



SA'S WATER CHALLENGE – cause for despair or competitive advantage? The choice is ours

The global water conversation has taken a new turn on the back of increased information access and the world reaching a point where it is now impossible to ignore the scarcity of the resource.

It is also important that the dialogue now includes business partners as the World Economic Forum recognises the availability of good quality water as a principal business risk globally. While this is a revelation for most of the developed world, this is not news for most of the developing world, and South Africa in particular. Throughout its history, South Africa has been acutely aware of the fact that it operates in a semi-arid environment with parts of the country already water scarce (with freshwater availability of 1 000 m³/person/year or less) and the average of the country being water stressed (<1 700 m³ /person/year).

Even where the rainfall figures are much more favourable, climate and weather variability has added to availability challenges, with periods of intense flooding interspersed with long dry periods. This has made storage difficult and assurance of supply hard to attain.

In this context it is not surprising that the word 'crisis' is often included in the South African public water discourse. It is important how we interpret this word 'crisis'. Its usual impact is unfortunately one of paralysis and despair. If one borrows from other languages, there is an important change in texture. The word for 'crisis' in Mandarin is *Wei Ji*. It consists

of two distinctive parts, *Wei* means 'a time of danger', and *Ji* denotes 'a time of opportunity'. This is a much more empowering definition of crisis. South Africa's challenge should be that of developing a *Wei Ji* response to find the opportunity in our current crisis that will not only result in more innovative ways in meeting our current water challenges but perhaps, more importantly, structuring a strategy that allows South Africa to develop an international competitive advantage.

Let us illustrate these possibilities with a few examples. During the 2013 National Water Week, Minister of Water & Environmental Affairs, Edna Molewa, released the report of the WRC study on The State of Non-Revenue Water (NRW) in South Africa. This was the first comprehensive study of its kind using data gathered from 132 municipalities representing 75% of the total municipal water supply in the country. The study indicated that the country's NRW was at 36,8%. This represents a combination of actual physical leakage (25,4%) and inadequate financial management (incomplete billing, inadequate collection etc.).

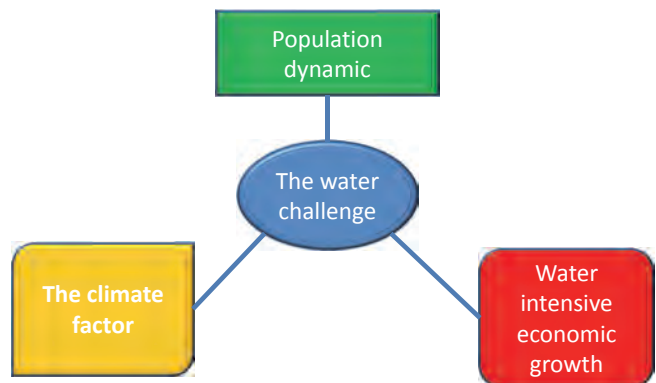
The estimated value of NRW is R7,2-billion per year. How does this represent opportunity? The first thing that the study is telling us is that South Africa is already paying R7,2-billion a year for water we do not get to use, therefore any investment in fixing this problem that is less than R7,2-billion a year is a positive cost-benefit in the medium to long term. It

also says that if this water leakage component of the problem is solved (25,4%), then the energy saving from need to treat and pump the currently lost water will be very significant.

A previous WRC study in the Sebokeng/Evaton municipal area indicated that a reduced demand of 1 million m³/month results in an energy saving of 13 000 MWh/year and a reduction in carbon emissions of 13 000 t in that same period. The NRW for the country is estimated at 1 580 million m³, so the savings in energy and the subsequent emissions impact is very encouraging. But even this does not represent the full potential of the opportunity. South African municipalities, and municipalities in much of the developing world, have the common burden of non-revenue services, be it water or electricity or waste management. In many cases the non-collection burden

also extends to rates and taxes. An ability in South Africa to effectively deal with the financial management dimension of municipal water services would have the important knock-on effect for other services and revenue collection as a whole. This has the important possibility of economically viable (even profitable) municipalities in South Africa, and a model to share with the rest of the developing world.

Another important example is that of acid mine drainage (AMD). AMD has become a crisis of our time as we gain the dis-benefit of more than 200 years of environmentally poor mining practices. The science response to the AMD challenge has been robust, with South Africa on the verge of world leading technologies in this domain. Why is this an international competitiveness opportunity? One of the global problems



The South African Water Problem Tree. The cornerstones of the South African problem tree are the increased demand from a resource of declining quality compounded with the impacts of climate and weather variability. The demand drivers are population growth, changing lifestyles (unfortunately more water intensive), skewed distribution patterns on the back of large-scale urbanisation, and, an industrial growth path trajectory that has a large water footprint. The latter is typical of resource based economies with large mineral deposits.



Initiatives such as the award-winning Emalahleni water reclamation plant situated at Witbank, which desalinates mine-water for resale to the Emalahleni Local Municipality, proves that South Africa possesses the know-how to deal with its water challenges. (Credit: Lani van Vuuren)

that is rapidly coming home to roost is that of salinity and brines. Centuries of production practices both in the industrial and agricultural domains have led to the diminishing quality of our freshwater resources, in particular the problem of salinity. South Africa's ability to expand its AMD science and technology into solutions for salinity and brine will position her for global leadership in this domain.

Similar cases can be developed for point-of use water treatment solutions, low-energy or energy-neutral wastewater treatment solutions, off-grid water and power supply

solutions in rural and peri-urban areas and of course water solutions for climate change adaptation. Global leadership in the water domain is a *Ji* away, if you are wearing the right lenses. The WRC has borrowed these *Ji* lenses in developing its current Corporate Plan 2013/14-2017/18 and is looking forward to realising these and other possibilities together with our partners in this the United Nations Year of International Water Cooperation.

This article is an adaptation of a lecture presented at the University of Cape Town during National Water Week 2013.

Water diary

Water law

Various dates – from April

The South African Institution of Civil Engineering is hosting a series of two-day courses across the country on the Water Law of South Africa. The courses will be held on 23-24 April at Port Elizabeth; 25-26 April at East London; 7-8 May at George; 9-10 May at Cape Town; 29-30 May at Midrand; and 4-5 June at Bloemfontein. The course will be presented by water law specialist Hubert Thompson. *Enquiries:* Dawn (SAICE); *Email:* dawn@saice.org.za

Wastewater treatment

June 25-28

The 13th World Congress on Anaerobic Digestion will take place in Santiago de Compostela, Spain, with the theme 'Recovering (bio)resources for the world'. Visit: www.ad13.org

Aquatic science

30 June-4 July

The annual conference of the Southern African Society of Aquatic Scientists will be held in Arniston, in the Western Cape. The theme for the conference

is 'Catchments, coastal interfaces and communities'. *Enquiries:* Petrie Vogel (Conference Secretariat); *Tel:* (012) 346-0687; *Fax:* (012) 346-2929; *Email:* petrie@savetcon.co.za; *visit:* www.savetcon.co.za

Municipal water quality

July 7-11

The Fourth Municipal Water Quality Conference will be held at Sun City with the theme 'Together committed to excellent Water Quality for the future'. Visit: www.wisa.org.za

Young water professionals

July 16-18

The Third Young Water Professionals Conference 2013 will take place in Stellenbosch, Western Cape. The conference is expecting 500 delegates from across Africa and beyond. The conference aims to provide a forum for young researchers and practitioners across the water sector to present and discuss their work and ideas. *Enquiries:* Glaudin Kruger (Conference Secretariat); *Tel:* (028) 316-2905; *Email:* kruger@kruger-associates.com or Visit: www.saywp2013conference.com/

Aquaculture

September 9-13

The 11th Aquaculture conference of the Aquaculture Association of Southern Africa (AASA) will be held in Stellenbosch in collaboration with the Department of Agriculture, Forestry & Fisheries. The theme for this year's conference is 'Fish Farm to Plate'. *Enquiries:* Email: deidre@iafrica.com or Visit: www.conferencesetal.co.za

Groundwater

September 17-19

The 13th Biennial Groundwater Division Conference & Exhibition will take place in Durban, with the theme 'Groundwater: A New Paradigm'. *Enquiries:* Conference Secretariat at *Tel:* (012) 348-9598; *Email:* info@gwd.org.za or Visit: www.gwd.org.za

Municipal engineering

October 23-25

The 2013 Conference of the Institute of Municipal Engineering in Southern Africa (IMESA) will be held at The Boardwalk Hotel & Conference Centre in Port Elizabeth with the theme 'Municipal Engineering: Meeting Peoples' Needs'. *Enquiries:* Debbie Anderson (Conference

Secretariat); *Tel:* (031) 266-3263;

Email: conference@imesa.org.za;

Visit: www.imesa.org.za

Large dams

November 5-7

The South African National Committee on Large Dams (SANCOLD) is hosting a conference on 'Advances in Dam Technology for Water and Energy in Southern Africa' at the Black Mountain Hotel in Thaba N'chu, Maria Moroka Nature Reserve. *Enquiries:* Merentia Meyer; *Tel:* (021) 808-4352; *Email:* merentia@sun.ac.za; *Visit:* www.sancold.co.za

Ecosystem health

November 20-21

North West University is hosting its fourth Annual Eco Health Research Forum at Golden Gate Highlands National Park, Clarens. The theme for this year's conference is 'Multidisciplinary Reflections on Environment, Health and Well-being Research in Southern Africa'. *Enquiries:* Yolandi Krone (Conference administrator); *Email:* yolandi.yevents@gmail.com; *Cell:* 082 553 6463.

Water by numbers

- **R827-billion** – The funds government is planning to spend on infrastructure projects over the next three years, according to Minister of Finance, Pravin Gordhan. A total of R430-billion has been allocated from the fiscus to build various water infrastructure, including dams, water and sanitation projects and new homes.
- **793 Mℓ** – The volume of water savings made during the WWF's Earth Hour campaign in March when 629 MW of electricity was saved by people switching off their lights for an hour.
- **144** – The number of complaints the South African Human Rights Commission (SAHRC) has received over the past two years about problems with the quality and supply of water.
- **75%** – The percentage of countries in Asia and the Pacific experiencing 'a serious lack of water security', according to a new report developed for the Asian Development Bank and Asia-Pacific Water Forum. A total of 37 of the 49 countries assessed were found to be either suffering from low levels of water security or have barely begun to engage in the task of improving water security
- **2 300** – The number of open toilets that reportedly remain unenclosed in Rammolutsi at Viljoenskroon, in the Free State. After the Mqohaka Local Municipality's failure to appear before the SAHRC to explain its apparent inaction to enclose the toilets, two years after they were first reported, the Commission appealed to Parliament and the Ministries of Human Settlement and Cooperative Governance & Traditional Affairs, to deal with the matter.

Entries open for First Biennial WRC Photographic Competition 2013



The Water Research Commission (WRC) invites the water community to be part of its first Biennial Photographic Competition 2013. The competition has been launched to celebrate and share the Commission's funded research projects and their impact

on the lives of all South Africans. Photographs will be received and adjudicated by a hand-selected panel of judges. Prizes will be awarded to the top three photographs (winner and two runners up).

The top 12 photographs will be displayed at the WRC Symposium 2013, where the winners will be announced, and will be compiled into a special 2014 WRC Calendar.

The competition is open to the general public to submit photographs. Photographs must portray images related to current or former WRC-funded

projects. Subject matter can relate to water & sanitation service delivery and innovation, industrial/mining water, water for agricultural use, water resource management, water & the environment, water & society, water & health and water & the economy.

Individuals can enter as many photographs as they wish, however, each photograph must be accompanied by a separate entry form.

The closing date of the competition is **1 August, 2013**.

For more information regards rules and entry details as well as to access the entry form, Visit: www.wrc.org.za/News/Pages/TheWRClaunchestheFirstBiennial-PhotographicCompetition2013.aspx

Business organisation joins anti-corruption initiative

Leads 2 Business has added its voice to the outcry against tender irregularities with a R100 000 donation towards Consulting Engineers South Africa's (CESA's) 'war chest'.

The initiative, for which CESA has already set aside R1-million, will be used to take legal action against 'corrupt' municipalities and private companies thought to act irregularly or illegally in the process of awarding or securing contracts. "Our subscribers are feeling the brunt of the gluttony practiced by corrupt

officials and fly-by-night companies," commented Leads 2 Business Founder and CEO, Victor Terblanche. "It is about time that we unite against the scourge that is so blatantly prevalent within the tendering industry."

Ethical professionals, contractors and suppliers alike are adversely affected by anti-competitive behaviour in the form of incompetence, corrupt practices, mismanagement, irregularities and outright fraud, noted Terblanche. "With Leads 2 Business being at the forefront

of tender notifications, we are in a position to identify irregularities in the bidding processes and, to date, have forwarded numerous tenders and tender awards to CESA's offices for investigation. Impractical and unreasonable timeframes contrary to regular bidding practice and sporadic media advertisements are among the criteria we use to identify untoward or suspicious behaviour. We commend CESA for taking up this initiative and have pledged our full support to their endeavour."

Durban explores new solutions for water security and service delivery

Etheke Municipality is exploring approaches to improve the quality and quantity of water in its lifeblood water resource – the uMngeni River – including restoring and maintaining the catchment's natural infrastructure.

Ecological, or natural, infrastructure refers to functioning ecosystems that produce and deliver services that are of value to society, such as freshwater, soil formation and disaster risk reduction.

Situated at the lower end of the catchment, the city currently spends millions

annually on making its water potable. "This has to change. We have tried traditional engineering solutions and it is not working," reports eThekweni Head of Water & Sanitation Services, Neil Macleod, who is spearheading the new initiative.

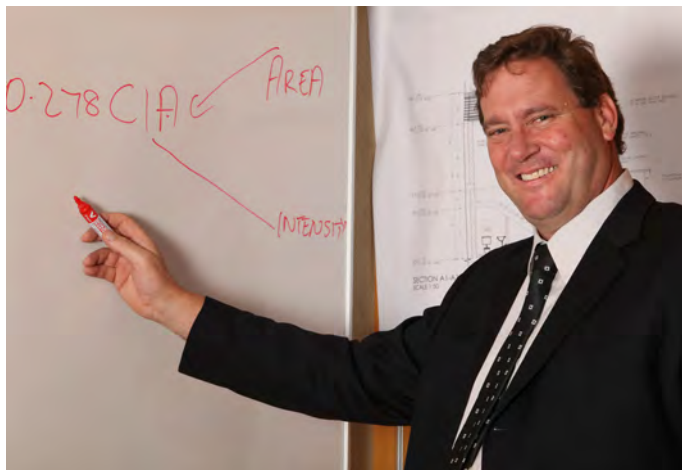
A workshop held earlier this year to explore potential partnerships to unlock the potential of natural ecosystems in the area provided evidence of the critical role that ecological infrastructure can play in improving the overall state of water resources in the catchment, while

simultaneously providing job creation opportunities through the restoration and maintenance of the ecological infrastructure.

Information presented at the workshop highlighted many of the challenges faced in the catchment as a result of inappropriate agricultural practices, industrial and other pollutants, poorly maintained sewage treatment works, among others, that are threatening the quality and quantity of water available for municipal use.

Source: eThekweni Metro

Hydrologist warns consumers about 'water guzzling' ways



As citizens in a semi-arid country, South Africans are wasteful water users, using as much as five times more water per person than we should.

According to Peter Shepherd, partner and principal hydrologist in the Johannesburg office of SRK Consulting (SA), the problem is further exacerbated by the uneven distribution and seasonability of rainfall, with 43% of rain falling on just 13% of the land. Also, the major urban and industrial developments are remote from the country's larger water courses.

He said that per capita water consumption in urban areas, where about 25% of our water is used, is about 200 ℓ a day - an unsustainable quantity for our available resources. "We are not a country with unlimited water resources and our water usage will exceed our available fresh water within the next 20 years."

"We urgently need to review our water usage habits," said Shepherd. "The more water we use, the more we have to find and we are running out of cheap and easy places to source water."

South Africa already transports water great distances – about 10% of our water originates from Lesotho – and it becomes more expensive as these distances grow. "Our gardens are where a lot of our water goes, so we need a more 'water-wise' approach to how we design our gardens and choose our plants," said Shepherd. "Being vigilant about water leaks is also vital; we could be losing

in excess of 20% of our water supply through unattended leakages and ageing infrastructure, despite good progress being made to renew and improve municipal infrastructure."

According to Shepherd, we could learn from neighbouring countries like Botswana, where most low-cost houses are built with rainwater tanks, and innovative methods are used to catch run-off in permeable areas that can infiltrate water into underground water systems.

An important factor that strengthens the country's ability to manage scarce water resources is the solid statistical platform that underpins national strategies and the application of technologies. "However, our hydrology skills base is ageing steadily and there are not enough qualified youngsters coming through to fill the gaps that are forming," said Shepherd. "The good news is that this is a broad and exciting field for young South Africans to consider as a career, and the demand for skills is high."

The hydrology profession, according to Shepherd, is not doing enough to foster awareness among school leavers, and promoting the potential areas of work in the field of water management. "School children know what a lawyer or accountant does, but few school leavers know what a hydrologist is," he said. "We're not doing ourselves any favours by our reticence to better publicise the vast opportunities in this exciting field of work."

Billions of Rand, dedication, needed to curb water wastage, Minister says



gross average water consumption is 286 ℓ/person/day – much higher than the international average of 173 litres.

According to Molewa, non-revenue water remains a challenge for many municipalities due to factors such as poor planning, limited financial resources to implement the necessary water demand management programmes, poor infrastructure asset maintenance, and lack of necessary skills and capacity. "Non-revenue water can potentially have a significant impact on water supply, and in some areas high levels of lost water has already forced the commissioning of new transfer schemes," she said.

The minister called on the entire water use sector to evaluate its water use and adjust consumption patterns. "Some organisations have already developed strong programmes around environmental protection and water conservation as part of their own programmes and their corporate social investment. I believe that if we all identify where large savings can be achieved within our individual sectors and go over to action, a lot can be achieved to reduce stress on our water resources," Molewa noted.

According to WRC CEO, Dhesigen Naidoo, water demand management while challenging for many municipalities, presented an opportunity to persuade customers to use water more efficiently. "Water sales are the prime source of income for local government structures. It is high time that people realise that if water is not used conservatively, demand will outstrip supply, resulting in the construction of expensive augmentation schemes, which cost billions of Rand."

An amount of R2-billion will be required every year for the next ten years in order to reduce South Africa's municipal water losses to a 'realistic target' of 25%.

This is according to the Minister of Water & Environmental Affairs, Edna Molewa. She was speaking at a Water Research Commission (WRC) Dialogue on the state of non-revenue water in South Africa, in Cape Town, during National Water Week earlier this year.

The dialogue brought together stakeholders to discuss the findings of the latest *State of Non-Revenue Water in South Africa (WRC Report No. TT 522/12)*, published by the WRC in collaboration with the Department of Water Affairs. The study, South Africa's most comprehensive yet, found that the country's present level of non-revenue water is in the order of 37%, of which a quarter is considered to be losses through physical leakage. (For more results, see 'Counting the lost drops – Study into non-revenue water shows we can do more' in *the Water Wheel* January/February 2013)

This percentage translates into a volume of around 1 580 million m³ of water that is 'lost' each year. This is roughly equal to the annual supply of Africa's largest water utility, Rand Water.

A worrying factor pointed out by the study is the fact that South African

WRC-NWU initiative to protect SA's historical records

The Water Research Commission (WRC) together with North West University (NWU) Vaal Campus is answering the call for the establishment of information storage facilities to preserve South Africa's water history.

This follows after the need for a water archival repository system has been expressed by various stakeholders in the South African water sector. It is envisaged that a number of entities, from government departments to water boards, will gain from the project. A number of retired

water engineers have already volunteered their records, including hydrology guru, Prof Will Alexander.

The challenges around archiving in a modern age were also at the centre of discussions hosted by the WRC and NWU in Vanderbijlpark earlier this year. The event, attended by around 100 delegates, shared the vision of the South African Water History Archival Repository.

International insight into archiving in a digital age was provided by special international guest speaker, Dr Adam

Jansen (pictured) of the School of Library, Archival and Information Studies at the University of British Columbia, Canada.

"Archiving in the electronic age involves a series of managed activities necessary for the protection of digital records of enduring legal, historical or fiscal value from loss, alteration, deterioration and technological obsolescence, while maintaining them in a trustworthy state in order to ensure an accurate rendering of those records in perpetuity in an environment independent from that which produced the record."



SA, neighbours sign environmental treaty

South Africa has signed an environmental treaty with the governments of Angola and Namibia.

Water and Environmental Affairs Minister, Edna Molewa signed the environmental treaty called the Benguela Current Convention, in Benguela, Angola, in March. The Benguela Current Convention is a formal agreement between the three governments and seeks to promote a coordinated regional approach to the long-term conservation, protection, rehabilitation, enhancement and sustainable use of the Benguela Current Large

Marine Ecosystem, to provide economic, environmental and social benefits.

Molewa is the current chairperson of the Benguela Current Convention and, as such, South Africa had played an important role in drafting and negotiating the Convention text. The Benguela current constitutes the boundaries of the Benguela Current Large Marine Ecosystem (BCLME), an area of ocean space stretching from Benguela, in the province of Cabinda in the North of Angola to Port Elizabeth.

According to the Department of Environmental Affairs, by signing the Benguela

Current Convention, Angola, Namibia and South Africa agreed to manage the BCLME in a cooperative and sustainable way for the benefit of coastal people who depend on the ecosystem for food, work and well-being.

The Convention will also establish the Benguela Current Commission – in existence since 2007 – as a permanent inter-governmental organisation with a mandate to promote the long-term conservation, protection, rehabilitation, enhancement and sustainable use of the BCLME.

Source: SA News

University staff and students vote for safe water with their feet

Stellenbosch University (SU) joined thousands of people from Africa and across the world in a local 'World Walks

for Water and Sanitation' event to raise awareness of people's right to safe water.

Organised by the university's Water

Institute and the NEPAD Southern Africa Network of Water Centres of Excellence (SANWATCE), more than 100 members of staff and students, including the Executive Mayor of Stellenbosch, Conrad Sidego, walked the 2,4 km on 19 March.

Also joining the march, SU Vice-rector

(research and innovation), Prof Eugene Cloete, said that such a day is important to make people aware of the scarcity and importance of water. "Such a day is very important if you take into account the fact that 1,2 million people in the world do not yet have access to safe drinking water. In South Africa, one out of every five children die because of a water-related illness."

According to Prof Cloete, there are many ways in which water wastage can be curbed. "The average person here uses 55 000 litres of water per year just by flushing the toilet. That is equivalent to an average-sized swimming pool."



Water on the web

www.ngopolis.com

This new website has been created to harness the power of social media for the conservation and sustainable development sector. The site will allow disparate groups to share data and will act as a resource enabling nature conservation and development professionals, educators, scientists, academics, and students to find relevant peers and information, to communicate in real time, to pool data and manage collective data tables, upload and download files, bookmark important websites, hold discussions, create groups for organisations or issue areas, and access the latest news and updates.

www.wisa.org.za

The Water Institute of Southern Africa (WISA) has launched its new-look website. Visit the site for information on membership, branches, divisions, and events.

<https://twitter.com/gwdivision>

The Groundwater Division of the Geological Society of South Africa has an active Twitter account. Follow to keep up-to-date with all things related to groundwater in South Africa.

Classic WRC publication underscores importance of wastewater management

Media headlines regularly woe the state of municipal wastewater treatment plants in South Africa. Dipping into the Water Research Commission's (WRC's) rich archive of reports and publications reveals that the country has a long history of grappling with wastewater management issues – with an abundant record of innovation to show for it.

Wastewater doyen, Kenneth Angus Murray's publication, *Wastewater Treatment and Pollution Control*, first published by the WRC in 1987, remains as relevant as it did 30 years ago. While the legislative milieu has changed, many of the technologies used to treat wastewater remain relevant today.

The publication follows the history of wastewater treatment in South Africa up to the 1980s, including the origins of sanitation and wastewater management and the international sanitation revolutions of the nineteenth century.

Murray explains how, as towns and cities developed following the arrival of European settlers in the seventeenth century, urban areas first made

use of sanitary buckets, with sanitary pail contents being removed by special mule-drawn carts (or trains in the case of Cape Town). Originally the bucket contents were disposed of at depositing sites in deep trenches with continuous coverage of earth.

In the Cape of Good Hope, established as a halfway house for East-bound ships by the Dutch in 1652, sanitation buckets were first disposed of by household slaves, who were meant to empty the buckets in the sea. However, it was not unusual for bucket contents to find its way into the town's water canals. From 1850 the canals were covered to prevent abuse, but progress in this direction was slow.

At the start of the South African War (1899-1902), British military authorities introduced the septic tank method of sewage treatment. The first municipal sewerage scheme planned in South was designed by consulting engineer Thomas Stewart for Wynberg (Cape Town) in 1898. This consisted of septic tanks, percolating filters and land treatment. The

final effluent found its way into Princess Vlei, which overflowed to discharge into the sea in False Bay. However, as a result of the South African War, construction of the scheme only started in 1902.

The first municipal scheme to be put into operation in South Africa was that designed by the City Engineer of Bloemfontein. Designed in 1901, construction work started in 1904 and sewage arrived at the works in November 1904. This scheme consisted of septic tanks, primary and secondary filters, followed by irrigation of cultivated land. Subsequently, other inland towns, notably Pietermaritzburg, Johannesburg and Pretoria became interested in more sophisticated sanitation removal and actions were taken by these authorities to deal with the disposal of their respective sewages.

The first sewer system in Johannesburg, which brought sewage to the Klipspruit 'sewage farm' was completed in 1907. Around the same time Pietermaritzburg constructed a wastewater treatment works consisting of screens, hopper-bottomed sedimentation tanks, percolating filters and separate sludge digesters. These works were significant in that it was one of the earliest works incorporating separate sludge digestion.

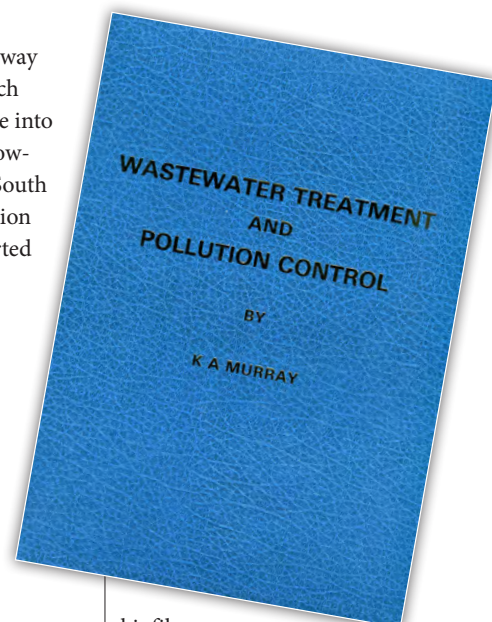
Walton Jameson, who designed the Pietermaritzburg works, then moved to Pretoria designing similar works for the capital city. The original

biofilters established at the Daspoort wastewater treatment plant are still in use more than 100 years later. Towns located next to the ocean opted for sea outfalls.

It was only after the Second World War that municipal sewage treatment really took off in South Africa. The methods have essentially remained the same to this day.

These methods are included in the book along with chapters on South Africa's contribution to the field of wastewater treatment, practical aspects of wastewater treatment and pollution control in South Africa, adverse effects of sewage spills, control of pollution from industrial effluents, marine pipelines and more.

The publication is still available from the WRC and is a must for the water history collector. To order the publication, *Wastewater Treatment and Pollution Control*, contact WRC Publications at Tel: (012) 330-0340; Fax: (012) 331-2565 or Email: orders@wrc.org.za



NLSA

A view of the parade and heerenracht (now Adderley Street), Cape Town, in 1763. Before the construction of the sewerage system in Cape Town waste content was often dumped in the city's drinking water canals.