese beheer waar die plant deur sy natuurlike vyand uitgeroei word.

Navorsing op hierdie gebied het reeds ver gevorder in Australië waar soortgelyke probleme as dié in Suid-Afrika ondervind word. Plaaslik doen dr Carina Cilliers, Senior Landbounavorser van die Navorsingsinstituut vir Plantbeskerming, navorsing op snuitkewers as beheeragente vir die drie wateronkruide. Sy sê hoewel baie van die navorsingsresultate in Australië in Suid-Afrika van toepassing is, is navorsing onder plaaslike toestande nog nodig. Die kewers wat hulle uit Australië ingevoer het was selfs onder kwarantyn geplaas om van enige ongewenste organismes ontslae te raak.

SALVINEA MOLESTA

Suksesse wat met *Salvinea molesta* in die Oos-Caprivi behaal is, is redelik bekend. Hierdie navorsing het reeds ongeveer drie jaar gelede begin. *Salvinea molesta,* 'n onkruid van Suid-Amerika, se natuurlike snuitkewervyand is uit Australië ingevoer (wat dit weer uit Suid-Amerika ingevoer het) en in die Oos-Caprivi geplaas. Suksesbeskrywings varieer van merkwaardig tot ongelooflik.

'n Soortgelyke probleem het onlangs in die Letabavallei ontstaan. Dr Reid het in September 1985 van die kewers in die Oos-Caprivi gaan haal en per helikopter na Letsitele in die Laeveld gebring. Hy het die kewers op plante wat van hier af geneem is ingebring, sodat slegs die insekte en geen plantmateriaal vanuit die Oos-Caprivi ingekom het nie.

Die snuitkewers is in die besproeiingsdamme in Letsitele uitgeplaas. In Australië is gevind dat die stikstofinhoud van die water belangrik is vir die ontwikkeling van hierdie insekte asook natuurlike temperatuur omdat insekte koudbloedig is. Daar moet dus gereeld opvolgingswerk gedoen word om te sien hoe die insekte vorder en aanpas in hulle nuwe omgewing.

"Teen April vanjaar," sê dr Cilliers, "het die *Salvinea molesta* begin doodgaan en gesink. Die kewers kan nou verskuif word en die Hoofbesproeiingsraad in Tzaneen gaan hierdie kewers in die Letabarivier versprei.

Waaraan het die snuitkewer sy *Salvinea molesta* sneuwelgevalle te danke? Dr Cilliers vertel: "Die kewers en hulle larfies vreet die groeipunte van die *Salvinea molesta* en die larfie tonnel op sy beurt in die stammetjie op en vernietig die plantweefsel. Die plant sterf geleidelik af en verrot uiteindelik.

"*Salvinea molesta* is belangrik vir die gasheer-spesifieke kewer se voortplanting en namate die *Salvinea molesta* afneem, neem die kewers ook af. Om die natuurlike balans te behou sal die kewer nooit al die onkruid uitroei nie."

Op 'n vraag of die kewers en dooie onkruid die kwaliteit van die water kan beïnvloed sê dr Cilliers dit het geen effek nie. Die verrottingsproses vind geleidelik plaas wat 'n voordeel bo chemiese beheer is. Met chemiese beheer gaan al die plante gelyk dood, sink en vorm 'n anaerobiese reaksie – 'n proses wat nie met biologiese beheer plaasvind nie.

WATERSLAAI

Waterslaai kom ook van Suid-Amerika af, en die waterslaaikewers weer eens via Australië. Die snuitkewers vir waterslaai is ook baie effektief met min of meer dieselfde werking as die salvineakewer. Hy lê sy eiers op die blare van die waterslaai. Die kewer vreet 'n tonnel in die blaar, water kom in en die plant verrot.

Dr Cilliers sê waterslaai is in hierdie stadium 'n klein probleem. Die grootste probleem kom voor in die Kruger Wildtuin in die noorde by Punda Maria waar twee waterpanne tans met waterslaai oortrek is en verder af in die Sabierivier en enkele klein verspreidings in Natal.

Dr Cilliers was in September by Punda Maria, nege maande na die kewers uitgeplaas is, en meer as 90 persent van die plante was of beskadig of vernietig.

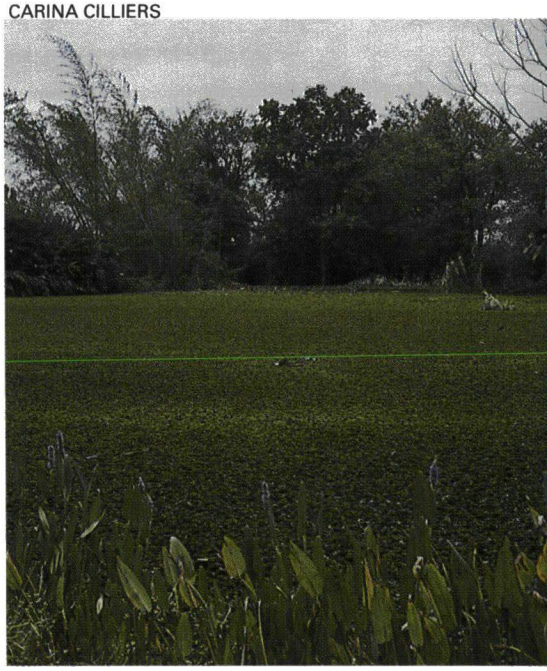
WATERHIASINTE

Suid-Afrika se grootste kopseer is natuurlik waterhiasinte. Omdat die plant en sy snuitkewer ook uit 'n subtropiese gebied kom en waterhiasinte meestal in koue dele in Suid-Afrika voorkom, kan dit 'n probleem veroorsaak. Hierdie snuitkewer se lewenssiklus is verder ook drie keer langer as die van die ander twee snuitkewers, maar die uiteindelike skade wat hy aanrig is dieselfde.

"In hierdie stadium is ons baie opgewonde," sê dr Cilliers. "Die kewers het reeds hulle eerste winter oorleef en hulle teel ook aan. Dit bly egter nog 'n ope vraag hoe lank dit nog sal duur vir waterhiasinte om onder biologiese beheer te wees."

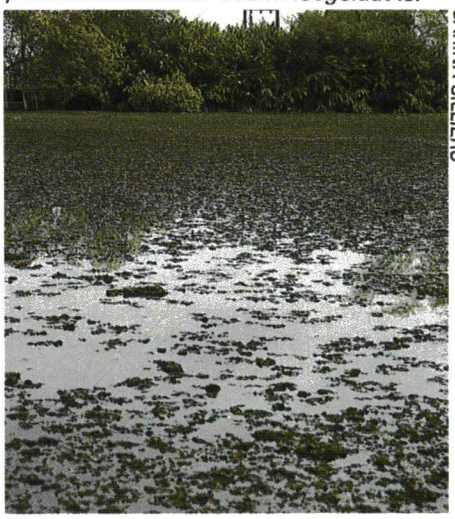
Dr Reid sê die Departement wil nog 'n natuurlike vyand vir waterhiasinte invoer. 'n Navorser by die Universiteit van Florida het 'n swam gepatenteer wat klaarblyklik waterhiasinte vernietig. Hulle beoog om die swam in te voer en dit sal eers deeglik deur 'n spesialis plantpatoloog van die Departement Landbou en Watervoorsiening getoets word voordat dit ook vrygestel kan word. Verder is daar ook nog 'n motsoort beskikbaar wat ingevoer kan word.

CARINA CILLIERS



Bo: Die digte mat Salvinea molesta *op die besproeiingsdam van mnr Gustav van Veijeren in die Letsitele distrik, September 1985.*

Onder: Dieselfde dam 'n jaar nadat die plant se snuitkewer daarin losgelaat is.



CARINA CILLIERS

120 Ml/d Sewage Works in pipeline for Cape area

A new sewage treatment works for Blue Downs and Khayelitsha is to be erected in the near future. The Driftsands sewage treatment works will be situated east of Khayelitsha in the Cape-Metropolitan area. The initial capacity will be 40 Megalitre/day, ultimately 120 Megalitre/day, serving a population of more or less 800 000 people.

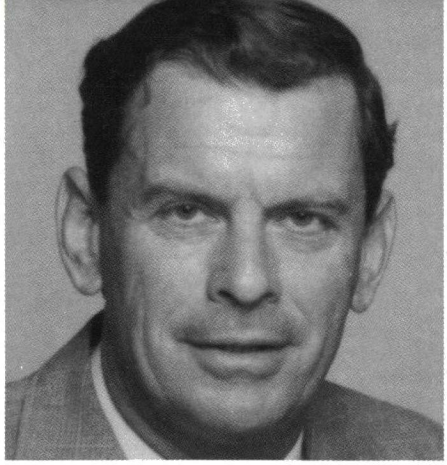
According to Mr C P Marais, Director of Blue Downs Development of the Administration: House of Representatives, Khayelitsha has developed in the space of two years from bush area to a population of about 170 000 people. Statistically, this is one of the fastest developing areas in the country.

Mr Marais says because the temporary existing treatment works at Khayelitsha is almost at full capacity, the new works will have to be built as soon as possible. The plan is to privatise the design, construction, financing and operation of the new works.

On the nature of the ground and subsoil conditions, Mr Marais says the site is covered by fines of sand-dunes which consist of windblown sand. "Ten trial holes were excavated between the dunes in May 1986 and water was found in holes 4,5m deep. A higher water table can be expected during winter and early summer."

According to Mr Marais the eventual catchment of the works will include Khayelitsha and the areas bounded by DF Malan airport, Bellville and the rural area east of the Strand-Kuils River railway line. The first phase 40 Megalitres/day plant will receive sewage primarily from Khayelitsha.

Effluent from the first phase will have to conform to the General Standard and will be released into the Kuils River.



Prof DG Kröger, Head of the Thermodynamics Division of the Department of Mechanical Engineering at the University of Stellenbosch, was awarded the Havenga prize in September by the **SA Akademie vir Wetenskap en Kuns** *for his work on heat transfer.*

The thermodynamics Division has been involved, through the Bureau for Mechanical Engineering (BMI), in various heat transfer developments and design projects.

The BMI, in collaboration with ESCOM, is also involved in a WRC-project evaluating wet/dry cooling systems.

During a social function at the symposium **Irrigation farming and mechanisation schemes in developing areas,** *Mr David van der Merwe, Chief Adviser at the WRC, was awarded the South African Agricultural Union's (SAAU) gold medal for outstanding contribution to agricultural engineering. The presentation was made by the President of SAAU, Mr JK Murray on 11 November 1986.*

WRC

CHARLES PIENAAR

Prof Harold Rudolph, Mayor of Johannesburg, presenting the final contract report – **Enhancement of Biological Phosphorus Removal by altering process feed composition** *– to Dr Jacques Kriel, Chairman of the WRC.*

The official handing over of the final report took place on 30 October at the Johannesburg Sun and Towers Convention Centre.

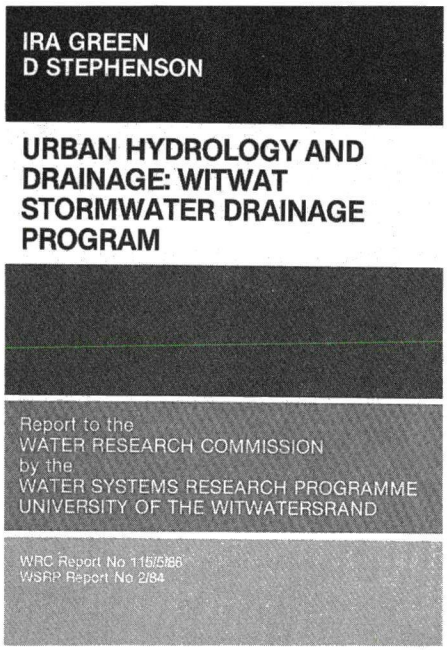
The three-year study was undertaken for the WRC by Mr Dave Osborn, Mrs Laurraine Lötter, Mr Tony Pitman and Mr Harold Nicholls of City Health and City Engineers Departmens of Johannesburg City Council. The report is available free of charge from: Water Research Commission, P O Box 824, Pretoria, 0001. Tel: (012) 28-5461.

URBAN HYDROLOGY AND DRAINAGE REPORTS

By the Water Systems Research Programme
University of the Witwatersrand.

A WRC research project on urban hydrology and drainage, under the direction of Professor David Stephenson of the Water Systems Research Programme at the Witwatersrand University, has recently been completed.

The main objectives were to produce design guides for hydrologists and engineers concerned with the determination of floods in urban and small catchments and for the design of drainage systems.



The contract generated the following ten reports:

Report No 115/1/86
Urban Hydrology and Drainage Review

Report No 115/2/85
Peak flows from small catchments using kinematic hydrology

Report No 115/3/86
Dimensionless hydrographs using kinematic theory

Report 115/4/86
Comparison of kinematic and time shift routing in closed conduits

Report No 115/5/86
WITWAT stormwater drainage program

Report No 115/6/86
Comparison of urban drainage models for use in South Africa

Report No 115/7/86
Factors affecting storm runoff in S.A.
I. Short duration rainfall

Report No 115/8/86
Factors affecting storm runoff in S.A.
II. Water losses

Report No 115/9/86
Stochastic – deterministic design flood estimation for small catchments

Report No 115/10/86
Stormwater pollution analysis

The reports can be ordered free of charge as a set, or separately, from the Water Research Commission, PO Box 824, Pretoria, 0001. Contact person: Mrs Tineke van der Schyff, telephone (012) 28-5461.

THE ESTIMATION OF PHYTOPLANKTON BIOMASS IN FRESHWATER

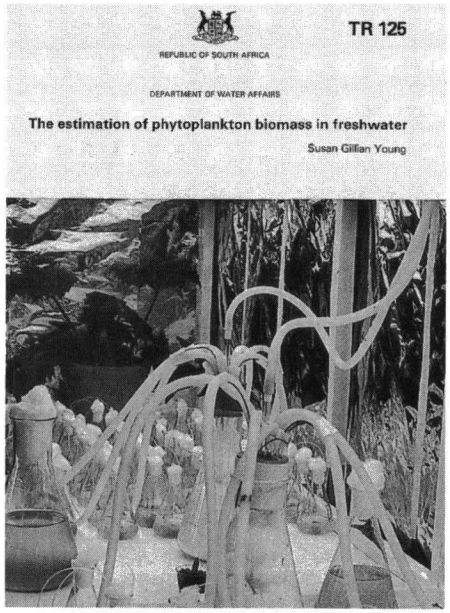
By Susan Gillian Young

In recent years the need to assess surface water quality has led to the measurement of many parameters to indicate the trophic state of a water body.

Perhaps the most visible impact of eutrophication is the increase in live plant material. Periodic surveys of standing stock may be used to describe this cumulative process. Data of standing stock of phytoplankton is vital for the study of aquatic systems including food chain dynamics and management rationale.

Unfortunately there is no direct method for determining the concentration of living particulate carbon in aquatic systems. Since the 1930s, a large number of methods have been developed using a variety of physical, chemical and biochemical parameters to estimate biomass. The parameters currently used are all indirect and each presents difficulties if used for a wide variety of water bodies on a routine scale. Since the estimation of phytoplankton biomass using these parameters has been shown to alter with different environmental conditions the inter-relationships and ratios of these estimations to that of cellular organic carbon will also alter. The ratios used must, therefore, be stated in conjunction with the conditions under which they prevail and the phytoplankton biomass calculated accordingly. The problem of inadequate ratios and inter-relationships for the widely different methods used in different countries and laboratories causes difficulty in comparing results.

The object of this project was to ascertain the inter-relationships of the estimates of biomass obtained from the five most commonly used methods. The effects of light, temperature, nutrients and these methods were investigated. An attempt has also been made to produce usable facts and figures to enable workers to estimate phytoplankton biomass, using the most suitable technique available, and be able to relate this to estimates made, using the other techniques, on samples from different water bodies or under different environmental conditions.



1986 191 pages Price R14,45 & GST
Technical Report TR 125
ISBN 0 621 10021 8

Available from the Department of Water Affairs, Manager: Scientific Services, Hydrological Research Institute, Private Bag X313, Pretoria, 0001. Contact person: Mrs M Blomerus, telephone (012) 82-1021.

WATER TREATMENT OPEN DAY AND SEMINAAR

Theme: Hypertrophy and Treatment of Water from Eutrophied Sources

Where: Hartbeespoortdam

When: 4 February 1987

The event is being planned by the National Institute for Water Research (NIWR) of the CSIR in cooperation with other organizations. It will be of interest to individuals and organizations involved in water supply planning and management, and in treatment of algal-laden surface waters.

For further details contact:
Mr Phil Coombs, NIWR, P O Box 395, Pretoria, 0001. Tel: (012) 86-9211.

1987

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.

GROUNDWATER MONITORING

An international symposium on groundwater monitoring and management will be held from 23 to 28 March 1987 in Dresden, German Democratic Republic.
Enquiries: Dr P Lösel, Director, Institut für Wasserschaft, Schnellerstr 140, DDR-1190, Berlin, German Democratic Republic.

POLLUTANTS

An international conference on the vulnerability of soil and groundwater to pollutants will be held in Noordwijk aan Zee, the Netherlands, from 30 March to 3 April 1987. Papers are invited.
Enquiries: VSGP '87, c/o KIVI, PO Box 30424, 2500 GK, The Hague, the Netherlands. Telephone: (0) 70-919900.

HYDROLOGY

An international symposium on hydrology in perspective: lessons from the past, prospects for the future, will be held in Rome, Italy, from 6 to 10 April, 1987.
Enquiries: GIBA s.a.s. Studio Congressi, Via Marco Besso 40,00191 Roma.

SEWAGE AND SLUDGE

A conference on the Marine treatment of sewage and sludge will be held in Brighton, England, from 29 to 30 April 1987.
Enquiries: Conference Officem Institution of Civil Engineers, 1-7 Great George Street, London, SW 1 P 3 AA.

WATER AND SANITATION

An international conference on water and sanitation in developing countries – "So What's New?" will be held in San Juan, Puerto Rico from 26 to 29 May 1987.
Enquiries: American Society of Civil Engineers, 345 East 47th Street, New York, NY 10017, USA.

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, Department of Civil Engineering, University of Leeds, LS29JT, England.

WATER QUALITY

The first IAWPRC international symposium and exhibition on systems analysis in water quality management will be held in London, UK, from 30 June to 2 July 1987.
Enquiries: Dr MB Beck, Watermatex 87, IAWPRC, 1 Queen Anne's Gate, London, SW1H9BT, England.

FRESHWATER ECOSYSTEMS

An international conference on the biomanipulation of natural and artificial freshwater ecosystems will be held at Lake Kinneret, Tiberias, Israel, from 2 to 7 August 1987.
Enquiries: The Organising Committee, International Conference on Freshwater Ecosystems, PO Box 3190, Tel Aviv 61031, Israel.

IUGG 1987

The 19th general assembly of the International union of Geodesy and Geophysics will be held at the University of British Columbia, Vancouver, Canada, on 9 to 22 August 1987.
Enquiries: Conference Secretariat, c/o Venue West, 801-750 Jervis St., Vancouver, B.C. Canada V6E2A9.

HYDROLOGICAL SCIENCES

A symposium combining 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) will be held on 6 to 9 September 1987 at Rhodes University in Grahamstown.
According to the organisers second circulars are now available and being distributed to those who replied to the first circular.

Key dates

Submission of summaries of proposed papers: 31 January 1987.
Submission of camera ready copy for programme and proceedings: 30 June 1987.
Second circulars and registration forms are available from the Organising Committee, Hydrological Sciences Symposium, Department of Geography, Rhodes University, PO Box 94, Grahamstown, 6140.

DESALINATION

The 3rd world congress on desalination and water reuse organised by the International Desalination Association (IDA) will be held in Cannes, France, from 14 to 17 September 19897.
Enquiries: Mrs Lucie Cohen, Societe de Chimie Industrielle 28 rue Sanint-Dominique, 75 007, Paris, France.

OZONE

The 8th ozone world congress will be held from 15 to 18 September 1987 in Zurich, Switzerland, Papers and posters invited.
Enquiries: International Ozone Association, Swiss Committee, c/o Wasserversorgung Zürich, Hardhof 9, Postfach, CH – 8023 Zürich. Telephone: 01/435-2111, Telex: 822060

MOUNTAIN CATCHMENTS

A jubilee hydrology symposium with the theme "Fifty years of mountain catchment research in South Africa" will be held in Stellenbosch from 11 to 13 November 1987.
Enquiries: Department of Environment Affairs, PO Box 727, Pretoria 0001 or phone Mr DL Owen at (012) 28-7120.

NITROGEN POLLUTION

A specialised conference on nitrogen pollution of water will be held in Brussels, Belgium, from 24 to 28 November 1987. The aim of the conference is to up-date all present knowledge related to nitrogen and water of all kinds, including drinking water, waste water, agricultural water, lake and river water, industrial process water, etc. Papers are invited.
Enquiries: Dr WJ Masschelein, Laboratories C.I.B.E., 764 Chaussee de Waterloo, B-1180 Bruxelles, Belgium.

S·Y·M·P·O·S·I·U·M

MODELLING OF AQUATIC SYSTEMS

OBJECTIVES

To encourage interaction between all limnologists, hydrologists, water resource planners and managers currently involved in, or interested in, the development or use of models of aquatic ecosystems and resources.

To assess the current status of aquatic modelling in South Africa.

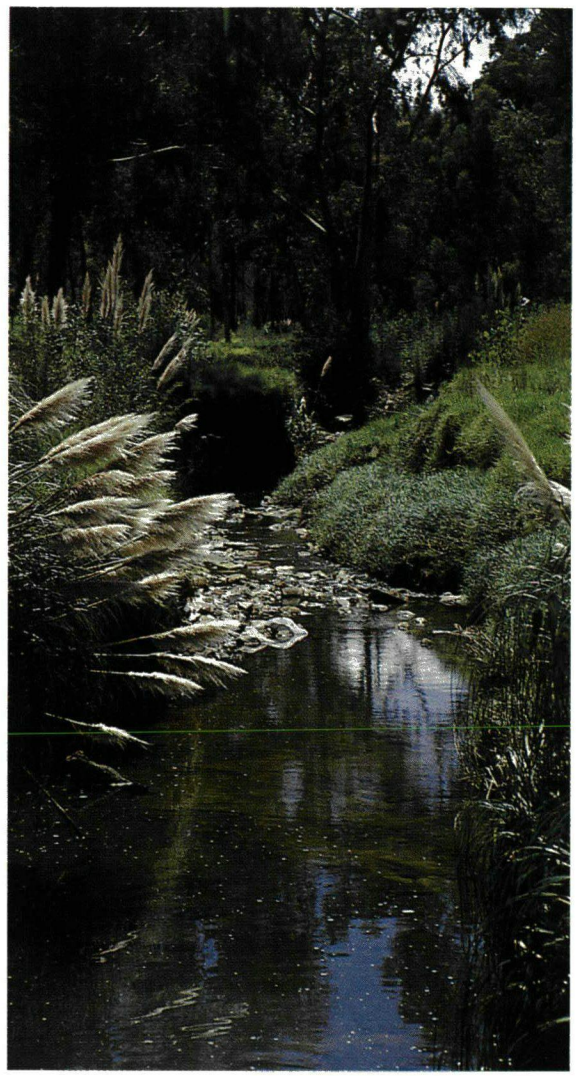
To present delegates with the array of models available for the science and management of water resources.

To identify areas requiring additional attention.

To encourage co-operation.

WHO SHOULD COME

Anyone involved in research management, planning or utilization of our freshwaters.



AUSPICES

The symposium will be held under the joint auspices of the Committee for Inland Water Ecosystems, the Limnological Society of Southern Africa and the South African National Committee for the International Association of Hydrological Scientists.

DATE

Monday 17th – Tuesday 18th August 1987.

VENUE

CSIR Conference Centre.

COSTS

The registration fee will be R70 which will include morning and afternoon teas, lunches and a social function on the evening of 17th August.

PRELIMINARY REGISTRATION

If you are interested in attending or participating in this symposium, please complete and return the registration card in this Bulletin before December 15th, 1986.

FORMAT OF PROGRAMME

Papers and posters will be welcomed on matters relating to the development and use of models relevant to water resource management. The programme will be split into the following sessions:

- ☐ Models of ecosystems and aquatic environments: development and application
- ☐ Development and testing of models for the extension of water quality and quantity data
- ☐ Development and testing of models for the assessment of the impact of land use and management on the quality and quantity of river run-off
- ☐ The use of micro-computers in aquatic resource modelling and management
- ☐ Sensitivity, error analysis, and calibration and verification of models
- ☐ Application of models in water resource management and operations

ENQUIRIES

Miss M Robbertse
Ecosystem Programmes
Foundation for Research Development
Council for Scientific and Industrial Research

PO Box 395
Pretoria
0001

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