

## IAWPR-referate: Gesogte kennis ...

# RSA PRESTEER MET 10

Uit die 170 referate wat ingedien is vir die International Association on Water Pollution Research (IAWPR) se Toronto-konferensie, is 68 geselekteer, en hiervan kom 10 uit Suid-Afrika.

Hoe merkwaardig hierdie prestasie is, blyk uit die feit dat slegs die VSA, met 13 referate, beter gevaar het. Hierna volg Kanada met 9, Frankryk 8, Wes-Duitsland 6, Japan

4 en elf ander lande met 3 of minder.

Die verdeling van die Suid-Afrikaanse referate is: Nasionale Instituut vir Watervorsing — 6, Watervorsingskommissie — 2, Universiteit van Kaapstad (Departement Siviele Ingenieurswese) — 1, en AECl — 1.

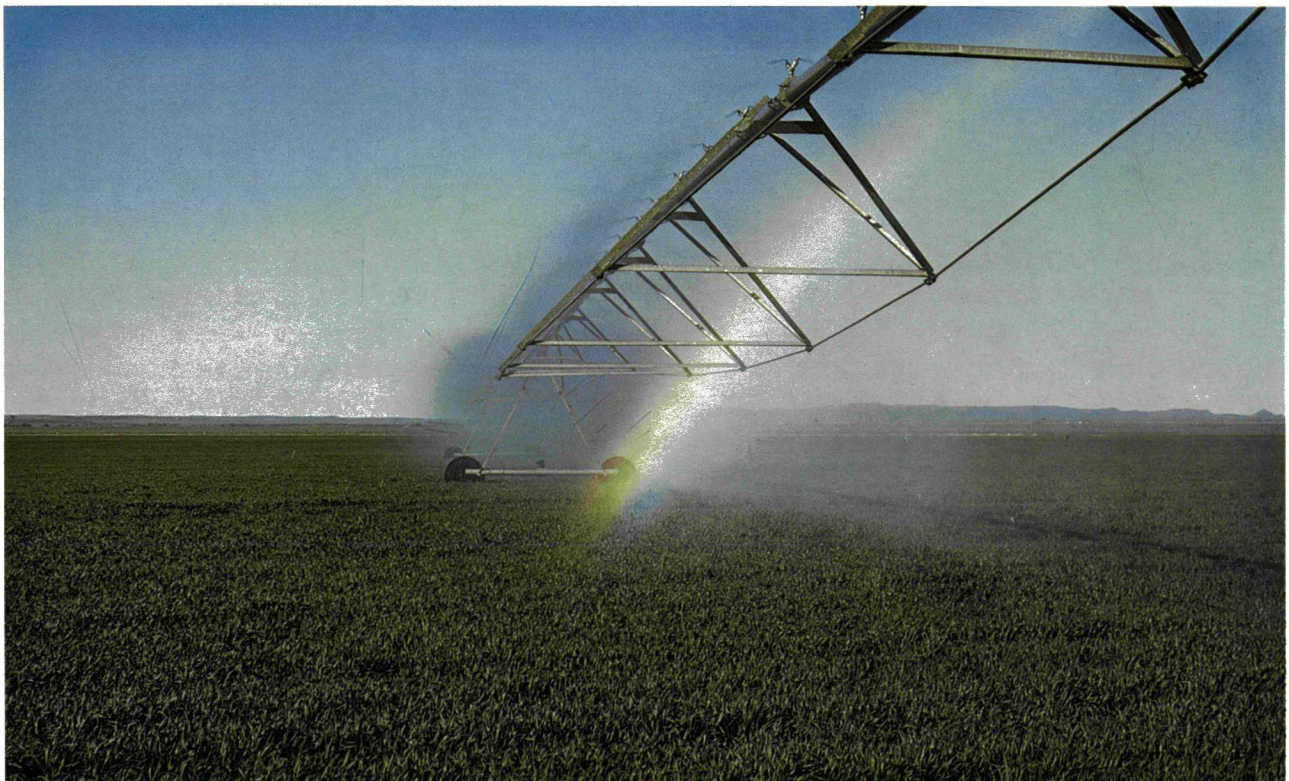
Die konferensie word van 23 tot 27 Junie 1980 in Toronto gehou en is die Tiende Konferensie van die IAWPR. Hierdie konferensies wat tweejaarlik gehou word, skep unieke geleenthede vir die bekendstelling van die nuutste kennis oor alle aspekte van waterbe-

soedeling en die bekamping daarvan. Nadere besonderhede oor die Toronto-konferensie kan verkry word van:

Die Sekretaris  
SA Nasionale Komitee vir IAWPR  
p/a NIWN  
Posbus 395  
PRETORIA  
0001

Suid-Afrika sal gasheer wees vir die Elfde Konferensie van IAWPR wat van 29 Maart tot 2 April 1982, in die Burgersentrum, Kaapstad gehou sal word.

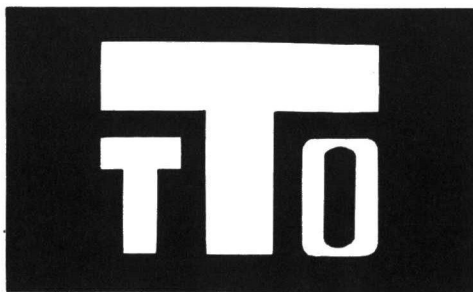
*Lees binne:*





## TEGNOLOGIE- OORDRAG

In hierdie rubriek sal gereelde aankondigings verskyn van publikasies, simposia of ander gebeurlikhede met 'n praktiese inslag wat kan help om die gaping tussen navorsing en toepassing te oorbrug.



## TECHNOLOGY TRANSFER

In this column regular announcements will be published of publications, symposia and other events of practical import which could contribute towards closing the gap between research and application.

# Treating metal effluents

The Department of Chemical Engineering at the University of the Witwatersrand under contract to the Water Research Commission has developed a process for treating dilute metal effluents. The range of metals that can be removed includes copper, silver, gold, lead, zinc, cadmium and nickel.

The main advantages of this system over other treatment methods are:

- The equipment is compact and easy to operate.
- Addition of chemicals is not required.
- The metals precipitate in a dense form, thus assisting disposal or possible recycling.
- The operating cost per unit of metal removed is small.

The pilot-scale cell, shown in the photograph, has been used to treat up to 20 l/min of electroplating rinse water effluent. The cell consists essentially of two cathode beds of crushed graphite separated from a lead anode by anion permeable diaphragms. Results indicate that metal concen-

trations in the range 10 to 100 ppm can be reduced to about 1 ppm with power consumption of between 100 and 500 watts.

Further information concerning this process may be obtained from:

**Professor AW Bryson**  
Department of Chemical Engineering  
University of the Witwatersrand  
PO Box 1176  
Johannesburg, 2000



*Pilot-scale cell used in the treatment of electroplating rinse water. The cell has a capacity of 20 l/min.*



# Verslag oor eutrofikasie

Alhoewel baie reeds gesê en geskryf is oor die nadelige gevolge van eutrofikasie in Suid-Afrika, was daar tot onlangs weinig pogings om hierdie gevolge in ekonomiese terme te kwantifiseer. 'n Belangrike eerste poging in dié verband is 'n verslag deur die Departement van Waterwese: *The economic impact of eutrophication in South Africa*, deur CA Bruwer.

Die verslag is gegrond op 'n opname en evaluering van beskikbare inligting. Sommige van die ekonomiese impakte van eutrofikasie, soos dié op watersuiweringswerke, die verwydering van alge in besproeiingskanale en die bestryding van alge en waterplante, kon met 'n redelike mate van akkuraatheid bepaal word. Dit was egter onmoontlik om die ekonomiese impak op ontspanning, estetiese aspekte, gesondheid en die waarde van aanliggende grondwaardes, met enige mate van akkuraatheid te bepaal. Daar was egter sterk aanduidings dat eutrofikasie groot ekonomiese impak het wat dringend akkurate vasstelling vereis.

Eksemplare van die verslag kan



verkry word van die Bestuurder, Wetenskaplike Dienste, Departement van Waterwese, Privaatsak X313, Pretoria, 0001.

*Die ekonomiese impak van eutrofikasie is moeilik kwantifiseerbaar, veral op ontspanning, estetiese aspekte en gesondheid.*

## Aid to flood prediction

The following report has been published jointly by the Water Research Commission and the University of Natal: *The Runhydrograph — Theory and Application for Flood Predictions*, by Lourens AV Hiemstra and David M Francis.

The report is based on a project carried out by the Department of Civil Engineering, University of Natal, under sponsorship of the Water Research Commission.

The runhydrograph is a concept based on the mathematical and statistical processing of existing hydrographs. These hydrographs may make it possible to identify important parameters in the runhydrograph for gauged catchments and to develop synthetic runhydrographs for ungauged catchments. The results could be useful to civil en-

gineers and those concerned with floods.

The theory of the runhydrograph was developed on the basis of continuous instantaneous records on most of the major gauged streams in the Republic of South Africa.

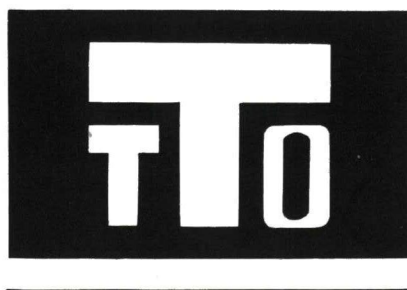
Since most catchments are ungauged (and gauged catchments are seldom homogeneous in time), simple methods were developed for the application of the runhydrograph theory on ungauged catchments.

Copies of the report are obtainable from:

The Chairman  
Water Research Commission  
PO Box 824  
PRETORIA 0001

OR

The Head  
Department of Civil Engineering  
University of Natal  
King George V Avenue  
DURBAN, 4001





# Beheer oor waterplante



Die Departement van Waterwese het in die somer van 1977/78 sukses behaal met die volskaalse bespuiting van waterhiasinte op die Hartbeespoortdam. 'n Multidissiplinêre wetenskaplike ondersoek van toestande in die dam voor en na bespuiting kon geen nadelige effekte identifiseer nie. Die resultate van dié ondersoek, wat onder koördinerende en gedeeltelike finansiering van die Waternavorsingskommissie uitgevoer is, is saamgevat in 'n gesamentlike verslag van die Kommissie, die Nasionale Instituut vir Waternavorsing en die Hidrologiese Navorsingsinstituut van die Departement van Waterwese. Die verslag, *Chemical Control of the Water Hyacinth on Hartbeespoort Dam*, is verkrygbaar van die Direkteur, Nasionale Instituut vir Waternavorsing, Posbus 395, Pretoria, 0001.

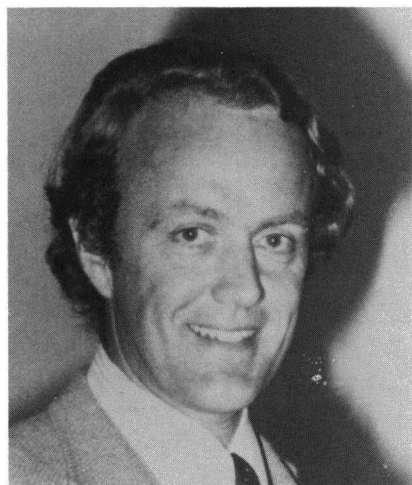
Aangesien meeste van die praktiese ondervinding wat tydens die bespuitingsprogram self opgedoen is, nie in die genoemde verslag opgeneem is nie, het die behoefte ontstaan om die inligting, saam met ander inligting oor die beheer van wateronkruid, te konsolideer in die vorm van 'n algemene gids. Die Departement van Waterwese het die leiding in dié verband geneem en die gids, getiteld *Guide to the use of herbicides on aquatic plants* — kan nou verkry word van Die Bestuurder, Wetenskaplike Dienste, Departement van Waterwese, Privaatsak X313, Pretoria, 0001.



*Ondervinding opgedoen tydens die bespuiting van waterhiasinte op die Hartbeespoortdam is nou gekonsolideer in 'n gids vir die gebruik van onkruidodders op waterplante. Die foto bo is tydens die bespuiting van die dam geneem en toon die vliegtuig bo 'n drywende massa plante.*

## Natuurlike hulpbronne

# HANKS AAN DIE HOOF



*Prof John Hanks*

Die Universiteit van Natal het onlangs bekend gemaak dat prof John Hanks as direkteur van die Instituut vir Natuurlike Hulpbronne aangestel is. Prof Hanks is tans direkteur van Biologiese Wetenskappe aan dieselfde universiteit en was voorheen ook aan die Natalse Parkeraad as Hoof-vakkundige beaampte verbonde.

Vanaf 1965 tot 1968 was hy as bioloog by die Kafue Nasionale Park in Zambië en tot 1970 as bioloog by die

Nasionale Raad vir Wetenskaplike Navorsing in Zambië werksaam. Hy verwerf sy doktorsgraad in 1971 en doseer tot 1975 aan die Universiteit van Rhodesië. Hierna sluit hy by die Natalse Parkeraad aan.

Prof Hanks, aan wie die Zimbabwese-toekenning vir uitstaande werk in 1974 toegeken is, is ook voorsitter van die radioprogram 'Talking of nature' en 'n aansienlike aantal publikasies het reeds uit sy pen verskyn.



## ***Besproeiing: Die spore van vooruitgang ...***

Geil koringlande en blink water — dit is die indrukke wat die Rust-besproeiingskema in die Suid-Vrystaat die besoeker bied. *SA Waterbulletin* het laat verlede jaar die Ramahkanale van dié skema met die kamera onder skoot gekry, en in hierdie foto-artikel vertel ons u van



# **BLINK VORE IN RAMAH**

'n Klompie kilometer suid van Luckhoff in die Oranje-Vrystaat, daar waar 'n mens in die lente deur plate kapokbossie op pad De Aar toe ry, word die reus van die Oranjerivier se vloei deur die groot wal van die PK le Rouxdam gestuit.

En stroomaf hiervan stoot die blink water in die stil Ramahkanale van die Rust-besproeiingsgebied op en glinster in die leivore en stuif soos dons uit die spilpunt- en kantrol- en kruipsprinkelstelsels.

Hierdie besproeiingskema is 'n besondere een omdat die stelsel van waterbeurte nie hier bestaan nie — die boere kan water verkry soos en wanneer dit nodig is. Om meer oor die onderwerp te verneem, het *SA Waterbulletin* besoek daar afgelê in

geselskap van mnr DJ (Salty) du Randt (die Departement van Landbou-tegniese Dienste se streekingenieur wat by Glen gevestig is), en mnr DS van der Merwe, senior adviseur van die Waternavorsingskommissie. By die PK le Rouxdam, wat die beginpunt van die kanaalstelsel vorm, het mnr Charles van Deemter, hoof-voorligtingsbeampste van die OVS-streksorganisasie van die Departement van Landbou-tegniese Dienste, uit Fauresmith by ons aangesluit om die geleide te doen in 'n gebied wat hy soos die palm van sy hand ken.

Die PK le Rouxdam wat deel van die Oranjerivierprojek uitmaak is in 1977 amptelik geopen. Die Departement van Waterwese se eie werkne-

mers het onder toesig van 'n internasionale groep raadgewende ingenieurs vir die konstruksie van die dam gesorg.

Uit hierdie opgaring word water vrygestel in 'n hoofkanaal waaruit vertakkinge, bekend as Ramahkanaal I en II, na die Rust-besproeiingsgebied spruit. Dié gebied is die eerste van vyf wat stroomaf van die PK le Rouxdam beplan word. Die ander staan bekend as Blesbok, Baviaanskrantz, Kalkplaat en Sanddraai.

Die besproeiingseenhede is 75 ha groot en die jaarlikse waterkwota is 880 mm teen R45/ha. Die maksimumstroom wat per eenheid getrek kan word, beloop 90 l/sek. Dit vergelyk baie gunstig met ander be-



## Blink vore in Ramah

*Die foto regs toon 'n uitlaatpunt in die Ramahkanaal wat na 'n verdere vertakking van die besproeiingstelsel lei. Die foto onder op hierdie bladsy toon 'n weerstasie voor 'n woonhuis op die skema.*

*(Van bl 5)*

sproeiingskemas waar 'n gemiddeld van nagenoeg 40 l/sek benut mag word.

Die stroom is weliswaar sterker as wat vir sprinkelbesproeiing vereis word, en dit vanweë die feit dat die toepassing van vloedbesproeiing ook in die beplanning 'n plek gehad het, en dit word inderdaad dan ook op sekere persele toegepas.

Die grond in dié deel van die Oranje-Vrystaat is fynsanderig met 'n lae vogretensie en daarom moet in kort siklusse besproei word. Dit vereis dat besproeiingswater te alle tye beskikbaar moet wees.

Die verspreiding van water op die persele in die Rustgebied geskied deur middel van pype wat vanaf die Ramahkanale aangelê is. Siwwe moes by die onttrekkingsuitlate van die kanale aangebring word om opdrifsel en paddas uit te hou.

Oor laasgenoemde onderwerp gesels die boere lekker omdat die siwwe natuurlik nie die paddaeiers kan opvang nie en dié dan uitbroei en in die pype beland.

Die kanaal bring water tot naby die hoogste (topografies) punt van elke perseel en die gravitasiedruk kan



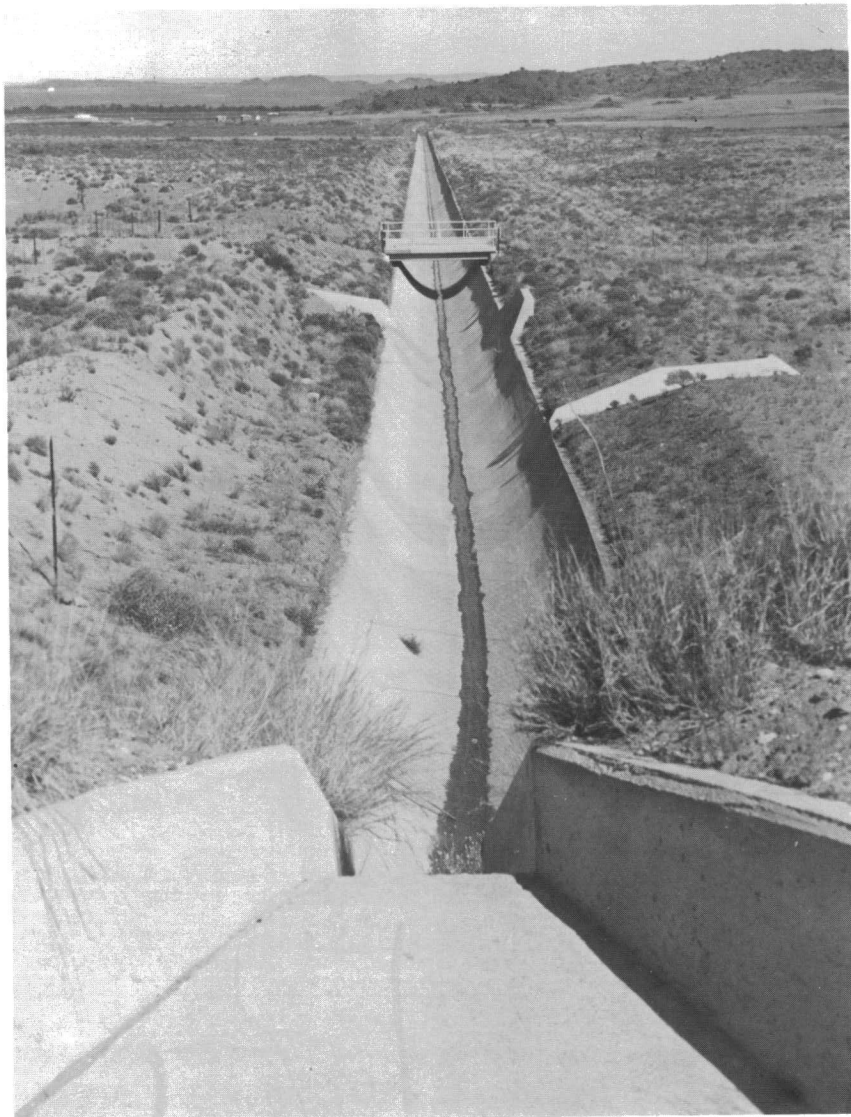


## Blink vore in Ramah

Mnr Charles van Deemter (links), hoof-voorligtingsbeampte van die Departement van die OVS-streekorganisasie van die Departement van Landbou-tegniese Dienste, in ernstige gesprek met mnr Willie van Zyl van die plaas Knervlakte op die Rust-besproeiingskema in die Suid-Vrystaat.



(Onder): Dreineringslote soos dié getuig van die deeglike beplanning van die besproeiingskema.



dus benut word. Dit bring ook voordele mee deurdat korter en makliker roetes vir die lê van pype gevolg kan word. Die druk wissel van 100 tot 300 kPa.

Mnr Du Randt bereken die potensiele waarde van die druk — 50c/25mm/ha vir elektrisiteit en R1,50/25mm/ha vir diesel as die druk 100 kPa beloop. Hy wys daarop dat gemeganiseerde sprinkelbesproeiing bykans gedwonge is as gevolg van die lae voghouvermoë van die sandgrond. Dit vereis besproeiingsiklusse van ongeveer 4 dae wat op sy beurt met konvensionele sprinkelbesproeiing 7 arbeiders per perseel sal verg.

Gewasse wat hier verbou word omvat koring, grondbone, katoen en mielies. Van die hoogste produksie-syfers wat tot dusver behaal is, is 3 t/ha grondbone, 2,5 t/ha katoen en 142 sak/ha mielies.

Om te kyk of die boere hieroor glimlag het SA Waterbulletin met mnr WH van Zyl van Knervlakte gaan gesels. Hy het in Februarie 1977 die ploeg daar ingeslaan nadat hy van Vaalharts verhuis het, en het in Junie 1977 hawer geplant. Later het die gemeganiseerde sprinkelstelsels gekom — twee spilpunte wat elk 30 l/sek gebruik en wat ten tye van ons besoek oor 'n geil koringland sirkel.

Probleme is daar wel — en dit bring mnr Van Zyl weldra by die paddas in die pype.

“Ek het self die siwwe in die kanaal vervang,” sê hy, “maar as jy 'n week nie gespuit het nie, is die pype

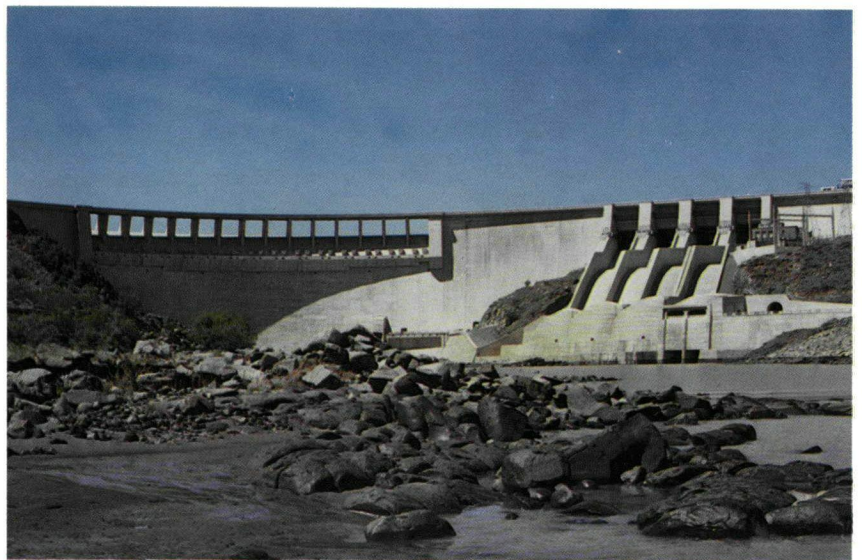
(Na bl 8)



## Blink vore in Ramah



(Bo) 'n Spilpuntbesproeiingsapparaat in 'n koringland in die Suid-Vrystaat. Hierdie moderne, gemeganiseerde besproeiingstelsels is besig om 'n algemene toneel by die besproeiingskemas van die Republiek te word.



(Bo) Die PK le Rouxdam waaruit water vir die besproeiingskemas stroomaf verskaf word. Hierdie manjifieke dam is op die Oranje-rivier suid van Luckhoff in die OVS geleë.



(Links) 'n Kantrolstelsel in gebruik op die besproeiingskema. Die foto toon duidelik hoedat die totstandkoming van die skema die bossieveld tot 'n groen lushof omskep het.

(Van bl 7)

vol paddas."

Mnr Van Zyl is egter in hierdie stadium heeltemal gelukkig met die gang van sake op Knervlakte. Hy hoop om elektrisiteit te verkry wat vir hom groot voordele sal inhou.

Kantrol- en kruipsputstelsels word ook in die omgewing gebruik, maar spilpuntstelsels is die onderwerp van groot bespreking — en veral ook die kwessie van grondverdichting — mens kan luister as die here Du Randt en Van Deemter die voor- en nadele van die onderwerp met groot entoesiasme vanuit verskillende standpunte uitpluis!

(Na bl 9)



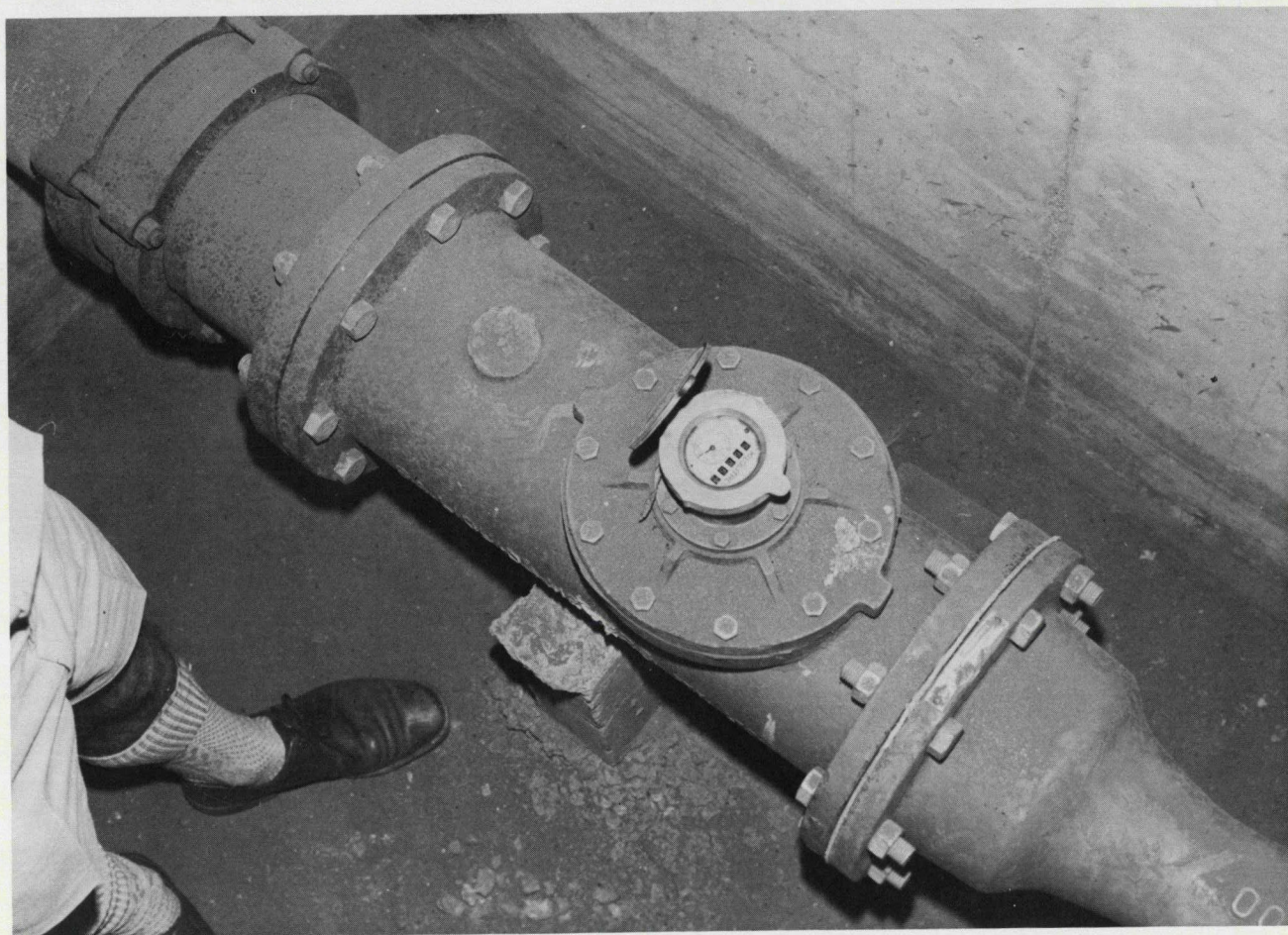
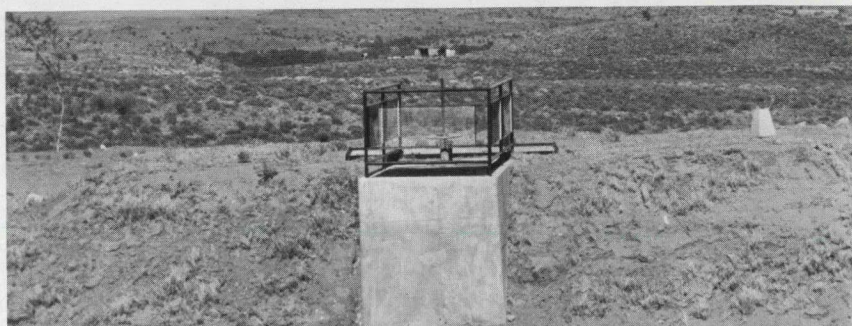
## Blink vore in Ramah

(Van bl 8)

Die Departement van Waterwese is verantwoordelik vir die bou van die kanale en die binneveldse beplanning van die persele word deur die Navorsingsinstituut vir Grond en Besproeiing, en die Afdeling Landbouingenieurswese en die OVS-streekorganisasie van die Departement van Landbou-egniese Dienste behartig. □

(Regs) Probleme met paddas in die besproeiingspype het boere genoodsaak om siwwe voor die uitlate uit die Ramahkanaal te laat aanbring, soos duidelik op die foto gesien kan word.

(Onder) Die water wat op die besproeiingseenhede verbruik word, word per pyp vanaf die kanaal tot op die rand van die eenhede gebring waar dit gemeet word, soos op die foto gesien kan word.





---

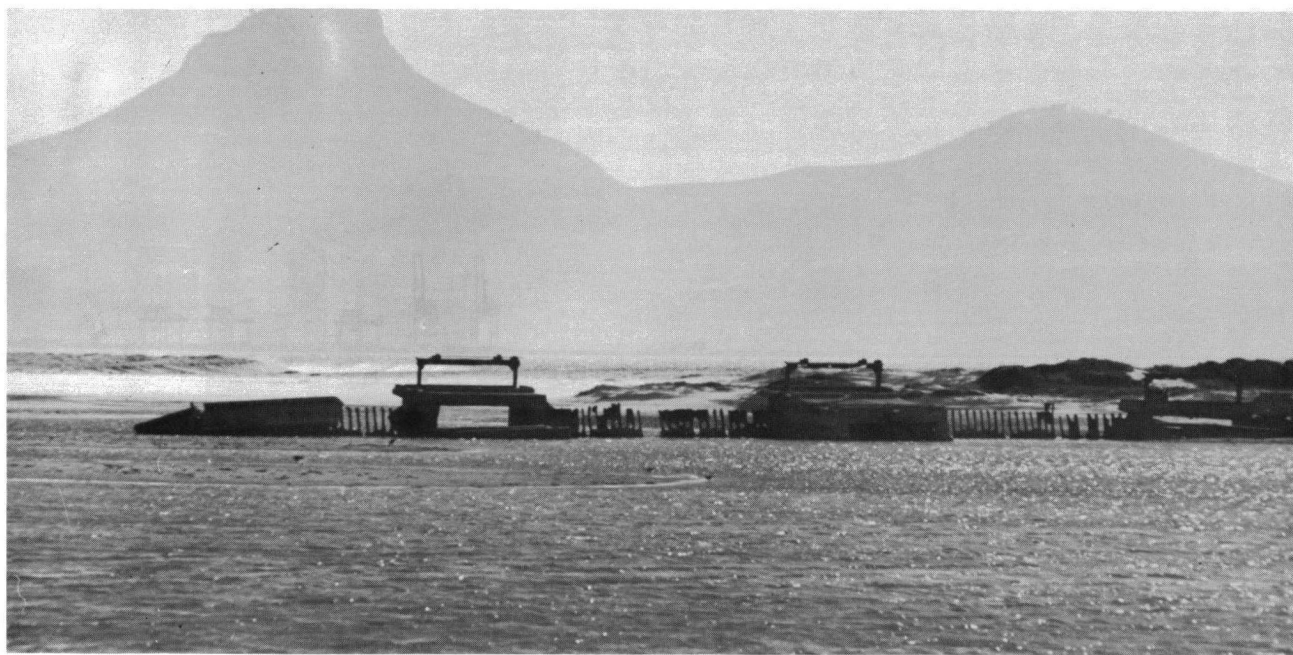
# THE EFFECTS OF DEVELOPMENT ON THE DIEP RIVER ESTUARINE SYSTEM NEAR CAPE TOWN

---

\*R.D. Beaumont PhD., MICE, MIWES

\*P.J. Heydenrych PrEng., MSc(Eng), MSAICE

(Paper presented at the Fourth National Oceanographic Symposium, University of Cape Town — July 1979)



*The remnants of the old weir across the mouth of the Diep River in Cape Town's suburb of Milnerton. The effects of development on the river system are traced in the accompanying article.*

---

## Introduction

The history of the Diep River estuary can be traced back almost 200 years. During this period considerable changes have taken place. The lower reaches have silted up creating a large dry pan in an area which was once a tidal lagoon.

The paper describes how the changes occurred. It refers to man's farming activities in the upper catchment and construction works across the lower reaches. It notes the effect of these changes upon the flooding characteristics. It also discusses the various development proposals that have been put forward in recent times and their possible effect upon the Diep River system.

## Existing River System

The Diep River rises in the Riebeeck Kasteel mountains north of Malmesbury and then flows for some 60 km in a south-westerly direction to the sea (see Fig. 1). It has one major tributary the Mosselbank river which drains the area to the west of Paarl. The total catchment covers some 1 400 sq.km and its annual surface run-off has been recently estimated at nearly 40 million cubic metres. For most of the year however there is no flow in the river by the time it reaches the coast.

Most studies relating to the Diep river have covered its lower reaches from Viissershok downstream to the mouth (see Fig. 2). At Viissershok the

river flows through a fairly wide gently sloping valley. There are numerous areas of marsh ground and reed beds adjacent to the river and along some reaches the main flow channel is far from clearly defined. At Table View township the river channel suddenly changes character and opens out into a wide triangular shaped basin some 3 km long. The basin, known locally as Rietvlei, remains dry except for short periods during and after the passage of large floods down the river. In the north-western corner of the basin there is a permanent body of water which was created by the excavation of material for extensions to Cape Town harbour in the mid 1970's.

The downstream end of Rietvlei is marked by a large road embankment and bridge. From this point the river

---

\*Executive Partners, Hill Kaplan Scott and Partners, Cape Town



channel begins to re-establish itself increasingly within a narrowing flood plain area until at the wooden golf course road bridge the two cannot be distinguished apart. This stretch or river channel, locally referred to as Milnerton Lagoon, has a permanent body of water which is subject to tidal action when the river mouth is open. The channel downstream of the wooden bridge is contained along its eastern bank by a concrete wall. At the mouth the remains of an old weir can be seen on the western bank. Except for periods after the passage of large floods the river remains cut off from the sea by a large sandbank.

### Historical background

One of the earliest maps which contains any detail of the Diep River estuarine system is that produced by Barbier<sup>1</sup> in 1786 (see Fig. 3). It shows that the river regime occupied much the same position as it does today except for its downstream section which joined up with the Liesbeek and Black Rivers before flowing out to sea. The mouth was located some 3 km downstream of its present position.

More detailed information about the characteristics of the river can be gained from Fanshawe's plan<sup>2</sup> of 1806. The plan was drawn up after the military occupation of that year and is primarily concerned with illustrating river crossing points for "Guns and Cavalry". It shows the river in much the same position as that drawn by Barbier. Of much more significance however is the reference to points at which the river was fordable. This implies that the river and particularly the Rietvlei area were deep enough to pose problems to anyone crossing them; it also possibly supports Green's belief<sup>3</sup> that sailing ships entered the river to take farm produce as far upstream as Viissershok, some 13 km from the present river mouth.

Fairly sophisticated survey plans of Rietvlei and the downstream channel area were drawn up in 1846<sup>4</sup> and 1860<sup>5</sup> (see Fig. 4). The plans are noteworthy for two reasons. Firstly they indicate that the Rietvlei basin was silting up; the term "quicksand" is printed across the area which Fanshawe<sup>2</sup> had labelled as being too deep for Guns and Cavalry to cross.

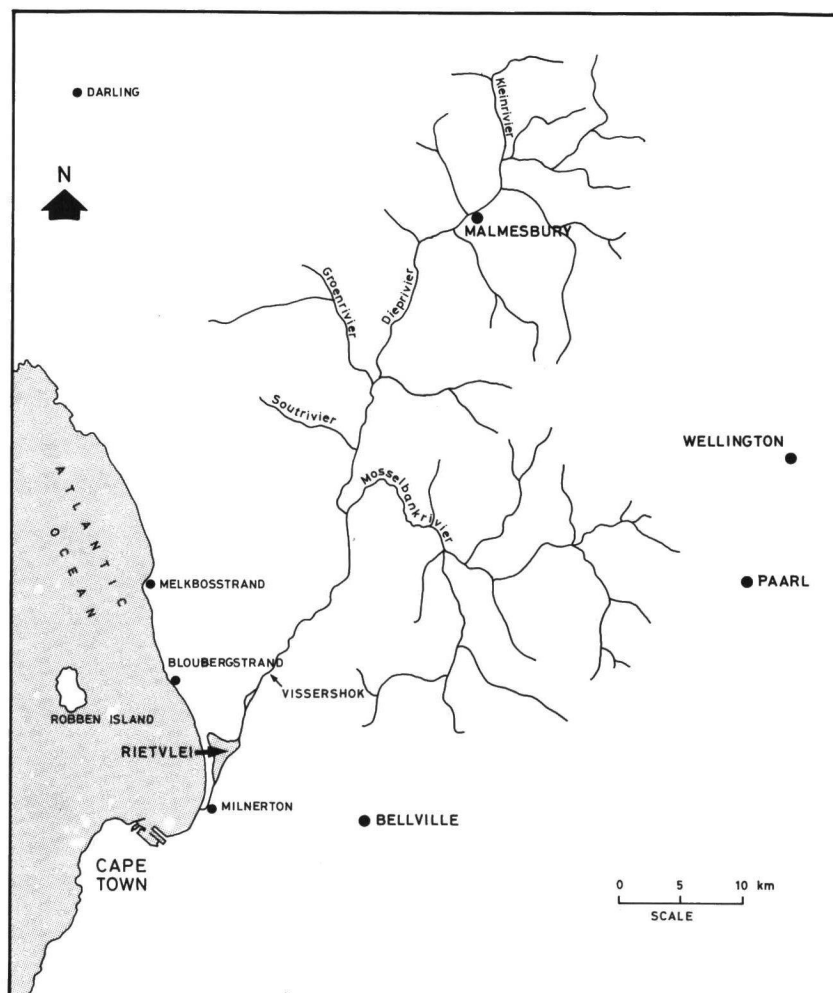


Fig 1: The Diep River catchment area.

Secondly they show that a new mouth had opened up close to its present day position. A form of sand bar is indicated at the new mouth and it is possible that with two openings to the Diep-Salt River complex and a reduced tidal flow into Rietvlei that periodic closures of this mouth may have occurred. It is also probable that deterioration of the channel between the two mouths dates from this time and was accelerated by development of road and rail services adjacent to it in the early twentieth century.

A later plan<sup>6</sup> of 1888 (see Fig. 5) indicates that the new mouth had become a permanent feature. The plan is a direct copy of Fanshawe's earlier work<sup>2</sup> and this is perhaps its main value. It does include certain modifications such as the mouth and fordable sites but still illustrates Rietvlei as being too deep to cross. This latter aspect, which is somewhat at

variance with other maps of the times, and its general lack of ground and urban survey detail makes its overall value somewhat questionable.

The first direct evidence of large scale siltation in the lagoon area dates back to 1905. Green<sup>3</sup> makes reference to steam dredgers that were used then to deepen part of Milnerton lagoon for rowing regattas. The siltation as in Rietvlei most probably resulted from bad farming practice in the upper catchment and would have contributed to further siltation by reducing the volume and hence scouring action of tidal waters moving up the lagoon into Rietvlei.

The effects of siltation in the estuary again became evident in the late 1920's. Boating activities were being seriously curtailed and so to improve matters this time, it was decided to raise the water level by building a weir across the river

(To p 12)



# Diep River

(From p 11)

mouth (see Fig. 6). The weir which incorporated 3 sluice gates for water level control was built in 1928. It provided man's first direct control of the estuarine regime. In subsequent years the weir was damaged by the passage of river floods. More significant however was the fact that the build up of flood waters behind the weir resulted in the inundation of residential areas adjacent to the lagoon. As a result of this and damage inflicted on the structure by the passage of two large floods in 1941 and 1942, the weir was broken up. The remains of the west bank portion are still visible today.

No further changes were made to the river system until 1961 when a large road embankment and bridge were built across the downstream end of Rietvlei. Just before completion of the contract a large river flood occurred which reached the top of this bridge. Subsequent studies have shown that this road embankment and relatively narrow span bridge now form a clear boundary between the upstream flood absorption area and downstream channel whose flood characteristics are largely influenced by the nature of the sand bar across the river mouth.

During the 1960's and early 1970's various proposals were put forward which would have altered the river regime completely. The first of these involved the building of a fishing harbour in which the river would have been diverted around the harbour area by means of a new channel. A dam was also to be built a short distance upstream of Visser-shok at the Koeberg site for attenuating flood flows. Some years later an entirely different set of proposals concerning marina and waterfront housing development was put forward. The proposals ranged from major development, in which large scale dredging of Rietvlei and the lagoon areas was planned to lesser schemes in which virtually no alterations to the river system would take place.

None of the above proposals proceeded beyond the investigation stage. However, in the mid 1970's two developments did take place in the north western portion of Rietvlei.

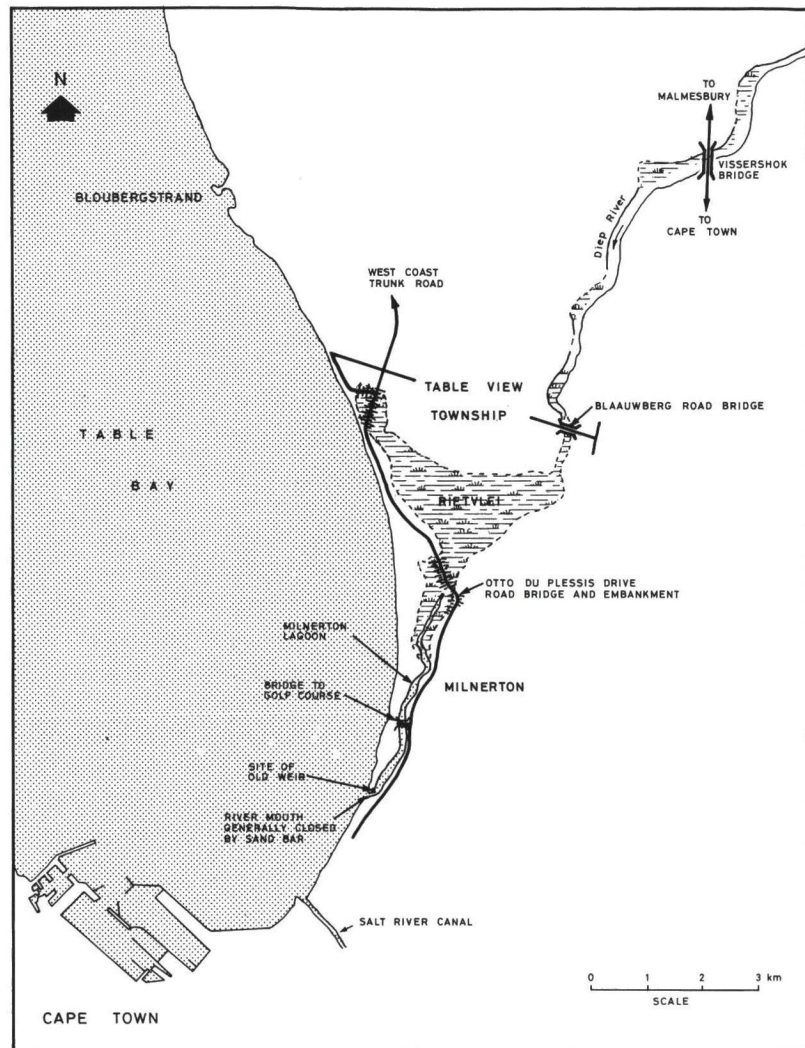
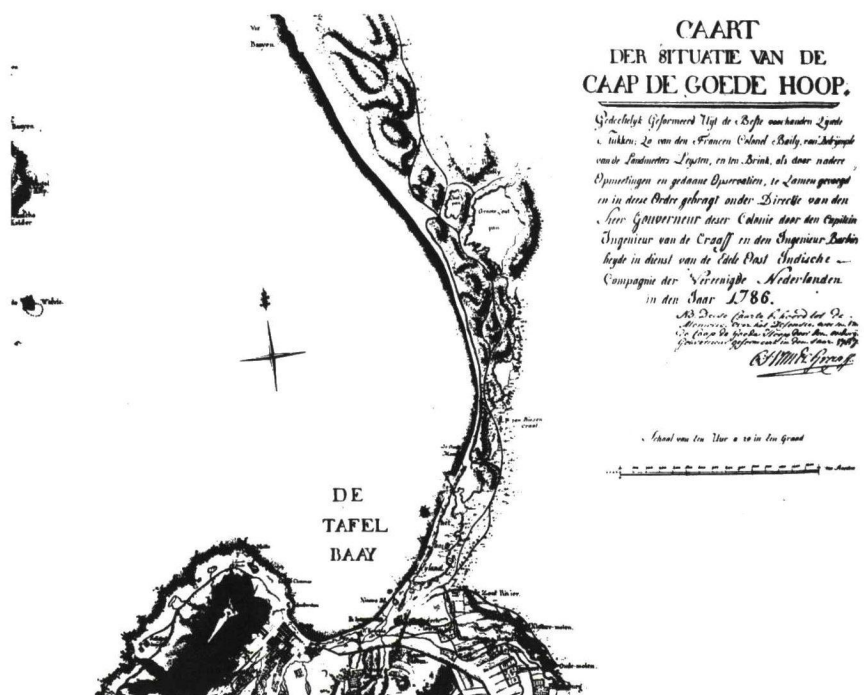


Fig 2: Lower reaches of the Diep River.

Fig. 3: Barbier's map of 1786.





Initially a large road embankment was built across the northern most corner of the vlei as part of the so-called west coast freeway development. Then dredging works were undertaken nearer to the main body of the vlei, the material being used as fill for extensions to Cape Town harbour. At the same time consideration was being given to the possible development of a dam at the Koeberg site for water supply purposes alone. This proposal is currently undergoing further examination.

The above information provides a brief outline of the historical changes to the Diep river in the Milnerton area. Although there are few specific details concerning changes in the flow regime, the information does nevertheless provide a valuable guide towards understanding the characteristics of the existing system and its potential for change.

### Flood studies

There are many references to the occurrence of floods in the lower reaches of the Diep river. Most of these however are based on the comment of local residents and, although valuable as a guide, must be regarded as suspect where details are concerned.

One of the earliest of the references is an engineering report<sup>7</sup> written in 1940. It mentions a flood of 1923 which is said to have risen to within 2,8 ft (0,85 m) of the road surface of the golf course road bridge. Using existing road levels as a base, this would indicate a peak flood level of some 2,5 m MSL at the site. The same report<sup>7</sup> also mentions a flood of 1927 which occurred whilst the Blaauwberg Road bridge was being constructed. The flood waters apparently rose some 14 ft (4,27 m) above the river bed and submerged the temporary bridge structure. No further reference is made to the magnitude or impact of this flood elsewhere in the catchment. A similar isolated reference is made to a flood of 1937 which is said to have risen to the top of the handrails on the weir at the mouth of Milnerton lagoon (see Fig. 6). This corresponds to a peak flood level of 2,75 m MSL.

Large floods are reported<sup>8</sup> to have passed down the Diep river in 1941 and 1942. Both resulted in significant damage to the weir at the

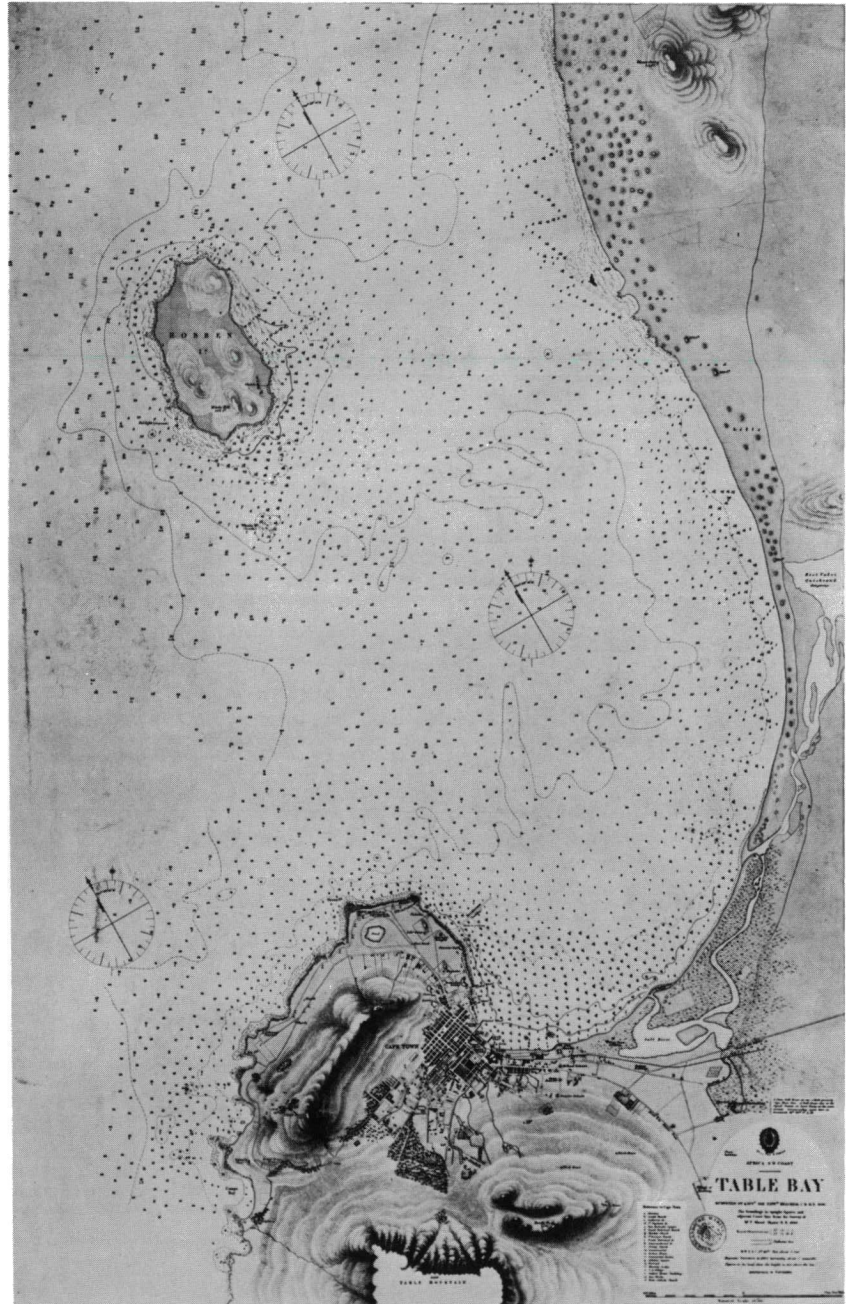


Fig 4: Survey plan drawn in mid-19th century of the Rietvlei and downstream area.

mouth but apart from a photo taken of the weir during the passage of the 1941 flood (see Fig. 7) no other details concerning the floods were found. References to subsequent floods are made in a preliminary report<sup>9</sup> drawn up in 1968 in connection with the planning of the Rietvlei harbour. The report mentions a flood of 400 cumecs reaching Rietvlei in 1954. It also refers to the flood of 1961 which occurred during the latter stages of construction of the Otto du Plessis road bridge. The flood es-

timated at 340 cumecs by the road engineers is reported to have risen to the underside of the bridge deck (i.e. a level of 2,75 m MSL) before subsiding. The report<sup>9</sup> estimates the 100-year flood at Rietvlei to be 810 cumecs. However using flow data from gauging station G2M14, which was established at Viissershok in 1966, a recent report<sup>10</sup> estimates the 50 and 100-year flood magnitudes at 210 and 300 cumecs respectively. These latest values are based on the

(To p 14)



## Diep River

(From p 13)

analysis of synthetic flows which were generated from rainfall data and calibrated with the 3 gauging stations in the catchment.

Between 1961 and 1974 no floods of any significance passed down the river. However as a result of the various development proposals that had been put forward during this period numerous studies of the flood regime were undertaken. These constituted the first comprehensive analysis of the overall flood situation. In one study of Rietvlei itself, it was calculated that the basin attenuates the 100-year flood by some 20%. In other studies the effects of various dredging, reclamation and weir control works on flood attenuation were examined.

As an integral part of the flood studies concerned with residential development in the Rietvlei and Milnerton lagoon areas, a water level recorder was installed on the golf course road bridge towards the end of 1971. Apart from a few short periods, the recorder monitored water level variations in the lagoon continuously until the end of 1975 when it was withdrawn from service. The record provides an extremely valuable account of the local river and tidal flow characteristics. It also clearly demonstrated the effects that the opening at the river mouth had

upon these flows when two large floods occurred in 1974 (see Fig. 8).

On 13 June 1974 a fairly large flood (peak discharge = 56 cumecs) was recorded at Vissershok. The flood passed through Rietvlei without inundating any of the Table View residential area and then flowed on down Milnerton lagoon. The mouth of the lagoon was closed by a sand bar and consequently the water level in the lagoon built up until it was sufficiently high to scour a path through to the sea. The peak level recorded at the golf course road bridge was 2,11 m MSL (see Fig. 8) and large sections of the adjacent road were flooded. Some two months later on 21 August 1974 an even larger flood (peak discharge = 87 cumecs) passed the Vissershok gauging station and this resulted in extensive flooding of the Table View residential area. In the north-western corner of Rietvlei where dredging activities were taking place a peak flood level of 3,68 m MSL was recorded by officials of the South African Railways. Further downstream however the mouth of the lagoon had been kept open by tidal flows since the June flood and this resulted in a correspondingly lower peak flood level of 1,81 m MSL being recorded at the golf course road bridge.

The records of these two floods clearly demonstrate the different flood regimes that have developed since the early seventeenth century. At Rietvlei the peak flood level is now entirely dependent upon the

magnitude of the river flood whereas further downstream in the lagoon the extent of flooding is largely controlled by the opening at the mouth. This situation and especially the changes that have taken place to the system since 1940 explain major discrepancies that occurred when initial attempts were made at calibrating a mathematical model of the Rietvlei and Milnerton Lagoon system using early photographic and written records of flooding.

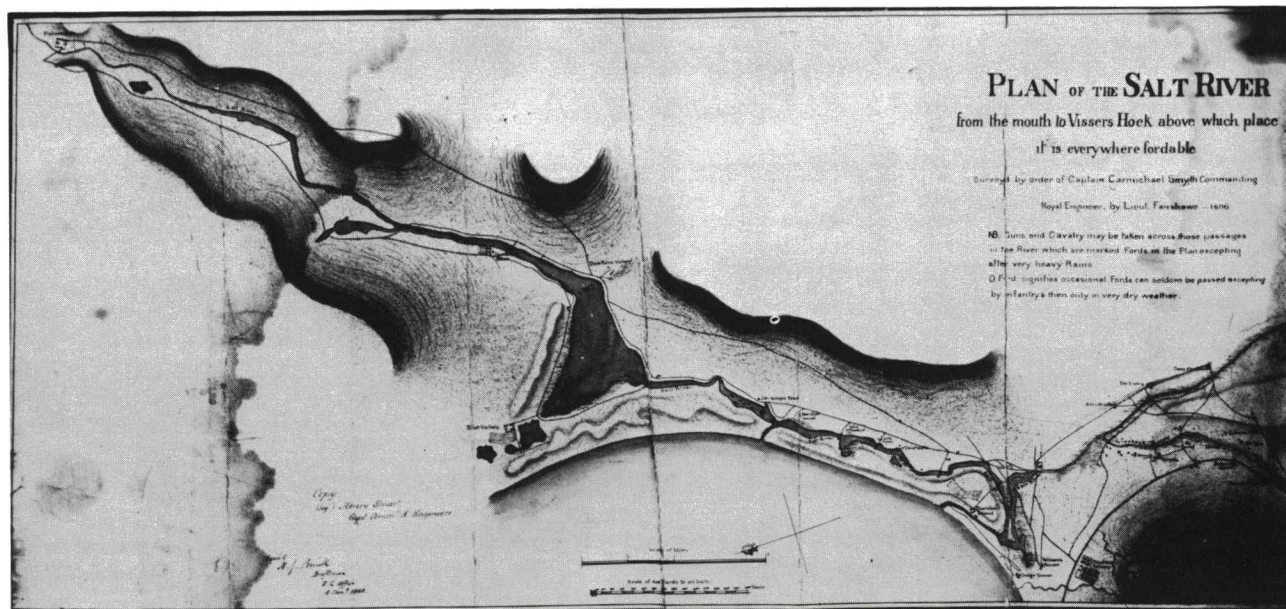
### The river mouth

Early records indicate that the river mouth was more or less permanently open to the sea. This situation has changed considerably over the years to the extent that during recent investigations concerned with marina developments, local residents and officials had advised that the mouth always closed within a few days of being scoured open by floods.

In order to investigate the nature of the sand bar that formed across the river mouth and in particular the height to which it could grow and build up flood waters behind it, survey measurements were taken of the sand bar during 1974. The lowest levels along the ridge of the bar varied from 1,87 m MSL in January 1974 to 1,55 m MSL in April 1974. A few days before the June flood of 1974 (see Fig 8) the minimum height along the ridge had been 1,68 m MSL and this accounted for the sub-

(Text to p 16)

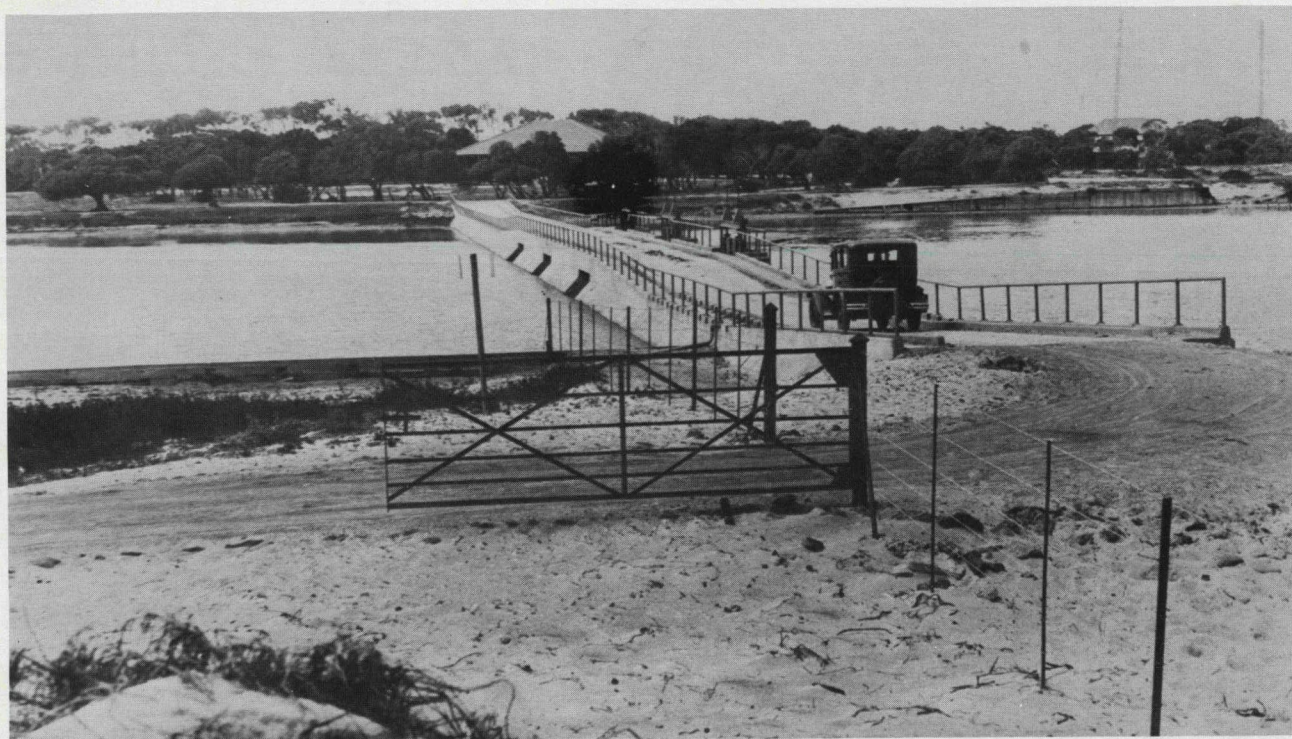
Fig 5: Plan of Salt River.





# Diep River

*Fig 6: View of weir constructed across the mouth of Milnerton lagoon in 1928 (looking east).*



*Fig 7: View of weir in flood — September 1941 (looking west).*



## Diep River

(From page 14)

sequent build up of flood waters in the lagoon.

After the flood had scoured a channel through the sand bar to the sea, the mouth remained open until November 1974. A few partial and full closures of the mouth did however take place during this period as a result of contractors working on a temporary pipeline structure across the lagoon and the final closure of the mouth also resulted from these activities.

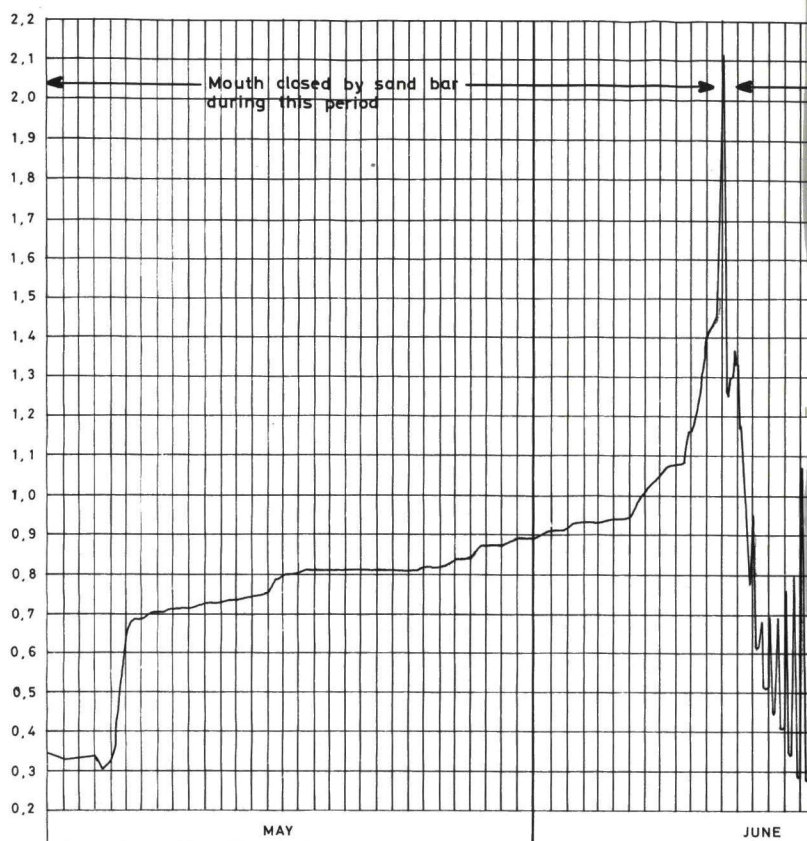
One of the most surprising aspects of the above studies concerned the length of time during which the mouth had stayed open. It had been concluded from comments concerning the rapid closure of the mouth that littoral drift would be dominant, especially in view of the small volume of water moving through the mouth on each tide cycle. The results of the 1974 opening together with survey records of the beach profile variation adjacent to a temporary pier structure, which had been erected off the Rietvlei coastline in connection with nearby dredging works, showed however that littoral drift was nowhere near as strong as expected. The on-offshore movement of sand at the mouth also proved to be less significant than anticipated.

The above findings thus indicate that a reasonable increase in volume of tidal waters moving up the lagoon, such as might be created by further dredging in Rietvlei, might lead to a permanent opening at the river mouth.

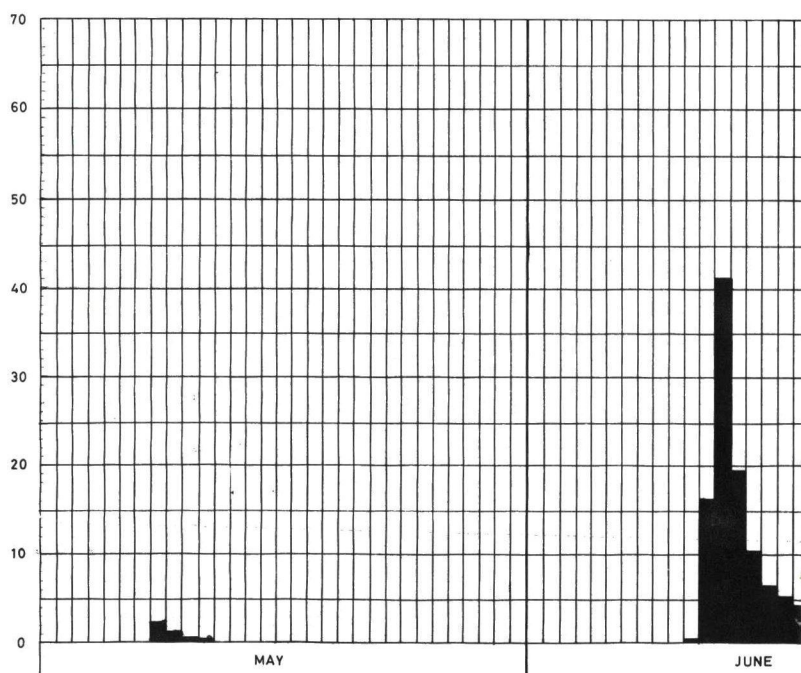
### Future development

The pressures for development in the Rietvlei and Milnerton lagoon areas have changed considerably since the early 1970's. The turndown in the economy and property market in the mid 1970's had a tremendous impact upon urban growth especially in fringe areas such as Rietvlei. As a result the investment of large sums of money to remould the environment and produce high-class residential and waterfront development schemes no longer represented financially viable propositions. Changing circumstances of a somewhat different

WATER LEVEL  
VARIATION AT  
GOLF COURSE  
ROAD BRIDGE  
MILNERTON  
(metres above  
MSL datum)



AVERAGE DAILY  
DISCHARGE AT  
VISSERSHOK  
GAUGING STATION  
Nº G2 M14  
(cumecs)



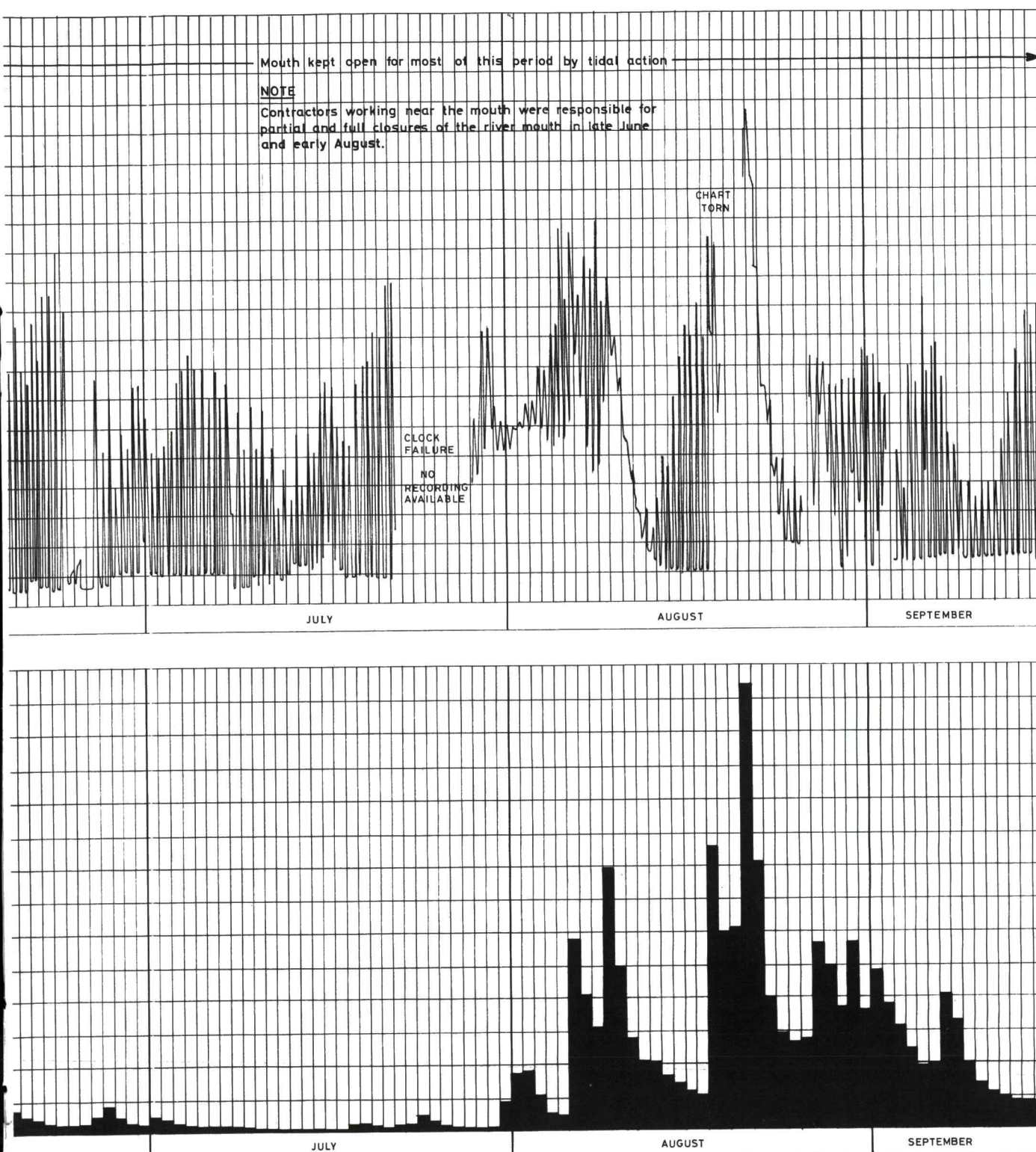
nature also affected the area's value and potential as a fishing harbour.

It is possible within the next decade or so that population growth will re-establish pressures for urban growth in the Rietvlei area. These same pressures could also result in the establishment of a dam at Koeberg<sup>10</sup> solely for the purpose of augmenting water supplies to the Cape

Metropolitan area. Such growth is also likely to necessitate further extensions to Cape Town harbour in the future and this could involve more dredging for fill material in the Rietvlei basin.

The construction of a dam will result in some attenuation of peak flood flows. The dredging of the Rietvlei basin however may be more





1974

significant. It could lead to the permanent opening of the lagoon mouth and re-establishment of an estuarine regime through to Rietvlei.

#### Summary and conclusions

During the last 200 years major changes have occurred along the lower reaches of the Diep river. Riet-

Fig 8: Comparison of flood regimes upstream and downstream of Rietvlei.

vlei has silted up and the closure of the river mouth has become an almost permanent feature. Road embankments, bridges, a weir and dredging operations have also radically altered the river system.

The flooding characteristics of the lower reaches have been modified

considerably by the changes. Two distinct flood regimes have been created, an upper one at Rietvlei which is dependent upon the river flow only and a lower one along Milnerton Lagoon which is influenced by the opening at the river mouth.

..(To p 18)---



## Diep River

(From p 17)

The relevance of past flood records must therefore be carefully assessed before being applied to present day conditions.

Urban growth is likely to increase pressures in the future for development of the Rietvlei and Milnerton lagoon areas. If further dredging takes place an estuarine regime at Rietvlei and permanent opening at the river mouth could be re-established.

An estuarine system stretching through to Rietvlei will change the flooding characteristics of the area. The construction of a dam at Koeberg and increased storm run-off resulting from urban growth will also produce changes. It is essential therefore that in the future planning and development of the area, full account is taken of any proposed modifications to the existing river and estuarine system.

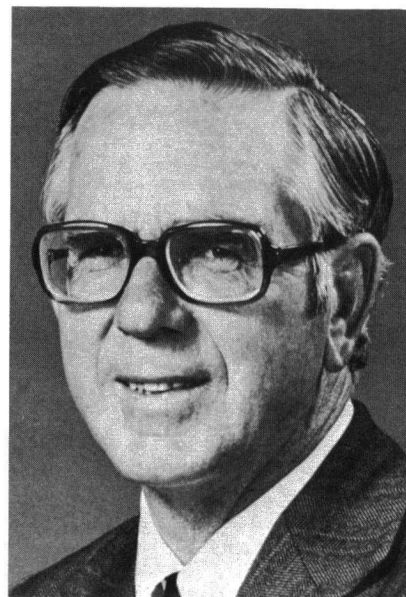
### Acknowledgements

Most of the information contained in the paper is based on a series of investigations and reports submitted to the Milnerton Estates Limited by Hill Kaplan Scott and Partners. The authors wish to acknowledge the kind permission of the Milnerton Estates Limited to publish this information.

The authors also wish to acknowledge the kind permission of the Cape Town Archives to reproduce Figs 3, 4 and 5.

### References

1. BARBIER, Ir. *Plan of the Cape of Good Hope* drawn up in 1786 by Barbier; a copy of the plan is lodged with the Cape Town Archives Ref No. M1/960.
2. FANSHAWE Lt. *Plan of Salt River* drawn up in 1806; the original plan is lodged with the Cape Town Archives, Ref. No. M2/633.
3. GREEN, LAWRENCE G. *Tavern of the Seas*, published by H.B. Timmins, Cape Town 1948.
4. BELCHER, E. *Plan of Table Bay* printed by the Admiralty, London in 1846; copy is lodged with the Cape Town Archives Ref No. M1/1403.
5. SKEAD, F. *Plan of Table Bay* printed by the Admiralty, London in 1860 — copy of Belcher's plan<sup>5</sup> with modifications. The plan is lodged with the Cape Town Archives Ref. No. M1/1404.
6. BRINK, M.J. *Plan of Salt River*, copy of Lt. Fanshawe's plan with modifications. Drawn up in 1888, the plan is lodged with the Cape Town Archives, Ref No. M2/469.
7. STEWART SHANNON AND SHAND Contract report on *Concrete Training Wall for North Bank of the Diep River* submitted to Milnerton Estates in January 1940.
8. MILNERTON ESTATES Various correspondence relating to flood damage to the weirs; information stored in the archives of Milnerton Estates.
9. RABIE, A.L. *Rietvlei Hawe Projek: Vloedbeheer van Diep Rivier* internal report of Department of Water Affairs 1968.
10. CROUS, W.W. *Dieprivierskema — Moontlike aanwending van Dieprivier as waterbron vir die stedelike gebied van Suid-Wes Kaapland*; internal report of the Department of Water Affairs, Ref. No. P0720/00/0179 June 1979.



## RJ (BOB) LABURN

SA Waterbulletin is privileged to print a short resumé of the career of Mr RJ Laburn who retired last year as Chief Engineer of the Rand Water Board.

ROBERT JAMES LABURN was born in 1920 and obtained his B.Sc. degree in Civil Engineering at the University of the Witwatersrand, Johannesburg, South Africa, in 1940 and an M.Sc.(Eng) degree at the same University in 1942.

He volunteered for military service in World War II and served in the South African Engineering Corps and the Royal Engineers in the Middle East and Italy, attaining the rank of Captain (was mentioned in despatches). He joined the Rand Water Board in 1946 and after serving the Board for 16 years he was appointed Deputy Chief Engineer and ultimately Chief Engineer in 1965, a position he held until his retirement in March, 1979. His early retirement was brought about by the injury he sustained when he survived the Nairobi air disaster in 1974.

Mr Laburn is a Chartered Engineer and a Registered Professional Engineer in South Africa. He is a corporate member of a number of engineering institutions; he was elected

President of the South African Institution of Civil Engineers in 1975 and President of the South African Federation of Professional Engineers for 1978/79.

He has been the South African Representative of the International Water Supply Association (IWSA) since 1965, a member of its Scientific and Technical Council and Chairman of the IWSA's International Standing Committee on Water Distribution since 1973.

He is the author of over twenty technical papers dealing with water supply for the urban and industrial region that the Rand Water Board serves, as well as several papers on water treatment, pollution control, reservoir and pipeline design and construction.

Apart from engineering interests, Mr Laburn has played an active part in lay Christian work, having served on his church's governing committee for many years, has an interest in African fauna and flora, particularly birds and indigenous trees and is a trustee of the Hans Merensky foundation.

In 1946 he married Beryl Joan Cullen, they have six daughters, three, of whom are married.

## LATEST ON LIMNOLOGY

Late news on the 1980 Congress of the Limnological Society of SA in Grahamstown is that it

will be held from July 4 to 9, and not 3 to 8, as previously published.



Rynbesoedeling:

# Soute meer — metale minder

Die besoedeling van die Ryn deur swaarmetale, rioolafval, landbougiftstowwe en ander chemiese stowwe neem skynbaar nie meer toe vergeleke by syfers vir vorige jare nie. Hierdie nuus is vervat in 'n koerantberig in Nederland. Die berig meld egter dat die afvalsoutbelading gedurende die eerste helfte van 1979 gestyg het.

Hierdie inligting berus op die jongste gegewens wat deur die Rijncommissie Waterleidingbedrijven (RIWA) versamel is. RIWA se woordvoerder verklaar dat die besoedeling van die Ryn tans as 'stabiel, met 'n geringe verbetering' beskryf kan word.

Die besoedeling van die rivier met biologies afbreekbare stowwe het gedurende die eerste vyf maande van die vorige jaar enigszins afgeneem waardeur daar ietwat meer suurstof in die water beskikbaar was. Volgens RIWA wil dit voorkom asof die besoedeling met fosfate langamerhand besig is om 'n plafon te bereik. Ten opsigte van enkele swaarmetale soos kwik en kadmium is laer waardes gemeet — 'n toedrag van sake wat ook vir landbougiftstowwe geld.

Alhoewel die soutebelading van die Ryn volgens die Rijncommissie in 1978 ongeveer dieselfde vlak as in 1977 bereik het, het dit gedurende die eerste helfte van 1979 aansienlik gestyg en gemiddeld op 147 mg/l gestaan. Die kommissie benadruk egter die feit dat die waardes wat verkry is nog ver bokant die norme is waaraan die waterverskaffers moet voldoen.

EUROPA



EUROPE

... maar ...

## FRANSE SÊ NEE VIR SUIWERING

Die Franse regering het besluit om nie die Nasionale Vergadering te versoek om die Bonn-konvensie oor die suiwering van die Rynrivier te bekragtig nie. Die Nasionale Vergadering sou op 10 Desember daaroor besluit het.

Nederland, wat die meeste deur die storting van die besoedelende uitvloeiels van die Alsace-kaliummyne geraak word, het te kenne gegee dat hy uiters teleurgesteld is in die beslissing van die Franse regering. Dié land is nou die enigste oewerland wat nie die ooreenkoms van 1976 bekragtig het nie.

Die verdrag is daarop gemik om souteortings in die Ryn te verminder. Frankryk se bondgenote het reeds hydraes aan die Franse regering oorbetal vir die wegdoening van die soute onder die grondoppervlakte in Alsace — Nederland het reeds 48-miljoen Franse frank hiervoor bewillig en betaal. Elke jaar bring die Ryn 18-miljoen ton soute na die monding van die rivier waarvan 40 persent deur die kaliummyne in Frankryk bygedra word. Hierdie

soutvrag het met 20 persent toegeneem sedert die Bonn-konvensie in 1976 gehou is.

Die soutinhoud van die Rynwater in Nederland is so hoog dat plantkwekers in die groot Ryndelta naby Rotterdam verplig is om reënwater en gefiltreerde grondwater te gebruik. Drie van hulle het in 1974 'n saak teen die Alsace-myne aanhangig gemaak maar geen uitsluitel is nog bereik nie.

## CALL FOR PAPERS

Papers are invited for a specialised conference on *The Environmental Impact of Man's Use of Water* which is to be presented by the IAWPR (UK Committee) and held in Brighton, England, from November 3 to 7, 1980.

More information may be obtained from Mr G Lee, Water Data Unit, Reading Bridge House, Reading RG1 8PS, United Kingdom.

## WATER FOR CAPRI

The romantic isle of Capri has solved its water shortage problems. An underwater aqueduct has been constructed and stretches 7 km between Capri and the Neapolitan Coast. The island formerly relied on water from a small desalination plant and water supply ships. It now receives 205 litres of water per second from a submarine supply system which cost approximately R11 million to install.



## Health aspects:

# A LOOK AT WATER RECLAMATION

Die beskikbaarheid van voldoende hoeveelhede voedsel en water van goeie gehalte is absoluut noodsaaklik vir die ontwikkeling, normale groei en voortplanting van alle lewende wesens — die mens ingesluit. Dit is lank gelede aanvaar dat die gesondheid van enige gemeenskap saamhang met die beskikbaarheid van hoë gehalte water vir huishoudelike gebruik. Die wêreldgeskiedenis met sy talle epidemies van watergedraagde siektes, soos maagkoors en cholera, is aan u bekend. Namate die kennis, veral van die begin van hierdie eeu uitgebrei het, kon verskeie patogene mikro-organismes in drinkwater, wat maag-dermkanaalstoornisse veroorsaak, geïdentifiseer word. Die gebruik van chloor as ontsmettingsmiddel van huishoudelike water, is sekerlik die suiweringsproses wat die mees dramatiese verbetering in drinkwatergehalte ter bekamping van watergedraagde siektes, meebring het.

Gedurende die veertigerjare is dit vasgestel dat virussiektes soos poliomiëlitis en hepatitis ook deur water versprei kan word. Water word vandag ook as 'n potensiële draer van ander virusse beskou.

Uit hierdie paar gedagtes is dit duidelik dat waterbronne teen besoedeling deur mens en dier beskerm moet word. Waar water wel besoedel word, moet doeltreffende suiwing en ontsmetting toegepas word om patogene organismes, virusse en parasiete te verwyder of te inaktiveer.

Deur die jare is daar ook meer en meer aandag gegee aan die chemiese gehalte van huishoudelike water. Baie lande en organisasies het dan ook standaarde en norme (kriteria) opgestel vir die maksimum toelaatbare konsentrasies van die algemeen bekende organiese stowwe en opgeloste vaste stowwe soos kalsium, magnesium, chloriede, sulfate, nitrate, fluoïed, ens. In dié verband is dit bekend dat daar sekere dele van ons land is waar die water baie hard is en ook ander waar ondergrondse water met besonder hoë nitraat- en fluoïedinhoud die enigste waterbronne is.

## Hoër

Soos in al die ander nywerheidslande ondervind die Republiek van Suid-Afrika sedert die laaste wêreldoorlog, toenemende nywerheids-, mynbu- en landbou-ontwikkeling, verstedeliking en verhoging van lewensstandaarde. Hierdie aktiwiteite bring nie alleen 'n hoër



**Dr GI van Rooyen**

**Director: Environmental Health Services, Dept of Health, Pretoria**

aanvraag na water mee nie, maar verhoog ook die besoedelingspotensiaal. Verder beland toenemende hoeveelhede kunsmatige besoedelingstowwe soos plaagbeheermiddels, chemikalieë en veral nuwe organiese stowwe in ons oppervlaktewaters. Dit is dan ook so dat die invloed van baie van hierdie stowwe op die mens nog onbekend is.

Nou kom nog verdere faktore hier in Suid-Afrika by — ons relatiewe

reënval en gevolglike beperkte waterbronne. Verwerk dit nou in die sisteem en ons vind dat indirekte hergebruik reeds in 'n groot mate plaasvind.

More specifically it is estimated that about one-third of the water supplied by the Rand Water Board, is returned to the Barrage via the Klip- and Suikerbosrand Rivers. Furthermore, these rivers drain a heavily populated area of intensive mining and industrial activity.

## Nightmare

It is obvious that we have all the ingredients for a health authority nightmare.

The question then is how does a department which is responsible for the promotion of the health of the inhabitants of the Republic and whose duty it is to keep a watchful eye on water quality, set about its task under such conditions?

Starting off in a more legal vein, one could discuss the provisions of our Health Act or that of our sister department, the Water Act. One could further amplify on the various aspects of daily administration. However, this is neither the time nor the place for such discussion.

It would seem as if it is more appropriate on this occasion to be aware of the lack of sufficient knowledge and to devise ways and means to overcome this. It is one's considered opinion that meaningful management in this field must at all



times consider and apply the results of research as far as it is practically possible. For this reason, strong pleas were made to the Treasury and the Department of Health was fortunate in obtaining approximately R750 000 since 1973. This could be used to finance various research projects relating to our own field of endeavour. Apart from this there was also a major input by the Water Research Commission and the C.S.I.R.

## Efficiency

As far as our own programmes are concerned, all the work is done by the National Institute for Water Research and the following can be mentioned:

- Information on chemical and microbiological quality of water supplies is gathered and the efficiency of water treatment processes are evaluated. These results and epidemiological data are necessary to establish quality criteria for safe drinking water. This would also include water for recreational and some agricultural and industrial purposes.
- Due to the ever-increasing demand for water and the fact that more and more (domestic, agricultural and especially industrial) effluents are discharged into our surface waters, the scope of chemical and biological investigations is being expanded to include more sophisticated studies.
- In the chemical field, new methods are applied and techniques are improved for the quantitative and qualitative determination and evaluation of the low concentration organic chemical pollutants. Many of these chemicals are of special concern because they may have long term toxic, mutagenic and carcinogenic properties. Biological assays with fish, bacteria, protozoa and mammalian tissue cultures are used to screen waters for the biological activities of these pollutants.
- It is suggested that these biological screening methods

**"We have the ingredients for a health authority nightmare"**

should have considerable focus placed on them for critical evaluation and then implemented as far as practically possible.

In the microbiological field studies on the presence of viruses such as the Hepatis Virus, is receiving special attention. Research is also carried out for suitable microbiological indicators to monitor the removal of pathogens in water treatment processes.

- Work is also being done on the possible detrimental effect which microcystis may have on the quality of drinking water coming from impoundments infested with blue-green algae.

From the various research reports and on-going survey by my Department, one arrives at the conclusion that by and large drinking water in the Republic of South Africa is at present of reasonably good quality *when measured against known criteria* and compared to that of the developed countries. There are however, certain areas where problems are encountered.

Where drinking water of poorer quality is being supplied to the public, it would seem to be attributable to either old and/or overloaded purification works and equipment (and this would also include sewage works upstream) or inadequate control and management due to insufficiently trained staff.

## Easy

It would now be very easy to say that these problems could be solved if the local and other authorities place far greater emphasis on water and waste water management and that more funds should be made available

for improved plants and training of staff. But are we entirely blameless? Here I would like to be the first to be critical of our own departmental effort. To what extent have we motivated these authorities? Have our priorities not been wrong?

But speaking collectively to all of us here — the water people — have we all made a concerted effort to bring about change? It is true our Act contains certain provisions for training of personnel and registration of various types of water purification and waste water disposal works. And it is also true that we as a Department could possibly have pursued this avenue more forcefully than hitherto. However, it is expected that the first letters to certain authorities will go out within the next few weeks. Herein they will be informed of the proposed classification of the various works under their jurisdiction and the level of training which will be expected of their personnel. But in spite of this, it must surely be a sad state of affairs when all the emphasis is placed on a law to bring about change. Is our prime objective not to reach the minds of people? Should we not look at our methods of communication?

## Chlorine

Whilst we are on the subject of purification, let us consider the rôle of chlorine. We in this country have tended to pat ourselves on the back by advocating that chlorination of sewage effluents should only be practised after reasonable advanced purification. Thereby, so it is argued, we will steer clear of the unacceptable odours, tastes and the chlorinated hydrocarbons with their carcinogenic potentialities. The question however is, how sure are we of the prior removal of the precursors of these compounds and are we not creating other problems by the insistence under certain special circumstances on nil *E. coli* counts? Either way there are pitfalls, but I think this is one place where we should again look at established practices and make sure that what we have been saying all along, is still correct.

All the indications are that we have already reached the stage where direct re-use of water or reclamation  
(To p 22)



# A look at Water Reclamation

(From p 21)

of sewage effluents for domestic purposes is a distinct probability. In this respect I would like to make a few comments.

In the light of the present knowledge available, the Department of Health will give sympathetic consideration for direct re-use with the following as guidelines:

- No alternative economically feasible conventional supply is available.
- Only sewage of domestic origin should be used — The sewage water should contain the absolute minimum of industrial effluent of which the composition is known. An adequate control system to monitor industrial effluents ("Catchment Quality Control") is recommended.
- Only the treatment and purification processes which have evolved through the many years of research should be used. If a changed process is contemplated, the change must be backed by the necessary research.
- An absolute necessity is properly trained and experienced personnel of various categories who are in constant attendance. This means full-time supervision.
- Serial monitoring of water quality after passing through specific treatment processes. These processes were evolved by the researchers to provide a system of multiple safety barriers. We should be sure that they in fact always do what they are supposed to do.
- Enough storage capacity for purified water should be available to allow for adequate retention time pending the monitoring results by, amongst others, independent laboratories with experience in these matters.
- As an additional safety measure, it is recommended that reclaimed water should be diluted and thoroughly mixed with conventionally treated water to a ratio of not more than 20% reclaimed water to 80% conventionally purified water. This can be revised as our knowledge increases.
- On-going epidemiological surveys will have to be done in the areas supplied with reclaimed water. Base lines studies prior to such a project is regarded as highly desirable.
- The whole issue of direct re-use is a sensitive one and the public must at all times be assured that it is exposed to a safe water. For this reason, it will be necessary to adhere to these recommendations. However, it is absolutely necessary that it should be informed about all aspects of utilization of reclaimed water. It should not be kept in the dark about anything. An informed public is of the utmost importance. This can hardly be overstressed.

## Question

So much for direct re-use. The question now is, are we giving enough attention to indirect re-use — especially in our metropolitan areas? This is becoming increasingly important in the light of industrial expansion and the creation of new growth points. I wish to name a few points which could possibly be fruitfully discussed.

I have just indicated that the Department of Health will only consider allowing direct re-use after purification of sewage water from a domestic hinterland. The reason for this is that we must be absolutely sure that all chemicals from industrial enterprises are in fact removed. All of us here are acutely conscious of the dangerous potentialities of these substances. But modern technology has now advanced to such an extent that substances can be detected in minute amounts. What was previously considered to be an adequate water, can no longer necessarily be regarded as such. I know that if we chemically compare the final product of for in-

stance Rietvlei water to the final product of the Stander Reclamation Plant, the latter will be the superior. This is not to be misunderstood. The adequacy of the people responsible for works like the Rietvlei or other works is not questioned. On the contrary, one has the highest regard for them. However, these findings are the result of the general system pertaining in many of our metropolitan areas. They bring forth certain interesting considerations. May I name a few of them?

- Are we in the Department correct in our insistence on sewage water of domestic origin for direct re-use knowing full-well of the superiority of the final product of the Stander Works? For the present I am sure our policy is the correct one, but I would nevertheless like to hear critical comment.
- Must local and other authorities not be more stringent on control in respect of chemical substances which may find their way into sewers? This brings one to the next consideration *viz* the quality of water coming from various sewage works. Against the background of scarcity of supply of fresh water and the necessity of either direct or indirect re-use, it would seem as if the quality of this water is inadequate for the demands that will subsequently be placed on it. The proposed stricter standards of the Department of Water Affairs, which will be applicable in certain areas, can only lead to considerable improvement.
- Are we giving enough attention to surface pollution and subsequent stormwater run-off. From what I have seen, housekeeping practices in certain sectors can be vastly improved.
- Do we sufficiently propagate the re-use of secondary water and prevent its pollution of relatively clean water?
- What are the economic implications of all this refinement? Will we eventually be able to identify the point in time where the eventual marginal health benefits obtained do not warrant the added expense?



- Indirect re-use is taking place on a vast scale and the implications are far reaching. It is one's considered opinion that nothing short of a total strategy involving fresh water supplies, purified sewage, surface run-off and solid waste disposal practises, will ensure a uniformly safe water supply.

One has attempted to highlight a few issues, some of which may be old ones, but which nevertheless bear closer scrutiny. I trust that some of them may be fruitfully discussed.

And as a parting thought, no surgeon in his right mind will ever contemplate operating with dirty hands and think he can get away with it because potent antibiotics are readily available. Is the burden that is being placed on water purification works due to an imperfect product reaching it, not similar to a dirty-handed surgeon?

## KONSEP VIR MONSTERS

Tegniese komitee 147 van die Internasionale Standaard-organisasie (ISO) het 'n konsep vir algemene riglyne vir bemonsteringstegnieke om data vir ontledings te verkry, opgestel. 'n Lys is ook opgestel van die vernaamste faktore wat in ag geneem moet word wanneer 'n bemonsteringsprogram met betrekking tot water voorberei word.

Algemene aanbevelings vir die bewaring en hantering van watermonsters is ook opgestel en die aandag gevestig op voorsorgmaatreëls wat getref moet word wanneer monsters vir ontleding bewaar en vervoer moet word.

Die riglyne vir bemonsteringstegnieke meld dat analitiese data benodig mag word om waterkwaliteit aan te dui byvoorbeeld deur opgeloste soute, chemikalieë, gasse en organiese stowwe, of gesuspenderde stowwe in water of bodemsediment op 'n spesifieke tydstip en plek te bepaal. Die bemonsteringstegnieke sal met elke individuele omstandigheid saamhang. Kenmerkende bemonsteringsvereistes word ook beskryf.

Die minimuminligting wat vereis

## Bedroë? Nee, oorstroom!



*'n Ontgogelde gevogelte: Met die goeie reën van Februarimaand het die water in 'n vlei opgestoot waar hierdie bleshoender groot planne vir sy verblyf gehad het. Maar o wee! al wat van die biesielandskap oorgebly het was een boom, een hopie stokkies en een nat bleshoender ...*

word, sal afhang van die uiteindelijke doel waarvoor dit gebruik sal word, en 'n kontrolelys word verskaf vir:

\* *Oppervlaktewaters* — naam van watermassa, ligging, bemonsteringspunt en tyd, diepte of vloei, naam van monsternemer, weerstoestande, aard van voorbehandeling

\* *Grondwater* — geografiese ligging, diepte van monster, omvang van bron, aard van voorbehandeling, bemonsteringsmetode, waterdraende formasies, watervlak, lewering, vernaamste doel van benutting, naam van monsternemer, datum van bemonstering, voorkoms van water ten tye van bemonstering.



## EQUIPMENT

As an information service to our readers, the editor welcomes for publication contributions (limited to approximately 300 words and one or two photographs and diagrams) by manufacturers and distributors of new equipment and processes related to the promotion of water affairs.

Any such contribution is, however, received or published on the understanding that: (1) the relevant manufacturer or distributor submitting the contribution is responsible for the information or opinions expressed in it and the claims made therein for that equipment or those processes; and (2) its publication does not imply that the editor or publisher or the Water Research Commission underwrites or is in agreement with the contents of such contribution.

Readers who require further information are requested to contact the manufacturer or distributor direct.

Anton Prinsloo  
EDITOR



**SA Waterbulletin**  
**PO Box/Posbus 824**  
**Pretoria 0001**

## TOERUSTING

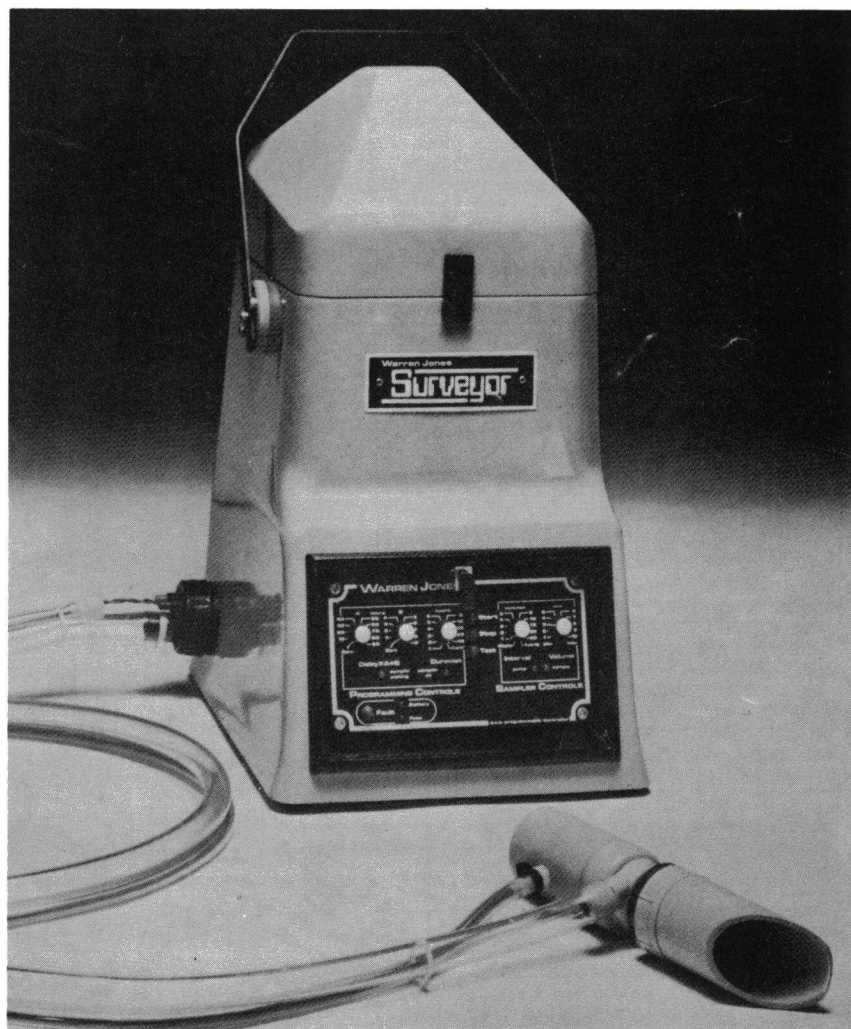
Ten einde 'n inligtingsdiens aan ons lesers te lewer, verwelkom die redakteur bydraes vir publikasie (beperk tot ongeveer 300 woorde en een of twee foto's en diagramme) deur vervaardigers en verspreiders van nuwe toerusting en prosesse wat met die bevordering van wateraangeleenthede verband hou.

Sulke bydraes word egter ontvang of gepubliseer met dien verstande dat: (1) die betrokke vervaardiger of verspreider wat die bydrae lewer, verantwoordelik bly vir die inligting of menings daarin vervat en vir aansprake ten opsigte van daardie toerusting en prosesse; en (2) publikasie daarvan nie impliseer dat die redakteur of die uitgewer of die Waternavorsingskommissie die inhoud van so 'n bydrae aanbeveel of daarmee in ooreenstemming is nie.

Lesers wat meer inligting verlang, word versoek om direk met die vervaardigers of verspreiders in verbinding te tree.

Anton Prinsloo  
REDAKTEUR

## ADVANCED DESIGN FOR SAMPLER



The Sewage Treatment Company (Pty) Ltd, have been appointed sole South African agents for the Warren Jones Surveyor Sampler. This sampler unit is of an advanced design using the latest silicon-chip technology for its control unit. The heart of the surveyor is its miniature centrifugal pump. The smooth internal contours of this pump provide unrestricted flow for grossly contaminated effluents and its high speed impeller helps to fragment fibrous material. It forces the sample through the delivery tube at a rate of 250 cm<sup>3</sup>/sec. This leads to a chamber within the Surveyor where a portion of the flow is diverted to a collection bottle: the remaining liquid being forced back out, through the pump.

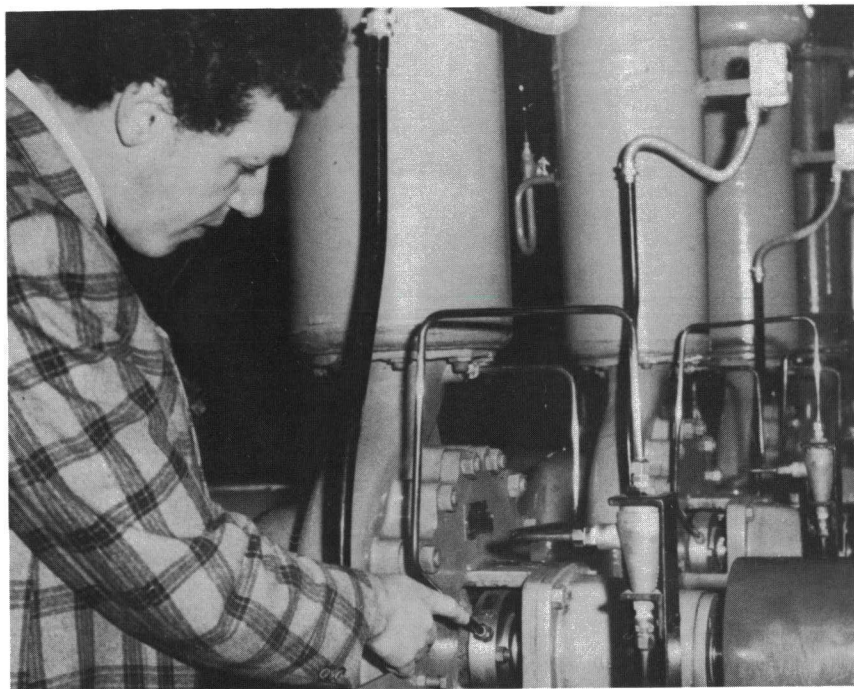
Sample volumes are adjustable from 10–150 ml. The complete sample and purge cycle takes less than 5 seconds (thereby minimising drain on the battery and enabling many thousands of samples to be taken between recharges).

Sampling rate can be set from one minute to one hour with eight intermediate settings. For flow proportional sampling, provision has been made to drive the sampler from an external signal. A battery unit is available for up to twenty four individual samples with, for example, ten sub samples per bottle. All parts are interchangeable and a complete range of spare parts and a repair facility are available in Johannesburg. The Surveyor is completely portable, weighing only 11 kg., and will operate under normal conditions for over two weeks between recharging of the battery.

Enquiries:  
Sewage Treatment Co (Pty) Ltd  
PO Box 7731  
JOHANNESBURG 2000  
Tel 674-1960



## SEAL FAILURES ELIMINATED



*Mr Ronnie Wisner, air conditioning supervisor, Johannesburg area, of Anglo American Properties, points out the recirculation connection from the cyclone separator to the Type 1A seal in one of the pumps in the Life Centre building. The cyclone separators, fitted to all the pumps in the line, give added protection to the seal by separating solids from the pumped liquid. The solids are returned to the suction side of the pumps.*

Prior to the installation of mechanical seals instead of gland packings in chilled water pumps in 29 buildings in Johannesburg there were endless problems with the air-conditioning systems.

Heavy and expensive chemical leakages, burnt out motors, and the replacement of gland packings and friction-worn shafts were regular and frequent occurrences.

Mr Albert du Preez, engineering manager of Anglo American Properties said this unhappy situation had ceased when the pumps in all the buildings were fitted with mechanical seals.

"The changeover has taken about three years so far" Mr Du Preez said, "and the first seals to go in three years ago have already paid for themselves."

He added that he had accepted the advice from engineers at Crane Packing (Pty) Ltd, of Springs to overhaul the pumps completely and to switch to stainless steel shafts when the mechanical seals were fitted.

This had paid off as there had not been a single seal failure since the conversion and there had been no costs through breakdowns or leakages.

"We anticipate that our pump maintenance and operating costs will be cut by about 50% after five years," Mr Du Preez said.

Enquiries:  
Crane Packing (Pty) Ltd  
PO Box 890  
SPRINGS, 1560  
Tel. 818-2031

## NEW EQUIPMENT PREVENTS SCALING

Many industrialists and commercial users of water are becoming increasingly frustrated at the apparent inadequacy and complexity of available methods for dealing with common carbonate scaling in vessels and pipes. Chemical methods usually do what they are intended to do from the point of view of the chemist. In other words, the predicted reaction takes place, but often results in extraneous phenomena which tend to nullify the advantages of the intended reaction. Drinking water for instance, may be deleteriously affected by the presence of suspended or dissolved matter resulting from the reaction. In some cases, the nature of the precipitate makes it more difficult to get rid of and more harmful to the process than is the carbonate scale in its untreated form. Other criticisms some times voiced about chemical treatment have to do with bactericidal effects, colour, corrosion and so on.

Equipment is now available of which the operation is based on the ionizing effect of silver electrodes in a chamber in series with the flow of water. The effects claimed and borne out in practice are firstly, the migration of ionized particles in such a way as to remain in suspension and not to adhere to containing surfaces and secondly, the release of silver ions which have a beneficial bactericidal effect.

From the point of view of the user, the main attraction of the process would be freedom

from the problems that invariably go with the administration and control of chemical dosing, and of course a similar freedom from maintenance problems. Units have been known to operate for years without any maintenance being required apart from occasional replacement of indicating lamps. Once the equipment has been set up so that the flow rate is within the capacity of the electrolyzing chamber and the electrodes spacing checked to ensure that the conductivity of the water does not require any adjustment the equipment may be left to operate without supervision apart from occasional and routine inspections.

Copious documentation is available from recognised authorities overseas to support the claims of the manufacturers. Success has been reported from the notoriously hard water area of Sishen.

An installation in a well known brewery on the Witwatersrand is showing promising results in that existing deposits of scale which previously could only be removed by scraping with hand tools or by acid treatment, can now be removed by finger.

Hotels, hospitals, factories, caravan parks, laundries and large building complexes would find the system of particular interest because it is easy to instal and maintenance free. This contention is particularly valid in isolated areas where access to technical information

and assistance is difficult.

The equipment is specified by model according to maximum flow rate of water to be treated. Larger models are proportionately cheaper than smaller units. The equipment has been found to be completely viable economically with a pay back period of less than two years.

For anyone concerned with maintenance and escalating costs, this equipment is well worth looking at.

Enquiries:  
Crustex SA  
PO Box 9270  
JOHANNESBURG 2000  
Tel. 22-0157

EQUIPMENT



TOERUSTING



## EQUIPMENT



TOERUSTING

WASTE  
DISPOSAL

Adverse comment some time ago in the National Press concerning sanitary landfill, and the risks of children obtaining potentially lethal materials from the waste stream highlighted a weakness in the control over certain landfill site security measures. Similar lack of effective control over the siting, design, operation and eventual closure and reclamation of landfill sites may exist which result in equally devastating problems for the water authorities of South Africa. The result is serious water pollution by highly toxic leachate deriving from unknown materials deposited in poorly controlled sites.

Waste-Tech is a company involved in scientific waste management and has earned a place among South Africa's foremost exponents of proper disposal practice. Waste-Tech endeavours to keep ahead of the changes in waste disposal procedures and has recently outlawed methods which were considered acceptable by the authorities only a year ago. They are at present the only organisation, private or public, which operates a regional hazardous and liquid waste disposal facility in South Africa. They help the industrialist by providing a collection, treatment and disposal service which ensures that:

- the waste materials are safely isolated from the environment without further risk or liability for the industrialist.
- the isolation is correctly carried out so as to ensure minimal risk to the environment and especially to the water resources.

Waste-Tech considers that all waste, solid or liquid, is potentially hazardous and the same high standards and objectives are maintained by Waste-Tech's solid domestic or industrial waste collection and disposal systems. Security is an important aspect both from the point of view of the pilferage risk and from the risk to the public through access to customers' reject products. Waste-Tech's landfill sites are designed to prevent waste materials from returning to the community through access by scavengers or children. The Waste-Tech collection systems are designed to achieve the goals of proper scientific waste management and are individually suited to the customer's requirements.

Enquiries:  
Waste-Tech  
D&H Waste Management (Pty) Ltd  
PO Box 41104  
CRAIGHALL 2024  
Tel. 788-7300

## WATER REPELLING

Certain types of linings, such as those made of plastic, rubber, bituminous ingredients, etc., used within concrete structures to prevent dampness, moisture, water seepage and efflorescence, have been found to have a 'life' of only a limited period. This is due not only to perishability, but also to tiny holes, not noticeable with the naked eye, in the original linings. This applies, of course, to the traditional Damp Proof Coursing.

Since these linings are more often than not incorporated in the structure, replacements are virtually impossible owing to inaccessibility. As a result one may say that the substantial cost of material and labour has been wasted and that one is faced with a rectifi-

cation problem of considerable dimensions.

This type of problem could, however, have been avoided if an additive, specially formulated for this purpose, had been used in the concrete at the time of casting. Such an additive is 'Coprox', the self-curing water repellent.

Enquiries:  
Coprox International Ltd  
PO Box 2200  
JOHANNESBURG 2000  
Tel. 836-8027

## Kanselier



'n Voormalige Sekretaris van die Departement van Landbou-tegniese Dienste en ook voormalige lid van die Watervorsingskommissie, dr PW Vorster, is laat verlede jaar benoem as kanselier van die Potchefstroomse Universiteit vir CHO. Dr Vorster tree nou in die plek van wyle senator Jan de Klerk wat vroeg verlede jaar oorlede is.

Dr Vorster was Sekretaris van Landbou-tegniese Dienste vanaf 1958 tot 1971 en verteenwoordiger van die Konvokasie in die Raad van die PU vir CHO vanaf 1960 tot 1976. Die onderskeiding om die DVD van die Staatspresident te ontvang, het hom ook verlede jaar te beurt geval.

## LARGE RO PLANT

The largest reverse osmosis water purification plant in the USA will be built in Sarasota, Florida, under a R1,6 million contract awarded to a firm in Santa Clara, California. The 20 000 m<sup>3</sup>/d plant will reduce total dissolved solids (TDS) in the city's drinking water from 1 744 to 90 ppm. The Water Information Centre Inc (Syosset, NY) reports that the purified water will then be blended with additional well water which will be softened with an ion exchange system to produce 54 000 m<sup>3</sup>/d of water having a TDS of less than 500 ppm.



## H<sub>2</sub>O-nuusflitse van elders

### GROOT GROND- WATER ONTDEK

Sjinese weermagingenieurs het 'n aansienlike grondwaterbron in 'n afgeleë gebied van die Tsaidambekken in die noordweste van Sjina ontdek, aldus dié land se Xinhuanuusagentskap. Die betrokke gebied was tot dusver deur 'n ernstige tekort aan water lamgelê.

Die 200 000 km<sup>2</sup> van die gebied op die Tsinghai-plato bevat ryk minerale neerslae en goeie weiding maar is ongelukkig onderworpe aan lae reënval. Die akwifer is ontdek na drie jaar se opnames op die plato.

Die nuusagentskap Xinhua berig ook dat 'n rioolboot op die Yangtzirivier in bedryf gestel is. Die boot haal besoedelstowwe uit wat deur die olietenskepe in die rivier gelaat is — riool en olie.

Die boot is 163,8 m lank en 21 m op sy wydste punt en is die grootste van sy soort op die Yangtzi. Sy kan 270 000 m<sup>3</sup> tenkskipriool per jaar hanteer en herwin na raming 1 500 t olie per jaar.

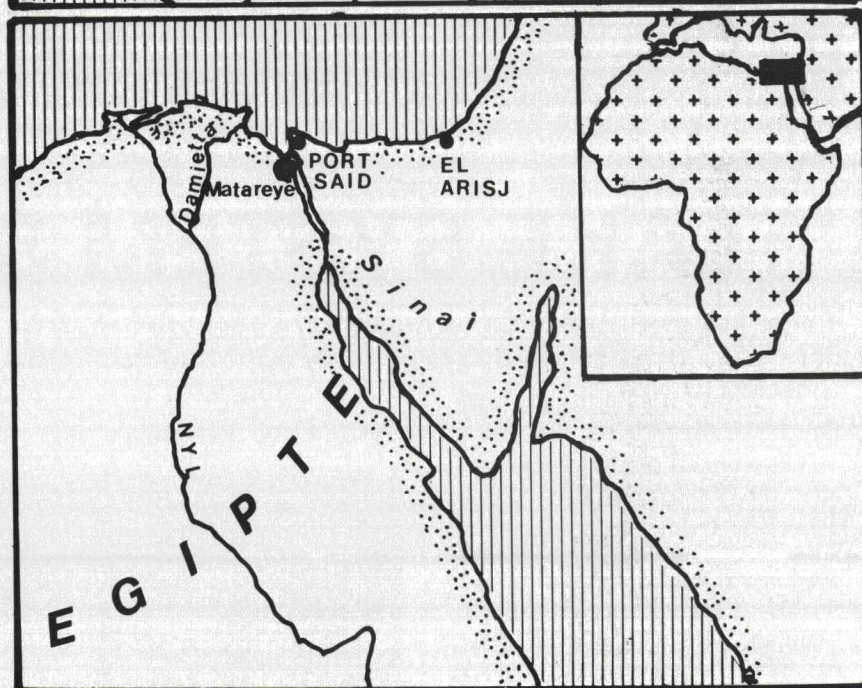
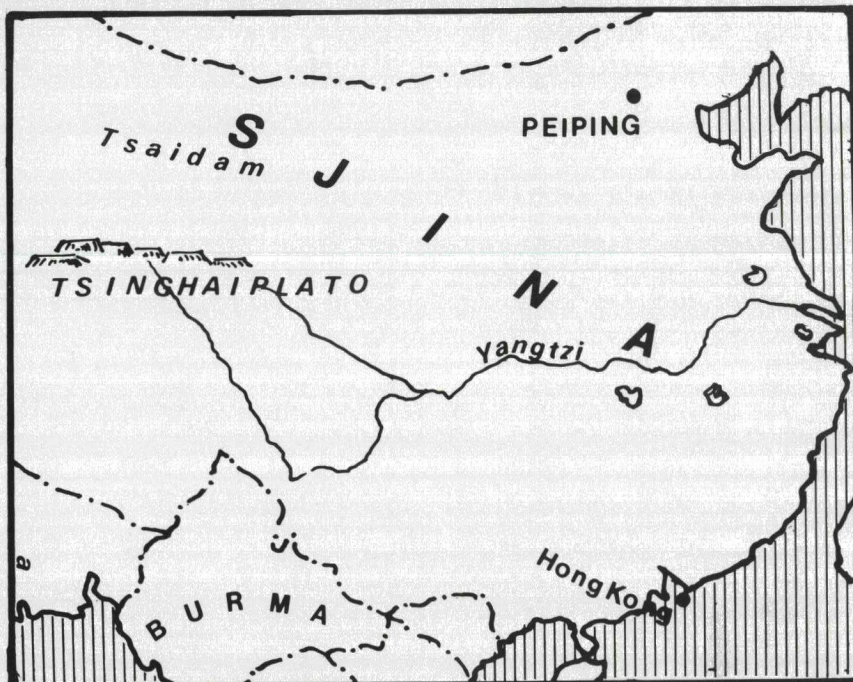
Die Yangtzi is Sjina se vernaamste binnelandse skeepvaartroete.

### SINAIKANAAL NEEM AANVANG

Die ambisieuse Sinaikanaalprojek het onlangs 'n aanvang geneem. Die projek is ontwerp om uiteindelik water per kanaal vanaf die Damietta (die oostelike tak van die Nyl) by die delta, oor die Suezkanaal na Noord-Sinai te voer.

Die eerste stadium wat 82 km lank is, sal deur 'n Egiptiese maatskappy gegrawe word en sal Nylwater na die Matareyemeer en tot binne 20 km vanaf Port Said bring. Hierdie eerste stadium sal besproeiing van 85 000 ha wes van die Suezkanaal moontlik maak.

Die volgende stadium sal die water na die oostekant van die Suez en so ver as die kusstad El Arisj neem en met die projek word beoog om 'n verdere 130 000 ha in Noord-Sinai te besproei.



### HERWONNE AFVALWATER SAL GROOT ROL VERVUL IN ISRAEL

Ongeveer dertig persent van die besproeiingswatervoorraad in Israel sal teen 1980 uit herwonne afvalwater bestaan as projeksies van die Hebreeuse Universiteit korrek is. Ongeveer 2,5 persent van die land se totale volume afvalwater sal vir besproeiing aangewend word mits die uitvloeisel behoorlik ontsmet kan

word en aan die veiligheidsvereistes vir menslike gebruik kan voldoen.

Die grootste enkele bron van afvalwater behoort teen 1980 beskikbaar te wees, naamlik die rioolwatersuiweringsprojek in die Dangebiet wat Tel Aviv bedien en ongeveer 160 000 m<sup>3</sup>/d behandelde afvalwater sal lewer.





## Hydrology

# LAKE SYSTEM STUDIED

There has recently been growing concern about the apparent deterioration of the scenic Wilderness Lake system. It is apparent that vegetation has been advancing into the lakes and also into the channels that connect the lakes. The advancing vegetation has made access to the lakes difficult thereby reducing the recreational potential.

The free flow of water between the lakes has also been restricted, to the detriment of the system. The importance of the Wilderness Lake system is a well-established fact and the pressing need for basic research on the limnology and ecology of the system has been stressed in several reports.

The Hydrological Research Unit of Rhodes University, together with the National Research Institute for Oceanology (NRIO) and the Department of Water Affairs, is contributing to a project which has the aim

(Text to p. 30)



*(Top) The splendour of a serene Swartvlei in the lake district of South Africa. (Right) A sample of the magnificent beaches adjacent to the lakes.*



*The importance of the lake district as a tourist attraction cannot be gainsaid. Scenes like the one on the right, depicting a quiet stretch of the Serpentine River near Wilderness, abound in this area.*



*Rustic serenity — the old and the new. This splendid setting for two cottages is to be found on the Kaaimans River where the lure of water has brought people right to the very edge of the river.*

*Arguably the most-photographed rail bridge in the country — and justly so. This picturesque setting is the bridge over the mouth of the Kaaimans River.*





## LAKE SYSTEM STUDIED



*Nothing like a quiet nap on an old jetty when summer sunlight sets Rondevlei ashimmer ... (top). In the picture below the sand bar which closes off the Serpentine from the sea is clearly visible beneath the national road bridge.*

*(From p 28)*

of producing a model of the dynamics of the lake system that will serve as an aid to the efficient management of the movement of water within the system. The contribution of

the Rhodes Unit will be to provide the hydrological and meteorological data that will constitute the input information to the model of the dynamics of the system which is to be developed by NRIO.



The major component of the hydrological data takes the form of records of runoff for the various streams that flow into the lakes and such information will have to be generated by the use of deterministic rainfall/runoff models. Such models have been developed and tested by the Rhodes Unit in the semi-arid Ec-ca catchments near Grahamstown. The use of these models in the more humid Wilderness catchments will not only serve to provide the necessary hydrological information but will also constitute an important phase in the research being done on these rainfall/runoff models.

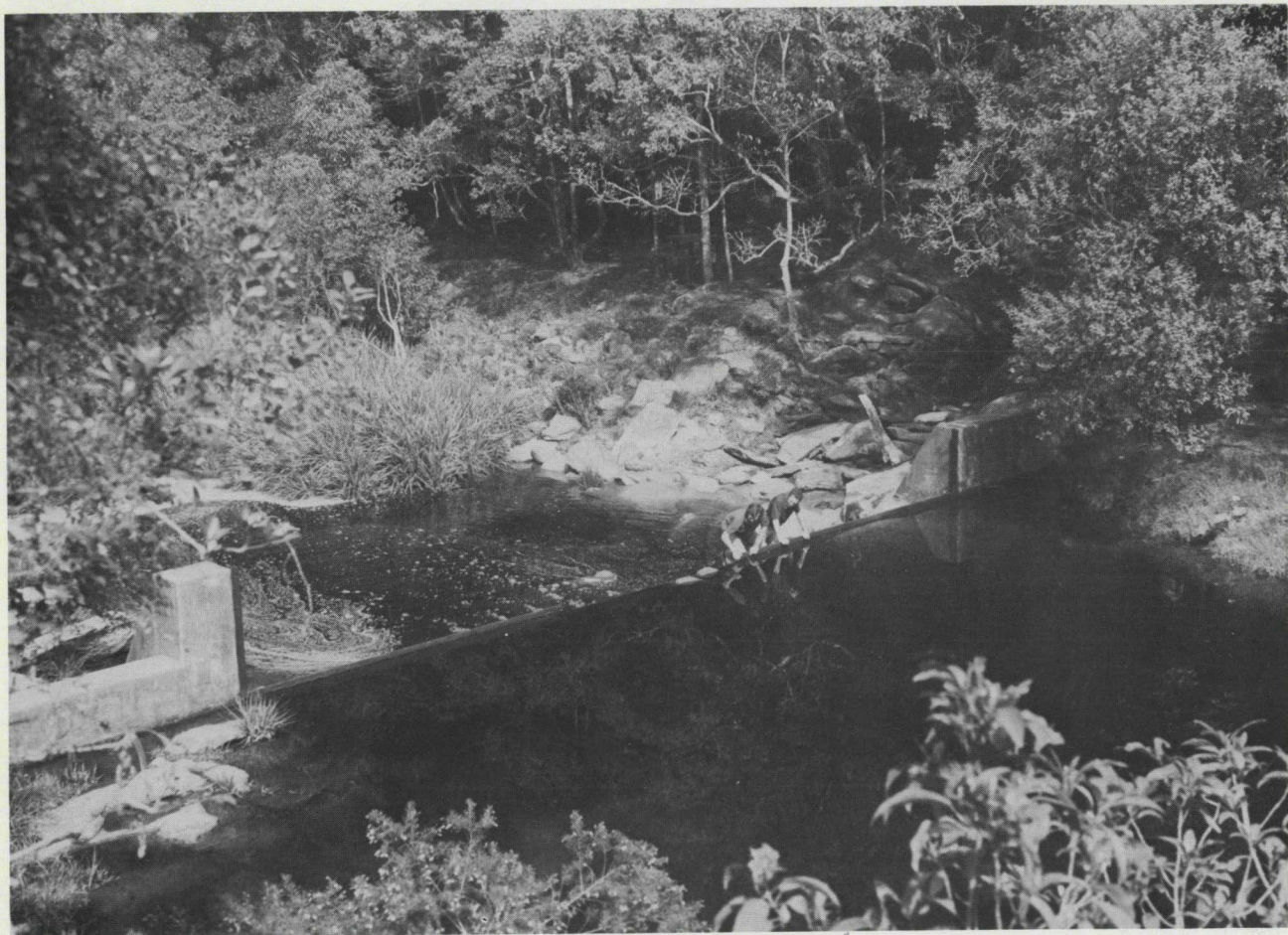
The Steering Committee for this project recently held its meeting in the Wilderness in order to acquaint members with the problem at first hand, and a selection of photographs taken during the field tour is reproduced on these pages, giving a glimpse of the scenic splendour of this area.



*A typical forest scene in the area around the Wilderness Lakes. Members of the Steering Committee are seen here admiring a forest giant which is purported to be approximately 900 years old — making it a sapling at the time of the battle of Hastings.*

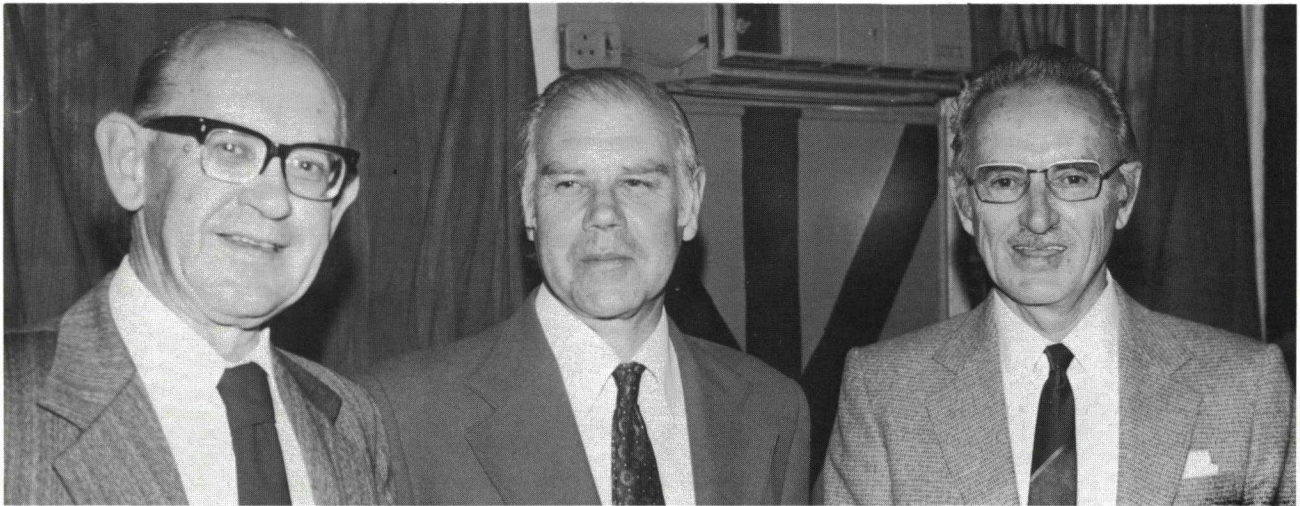


*(Below) Dwarfed by the surrounding vegetation, two hydrologists are reflected darkly in the upstream pool of a weir in a valley in the Wilderness area.*





## LAKE SYSTEM STUDIED



*(Top) Three prominent members of the Steering Committee currently investigating the Wilderness Lake system are (from left to right): Prof PJC Vorster (Chief Adviser to the Water Research Commission); Prof JB McI Daniel (Rhodes University), and Prof DC Midgley (University of the Witwatersrand).*



*(Right) Reality is suspended in the glass-smooth water of a mountain stream deep within the wooded countryside bordering the bleached beaches of the Southern Cape.*



## Pollution

### NEW APPROACH

**Richland, Washington** — A method of summarizing results of environmental assessments on groundwater contamination problems has been developed at Battelle's Pacific Northwest Laboratories.

A new approach could make it easier for government officials and the public to understand technical information contained in assessments. Information is required to determine what corrective action, if any, is needed to deal with groundwater contamination problems.

The new method was developed by R William Nelson of Battelle's Water and Land Resources Department. "We are attempting to improve the way technical information is communicated to decision-makers through environmental assessments," he said.

To improve communications Nelson determined what information the decisionmaker needs to evaluate the consequences of a groundwater contamination problem. That information is provided by answering these questions: Where will the contaminants reach the biosphere; when, and in what quantities?

"Answering these questions is a difficult task requiring technical specialists with expertise in geology and hydrology. Understanding the answers would be equally difficult if the decision-maker had to comprehend every step in the specialist's complex analyses," said Nelson. However, he has simplified the problem by developing two techniques for summarizing results in an understandable fashion. The techniques are the location/arrival time distribution and the location/quantity outflow distribution data which are compiled in two easy-to-follow graphs. One shows where the contaminant will contact the environment as a function of time. The other shows how much of the contaminant will reach a particular point.

For Nelson's method to be effective, the technical specialists who conduct environmental assessments and the decision-makers who read them must share an understanding of how the distributions are used.

Nelson has explained them to the technical community through articles in technical publications.

"Mastering the distributions is the key to understanding the results of environmental assessments conducted using this method," he said. "They provide quick access to the information needed to evaluate the consequences of a groundwater contamination problem."

### AND DUMPING TO END ...

Sewage sludge and industrial waste dumping into United States waters was ended by thirty-two communities and companies in 1978, reports the Environmental Protection Agency. During 1978 dumping of industrial wastes in the Gulf of Mexico declined by 99 per cent and no chemical wastes were incinerated along the Gulf Coast. Total tonnage of industrial wastes dumped in the Atlantic and the Gulf was about 50 per cent less than in 1973, when the EPA's regulatory programme commenced. No chemical wastes or sewage sludge were dumped into the Pacific Ocean, as in previous years.

All dumping must end after 1981, and the EPA has made this phase-out a condition of all sludge-dumping permits that have been issued since 1976.

The 1981 ban requires all present permit-holders to start using alternative sludge disposal methods. Methods available include processing for use as fertilizer or soil conditioners, disposal in landfills or strip-mined areas, incineration, or as a resource.

### SOVIET TO AID INDIA

**India** — Prime Minister Mararji R Dcsai revealed recently that his country has asked the Soviet Union to help it construct two large canals running 12 670 km which would help offset floods and droughts, according to the *New York Times* (4, 4). The project, estimated to cost R23 000 million and take 15 years to complete, includes one canal which would encircle the Himalayan foothills across northern India and another which would encircle the southern and central part of the country.

## Mars:

### HAWAII VAN DIE HEELAL?

**Minstens twee streke van die Marswoestyne kan "oases" bevat waar grondwater betreklik volop kan wees, luidens 'n berig in 'n onlangse nuusbrieff van die Water Information Centre in Syosset, New York.**

Gegewens aangaande Mars wat met Viking-landingstuie en teleskope verkry is deur 'n span navorsers onder leiding van dr Robert L Huguenin van die Universiteit van MFassachusetts in Amherst het waterdampkonsentrasies op twee plekke net suid van die ewenaar van Mars aangetoon.

"Ons het altyd geglo dat daar water op Mars is," sê dr Huguenin. "Voor die Viking-landingsvaarte van 1976 was die teorie dat die water in die permanente ysbedekking van die pole opgesluit is of as chemies gebonde water in die grond voorkom. Maar deur middel van die Vikingtuie het ons gevind dat die grond so droog is dat dit korte mette met die idee van grondwater gemaak het."

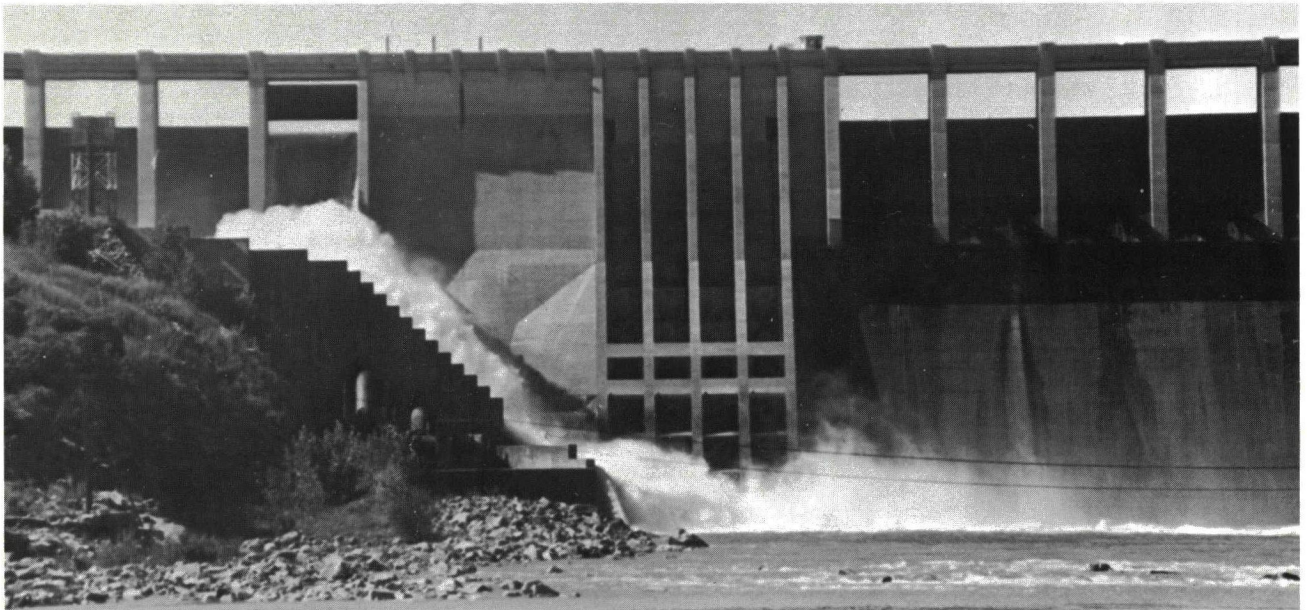
Foto's van erosie wat vanuit die tuig se wentelbaan geneem is, het duidelike tekens getoon dat groot massas water in die verre verlede op Mars gevloei het.

"Ek wil nie voorgee dat daar palmbome by hierdie oases is nie," skerts dr Huguenin, "maar dié streke kan dalk lewe in die vorm van mikro-organismes onderhou. Die Vikingtuie het 10 tot 15 keer soveel waterdamp in die atmosfeer bo hierdie twee plekke as bo enige ander plek op die planeet aangetref.

"Hierdie streke is op die warmste breedtegraad van Mars geleë. As die water suiwer ys is, kan dit 'n daaglikse vries-smeltsiklus vir ongeveer een-helfte van die Marsjaar deurloop, dit wil sê vir ongeveer 343 dae. Maar dit sal slegs vir 'n paar uur per dag in 'n vloeibare vorm wees."

Dr Huguenin het gesê dat as die water soute bevat dit dwarsdeur die Marsjaar die vries-smeltsiklus kan deurloop en ook die hele dag in vloeibare vorm kan bly, veral wanneer die planeet in sy wentelbaan die naaste punt aan die son bereik. Onder sulke omstandighede kan sekere aardorganismes moontlik aan die lewe bly, of selfs floreer, sê hy.





*'n Welkome gesig in die Republiek: 'n oop sluis in Vaaldam na die mooi reëns van die najaar.*

## RICHARDS BAY STABILISING — NPB

Conditions in the Richards Bay Sanctuary Area appear to be almost stabilised, the Natal Parks Board announced recently. Reports from various experts were presented to a committee, established by the Board some years ago, to monitor the effects of the new Richards Bay harbour on the southern sanctuary, and to study the results of the new, artificial estuary mouth on the existing flora and fauna.

It has been found, for instance, that the estuary, now much reduced in size from the original, is serving a very important function as a nursery for marine fish. Of the 32 fish species recorded there has been a high proportion of young individuals. Many sharks have been reported.

However, a recent bird count revealed only 38 species of aquatic birds in the area, and that there has been a change in the composition of species. There were no flamingoes present and the breeding colony of pink-backed pelicans appeared to be declining in numbers.

The Natal Parks Board, which administers the sanctuary, has planted a number of water plants, including mangroves, to try to improve living conditions for smaller estuarine animals such as snails and crabs, which

are so important in the overall food cycle. This planting scheme has been fairly successful.

The 1979 dry summer season enabled the mud banks at the mouth of the Mhlatuze river to consolidate and a new delta has formed which will, it is hoped, provide a new home for the animals and birds as well as act as a partial filter for the river silt.

The committee also noted that much of the fish life has now return-

ed to the area of the harbour that was so seriously affected by pollution about three months ago. Recent samples indicate that shrimps inhabiting that area were smaller than elsewhere, suggesting that it was repopulated by juveniles.

### RO for Japan

The Japanese government has announced the development of a reverse-osmosis desalination system which can produce 800 m<sup>3</sup>/d of drinking water at a cost of R1,25/m<sup>3</sup>.

An engineer from the Ministry of International Trade and Industry said that the research and development had cost R2,3 million. He predicted that the treatment costs could be reduced to R0,90/m<sup>3</sup>.

The government is to set up a study in 1980 on the feasibility of packing a 200 000 m<sup>3</sup>/d system into a ship. This would be sufficient to provide water for a 50 000 population, the engineer said.

### Groundwater 1980

A Symposium *Groundwater 1980* is being held at the University of Pretoria from July 7 to 9, 1980. It is being jointly organised by the Groundwater Division of the Geological Society of South Africa and the Division of Hydraulic and Water Engineering of the SAICE.

Scientific papers will be presented on a wide range of subjects related to groundwater.

Further particulars are obtainable from:

Organising Committee  
c/o W.R.G. Orpen  
Department of Water Affairs  
Private Bag X313  
PRETORIA 0001  
Tel: 012 48-5817 x 2



**Geology:****PARIS CONGRESS**

The international Geological Congress will hold its 26th session in Paris from 7 to 17 July, 1980, under the sponsorship of the International Union of Geological Sciences. This session will mark the first centenary of the Congress.

Apart from the opening session, the scientific programme of this Congress will include 20 sections covering practically the whole field of Earth Sciences: Petrography, mineralogy, paleontology and micropaleontology, stratigraphy, tectonics, marine geology and sedimentology, precambrian, geomorphology of the Quaternary, geophysics, geochemistry, teledetection, mathematical geology, metallogeny and mineral deposits, fossil energies, *geohydrology*, engineering geology and materials, geological risks, planetary geology, history of geology and lastly, education and development; in addition, 7 colloquia will be held dealing either with the main current themes: Mineral resources, energy, geology of the continental shelf, or with the geology of France and of Europe.

Excursions will take place in 19 European countries either before or after the Congress. The final list of excursions will be found in the second circular which can be obtained from: Westpoint Travels (Pty) Ltd, PO Box 31240, Braamfontein, 2017; (Mrs Myrna Kaplan); Tel: (011)725-4340; Telex: 4-22061 S.A.

A social programme will be arranged in Paris and around for participants in the Congress and accompanying members.

The General Secretariat of the Congress is located at the Maison de la Géologie, 77-79 rue Claude-Bernard, 75005 Paris, France.

Information is also available from B.R.G.M.'s representative in Southern Africa:

- **FRANSA** — French South African Trade Development Corporation (Pty) Limited  
PO Box 41211  
CRAIGHALL  
2024  
Telegrams: "FRANSADEV-Johannesburg"  
Tel: 011-48.57.31/2/8  
Tlx: 4-24871 S.A.

**CONFERENCES AND SYMPOSIA**

(From p 36)

**Water Pollution Research** will be held from June 23 to 27, 1980, in Toronto, Canada.

Enquiries: IAWPR, Chichester House, 278 High Holborn, London WC1, UK.

**LSSA**

The 1980 conference of the Limnological Society of Southern Africa will be held from July 4 to 9, 1980, in Grahamstown.

Enquiries: PH Skelton, Registration Officer, LSSA Committee, c/o The Albany Museum, Somerset Street, Grahamstown, 6140.

**WATER SUPPLY**

The annual conference of the National Water Supply Improvement Association (NWSIA) will be held from July 6 to 10, 1980, in San Francisco, USA.

Enquiries: Patrick Burke, Executive Director, NWSIA, 26 Newbury Road, Ipswich, Mass 01938, USA.

**GEOLOGY**

The 26th session of the International Geological Congress will be held from July 7 to 17, 1980, in Paris, France.

Enquiries: Mr H Castelnau, FRANSA (Pty) Ltd, PO Box 41211, Craighall 2024. Tel (011) 485731/32/38.

**FLOOD STUDIES**

A conference on *Flood Studies Report* — 5 years on will be held from July 22 to 24, 1980 in London, UK.

Enquiries: Conference Office, Institution of Civil Engineers, 1-7 Great George Street, London SW1P 3AA, UK.

**LIMNOLOGY**

The 21st Congress of the International Association of Theoretical and Applied Limnology will be held from August 24 to 31, 1980 in Kyoto, Japan.

Enquiries: Congress Secretariat, c/o Otsu Hydrobiological Station, Kyoto University, Shimosakamoto Otsu, 520-01 Japan.

**IWSA**

The 13th International Water Supply Association Congress will be held from September 1 to 4, 1980, in Paris, France.

Enquiries: Mrs M Kitchingman, IWSA, 1 Queen Anne's Gate, London SW1H 9BT, UK.

**WATER FROM SEA**

An international water technology exhibition and the 7th International Symposium on Fresh Water from the Sea will be held from September 23 to 27, 1980, in Amsterdam, The Netherlands.

Enquiries: Aquatech Tentoonstelling, Waalhaven ZZ44, 3088 HJ, Rotterdam, The Netherlands.

**DESIGN OF DAMS**

A conference on the design of dams to resist earthquakes will be held during October 1980 in London, UK. Details later.

Enquiries: Institution of Civil Engineers, Great George Street, London SW1P 3AA, England.

**MAN'S USE OF WATER**

A specialised conference of the International Association on Water Pollution Research on the environmental impact of man's use of water will be held from November 3 to 7, 1980, in Brighton, UK.

Enquiries: G. Lee, Water Data Unit, Reading Bridge House, Reading RG1 8PS, England.

**WASTEWATER**

A symposium on "Aquaculture in Wastewater" will be held from November 25 to 27, 1980 at the CSIR Conference Centre in Pretoria.

Enquiries: National Institute for Water Research, PO Box 395, Pretoria 0001.

**WATER SUPPLY**

An international fair on water supply will be held from March 30 to April 4, 1981, in Berlin, West Germany.

Enquiries: AMK Berlin, Ausstellungen-Messe-Kongress-GmbH, Postfach 191740, Messedamm 22, D-1000 Berlin 19, West Germany.



## CONFERENCES AND SYMPOSIA

### WATER TREATMENT

A conference on biological fluidised bed treatment of water and wastewater will be held from April 14 to 17, 1980, in Manchester, UK.

Enquiries: Water Research Centre, Medmenham Laboratory, Henley Road, Medmenham, PO Box 16, Marlow, Bucks, SL7 2HD, UK.

### HYDRO FORECASTING

A symposium on hydrological forecasting will be held from April 15 to 19, 1980, in Oxford, UK.

Enquiries: Celia Kirby, Institute of Hydrology, Crowmarsh Gifford, Wallingford, Oxon OX10 8BB, England.

### IMIESA

The Biennial Conference of the Institution of Municipal Engineers of Southern Africa will be held from April 29 to May 1, 1980 in Bloemfontein.

Enquiries: Hon. Secretary/Treasurer, IMIESA, PO Box 1055, Pretoria 0001.

### GREAT LAKES

The conference on Great Lakes '80 of the International Association for Great Lakes Research will be held from May 19 to 22, 1980 in Kingston, Ontario, Canada.

Enquiries: Dr ED Ongly, Great Lakes '80, Queen's University, Kingston, Ontario, Canada K7L 3N6.

### SLUDGE PROBLEMS

A conference on sludge problems will be held during June 1980, in Karlovy Vary, Czechoslovakia.

Enquiries: Dum Technicky CSVTS, Ing Karel Beranek, Dr Maye 6, 70928 Ostrava 1, Czechoslovakia.

### SURFACE WATER

A conference on surface water impoundments will be held from June 2 to 4, 1980, in Minneapolis, USA.

Enquiries: John S Vollum, 222 Nolte Centre, 315 Pillsbury Drive SE, University of Minnesota, Minneapolis, Minn 55455 USA.

### IWPC

The annual conference of the Southern African branch of the Institute of Water Pollution Control will be held from June 2 to 5, 1980, at the CSIR Conference Centre, Pretoria. Enquiries: Hon. Conf. Secretary IWPC, PO Box 4623, Johannesburg 2000.

### AWWA

The annual conference and exhibition of the American Water Works Association will be held from June 22 to 27, 1980 in Atlanta, USA.

Enquiries: AWWA, 6666 Quincy Ave, Denver Colorado 80235, USA.

### IAWPR

The 10th International Conference of the International Association on

(To p 35)

## SA WATERBULLETIN

Information contained in this publication does not necessarily reflect the considered opinions of the chairman or members of the Water Research Commission.

SA Waterbulletin is published by the Water Research Commission, PO Box 824, Pretoria 0001, and subscription is free. Correspondence and views dealing with water topics are invited.

Editor: Anton Prinsloo

Inligting in hierdie publikasie vervat weerspieël nie noodwendig die oorwoë menings van die voorsitter of lede van die Watervorsingskommissie nie.

SA Waterbulletin word deur die Watervorsingskommissie, Posbus 824, Pretoria 0001, gepubliseer en intekening is gratis. Korrespondensie en menings ivm wateraangeleenthede sal verwelkom word.

Redakteur: Anton Prinsloo

### Finally:

## The green, green gas of home ...

Sewage purification works are not always the romantic places they may seem to the uninitiated (or the uninvited).

An acquaintance of mine is known for his *sang-froid* in times of great personal crises — he once fell down a shaft dug by a world-renowned British archaeologist (whose name escapes me now) and was heard to call out the archaeological strata in the walls in a regressive chronology through Babilonian, Iron, Bronze and Stone Ages — even, astoundingly, down to the Upper Palaeolithic period some 35 000 years BC.

### Wild

Falling into a sewage settling tank on a wild night of subsequently unexplained revelry this pillar of reservedness, this icicle of cool, lost not only that but also his dignity (and, for the sake of truth, also the aroma of his pre-, during and after shave lotion).

Old hands at these plants can readily be recognized by the unworried, unhurried way in which they eat their sandwiches during the lunch hour. They also talk with great gusto about culinary delights such as *escargots bourguignons*, *rigatoni al forno* or algal broth.

### Pale

New hands can be distinguished by the pale oliv green colour of their faces, not unlike the green caught for ever in Manet's painting *Déjeuner sur l'herbe*. Biliousness, however, is taken as a sign of extreme inner weakness in these surroundings and is frowned upon, if not sported at in disgust.

Sewage purification plants are, in word of fact, *very* mundane.