Fluid Thoughts

WRC CEO, Dhesigen Naidoo

Can we benefit from a value paradigm shift?

Our recent history has been dominated by a national water dialogue of scarcity, pollution, quality problems and social unrest associated with last mile service delivery.

South Africa's water future is determined by the three faces of the current Malthusian challenge, namely, a growing population, an improving quality of life that is linked with increasing personal water budgets, and a policy determination that relies on water intensive economic growth sectors. This seems to imply that our water scarcity is highly probable.

If we add to this mix the vagaries of climate change and extreme weather events, the scarcity is increasingly assured. The facts as we have them is that using our current water behaviour baseline, tomorrow's South Africa will have less water per capita for personal use and less water per activity for productive use.

Although this analysis is accurate, its narrative is disempowering.

Another perspective can be derived from a different narrative with the same facts. South Africa is indeed water poor, as it has been throughout its recorded history. Our economic pathway is almost inevitably water-intensive as our country has as its mainstay our natural resources and their beneficiation. The couplets of mining and manufacturing; biodiversity and tourism; arable lands and agriculture come to mind.

The goal of universal access to clean water and safe sanitation are non-negotiable based both on the tenets of the Constitution as well as the moral and social compacts of modern democratic South Africa. All of these demands play out in the reality of a finite resource of ever-decreasing quality through continuous use and re-use.

In classical economic terms this defines water in South Africa as a principal determinant of development success. Water is therefore, because of its non-substitutable and irreplaceable nature, a Strategic National Asset. This points to a more empowering paradigm and the change in language has the real possibility of a vector to action.

This shift in emphasis toward the paradigm of a strategic national asset has implications across all the areas of water challenges and opportunities. It most importantly has the potential to change the nature of the dialogue. Let us consider the current debates around shale gas harvesting in the Karoo.

The new narrative is the inter-relationship between two strategic national assets. The first is a much needed new energy source in the form of natural gas for a country that has oil imports as a key driver of our negative trade balance. The second is water in a part of South Africa that is water scarce and has a very high environmental value.

This combination sets the stage to develop protocols and methodologies to derive benefit from the natural gas reserves in a manner that has the possibility of limited negative impacts on the water resource. If we

SCARCITY		STRATEGIC ASSET
Risk	→	Opportunity
Fear	→	Promise
Blame	→	Ownership
Emergency	→	Plan for intervention
Survival	→	Growth possibilities
Cost of remediation	→	Investment in new resources
Unrest	→	Partnership
Reactive	→	Pro-active

Figure 1. *The paradigm of scarcity advises a collection of emotive descriptors in its narrative. A putative sample is presented, all of whom are transformed into a much more empowered, action oriented counterpart in the paradigm of water as a strategic national asset. The opportunities for growth and improvement of quality of life became more apparent as we re-visualise costs of remediation into investment in new water availability.*

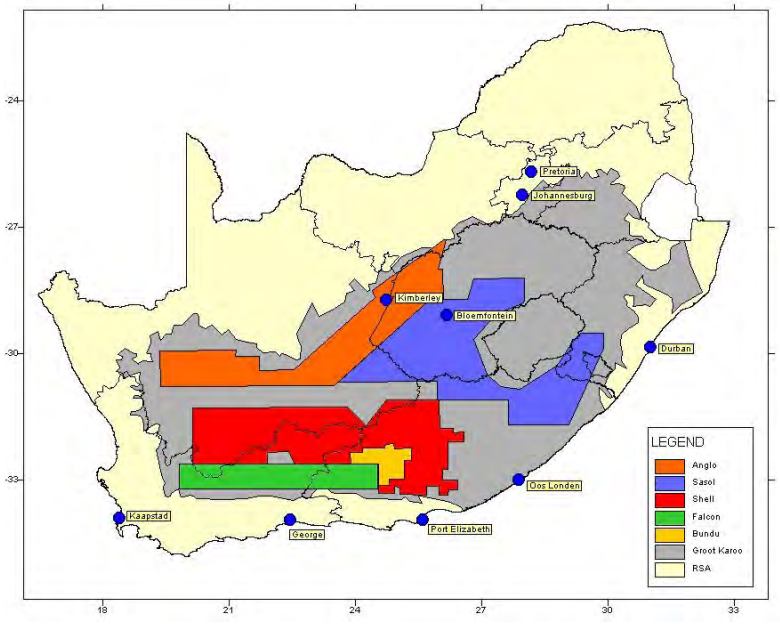


Figure 2. *Current exploration areas and companies involved in hydraulic fracturing in South Africa*

manage to do this, it will enable the South African shale gas exploitation project to become a global best practice and change the international narrative of such endeavours.

The WRC embraces this new paradigm in its strategy. The project portfolio gives effect to the notion of water as a Strategic National Asset from the basic planning regimes of water sensitive design to the mining of freshwater and valuable minerals from acid mine water. The notion can be applied from developing sustainable low/no-water safe sanitation solutions to women-led small scale agriculture initiatives, and from research to empower the notion of ecological infrastructure as a key element of water infrastructure, to novel governance mechanisms to encourage wider empowered participation.

This the WRC does in partnership with South Africa's small but highly productive water R&D community, the dedicated South African water practitioners, the prudent water users and our friends around the global in the quest to ensure the reality of universal access to water and water services.

Water diary

Large dams
June 1-6

The International Commission on Large Dams is holding its 82nd Annual Meeting in Bali, Indonesia, with the theme 'Dams in global environmental challenges'. More than a 1 000 dam experts, engineers, scientists, consultants, and operators, among others, are expected to attend. *Visit: www.icold2014bali.org for more information.*

Water resource management
June 11-12

The Second African Water Symposium titled 'Planning for the future' will be held in conjunction with the 6th Orange River Basin Symposium at the University of the Free State. *For enquiries Tel: (051) 401-2863'Fax: (051) 401-2629; Email: info@africanwatersymposium.co.za or Visit: www.africanwatersymposium.co.za*

Aquatic science
June 22-26

The 2014 conference of the Southern African Society of Aquatic Scientists will be held in Thaba Nchu, Free State. *Enquiries: Petrie Vogel; Tel: (012) 346-0687; Fax: (012) 346-2929; Email: petrie@savetcon.co.za; or Visit: www.savetcon.co.za to register.*

Sediment water science
July 15-18

The International Association for sediment water science (IASWS) brings together and fosters collaborative research and dialogue between earth scientists, biologists, chemists and environmental engineers whose interests pertain to sediment-water interactions in all aquatic systems. Conference themes include the impact of sediments on ecosystem functioning and human health; multiple stressors; scale-dependent connectivity in aquatic systems; technical and methodological advances in sediment-water science; and physical and biochemical processes in sediment systems. *Enquiries: Prof Kate Rowntree; Email: k.rowntree@ru.ac.za or visit: www.iasws2014.co.za for more information.*

World Water
September 21-26

The International Water Association (IWA) is holding it World Water Congress & Exhibition in Lisbon, Portugal. *Visit: www.iwa2014lisbon.org for more information.*

Municipal engineering
October 29-31

The 2014 Conference of the Institute of Municipal Engineering in South Africa (IMESA) will be held at the Durban International Convention Centre, in Durban. *Visit: www.imesa.org.za*

Health and nutrition
November 19-21

The Second International Conference on Health and Nutrition will be held in Rome, Italy. The conference, hosted by the World Health Organisation and the Food and Agriculture Organisation of the United Nations, along with several other parties, will focus on how to address major nutrition challenges over the coming decades. *Visit: http://www.who.int/mediacentre/events/meetings/2014/international-conference-nutrition/en/*

Young water professionals
December 7-10

The 7th International IWA Young Water Professionals Conference will be held in Taipei, Chinese Taiwan. Conference topics include water treatment and management, wastewater treatment and management, water reuse and desalination, energy saving, nutrient removal and recovery, health-related issues, nanotechnologies, sludge management and resource recovery, and wetland and climate change, among others. *Enquiries: Tel: +886-2-33664377; Email: ywp2014@iwahq.org; Visit: www.iwa-ywp7.org*

Social Science
July 2015

The third World Social Science Forum is set to take place in Durban. The forum is a global event of the International Social Science Council that brings together researchers and stakeholders in international social science cooperation to address topical global issues and future priorities for international social science. The theme for this event is 'Transforming global relations for a just world'. *Visit: www.codesria.org/spip.php?article1674*

Water by numbers

11% – The percentage of the population (about 1.4 million households) who do not have sanitation facilities or services, according to a report, *The Quality of Sanitation in South Africa*, presented in Parliament in 2012. The same report says government requires about R44.5-billion to resolve the sanitation crisis.

30% – The average percentage of water utilities' operational cost represented by the cost of energy.

0.76% – The percentage of South African gross domestic product (GDP) spent on research, according to a study published by the Human Sciences Research Council. This still falls short of government's target of 1% of GDP.

44% – The percentage increase in newborn survival rates when birth attendants and mothers wash with soap, according to UNICEF.

8% – The percentage of all freshwater drawn worldwide used for energy, according to the UN. In some developed countries, this figure is as high as 40%.

21 – The number of Wetlands of International Importance designated in South Africa. Still, 71% of what remains of the country's wetlands are not protected at all, according to the South African National Biodiversity Institute.

50% – The number of scholarly articles read on screen – as opposed to in hard copy, according to a survey undertaken by the University of Tennessee. However, print readings were generally read with more care.

1 011 – The number of wetlands which have been rehabilitated by Working for Wetlands since 2002. The organisation has invested R725-million to rehabilitate 80 000 ha of wetland area, according to Deputy Minister of Water & Environmental Affairs, Rejoice Mabudafhasi.

Poor water quality putting people's health at risk, says organisation

The lack of compliance with water quality regulations by some South African water services authorities is a clear indication of failing municipal infrastructure and management, according to civil rights organisation AfriForum.

Earlier this year the organisation published its first report on municipal water quality following an initiative to test various sources of public drinking water and outlets of several wastewater treatment facilities. According to AfriForum Head: Environmental Affairs, Julius Kleynhans, local authorities and the media accompanied the test teams across the country in order to ensure the validity of the tests. Water samples were tested by independent accredited laboratories.

According to the AfriForum report, of the 114 municipal drinking water quality tested, 11 municipalities did not comply with drinking water quality standards. In Hertzogville and Delareyville, the tap water was found to contain high concentrations of nitrate (14 mg/100 ml and 12 mg/100 ml respectively), while at Kareedouw, Stormsrivier, Polokwane, Stella, Vryburg, Coligny, and Mafikeng tap water was found to contain E.coli. Standerton's water was found to be safe to drink, although the colour of the water did not comply to drinking water standards.

Of greater concern to AfriForum was the standard of effluent leaving South African municipal sewage treatment works. Of the 43 wastewater treatment works visited, 33 did not comply to standards. "This holds a threat to human health, food security and the environment," said" Kleynhans in a statement.

The results indicated that in some municipalities water was more polluted upstream due to failing infrastructure and untreated sewage pouring out of manholes and pump stations into natural resources. Failing wastewater treatment works were found in metropolitan areas, such as Tshwane, to smaller towns, such as Brits, Klerksdorp, Magaliesburg, and Bela-Bela.

The organisation sent letter to those municipalities who were not compliant and intended further steps in case these municipalities failed to rectify their water quality issues. According to the AfriForum report, the results indicated a need for political will to utilise, maintain, protect, conserve and manage South Africa's resources and infrastructure. "There is a great need for the reviewing of current water services authorities, restructuring of personnel and a thorough investigation into the possibility of privatisation of water and sewerage infrastructure."

The Department of Water Affairs earlier rejected the AfriForum campaign, saying it only focused on water quality analysis which was only a portion of the original Blue and Green Drop audits that the department conducts.

To access the AfriForum report, Visit: https://www.afriforum.co.za/wp-content/uploads/AfriForum-Omgewingsake-Blou-en-Groendruppelveldtog-2014-VERSLAG-ENG.pdf

Renowned SA hydrogeologist passes away

The water research community is still reeling with shock following the sudden death of Prof Gerrit van Tonder (61) of the Institute of Groundwater Studies at the University of the Free State.

Prof van Tonder died on 22 April, apparently of a massive heart attack. A well respected figure in the groundwater community, he had close to 40 years' experience in hydrogeology, with a focus on groundwater management and pollution. He published more than 50 scientific papers in peer-reviewed journals. He was a long-standing funded researcher of the Water Research Commission, partaking in more than 30 Commission projects.

Prior to his death Prof van Tonder focused his efforts on impact research around proposed shale gas mining in the Karoo. He was a peer-review member of the Karoo Water Expert Group, formed under the auspices of the Groundwater Division (GWD) of the Geological Society of South Africa to study the hydrogeology of the Karoo Basin, and a regular speaker at debates around hydraulic fracturing.

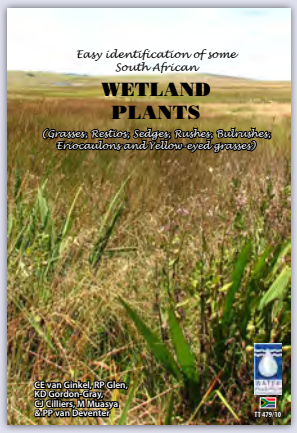
In 2005, he was identified by the Academy of Science of South Africa as the most outstanding groundwater scientist in South Africa. He was also an honorary life member of the GWD. Prof van Tonder leaves behind his wife, Fransie, and children Sanri and Gideon.

Prof van Tonder was a good communicator with a great sense of humour as well as an excellent lecturer whose passionate instructional approaches enabled his students to internalise information and acquire knowledge. He was also a very supportive and resourceful supervisor who always availed time for his master and doctoral students, and demonstrated remarkable patience without compromising excellence.

"The groundwater community is poorer without Prof van Tonder. He was instrumental in developing groundwater hydrology and the capacity we have today. Like so many others, I will miss his engagements on a variety of issues," said WRC Research Manager, Dr Shafick Adams.

New from the WRC

Special price for wetland plant guide

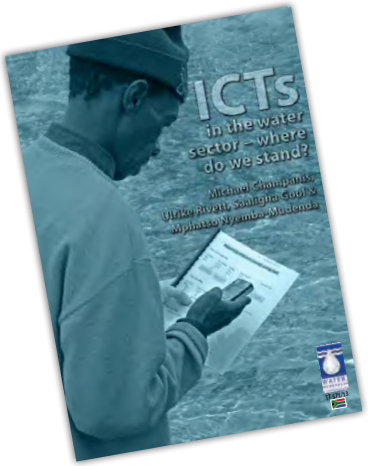


Until 30 June only the field guide, *Easy identification of some South African wetland plants* (**TT 479/10**) is available for R150 only. The guide normally sells for R200. This field guide focuses primarily on obligate wetland plants, paying special attention to grass-like plants. In total, 290 species of plants are covered. The book is printed on high-quality paper and includes many colour photographs and illustrations.

Report No. TT 571/13

ICTs in the water sector – where do we stand? (M Champanis; U Rivett; S Gool & M Nyemba-Mudenda)

Over the last decade information and communications technologies (ICT) systems have become known as a potential solution for developing countries and their information needs. The wide distribution of mobile phones in even the most rural environment has created the suggestion that cellphones are far more than a mere communication tool. The water, sanitation and hygiene (WASH) sector has also seen an increase in ICT applications, mainly for the purpose of improving data collection, information flow between decision-makers and engagement with the wider public. This research project was undertaken to assess the status quote of ICT solutions in South Africa. The aim of the study was to understand in more detail the potential for ICT in the South African water sector, to learn from the successes and failures of existing systems and understand the enablers and barriers for ICT implementations.



Report No. 2089/1/13

User perceptions and levels of satisfaction of water management devices in Cape Town and eThekwini (L Thompson; T Masiya; P Tsolekile De Wet)

Since the onset of democracy, South Africa has experimented with different ways of promoting sustainable water service delivery in urban areas. In the 1990s, there was concern with the need to expand water service delivery to unserviced areas in an environment characterised by non-payment or resistance to payment for water services. Pursuant to these concerns, numerous efforts were made to collect outstanding debts from water users. These included water cutoffs as well as seeking judicial redress. However, these measures met with limited success. As a result, municipalities began to develop novel ways of enforcing payment for services. This resulted, among other alternatives, in the introduction of water management devices. While these devices have been praised as efficient and effective mechanisms in regulating water service delivery, limited studies have been conducted to find out perceptions of the recipients of these devises. This study provided an understanding of user perceptions of the efficacy of water management devices.

Report No. KV 307/13

Discussion paper on the role of water and the water sector in the green economy within the context of the new growth path (D Naidoo; S Moola; H Place)

The benefits of the green economy and the need for more sustainable ways of operating have been very topical in South Africa. The green economy is also prioritised as a key economic driver by Government policy and strategy. All government departments need to develop implementation plans and align their programmes with the job creation imperative. A number of priority programmes were identified that effectively provide practical interventions for the environment sector contribution. If implemented, the programmes will have a significant contribution towards mainstreaming green economy approaches within South Africa to the benefit of the environment, economy and society, promoting growth while reducing pollution and greenhouse gas emissions, minimising waste and inefficient use of natural resources, maintaining biodiversity and strengthening energy security. This discussion paper looks to explore whether the green economy, from a water sector perspective, will effectively assist in achieving the national development and job creation objections as outlined in the New Growth Path.

Report No. 2011/1/13

Application of emulsion liquid membranes in the extraction of rhodium from mining and metal refinery effluent (R Tandlich; CD Luyt; KL Tyalana; F Moyo)

The platinum group metals (PGMs) constitute the backbone of the economy in South Africa. The mining and related metal refinery operations contribute a significant proportion to the gross domestic product and the employment in the country. The emulsion liquid membranes are a relatively old technology which has been successfully used to extract base metals from acidic media. This project set out to investigate the application of emulsion liquid membranes in PGMs from the aqueous by-products of PGM refining. The by-products are generated as side-streams which require storage and processing. Of the PGMs, rhodium is one of the more inert and therefore difficult to extract.

Report No. 1966/1/13

A large-scale study of microbial and physic-chemical quality of selected groundwaters and surface waters in the North West Province, South Africa (CC Bezuidenhout)

Water from the North West Province catchment areas support prosperous gold and platinum mining, manufacturing industries, agriculture and a growing urban and rural population. However, water allocation for the province has almost reached the quota available, based on surface water estimates. Furthermore, there are reports that the source water within the catchment may be exposed to pollution from various sources, but particularly from economic activities. These reports have demonstrated that several surface waters and groundwater are contaminated with faecal matter and some with opportunistic pathogenic bacteria. Further social and economic developments as well as climate change will impact on the anticipated water availability, requirements and quality of water. Baseline data in these categories will be important for long-term planning. However, detailed large water quality studies have not been conducted in the province to date. This study was aimed to address this gap.

Report No. 2093/1/13

Scoping study and research strategy development on currently known and emerging contaminants influencing drinking water quality (H-G Patterton)

The aim of this study was to investigate and identify the most important new substances in drinking water that could be a concern to human health in South

Africa. The specific aims were to complete a comprehensive review of literature on emerging contaminants (ECs); identify the three most critical ECs in South Africa; review current methods to analyse and quantitate ECs in water; complete a national reconnaissance study on the three critical ECs, develop a risk matrix for the three critical ECs; define critical issues that must be addressed regarding ECs and identify knowledge and skill gaps, propose a future research strategy and develop a terms of reference for the research.

Report No. 2170/1/13

Identifying and prioritising water research questions for South Africa (R Siebrits & K Winter)

Limited historical data are available to describe water research in South Africa over the first half of the 20th century. Many authors recognise that this period was dominated by technological developments, breakthrough research and projects in water storage and transfer, and frequently characterised by a positivist approach to nature and development. A new era in water research in South Africa began with the promulgation of the Water Research Act No. 34 of 1971, which led to, among others, the formation of the Water Research Commission. This study commences with the identification of the prevailing paradigms that have influenced the history of water research in South Africa by analysing the publication output over the last four decades, and in identifying research questions proposed by a range of researchers active in the water sector in South Africa.

Report No. 2048/1/13

Development of a groundwater resource assessment methodology for South Africa: Towards a holistic approach (A Allwright; K Witthueser; J Cobbing; S Mallory and T Sawunyama)

This study tested the Mixing Cell method as an additional tool used to quantify the groundwater baseflow volume in South Africa, among others. In light of the persisting lack of understanding of surface water-groundwater interactions, the importance of the groundwater contribution to streamflow and the increasing use of groundwater, a new approach to the quantification of this is proposed.

Report No. TT 578/13

Groundwater governance: A global framework for action (2011-2014). Regional diagnosis for the Sub-Saharan Africa region (E Braune & S Adams)

The information for this diagnostic has come largely from the regional consultation for the sub-Saharan Africa region of the Groundwater Governance: A Framework for Action project, supplemented from other sources to strengthen the interpretation and conclusions. The purpose of the regional consultations is to solicit regional perspectives on the practical application of groundwater governance. This report starts with a brief Africa water resources and socio-economic setting, followed by an assessment of the current state of groundwater governance in the region, including the gaps in this regard. A section on lessons and opportunities to address the gaps forms the basis for a set of conclusions and recommendations.

Report No. KV 320/13

Implementation plan for direct and indirect water re-use for domestic purposes – Sector discussion document (AM van Niekerk & B Schreiner)

The National Strategy for Water Re-use has to date not been broadly communicated and consulted. The aim of this short-term project is to develop a plan to bridge the gap between the strategy and implementation of water re-use for domestic/potable water use in consultation with the Department of Water Affairs and the WRC. The document was informed by a study of international best practices as well as a locally held workshop on water re-use.

Report No. 2076/1/13

Investigating stakeholder engagement cycles and identities within water resource management, using narrative techniques (AG Choles; N Govender; A Vlok)

The WRC-funded research project, undertaken by The Narrative Lab during the course of 2012/13, investigated the social dynamics of stakeholder engagement and volunteerism using narrative techniques at two study sites in the Western Cape, namely the Wilderness and Swartvlei estuaries, which are situated on the Garden Route. In particular, the study aimed to understand why citizens choose to engage with water resource challenges, how they translate the engagement into action and participation, and how such engagement may be cyclical in nature. The study investigated how citizens become and remain engaged in the decision-making regarding the management of the natural resource and to determine a) if they feel they are empowered, b) if they have sufficient knowledge as well as c) guiding principles on how to act or start an active engagement process.

Report No. 2103/1/13

Estimating the marginal value and price elasticity of demand for water in the industrial sector in South Africa: An application and assessment of the marginal productivity approach (A Nahman & W de Lange)

The need for this project has arisen in the context of the National Water Act and its emphasis on demand-side management, specifically, the economic principle of encouraging more efficient water use by means of water pricing. Designing and implementing water pricing strategies for a particular user group requires information on the marginal value of water to that user group, i.e. the increase in economic value generated per unit increase in water use (in order to assess whether there is scope for increasing water prices); as well as the price elasticity of demand. This project estimated the marginal value of industrial water use in South Africa, and the associated price elasticity of demand for water, using a production function approach. Specifically, the marginal productivity approach was used.

Report No. 2014/1/13

Preparation of magnetic nano composite beads and their application to remediation of mine wastewaters

In this project magnetic ion imprinted polymers with high recognition for uranyl and chromium were prepared for the first time. The prepared magnetic ion imprinted polymers were characterised and optimised in the laboratory. They were then applied to wastewaters from acid mine drainage and influent from a wastewater treatment plant.

Report No. 1734/1/13

Investigation into methods for the development of a protocol for quantitative assessment of industrial effluents for permitting of discharge to sewer (C Brouckaert; F Mhlanga; A Mashava)

The conceptual basis of this project was to develop a protocol, involving a combination of laboratory testing and process modelling, which would be able to predict the effect of a range of loads of factory effluent on the operation of the treatment plant receiving the effluent, to inform the process of granting a discharge permit. Because of the sustained high impact of textile effluents on several wastewater treatment plants in eThekwini, textile effluents were chosen as the subject of all the investigations.

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Report No. 1849/1/13

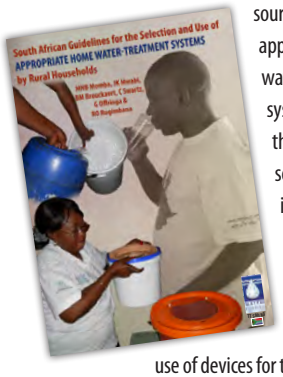
Management of human-induced salinisation in the Berg River catchment and development of criteria for regulating agricultural land use in terms of salt generating capacity (W de Clerq; N Jovanovic; R Bugan; E Mashimbye; T du Toit; A van Niekerk; F Ellis; N Wasserfall; P Botha; T Steudels; J Helmschrot; and W-A Flugel)

The main aims and the specific objectives of this project were to quantify the water and salt balances for a variety of land uses and on-farm management practices in the Berg River catchment; to set up and develop a hydrological model of the Sandspruit catchment for predictions of salt load contributions to the Berg River from different land uses and management practices, and finding the best practice to accommodate land use change in hydrological modelling; and finally to develop guidelines for regulating land use in terms of salt generation capacity, based on the knowledge gained from on-farm experiments and hydrological modelling.

Report No. TT 580/13

South African guidelines for the selection and use of appropriate home water-treatment systems by rural households

In contrast to metropolitan areas, the South African government still faces a number of challenges in delivering safe drinking water to rural communities, in spite of significant progress made in the provision of this basic service since 1994. At least 5 million people still have no access to treated potable water within reasonable distances from their dwellings. A project was commissioned by the WRC to source and investigate appropriate home water-treatment systems, to determine the efficiency of the selected devices in removing contaminants, and to provide guidance on both the selection and use of devices for the production of safe drinking water by rural under local conditions. The guidebook is a result of an extensive literature search, laboratory and field studies, workshop series and a social acceptance study aimed at determining the most important influencers of the social acceptance of home water-treatment technologies as perceived by rural households. A technical report, *Selection and use of home water-treatment systems and devices* (**Report No. 1884/1/13**) is also available.



Report No. TT 583/13

Community engagement in drinking water-supply management: A review (U Rivett; D Taylor; C Chair; B Forlee; M Mrwebi; JP van Belle & W Chigona)

This review emanates from a previous WRC-funded project that investigated the possibility of incentivising community engagement in order to improve drinking water supplies in South Africa. The research is based on the notion that an increase in community engagement, particularly in rural areas, would result in an increased understanding of the current shortcomings of drinking water supplies, an increased understanding of the communication challenges between communities, water service authorities and water service providers, as well as an improved experience of greater transparency and accountability for all stakeholders.

Report No. TT 570/13

The use of isotope hydrology to characterise and assess water resources in south(ern) Africa (Tamiru Abiye – Editor)

Envirnmental isotopes are routinely employed worldwide in the study of groundwater and surface water, as they provide unique information on transport and interconnectivity of water resources and reservoirs. The overall contribution of this project was to raise awareness of environmental isotope hydrology as a useful tool in the assessment of water resources at different spatial scale both at local and international level.

Independent investigation into home-based water purification units

An increasing number of South Africans are purchasing over-the-counted home-based water treatment devices, but do these actually work and are the claims made by the manufacturers true?

A team from the University of Johannesburg set out to independently assess home water treatment devices sold in South Africa for their capacity to provide safe drinking water for domestic, public and occupational use, and to provide guidelines to enable consumers to make informed choices when purchasing these units. The study evaluated the performance capacity of tap-mounted and jug-type purification systems currently available in South Africa. The systems were evaluated for their ability to remove microorganisms under a variety of running conditions. These findings were then compared with the claims made by the manufacturers of the products.

The study confirmed the wide variety of devices in South Africa. According to the researchers, users should pay close attention to the claims made by the manufacturers in their information brochures to ensure that the devices are used correctly. This includes specific flow rates for the faucet-mounted devices, which in most cases do not translate to the normal opening of the tap. Possibly the greatest concern was the fact that all the devices tested as part of the study indicated that the device should only be used with municipal treated tap water that meets SANS241 requirements, raising the question why there would be a need for further treatment of the water.

While an overall general pattern was observed that most of the home water treatment devices tested within this study potentially did improve the water quality in terms of its aesthetic attributes, such as reducing scale, the devices generally tested poorly for taste, odour, heavy metal, and microbiological removal as claimed by the manufacturers.

"Considering that these were the most common claims made by the manufacturers, i.e. that their devices could remove heavy metals and pathogens, as well as improve taste and odour, this is of great concern bearing in mind that their devices did not accomplish what they had claimed," noted the researchers in the final report.

In terms of the microbiological analysis, ultrafiltration and sediment filtration proved to be the most successful for removing bacteria and cysts; however, none of the technologies tested successfully removed viruses. In terms of the physic-chemical analysis most of the manufacturers of home water treatment devices also claimed chlorine removal after treatment – this proved to be true for most of the devices tested.

Several devices successfully neutralised both acidic and alkaline waters while also removing turbidity.

The associated reports, *An independent investigation into the purification capacity of small-scale water purification units supplied in South Africa (Volume I and Volume II)* can be ordered through Publications or accessed via the WRC website.