

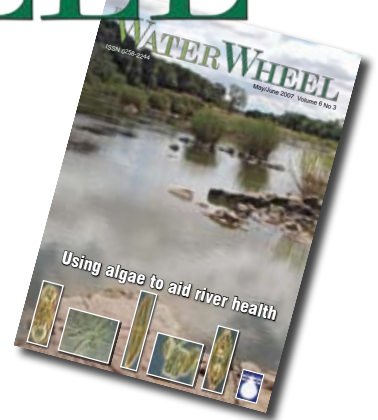
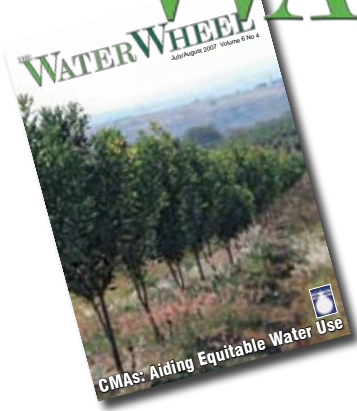
THE WATER WHEEL

July/August 2007 Volume 6 No 4



CMAAs: Aiding Equitable Water Use

THE WATER WHEEL



Subscription Request/ Renewal

Contact Details

Name:

Company:

Designation:

Postal Address:

.....

Tel:

Fax:

E-mail:

What would you like to read more about in *the Water Wheel*?

.....

.....

Would you be willing to pay for *the Water Wheel*?

The Water Wheel

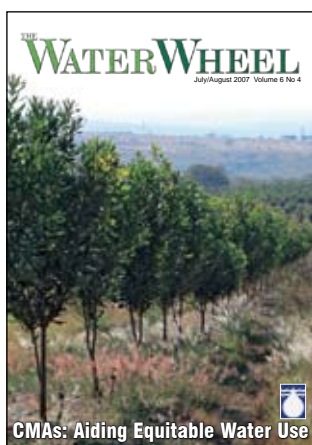
Tel: +27 (0) 12 330-0340

Fax: +27 (0) 12 331-2565

E-mail: laniv@wrc.org.za / www.wrc.org.za

Physical address: Marumati Building, C/o Frederika & 18th Ave, Rietfontein, Pretoria

Postal address: Private Bag X03, Gezina, 0031



Cover: Inkomati CMA is working hard to reconcile competing water uses. See page 14.

LETTERS	4
UPFRONT	5
ESTUARIES MANAGEMENT Valuing estuaries helps student win award	13
CATCHMENT MANAGEMENT Joining hands to manage SA's water resources	14
HIV/AIDS Research underpins value of water in fight against Aids	18
FRESHWATER PROTECTION Keep rivers flowing free, group urges	22
GROUNDWATER PROTECTION Protecting what's underneath the tap	24
WATER KIDZ Reaping the rain	28
THE LAST WORD Here's looking at algae	30

THE WATER WHEEL is a two-monthly magazine on water and water research published by the South African Water Research Commission (WRC), a statutory organisation established in 1971 by Act of Parliament. Subscription is free. Material in this publication does not necessarily reflect the considered opinions of the members of the WRC, and may be copied with acknowledgement of source.

Editorial offices:

Water Research Commission, Private Bag X03, Gezina, 0031, Republic of South Africa.

Tel (012) 330-9031. Fax (012) 331-2565.

WRC Internet address: <http://www.wrc.org.za>

Editor: Lani van Vuuren, E-mail: laniv@wrc.org.za; **Editorial Secretary:** Rina Human, E-mail: rinah@wrc.org.za;

Layout: Drinie van Rensburg, E-mail: drinie@wrc.org.za



LETTERS TO THE EDITOR

No denying climate change

The recent response by Dr Midgley and Prof Underhill to the earlier article by Prof Alexander (*Is Climate Prediction Model Flawed*, *Water Wheel* March/April 2007) deserves amplification and emphasis.

Even without the details and statistical analysis provided by Midgley and Underhill, the Alexander article was characterised by some very strange arguments and pseudologic. I strongly share the belief that peer review was either absent or minimal. We have a looming problem here and the only uncertainties relate to the magnitude and time frame.

There is the consolation that the Midgley/Underhill article may well have served to bring together data which might not have been easily accessible to many readers. Maybe these authors could be persuaded to provide some directions to authoritative, easily accessible input on climate change implications for this country.

Prof AT Forbes, Marine & Estuarine Research, Hyper by the Sea

(The letter has been edited – Ed.)

Cooperation or confrontation in water resource development?

In the late 1960s, civil engineers in the Department of Water Affairs appreciated that South Africa's water resources would approach depletion soon after the turn of the century. A commission of enquiry was appointed. Its 1970 report resulted in the establishment of the Water Research Commission. The commission of enquiry also recommended that research be conducted on the development of a climate prediction model that was required for future water resource development and management.

Coupled with this research was the need to determine the role of variations in solar activity on climate.

No scientists have yet developed a multiyear climate prediction model or examined the role of solar activity. I examined and reported on both aspects in my technical report, *Long Range Prediction of River Flow – A Preliminary Assessment*, published in 1978. My paper *Floods, Droughts and Climate Change* was published in August 1995 in which I successfully predicted the imminent reversal from drought to flood conditions. I continued my research. In April 2004 my paper, *Development of a Multiyear Climate Prediction Model*, was published in *Water SA*. Based on my studies, in November 2005 I issued a flood alert. Climatologists disagreed. Within three months countrywide floods occurred over virtually the whole of Southern Africa.

My *Water SA* paper had three components. The first was the further development of a multiyear climate prediction model recommended in the commission of enquiry's report thirty years ago, including the influence of solar activity. The second was the development of an advanced method for numerical characterisation of the hydro-meteorological processes that would be needed for water resource development and management applications as our resources become depleted. This characterisation makes provision for changes in flow regimes resulting from climate changes once these can be verified and quantified. The third aspect of my paper was that I was unable to detect any changes in the hydrometeorological processes that could be attributed to global warming.

It is not all that clear which of these three aspects Midgley and Underhill challenged

in their response printed in the March/April 2007 issue of the *Water Wheel* (*Is Climate Prediction Model Flawed?*). I have successfully developed, calibrated and verified a multiyear climate prediction model that meets the requirements identified by the Commission of Enquiry more than thirty years ago.

The ball is now firmly in the court of the Water Research Commission. With South Africa rapidly approaching the depletion of our remaining water supplies, and my prediction based on the model that we can expect drought sequences all the way through to 2016, the Commission is under a fundamentally important obligation. The Commission must decide urgently whether or not my studies meet the requirement set out in the report of the Commission of Enquiry that led to the Commission's establishment. If the Commission has doubts about my work then it will have to initiate research on this topic as a matter of urgency.

By publishing the vitriolic article of Midgley and Underhill, the Commission has unintentionally discouraged all future research in this field. No researchers are likely to undertake this research in the knowledge that they may expose themselves to personal attacks such as those published in *Water Wheel*.

Prof Will Alexander

(*Climate change remains an extremely passionate issue for researchers, decision makers and the public alike. Due to the many uncertainties that remain, it is understandable that there are many opinions regarding this issue. Only time will tell what the future climate will look like in South Africa. Please note that no other correspondence on this issue will be accepted.* – Ed.)

Letters must be addressed to The Editor and can be faxed to (012) 331-2565 or E-mailed to laniv@wrc.org.za. Letters are published at the editor's discretion, and may be edited for length. Letters are strictly the opinion of the author(s) only and do not necessarily reflect the considered opinions of the members of *the Water Wheel* or the WRC.

Let's build together – Minister

Public Works Minister Thoko Didiza has called for greater cooperation in the construction industry in an effort to drive infrastructure development in emerging economies.

As government news agency BuaNews reports the Minister was speaking at the closing session of the International Council for Research and Innovation in Building and Construction in Cape Town earlier this year. She said that the construction industry has a pivotal role to play in infrastructure provision. "Construction creates the foundations of the global economy and the basis for human advancement. It also accounts for about 10% of the global economy, and provides much needed employment and dignity to millions of people around the world."

That is why infrastructure development continues to occupy a central position in government's agenda to roll back the underdevelopment of decades of neglect, Didiza said. The inherited backlog of uneven deployment coincides with the need for new levels of infrastructure investment.

Increased infrastructural development would enable the country to deliver the Accelerated and Shared Growth Initiative of South Africa (AsgiSA) which aims to achieve an economic growth rate of 6% by 2010 and to halve poverty and unemployment by 2014.

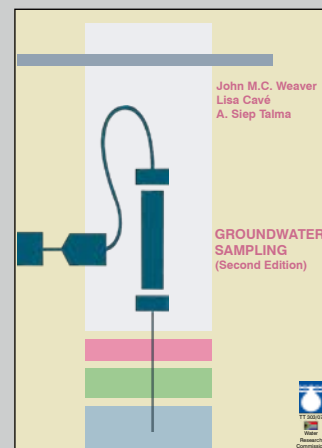
New groundwater sampling manual available

A new manual on groundwater sampling has been published by the Water Research Commission (WRC).

This revised edition follows the publication of the first manual by the organisation in 1992. Authors John Weaver, Lisa Cavé, and A. Siep Talma explain that the purpose of the manual is to provide consistent groundwater sampling techniques that will ensure that all groundwater quality data collected is representative of in situ groundwater quality.

For many years, groundwater sampling has been directed towards evaluating water quality of aquifers for water supply purposes. Closely allied to this objective has been the curiosity of hydrogeologists, who have wished to understand the natural processes that govern changes in groundwater chemistry over the distances and time of long groundwater flowpaths.

Recently, more attention has been focused on the contamination of groundwater. With this attention the understanding of the complex hydrogeochemical and hydrogeological processes governing the fate and transport of these contaminants has increased. Closely linked to this has been a proliferation of specialised sampling equipment, complex



sampling techniques, and legislation governing sampling at pollution sites.

The new manual incorporates a number of additional sections, such as sampling for isotopes, and down-hole logging, to name a few. Some chapters have been substantially revised to include advances in field instrumentation, such as pH meter technology and increased attention to organic compounds. "The manual provides sufficient technical detail for hydrogeologists involved in water supply projects to collect proper samples, and to conduct hydrogeochemical investigations of natural systems," note the authors.

- To order the manual (WRC Report No TT 303/07) contact Publications at Tel: (012) 330-0340 or E-mail: orders@wrc.org.za

Keeping an eye on our rivers



This year's World Water Monitoring Day will take place on 18 September.

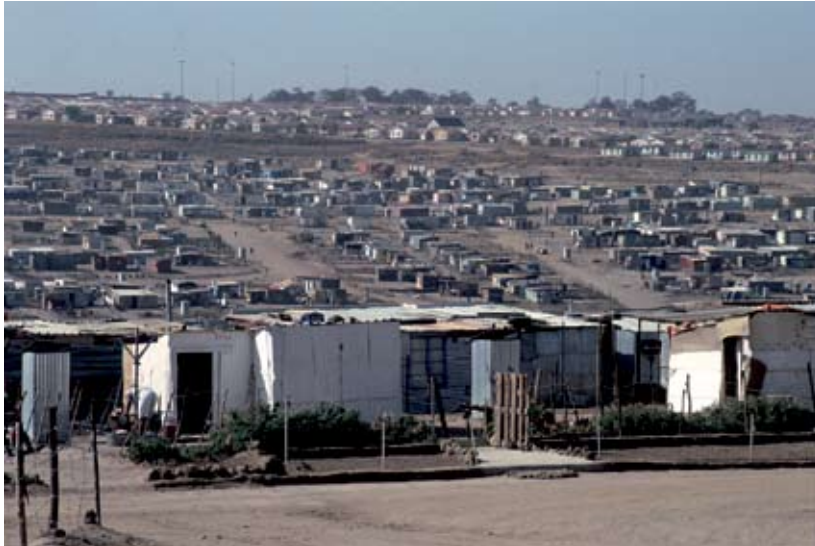
This international outreach programme, created by the Water Environment Federation and the International Water Association build public awareness and involvement in protecting water resources around the world.

Held annually since 2002, the programme engages communities in monitoring the condition of local rivers, streams, estuaries and other water bodies.

On-line site registration and purchase of monitoring kits begins on 18 July. The monitoring period occurs between 18 September and 18 October.

- For more information, go to www.worldmonitoringday.org

SA's housing efforts not enough – UN expert



Despite South Africa's efforts to redress housing inequality, desperate living conditions persist in some areas, according to United Nations human rights expert Miloon Kothari following a visit to the country earlier this year.

Kothari, who is a Special Rapporteur on adequate housing called on the government to boost social services and take other measures to improve all settlements. "Success cannot be measured merely through the number of houses built, but also needs to take into account quality of housing and access to services."

While praising the South African government's post-1994 efforts, he eluded to the many informal settlements which have sprung up as a result of large development projects, rapid urbanisation, and land

restitution claims. "In many such cases, communities do not receive even the most basic support services, including proper sanitation, water, access to schools and access to livelihood options," he said, adding that "there are few follow-up support mechanisms, such as regular maintenance or service repair facilities in cases of resettlement."

To redress these conditions, Kothari recommended that government improve coordination between departments of housing, water, health and social services, ensuring a unified approach to housing. He also advocated inclusive tactics for the rehabilitation of urban areas, strategies to mitigate skyrocketing real-estate prices, restrictions on evictions and renewed concern for shelter for households headed by women.

R184-m. to get rid of NW buckets

The North West government has budgeted R184-million for the eradication of the bucket system in all formal areas by the end of the 2007/08 financial year, government news agency BuaNews reports.

Delivering his budget speech earlier this year, MEC for Local Government & Housing Pheny Vilakazi said this was

aimed at meeting the 2007 deadline for the eradication of bucket sanitation. One of the local authorities battling to improve sanitation to receive funds is Matlosana Local Municipality, which will have R85-million to replace its 14 000 bucket toilets. In total, North West still has about 25 124 bucket toilets in formal settlements.

Global news at a glance

- UN-Habitat has signed an agreement with **Coca-Cola** to collaborate on projects to improve community access to water and sanitation in India and Nepal. Among others, the collaboration will see 150 schools in West Bengal state receiving safe water and sanitation facilities.
- The **Sante Fe River** is the most endangered river in the US, according to the American Rivers Organisation.
- The World Bank will be providing US\$360-million in loans and guarantees to the 250MW **Bujagali** hydropower project in Uganda. The scheme, which will be constructed on the Victoria Nile, is due to be commissioned in 2011.
- Eritrea, Ethiopia, Kenya, Uganda, Somalia and Sudan have strengthened East Africa's capacity to predict climate-related disasters through the establishing of a regional **climate monitoring** institution, the Intergovernmental Alliance on Development Climate Prediction and Application Centre.
- New research confirms that avoiding **deforestation** can play a key role in reducing future greenhouse gas concentrations. According to CSIRO, in Australia, deforestation in the tropics accounts for nearly 20% of carbon emissions due to human activities.

DWAF to spend billions on storing water

A significant percentage of the Department of Water Affairs & Forestry's (DWAF's) R5,3-billion budget for the 2007/08 financial year will go towards financing the construction of bulk raw water infrastructure.

Presenting her first budget as Minister of Water Affairs & Forestry in Parliament earlier this year, Lindiwe Hendricks said funds had

also been set aside for the maintenance of dam safety, weirs, canals, tunnels, pump stations, siphons, pipelines and related buildings. "My department has completed a preliminary assessment of refurbishment requirements, which is estimated at R3,1-billion. While R1,5-billion has been secured we will continue to investigate various avenues for funding the R1,6-billion shortfall."

While construction of the De Hoop Dam gets underway in Limpopo, investigations into a number of other bulk raw water infrastructure projects continue. These include the construction of the Spring Grove and Mzimkulu Off-channel dams in KwaZulu-Natal, as well as the possible raising of the Hazelmere Dam in the same province. Decisions on these projects are expected this year.

Another potential bulk infrastructure being investigated at present is the Groot Letaba River Water Resources Development project in Limpopo. The main feature of this project is the possible construction of the Nwamitwa Dam below the confluence of the Groot Letaba and Nwanedzi rivers. If constructed, this dam could have a storage capacity of 144 million m³ and an estimated yield of 47-million m³ a year.

The main purpose of the development is to meet the projected growing primary water requirements of the region to 2025 and to improve the water availability for the riverine ecosystem in an effort to improve the baseflows into the Kruger National Park. The project is also expected to stabilise water availability to the irrigation sector for existing development, including the establishment of resource poor farmers.

Initial feasibility studies were completed in 1998. A bridging study addressing issues pertaining to environmental authorisation; project financing and technical aspects (such as updating cost estimates, optimising configuration and sizes, and reassessing the yield) is underway at present.

It is expected that these projects will in future be implemented through the National Water Resources Infrastructure Agency. Meanwhile, Hendricks pointed to the lack of bulk infrastructure and wastewater capacity as one of the greatest challenges faced by municipalities. "This lack of infrastructure is becoming increasingly acute as we roll out water and sanitation services."

The optimum solution, according to the Minister, was often regional works that could supply a number of municipalities. "My department has decided to establish a special programme for water services bulk infrastructure. The programme will come into operation during this financial year, and a grant amount of R1,4-billion has been allocated over the next three years."

Heritage Site 'outgrows' old name

South Africa's first World Heritage Site, Greater St Lucia Wetland Park, has been renamed.

According to Minister of Environmental Affairs & Tourism, Marthinus van Schalkwyk, the park's new name, iSimangaliso Wetland Park, better reflects its "unique identity and sense of place". "The 220 000 ha wetland park has outgrown the name of St Lucia, linked to the town and lake of the same name. "The consolidated boundaries of the park now include a third of the length of the KwaZulu-Natal coastline, and destinations such as Kosi Bay, Lake Sibaya, Sodwana Bay, uMkhuze Game Reserve, False Bay, Fannies Island, Charters Creek, Lake St Lucia, Cape Vidal and Mapelane," the minister continued. "In addition, internationally the island of St Lucia in the Caribbean, with its newly-established World Heritage Site, has a strong market presence, which dilutes the brand value of our St Lucia Wetland Park."

Water on the Web

www.hydrogeologistswithoutborders.org
Hydrogeologists Without Borders was initiated by a group of Canadian Hydrogeologists in 2005. HWB is a group of hydrogeologists, water well technicians, groundwater specialists and groundwater organisations who share a concern about the high importance of ground-

water in developing countries. HWB places a particular emphasis on potable water supply to the most impoverished areas of the world and seeks to build hydrogeologic capacity to apply local solutions to the development, use, management and long-term protection of groundwater resources in developing countries.

Water by Numbers

- **240** – The number of reservoirs under Umgeni Water's jurisdiction.
- **R4,8-million** – Nelson Mandela Bay municipality's estimated annual savings through its water conservation programme. People in the community are trained as plumbers and sent out to poorer areas to repair leaking pipes and taps.
- **3** – The number of river systems of strategic importance to eThekweni Municipality that are still in a natural state. A total of 61 river systems were surveyed.
- **1 billion** – The estimated number of people who have received at least basic sanitation in the last 14 years, according to the United Nations. About 2,6 billion people are still without toilets, an estimated 980 million of them children.
- **R2-million** – The capital cost of the Kooberg project, which is supplying water to nine farms in the Vanrhynsdorp area, in the Western Cape, through four groundwater pumps, and a new 18 km-pipeline and associated 21 water tanks.
- **11 Ml** – The size of Rand Water's largest reservoir, Libanon. The water utility has a total of 47 reservoirs.
- **R284,8-million** – The total funds allocated to the Eastern Cape to eradicate the bucket system in the province, according to government news agency BuaNews. There are about 58 470 households in the province still using the bucket system.
- **500 l** – The average daily water consumption of a typical resident in California, US.
- **US\$23,1-million** – The earned revenues of the South African desalination plant market in 2006, according to global growth consulting firm Frost & Sullivan. This value is expected to more than triple by 2013 spurred on by increased demand due to expected future water shortages.
- **300 000** – The number of deaths linked to a number of causes most closely connected to shifting weather patterns by 2030, according to the World Health Organisation.

Water Diary

WATER QUALITY

AUGUST 13-17

The Unilever Centre for Environmental Water Quality is offering an introductory course in managing environmental water quality. Registration deadline: 24 July. *Enquiries: Tel (046) 622 2428; E-mail: course@iwr.ru.ac.za*

SUSTAINABLE DEVELOPMENT

AUGUST 15-17

Sustain, the water, energy, earth and air business-oriented exhibition will be held at the Sandton Convention Centre. *Visit: www.sustainex.co.za*

DRINKING WATER

AUGUST 19-22

DWAF, WISA and the WRC are hosting a Drinking Water Quality Conference at Sun City. *Enquiries: Taryn van Rooyen, Tel: (011) 463-5085; Fax: (011) 463-3265; E-mail: conference@soafrica.com*

BILLING & METERING

AUGUST 21-24

Billing & Metering World Africa will take place at the Sandton Convention Centre, Johannesburg. *Visit www.terrapinn.com/2007/bmwza*

RIVERS

SEPTEMBER 3-6

The 10th International River Symposium and Environmental Flows Conference will be held in Brisbane, Australia. This year's

symposium will focus on the emerging field of river management and environmental flows. *Enquiries: Lynette Maxwell, E-mail: lynette@riverfestival.com.au; Visit: www.riversymposium.com*

CLIMATE CHANGE

SEPTEMBER 3-6

The Third International Conference on Climate and Water will be held in Helsinki, Finland. Main themes include climate change and hydrological extremes, climate change and water resources; risk and risk management; adaptation to the impacts of climate change in the water sector; climate change mitigation and hydrology. *Enquiries: Esko Kuusisto (conference secretary); E-mail: esko.kuusisto@ymparisto.fi; Visit: www.ymparisto.fi/default.asp?contentid=169172&lan=en*

RIVERS

SEPTEMBER 3-6

The Tenth International River Symposium and International Conference on Environmental Flows will be held in Brisbane, Australia. *Enquiries: Emily Smigrod, River Symposium event coordinator; Tel: +61 (0)7 3034 8230; Fax: +61 (0)7 3846 7660; E-mail: Emily@riverfestival.com.au; Visit: www.riversymposium.com/index.php?page=Symposium2007*

HYDROLOGY

SEPTEMBER 6-7

The 13th SANCIAHS Symposium will be

held at Breakwater Lodge, in Cape Town. The theme for this year's symposium is "Hydrology and Water Resources: The Future is Not What It Used to Be." *Enquiries: Roxanna Cloete, Tel: (021) 481-2446; Fax: (021) 424-5588; E-mail: Roxanna.cloete@shands.co.za; Web: www.ru.ac.za/institutes/iwr/index/html*

WASTEWATER TREATMENT

SEPTEMBER 9-13

IWA's 10th Specialised Conference on Large Wastewater Treatment Plants will be held in Vienna, Austria. This conference aims to promote the exchange of experience and knowledge in wastewater treatment between designers, managers, operators and scientists on an international level. *Enquiries: austropa@interconvention.at*

GEOCHEMISTRY

SEPTEMBER 10-14

The 7th International Symposium on Applied Isotope Geochemistry will be held in Stellenbosch, Western Cape. *Enquiries: Dr Jodie Miller, Chair organising committee, Fax: (021) 808-3129; E-mail: aiq7@sun.ac.za; Web: www.sun.ac.za/geology/aiq7.htm*

DAMS

SEPTEMBER 17-19

The 14th German Dam Symposium will be held in Munich, Germany, in conjunction with the Seventh ICOLD Symposium.

E-mail: talsperre@conventus.de or Visit: www.conventus.de/talsperre

CT ups pump station power to help curb spills

The City of Cape Town will in future be using mobile and fixed power generation plants in collaboration with the city's electricity department to curb possible sewage overflows.

In a report to the Utility Services Portfolio Committee, the Directorate of Utility Services says there are 501 pump stations in the metropole. Of these, 376 are used to pump sewage while others are used to pump potable water to higher lying areas.

In the last year, at least 33 of the sewage

pump stations failed, mainly due to local power failures. "The City has considered installing standby generators at all sewage pump stations. However, this would come at an installation cost of R30-million," reported Clive Justus, Chair of the Utility Services Portfolio Committee. "As this would not guarantee perfect functionality, the City has now embarked on a strategy of using a combination of mobile and fixed generation plant."

All sewage pump stations are monitored

via a telemetry system which monitors which pumps are running, the availability of pumps, as well as pump trip conditions, including mains failure and power outages, wet well high level alarm, and intruder alarms in high-risk areas. These monitoring systems provide an early warning to rectify the situation before the pump station overflows. The average response times to alarms range from 30 to 60 minutes, which is in most cases ample time to prevent pump station overflows, the City said in a statement.

HELP – Linking hydrology with society’s needs

With the HELP Southern Symposium taking place in South Africa in November, it is prudent to reflect on the origin and purpose of the HELP initiative and touch on progress that has been made to date.

HELP (Hydrology for the Environment, Life and Policy) is a joint UNESCO/WMO programme which is designed to establish a global network of catchments to improve the links between hydrology and the needs of society. It is a cross-cutting programme of the UNESCO International Hydrological Programme, the key intergovernmental programme to advance water science.

In many international water fora, for example the Second World Water Forum in The Hague in 2000, there has been a growing call to advance processes of collaboration between science and technology in a field context and water policy and management. This finally led to the HELP Programme, designed to create a framework that enables water law and policy experts, water resources managers and water scientists to work more closely together on water-related problems and achieve scientific results that are more directly beneficial to the needs of society.

This is to be achieved in an integrated long-term programme with process hydrology undertaken at larger drainage basin scales than previously, so that it can be of more practical value to the resource management process. Importantly, the HELP design also recognised the inequality of opportunity between developed and developing countries, and therefore emphasises the technology transfer, education and capacity-building initiatives needed to allow the HELP objectives to be achieved throughout the world.

To date, some 70 HELP basins have been set up worldwide, with 14 of them in Africa. South Africa has two HELP basins, namely the Olifants

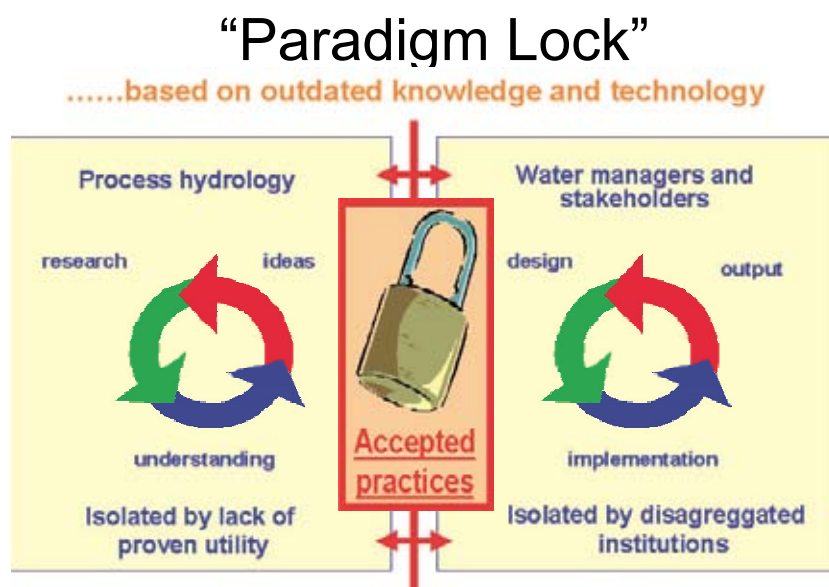
(draining into Mozambique) and the Thukela. These initiatives are being led by the International Water Management Institute (IWMI) and the University of KwaZulu-Natal respectively. A further HELP basin for the Berg River, coordinated by the University of the Western Cape, is under consideration. With the unique challenge provided by the National Water Act that water resources management should be devolved to 19 catchment management associations, it would seem desirable that each catchment and its management association should have an academic institution at its side, providing essential scientific support.

Given the need for science-led water resources management, the Department of Water Affairs and Forestry in 2005 took the strategic decision to strengthen its National Committee for the UNESCO-IHP. The Committee is now representative of the water sector as a whole and the Secretariat is provided by the Water Research Commission.

Some four hundred HELP basin representatives and water resources specialists from around the world will share their experiences and chart the way forward for this important initiative. A particular challenge for the Symposium organisers is how to not only make this an excellent once-off event, but an ongoing process for sharing and learning – a HELP related International Centre of Excellence maybe?

To encourage wide participation from roleplayers and particular students, the South African Committee has extended the Call for Posters on the Symposium Themes until 31 July 2007. Please submit your 1 page (150-300 words) to wbv@dwaf.gov.za

Should you be interested to attend this event, registration can be done via the Symposium website www.unescohelp.co.za which also contains greater detail on the poster requirements.



The 'Paradigm Lock' based on outdated knowledge and technology.

New phase as TCTA turns 20



TCTA, originally created to implement and oversee the South African side of the Lesotho Highlands Development Project, has turned 20.

The company, a Schedule 21 State-owned entity, later handled liability management of the project. In 2002, TCTA was appointed to fund and implement the Berg Water Project (BWP) near Franschhoek, in the Western Cape. Construction of the project started in July 2004 at an estimated cost of R1,6-billion. The project is funded through a combination of long-term committed facilities and a commercial paper programme to cater for short-term liquidity requirements.

In 2004, TCTA was further issued a directive by the Minister to implement and fund the Vaal Pipeline Project (VRESAP), a 121 km-long pipeline that abstracts water from the

Vaal Dam to Secunda to sustain economic growth and development in Mpumalanga.

Sasol and Eskom are the main beneficiaries of this R2,5-billion emergency project. The project is funded on a similar structure as the BWP.

"The occasion of our twentieth anniversary assures a new phase in TCTA's life," said Chair Malixole Gantsho. "We see ourselves as a key component of the future National Water Resources Infrastructure Agency, drawing on the reservoir of our experiences and playing a catalyst role in the responsibility of funding, financing, implementing, administering, further developing, altering, refurbishing, operating, maintaining and managing South Africa's national water resources infrastructure going forward."

Water on the Web

www.ewisa.co.za

E-WISA is the new business and information system of the Water Institute of Southern Africa (WISA), established to promote the Institute's vision of "building expertise, sharing knowledge and improving the quality of life for all South Africans." The main objective of the initiative is to promote capacity building through online and off-line learning programmes. The website offers information on various subjects, including water companies, water resources, potable water and capacity building.

<http://water.nml.uib.no/>

The Water Research Network database is a collaborative effort, run by the University of Bergen, in Norway, and sponsored by the Norwegian Research Council and the Dutch government. The database is a tool in the process of creating a multi-volume publication entitled *History of Water and Civilisation* initiated by UNESCO. The database is said to be useful for researchers and students from various disciplines dealing with the role of fresh water in history and development.

Anglo Coal aims for zero waste through new project

CSIR and Anglo Coal have signed a contract for the construction of a demonstration plant to recover products from waste gypsum.

The plant will reportedly make use of CSIR's patented GypSLiM process which produces sulphur, limestone and magnesite from the waste gypsum produced during the neutralisation of acid mine-water.

Anglo Coal, in partnership with BHP Billiton, is currently constructing the world's first plant to produce drinking water from acid mine drainage. Water from the plant, which will have an initial capacity of 20 Ml/day, will be supplied to the Emalahleni Local Municipality.

"Anglo Coal sees this (pilot project) as an exciting opportunity to solve the waste problem by converting a mining environmental liability into a sustainable asset," said Rian van der Merwe, Anglo Coal Head: Joint Ventures and New Business Development. He emphasised that even at the present 99% water recovery at the Emalahleni Water Reclamation Plant, the waste being produced over the next 20 years will cost R300-million to manage, while the coal mining house is aiming for zero waste disposal.

Chlorine gas plant planned for Coega

The Coega Industrial Development Zone has signed its tenth investor, Singaporean chlorine manufacturing and water desalination company Straits Chemicals.

The firm is reportedly investing R5,8-million in its Coega plant, which is expected to be constructed in two years' time. Once up and running, it is expected to turn out 600 t of chlorine a day for local and international markets. About 250 permanent jobs will be created by the new plant.

US fish show estrogenic activity

A new study from the US' University of Pittsburgh Cancer Institute's Centre for Environmental Oncology suggests that fish caught in Pittsburgh rivers contain substances that mimic the actions of estrogen, the female hormone.

The study also demonstrated that the chemicals extracted from the local fish can cause growth of estrogen-sensitive breast cancer cells cultured in the laboratory. Extracts of fish caught in areas heavily polluted by industrial and municipal wastes resulted in the greatest amount of cell growth. "We know that there are hundreds, even thousands, of chemicals in the environment that can have estrogenic activity," said Dr Patricia Eagon, a principal investigator of the study. "These chemicals usually come from industrial pollution, farm animals, farm chemicals and municipal water treatment plants. What surprised us most in this study was that these estrogenic materials are present in such easily detected levels in local fish."

The next step in this research is to identify the estrogenic chemicals and their sources in the local water and fish.

Aliens use 'resource conservation' as weapon

Biologists have long assumed that alien species pose less of a threat in resource-poor environments because they are less able to compete with indigenous plants, which have adapted to their habitats over thousands of years.

However, a new study, published in the April 26 issue of the journal *Nature*, has found that invasive alien plants can indeed flourish in low-resource environments by adopting efficient ways to use available resources. Jennifer Funk, a postdoctoral fellow in the Stanford Department of Biological Sciences explains that the researchers studied three ecosystems in Hawaii, a forested area with limited light, volcanic soils with low nutrients and a desert.

A total of 19 invaders were compared with 19 closely-related indigenous plants. "Invasive plants were more efficient on



short-time scales, but overall there is no difference in the long term," said Funk. "We were surprised that the invasive plants were not at a disadvantage under conditions where resources were scarce."

Bottled water pricey for environment

The present boom in the global water market could have detrimental effects on the environment, according to a new report by US organisation, the Worldwatch Institute. In parts of the world excessive withdrawal of natural mineral or spring water to produce bottled water has threatened local streams and groundwater, while the product consumes significant amounts of energy in production and shipping.

Millions of tons of oil-derived plastics, mostly polyethylene terephthalate (PET), are used to make the water bottles, most of which are not recycled. Each year, about two million tons of PET bottles end up in landfills in the



US alone, according to the report.

"Bottled water might be an industry winner, but it's an environmental loser," said Ling Li, a fellow with the Institute's China Programme who authored the report. "The beverage industry benefits the most from our bottled water obsession. But this does nothing for the staggering number of the world's poor who see safe drinking water as at best a luxury, and at worst, an unattainable goal." Consumers in industrial countries choose to drink bottled water for taste and convenience, while in developing countries, unreliable and unsafe municipal water supplies have driven the growth in consumption. Yet many poorer people who seek improved drinking water supplies cannot afford the bottled version. Bottled water can be between 240 and 10 000 times more expensive than tap water. Global consumption of bottled water more than doubled between 1997 and 2005, securing the product's place as the world's fastest-growing commercial beverage. The US remains the largest consumer of bottled water, but among the top ten countries, India has nearly tripled its consumption, while China more than doubled its consumption between 2000 and 2005.

Premature babies caused by pesticides in water

The growing premature birth rate in the US appears to be strongly associated with increased use of pesticides and nitrates, according to work conducted by the Indiana School of Medicine.

According to Prof Paul Winchester, his team's research found that preterm birth rates peaked when pesticides and nitrates measurements in surface water were highest (April-July) and were lowest when nitrates and pesticides were lowest (August to September). More than 27 million US live births were studied.

"A growing body of evidence suggests that the consequence of prenatal exposure to pesticides and nitrates as well as to other environmental contaminants is detrimental to many outcomes of pregnancy. As a neonatologist, I am seeing a growing number of birth defects, and preterm births, and I think we need to face up to environmental causes," said Dr Winchester.

Helping Municipalities Manage their Natural Riches

A new publication aimed at assisting municipalities in managing estuaries and their catchments has been published by the Water Research Commission (WRC).

The publication, *Estuaries & Integrated Development Planning: A Manager's Guide*, was prepared for the WRC and the Tony & Lisette Lewis Foundation by the Centre for Environment, Agriculture & Development at the University of KwaZulu-Natal (UKZN). According to editor Duncan Hay, it is hoped that the publication will assist in the improved management of the country's estuaries.

Estuaries are considered some of the richest natural resources in the world due to the goods and services they provide. In South Africa, estuaries are not only valued for their aesthetic beauty, which attracts tourists and investors from all over the world, but also as sources of food and income to the poor.

In Mngazana, for example, local community members harvest mangroves for building material. These mangroves also form the nursery habitat for fish caught by subsistence and recreational fishermen, are the focal interest of commercial canoe trails and contain a honey production business. The economic value of these mangroves to local communities is estimated at around R3,4-million a year.

Development in South Africa's coastal areas, at and around estuaries, and in their catchments, has increased dramatically in the last few years. With this is an increased demand for the goods and services that estuaries supply. Different forms of development compete with each other for what an estuary can provide and, in some instances this



The view of the Knysna estuary increases property values by up to R2-billion.

Courtesy of SA Tourism

estuary; how to support the establishment of sustainable businesses at estuaries; how to optimise the benefits and reduce the impacts of estuaries; as well as where to find more information.

"Municipalities are development orientated. They are trying to correct the disparities of the past, trying to increase income-earning opportunities for residents and to increase the income for

competition compromises the value of the estuary system.

According to the authors decisions have to be made about who gets what. "This requires active management. Estuaries are not privately owned, they are public resources. So, management is complex, and requires cooperation between residents, interest groups, government and the private sector."

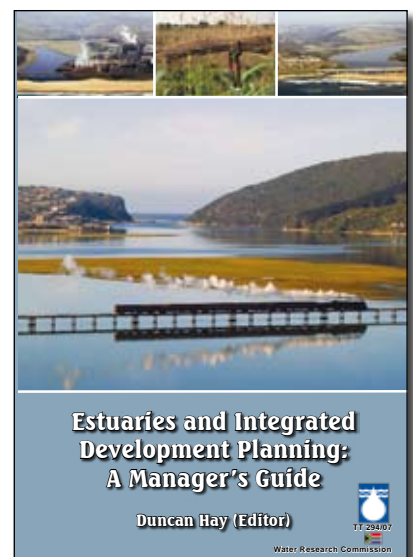
Due to the relatively small size of the majority of South Africa's estuaries (less than 100 ha), all or part of an estuary is likely to fall entirely within a local or district municipality. These municipalities, through their integrated development planning (IDP) processes are then responsible for leading managing developmental activities within their area of authority.

At present estuaries hardly feature in municipality IDPs as a scan of IDPs in the Eastern Cape, where over half of South Africa's estuaries are located, shows. Estuary management is generally not considered and not budgeted for, despite being valuable municipal assets.

The new publication hopes to change this by assisting municipalities to engage in more effective estuary management. It describes the value of estuaries; how estuaries function; the potential impacts on the functioning of an

themselves, so that there will be sustained delivery of infrastructure and services," say the authors. "Estuaries provide numerous opportunities to do this, and development should be encouraged. If we are unable to obtain tangible economic benefits from a system, what is the incentive for its management? However, we must go about obtaining these economic benefits carefully."

- To order the publication (WRC Report No **TT 294/07**), contact Publications at Tel: (012) 330-0340; Fax: (012) 331-2565; or E-mail: orders@wrc.org.za



Valuing Estuaries Helps Student Win Award

How does one calculate the economic value of the loss of services rendered by estuaries as a result of reductions in freshwater inflow? University of Port Elizabeth (UPE) Masters graduate George Dimopoulos earned himself the Founders Medal from the Economic Society (ESSA) of South Africa in an attempt to answer this question. Lani van Vuuren reports.



Prof Stephen Hosking, Head of the Department of Economics at the University of Port Elizabeth, Founders Medal winner George Dimopoulos and Dr Gerhard Backeberg, Water Research Commission Director: Water Utilisation in Agriculture.

There are just over 250 functioning estuaries in South Africa. Of these, a growing number are subject to river inflow deprivation due to an increased demand for water upstream. As a result, the services rendered by these estuaries are eroded.

It is important for decision makers to be able to weigh the economic benefits from upstream activities against the loss of estuarine services, especially when decisions regarding water abstraction needs to be made. To date, this has proven a challenging process.

For his Masters Degree, Dimopoulos, who studied at the Department of Economics at UPE, researched the valuation of freshwater inflows into selected estuaries in South Africa using the contingent valuation method (CVM). CVM is a method gaining popularity to value public goods and especially those yielding services to passive users (such as environmental resources).

His research focused on the Knysna, Klein & Groot Brak estuaries and formed part of a larger project funded by the Water Research Commission. According to Head of the Department of Economics, Prof Stephen Hosking, Dimopoulos broke new ground in the generation of values of river water through the application of CVM. "Historically, the allocation of river water in South Africa has been guided mainly by considerations of cost factors, but the impact of this and related work is set to change this practice."

"(Dimopoulos') dissertation places environmental demand into river water allocation equation in South Africa," Prof Hosking continued. "The problem of reduced inflows into South Africa's estuaries is succinctly outlined, the method of CVM clearly explained and applied, and sensible conclusions are drawn on the basis of this analysis."

This was also recognised by the ESSA, who awarded Dimopoulos the Founders Medal. As Prof Hendrik

Lloyd of ESSA pointed out, the purpose of the medal, awarded once a year, is to encourage research in the field of economics in South Africa and to recognise economic research of outstanding quality conducted at a South African university.

"Dimopoulos' dissertation showed innovation in the application of economics techniques," said Prof Lloyd. This is the first time a student from UPE's Department of Economics has been awarded the Founders Medal.

According to Dimopoulos he was drawn to the research after witnessing the degradation of the Knysna estuary, where he grew up. "The same development and commercial activities benefiting from the beauty of the estuary are now causing its demise," he told *the Water Wheel*. "By putting a Rands and Cents value to the services rendered by environmental resources, such as estuaries, we are able to ensure that the environment is viewed as a legitimate user of water, especially in the eyes of decision makers."



Joining Hands to Manage SA's Water Resources

After many years in the making, South Africa launched its first catchment management agency (CMA) for the Inkomati River water management area last year. This year, the Department of Water Affairs & Forestry (DWA) plans to establish several more agencies, including the Usutu to Mhlatuze and Thukela CMAs in KwaZulu-Natal, the Gouritz and Breede CMAs in the Western Cape, and the Olifants CMA in Mpumalanga/Limpopo. Lani van Vuuren investigates the opportunities and challenges of this move to decentralise decision making to manage South Africa's water resources for the benefit of all.

Why CMAs? Internationally, there is an increased move towards the integrated management of all water resources at regional or catchment level, involving all roleplayers in the decision-making process, explains water law expert Hubert Thompson. "DWAF should be the custodian of the water resources with the mandate to ensure that the water resources are protected, used, developed, conserved, managed and controlled in a socially equitable and economically beneficial and sustainable manner in the long term for the benefit of all people in South Africa."

"The main functions associated with this are the developing of policy, facilitating the implementation thereof and overseeing the activities of all water resource management institutions. Other water resource management functions, such as monitoring and regulating the use of the water resources, need to be assigned or delegated to other institutions."

"The intention is for water resources management, among others, to meet the basic human needs of present and future generations; promote equitable access to water; redress the results of past racial and gender discrimination and facilitate social and economic development,"

Thompson tells *the Water Wheel*. "The CMA is a mechanism to unite opposing opinions towards this integrated management of our country's water resources."

The National Water Act makes provision for the phased establishment of CMAs covering all 19 water management areas in South Africa to fulfil the monitoring and regulating water resources management functions currently performed by DWAF. This does not necessarily mean that there will be 19 CMAs. As the phasing in of CMAs progresses, it might be necessary to redefine the different water management areas, Thompson points out. "It is important to realise that this is an evolutionary process, unique in the world, and we are learning as we go along."

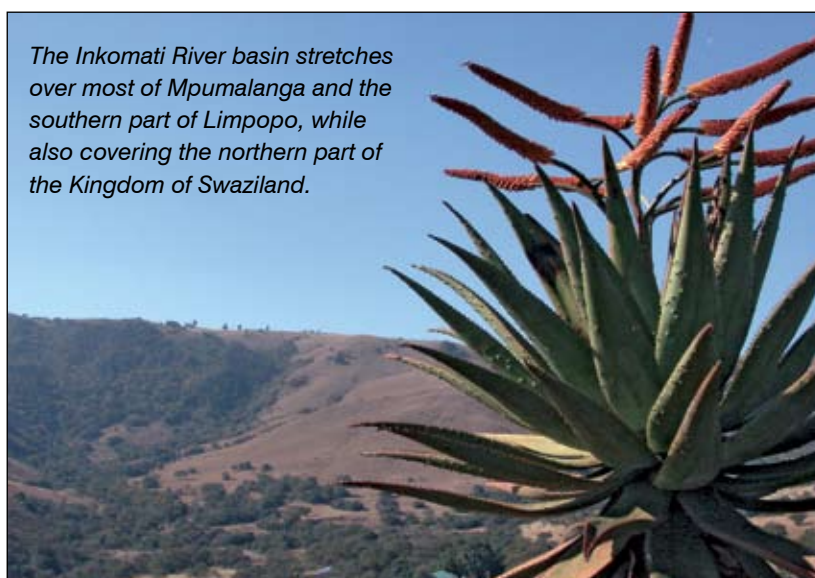
Broadly, the initial role of a CMA is investigate and advise interested persons on the managing of the water resources in the water management area, coordinate the functions of other institutions involved in water-related matters (such as local government institutions and water user associations), and to involve local communities in the management of the water resources. Every CMA must establish a catchment management strategy (CMS) that



"We are all children of the same river," believes Sizile Ndlovu, CEO of the Inkomati CMA.



The Nkomati is an international river, originating in South Africa (near Carolina), flowing partly through Swaziland and transversing Mozambique.

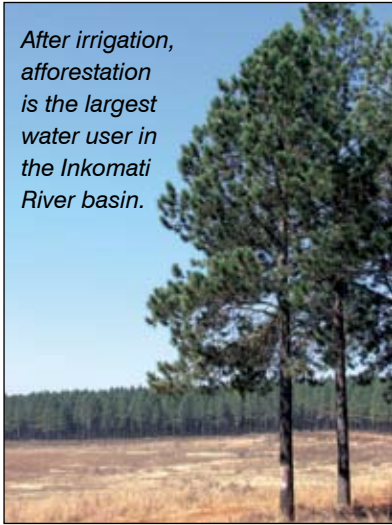


The Inkomati River basin stretches over most of Mpumalanga and the southern part of Limpopo, while also covering the northern part of the Kingdom of Swaziland.

sets out the framework for managing water resources within that specific area and the principles for allocating water to existing and prospective water users.

The strategy must also set out the water management institutions to be established in the area, and guide these institutions in performing their functions. The CMS will have to align with key programmes of government, particularly in support of job creation,

After irrigation, afforestation is the largest water user in the Inkomati River basin.



poverty eradication and sustainable social and economic development.

Depending on the size and capacity of a CMA, other powers and duties may be assigned or delegated to it by the Minister. This may include general management of water resources in the water management area, developing policy and strategy, supporting other institutions, regulating and authorising the use of water, implementing water resources infrastructure, managing information and auditing water resources management.

“One must realise that despite some of these duties being delegated to the CMA, the Minister, as the custodian of South Africa’s water resources, will ultimately remain responsible for the management of the nation’s water. Therefore, the relationship between DWAF and the CMA will inevitably be a close one, with the department monitoring whether the CMA is carrying out its functions effectively,” says Thompson. The structure of a CMA to be established will depend on factors such as water resource challenges and priorities, demographics, type of water use and water-related capacity in the water management area.

Is a CMA just another regional DWAF department? Certainly not, says Eustathia Bofilatos, Director of WMIG

at DWAF. “While a CMA is an organ of state it is not part of the three spheres of government. Rather than being extensions of the department, CMAs are legal entities with their own identity.” Thompson adds that the functions of DWAF and CMAs are also different. DWAF is the custodian of South Africa’s water resources, while the CMA will be regulators regulating the use of water.

A CMA is managed by a governing board, appointed by the Minister, and representative of roleplayers in the water management area. A CMA will appoint the necessary staff to carry out its tasks and some members of staff of regional DWAF offices may be transferred to the CMA.

CMAS AND MUNICIPALITIES

Bofilatos emphasises the importance of the relationship between CMAs and the water users or stakeholders in the catchment, especially municipalities. “It is critical that municipalities prioritise interaction with CMAs, as a number of their functions will be dependent on relations with them, particularly the water services function.”

“CMAs have no function in the provision of water services, but they can be a means to effective provision of this service by local government,” Bofilatos continues. “Municipalities need to align their infrastructure development plans (IDPs) and water sector development plans with the catchment management strategy.”

In the areas where the CMA process has been initiated, water users have generally welcomed the prospect of participating in water resources management decisions. However, effective awareness and education strategies around what water resources management entails, and the responsibility this places on all water users, are crucial.

WHAT IS IWRM?

Integrated water resources management is an accepted and practiced international principle to manage water, land and related resources to maximise resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.

Ma Tshepo Khumbane is the founder of the Water for Food Movement, an organisation that assists communities to stave off hunger by harnessing rainwater and growing food productively. She has actively participated in the consultation process of the Olifants CMA. “Local communities are invited to attend stakeholder meetings. People come and listen, then go home and forget, because they do not understand what water resources management is and what role they are to play in it.”

“Communities need to be empowered through education and awareness. They need to realise that they have just as much say as traditionally powerful stakeholders, such as industries and commercial farmers. Awareness campaigns can also make them realise the potential benefits of the establishment of a CMA, such as the reallocation of water to emerging farmers,” notes Khumbane.

CATCHMENT MANAGEMENT IN THE INKOMATI

Leading the way is the Inkomati CMA, officially launched in November last year. The CMA has become the key water resources management body within a highly contested institutional environment. Local and provincial government, traditional leaders, water user associations, international water bodies, sector representative bodies, non-governmental organisations and other interest groups all want to influence, cooperate and/or dictate



Irrigated agriculture is the mainstay of the economy of the Inkomati River basin.

the way in which water resources are managed within the catchment.

The Nkomati River basin comprises three major catchments, the Komati, Crocodile and the Sabie-Sand, as well as two smaller catchments, the Nwaswitsontso and the Nwanedzi (the latter two rivers fall entirely within the Kruger National Park). All the rivers in the water management area flow into the Nkomati, a transboundary river, which crosses Swaziland and traverses Mozambique, entering the Indian Ocean near Marracuene.

There are many competitive water users within the basin, and demand already outstrips supply. At present, commercial agriculture, including crops such as sugarcane, citrus and sub-tropical fruits, is the main water user in the catchment, followed by forestry. Eskom also abstracts more than 100 million m³ of water a year from the Nkomati River basin for its power stations on the Highveld.

In addition to these competitive water uses, ecological water needs to be released as a non-consumptive base-flow for the maintenance of riverine and aquatic ecosystems in all three main sub-catchments of the Nkomati River basin. South Africa also needs to meet its international obligations in ensuring that Mozambique receives its fair share of the water.

While domestic consumption only constitutes a small percentage of water

use in the basin, this is likely to change in future. Several thousand households, especially those living in former homeland areas still do not have access to safe water and sanitation, requiring urgent intervention. In addition, previously disadvantaged farmers do not represent a significant proportion of irrigated agriculture in the basin. The re-allocation of water to especially emerging farmers and households for productive purposes is thus seen as an important task for the near future.

“We need to make certain that those who were never able to take part in the decision making process now have a voice.”

As the mediator between all of these stakeholders, the Inkomati CMA has a crucial role to play in promoting a culture of dialogue among water users to ensure that water resources within the basin are shared sustainably and equitably. “It is extremely important that the agency is not seen to be taking sides,” reports CEO Sizile Ndlovu. “The agency must understand the needs of the people and balance expectations realistically.”

Building a relationship with all stakeholders has been an essential part of this process. Separate meetings are held regularly with different water users, such as the nine provincial and local authorities, commercial farming


groups, the Kruger National Park and tribal authorities. The CMA has also initiated outreach programmes targeting rural poor, emerging farmers as well as women and the youth. The main aim of these programmes is to raise awareness about the existence of the agency, as well as to institutionalise the idea of collective water resources management. “We need to make certain that those who were never able to take part in the decision making process now have a voice,” explains Ndlovu.

A process of verifying and validating existing use has been initiated as part of the compulsory licensing process. The CMA is also busy updating hydrology data to enable the assessment of water availability.

At a strategic level, the agency has started developing its catchment management strategy. It is proving a cumbersome process as all local government IDPs, the provincial growth and development plans, and the plans of national departments need to be reflected in the strategy.

Ndlovu believes that CMAs are the best way to ensure the sustainable development of South Africa’s water resources for the benefit of all. “By engaging with stakeholders at a local level, CMAs can really get to grips with the needs and opportunities within a catchment, something which is very difficult to achieve within a national department.”

His vision for the Inkomati CMA is to become an institution for the people. “Water resources management is not about engineering and science, it is about people, and their relationship with one another and with the resource on which they depend.”

“The ideal situation is a catchment where all the water users appreciate the resource and realise the importance of taking care of the resource collectively. In Inkomati, we are all children of the same river.” 



The importance of access to safe water and sanitation for the efficient caregiving of those suffering from HIV/Aids was highlighted during a recently completed research project. Lani van Vuuren reports.

The project was initiated by the World Health Organisation (WHO) and entailed a series of short-term assessments in resource poor urban and rural communities in several countries to determine how the quality of home-based care is influenced by the type and adequacy of water, sanitation and hygiene arrangements. In South Africa, the Water Research Commission managed the project on behalf of WHO while providing additional funding for research.

"Water, sanitation and hygiene are essential underpinnings to home-care strategies, particularly in relation to HIV/Aids, however, this is poorly

recognised by either the health sector or the water and sanitation sector," WHO said in a statement. "The overall goal (of this project) was to produce evidence-based guidance on water and sanitation needs in home-based care strategies, particularly in resource-poor situations."

WATER AND AIDS

The spread of HIV/Aids in sub-Saharan Africa is taking place at an alarming rate. It is reported that 70% of all adults and children infected with the virus live on the sub-continent. HIV/Aids typically strikes adults in the prime of their lives when these people are most economically active.

Since HIV/Aids is not a waterborne disease, water and Aids seem to bear very little relation to each other. However, closer scrutiny reveals that there are significant linkages between Aids and water, reports Dr Natasha Potgieter of the University of Venda, who undertook the South African-based assessment of the WHO project.

"The provision of safe water to HIV positive and Aids individuals is paramount as they live with compromised immune systems and are therefore more susceptible to waterborne diseases," she tells *the Water Wheel*. In many areas where HIV/Aids infected people do not have access to antiretroviral treatment, safe drinking water

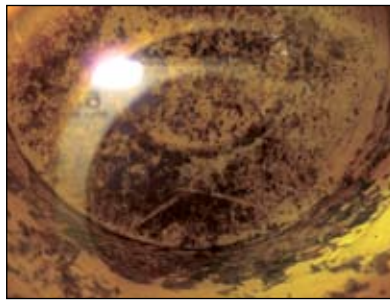
helps them to avoid some opportunistic infections and diarrhoea.

The majority of HIV/Aids patients are cared for within their local communities. Water is needed for bathing, washing soiled linen and clothing, keeping the home environment clean, taking medicine and preparing food. In these instances it is important that water supply points and toilets are accessible and close to where they are needed to reduce the burden of a long walk and to maintain the dignity of the patients.

THE ASSESSMENT

Research was conducted in peri-urban and rural communities in Limpopo, the Eastern Cape and Mpumalanga over an eight-month period. Dr Potgieter points out that, since HIV/Aids remains an unmentionable topic to many South Africans, it was important that the research be done in an atmosphere of trust. Information was mainly gathered through home-based care groups already working in the selected communities. Confidentiality was a crucial aspect of the research as many HIV/Aids sufferers did not want their status disclosed to friends or relatives.

In general, the prevalence of HIV/Aids infected individuals in these communities was relatively high. Most people



Water is often stored in unhygienic conditions.

“The provision of safe water to HIV positive and Aids individuals is paramount as they live with compromised immune systems and are therefore more susceptible to waterborne diseases.”

in the study areas lived below the breadline of R1 200 a month. Many of the households relied solely on government social grants (including pensions, disability grants and child support grants). This placed many people in compromising positions to earn extra income; for example, many women were forced into prostitution thereby leading to the further spreading of HIV/Aids.

Most of the areas studied were serviced with safe water in some form or another. However, it was found that households did not always have easy access to these water sources, nor was the water always available to them. It is most likely that this had an effect on the quantity of water that individuals brought into the household – none of these areas surveyed brought in the minimum baseline of 25 ℓ per person per day.

Collecting water when the municipal supply (i.e. piped water, boreholes) was not available was challenging. This meant water collectors had to walk through bushes and uneven terrain to get to remote and often unsafe sources, such as rivers and springs. This was an exhausting task for people living with HIV/Aids. Not only were these areas far removed from the household, they were also dangerous – the sources were often in secluded areas increasing the danger of



The majority of toilet structures assessed were sub-standard, unsafe or structurally dangerous.



In many cases the toilet structures assessed bore ample opportunity to cause or transmit disease.

women being attacked. Dr Potgieter reports that those households whose only alternative water source was the next village's standpipes had to walk between two and five kilometres there and back again.

“Elements such as dung-smearred floors, root of fires in the huts, the presence of insects and unhygienic households practices compromised the safety of the water stored.”

The average household brought in only 14 ℓ to 16 ℓ per person per day. This water had to be used for hand washing, bathing patients, cleaning wounds, taking medication, cleaning the dwelling, laundry, cooking and preparing food. Dr Potgieter notes that apart from the fact that households brought in very little water for personal use, they also created opportunities for the water to become contaminated during storage at home. “People did not always take precautions to treat and protect their water. Elements such as dung-smearred floors, root of fires in the huts, the presence of insects and unhygienic households practices compromised the safety of the stored water.”

SANITATION AND HYGIENE

The assessment found that although most of the households did have some kind of toilet infrastructure, the majority were sub-standard, unsafe or structurally dangerous and, in many cases, these toilet structures bore ample opportunity to cause or transmit disease. In addition, most of the ventilated improved pit toilets were not constructed according to acceptable standards.

Caregivers found it difficult to assist patients to use the toilets because they were often small, narrow structures. In addition, the distance from the dwelling made it difficult for patients to access.

Dr Potgieter reports that an attitude of apathy towards sanitation reigned in most of the communities surveyed. “Many people felt that their toilets were not worth cleaning, and said they would only clean those toilets provided by government. Ironically, it was found that the State RDP toilets were not cleaned either.” The households in all the areas surveyed were more likely to wash their hands after they had used the toilet and before eating their meals than any other time.

CONCLUSIONS AND RECOMMENDATIONS

The assessment underlined the importance for people living with HIV/Aids and their caregivers of having reliable access to safe water supply. When leakages and breakages leave communal taps useless, people are forced to return to unsafe water supplies exposing them to all kinds of health risks.

“Those that did not have alternative water sources were forced to go without and/or resort to store water for long periods of time. This meant that they could not drink enough water to stay hydrated, drink their medication, prepare food or keep themselves and their environment

FACTS & FIGURES



According to the Human Sciences Research Council (HSRC), there were 571 000 new HIV infections in South Africa in 2005. This translates into roughly 1 500 new infections per day. Of all new HIV infections, 34% occurred in young people in the 15-24 age group. The incidence rates among young women in the prime childbearing age are especially alarming. The HIV incidence in the age group 20-29 is 5,6%, six times more than in males of the same age. Among young people in the 15-29 age group, women account for 90% of all recent HIV infections.

People living in informal urban settlements have by far the highest incidence rates, followed by those living in rural informal areas, rural formal areas, and urban formal areas. The HSRC reports that this indicates that poverty plays a significant role in increasing vulnerability to HIV.

To access the HSRC report, *National HIV Incidence Measures – New Insights Into the South African Epidemic*, go to <http://www.hsrc.ac.za/Document-2067.phtml>

clean. This further increased the health risk due to the unavailability of water,” notes Dr Potgieter.

While it is recognised that local governments are making progress in the provision of basic water and sanitation services, the effectiveness of present systems provided should also be considered. Improved water systems and an increased number of water supply points are recommended to alleviate this problem.

In addition, sanitation remains a challenge. In all the areas studied access to safe sanitation was extremely poor. Many households had sub-standard toilets or no toilets

at all. Full and overflowing toilets exposed people to various diseases while inadequate substructures were in danger of collapsing in the rain. It is clear that sanitation requires more attention, and that those who receive no service at all should receive first priority.

Sharing correct information is also crucial. For example, it was found that in the areas where people received groundwater they were under the impression that the water was treated (this was not the case). Therefore they believed they themselves did not have to treat this water. This information is important, especially when water is stored for indefinite periods. Hygiene education in these communities is also imperative.


It is hoped that the results of this assessment will assist decision-makers, HIV/Aids programme



Water, sanitation and hygiene are essential underpinnings to home-care strategies.

managers and donors to improve the lives of people living with the disease.

Dr Potgieter is also the project leader for a follow-up study on the adequacy and quality of water, sanitation and hygiene

practices for the efficient caregiving of those suffering from HIV/Aids over the next two years in all provinces of South Africa. This project is being funded by the Department of Health, Medical Research Council and the WRC. 

Looking for a Workhorse?

Denorco's range of hard working Mono progressing cavity pumps is versatile, reliable and efficient. Ideal for demanding applications in mining, industry and agriculture, the Mono range is the benchmark for pumping solutions in Southern Africa.

- Mono HD – horizontal discharge transfer pumps
- Mono BP – positive displacement lineshaft borehole pumps
- Mono Industrial Pumps
- Mono Hand Pumps

For trusted brands, excellent service and advice, contact us for an engineered pumping solution.



13 Engwena Road, Sebenza, Edenvale, 1610, South Africa Tel: +27 11 609-4150
Customer Care: +27 11 723-6617 info@denorco.com www.denorco.com

Branches: Bloemfontein: +27 51 434-1565, Cape Town: +27 21 949-5458, Durban: +27 31 700-4160,
Depot - Port Elizabeth: +27 41 487-2866, Export Division: +27 11 609-4150

Orbit Pumps Botswana (Pty) Ltd: +267 397-4926

Keep Rivers Flowing Free, Group Urges

A group of international experts from leading conservation organisations have advocated urgent action and approaches to water management to combat the alarming decline of freshwater species and correct mistakes of the past.

The Skukuza Statement: Keeping Our Rivers, Lakes & Freshwater Wetlands Alive – a Call for Action, states that the diversity of freshwater species is declining more rapidly than those in terrestrial or marine environments. The Skukuza Freshwater Group is

made up of freshwater biologists and other experts from South African National Parks (SANParks), CSIR, the Nature Conservancy, WWF, and various independent academics from Australia, the US and South Africa. It is named after a symposium held in October 2006 in Skukuza, in the Kruger National Park, to discuss the potential for improved protection of freshwater ecosystems (See, Helping Rivers Fight for their Lives, *Water Wheel* January/February 2007).

Freshwater ecosystems present a special challenge in meeting globally-agreed targets for protection of biological diversity. For example, the World Conservation Union World Parks Congress in 1992 recommended that at least 10% of each biome (type of habitat) should be included in a legally-protected area.

This percentage is expressed as the land surface under protection, and does not account for the connectivity, flows or protection of essential catchments that each affects freshwater biodiversity. According to the Skukuza Freshwater Group, for this reason many freshwater ecosystems have been 'substantially failed' by the weaknesses in design and management of many networks of parks and protected areas because they are focused mainly on terrestrial conservation and ignore the parts of the freshwater systems that lie outside park borders.

"Healthy freshwater species and the water needs of people are inextricably linked, and the future of both is at stake. More than three billion people collectively lack adequate drinking water and/or sanitation services and freshwater life has declined 50% since the 1970s," noted Carmen Revenga, senior freshwater scientist at The Nature Conservancy. "It is imperative that we find ways globally to manage water for people and nature and address threats to ensure that these valuable resources are protected now and for future generations."


The variety of species within rivers, lakes and wetlands will depend on factors as diverse as the quality of sediment and nutrients, water temperature, the timing of annual floods and the variety of habitats used by organisms at different times of the year, such as the main river, floodplain wetlands, lakes and headwater streams. Changes to any of these features can have severe

consequences for freshwater life, yet they are usually brought about by activities beyond the boundaries of protected areas.

The Group made a number of recommendations to improve freshwater protection, including new guidance to help protected area managers to better target freshwater areas in parks and protected areas as well as participate in management decisions of rivers outside park borders. Another proposal is an integrated approach to manage water that balances protection of key species and habitats, with conservation ecosystem functions that deliver services to people, particularly the poor whose livelihoods depend on freshwater ecosystems.

According to the Group, recognising their limitations, protected areas offer opportunities for safeguarding freshwater biodiversity at a local scale. Within their areas of management, they can prevent over-harvesting of freshwater species, direct habitat destruction, riparian vegetation removal, and negative impacts from a variety of land uses.

The Skukuza Freshwater Group is also working towards developing criteria to help governments protect the world's declining number of free-flowing rivers, i.e. those free from dams and significant levels of water extraction, as important assets in the protecting of global biodiversity. The WWF has estimated that of the world's 177 large rivers, only a third remain free from significant barriers to their flow, such as dams.

By registering their free-flowing rivers, it is maintained governments can bring together a global network that recognises their collective importance to maintaining the variety of life on earth. This should not detract from measures to improve the condition of river basins that have already undergone significant changes. 

MANAGING WATER BEYOND THE FENCE

The Skukuza Group studied a number of examples of freshwater ecosystems, including those found within the Kruger National Park.

The reserve lies in the middle of five major river systems flowing from heavily polluted areas upstream across the international border with Mozambique to the east. The upstream headwaters of all its rivers lie well outside the park – in the case of the Olifants, for example, just 100 km of its 840 km length and 8% of its catchment area are contained within the Kruger National Park.

Faced with deteriorating quality and quantity of water flows, the park has attempted to improve freshwater biodiversity in recent years by actively engaging in discussions about water resource use in the upstream catchments. In addition, it has applied new management processes within the park to identify and act upon signs of trouble for its river life.

Among the concrete achievements of this engagement has been the release of additional water from dams to maintain flows during severe droughts, and the development of management plans to prevent highly damaging surges of sediment associated with the flushing out of upstream reservoirs. While the complete drying out of rivers has not been entirely eliminated, occurrences have been reduced.

"Ecological processes have very tangible impacts that can make or break a river system. Stemming freshwater decline entails managing demands and water allocation for uses from agriculture to industrial and urban use, protecting rivers and wetlands that support aquatic species, and reducing land-based pressures, such as pollution and deforestation," said Dr Harry Biggs of SANParks' Programme for Adaptive Biodiversity Outcomes.

Protecting



What's Underneath the Tap

Protecting groundwater resources, especially those used for domestic purposes, remains a challenge in South Africa. Harrison Pienaar and Yongxin Xu explore the fundamental principles and challenges of groundwater protection while proposing a framework model for undertaking groundwater source and aquifer protection zoning in South Africa.

Today, almost 60% of the country's rural communities are directly dependent on underground resources. This figure is set to rise as more effort is being put into ensuring all citizens' access to basic water supply.

At the same time groundwater resources must be protected. Pollution of groundwater resources can affect both groundwater and

surface water quality in streams fed by baseflow. Remediation of polluted aquifers is expensive and technically difficult. Groundwater moves slowly so the impact of human activities can potentially last a long time.

However, there is currently no policy in South Africa that directly addresses the protection of groundwater used for drinking water. Groundwater protection is addressed to a limited extent through resource directed measures (RDM), however, although often on an *ad hoc* basis.

As protection of all aquifers is considered impossible in South Africa, a differentiated protection policy, where priority is given to important and vulnerable aquifers, has been proposed as the optimum solution.

The groundwater component of the Reserve is the part of the groundwater resource that sustains basic human needs and aquatic ecosystems. Since groundwater is far more widespread geographically than surface water resources, that component of the geohydrological system which sustains the Reserve is only a part of the greater system considered on RDM for groundwater.

Groundwater can only be allocated to users once the volume of groundwater that contributes to sustaining the Reserve has been quantified and the resource quality objectives (RQOs) have been met. RQOs can be based on both the Reserve and the classification of water resources (which delineates resources as Protected, Good, Fair or Severely Modified). These four classes imply different levels of protection and impacts to stakeholders of the resource. Figure 1 summarises the RDM for groundwater protection.

GROUNDWATER AND SERVICE DELIVERY – THE DELMAS CASE

The Delmas community, in Mpumalanga, is supplied with treated water from underground water resources (a dolomitic aquifer). The water is abstracted from a number of boreholes, chlorinated and reticulated.

While residents living within the formalised stands of Botlegeng have access to reticulated water and waterborne sanitation, those living in informal dwellings surrounding the area get their water from standpipes. These residents are also still dependent on the bucket system.

On average, the local municipality empties the buckets twice a week. If a household requires the bucket to be emptied between visits from the municipality, they have to do it themselves. This is most often done by excavating a small hole in the ground behind the dwelling at a point adjacent to a low lying marshy flood plain area.

It has been reported that the converted skip, used to collect the waste, requires repair work, and that no disinfection takes place when the buckets are emptied. Residents have also voiced their concern over the fact that emptied buckets are merely thrown outside the houses. The waterborne sanitation system of the town is serviced by two wastewater treatment works (Delmas and Botlegeng); sewage pumps stations and septic tanks in some villages.

TYPHOID OUTBREAK

On 5 September 2005, a typhoid outbreak was confirmed in Delmas resulting in five reported deaths and the hospitalisation of 17 others. An increased number of diarrhoeal cases were also reported. Various steps were taken immediately to ensure a safe water supply to people, to find the possible source of infection and to promote improved health and hygiene practices in the communities.

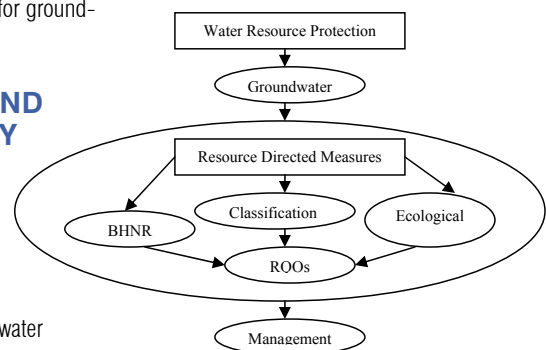


Figure 1: RDM for groundwater protection.

A Joint Operation Committee was formed, including representatives of the municipality and national and provincial sector departments (such as Health and Social Services, Local Government and Housing, Water Affairs & Forestry, and Agriculture). This committee met regularly and coordinated efforts to curtail the outbreak.

Investigations found untreated water from one borehole to be polluted by faecal pollution. In addition, the use of a novel rapid, highly specific molecular analytical technique indicated the possible presence of *Salmonella typhi* in untreated water from one borehole and adenovirus from another borehole.

LESSONS LEARNT

1. DWAF as sector leader

The events at Delmas have emphasised the importance of DWAF's role as regulator, the need for support for municipalities to implement water resource protection, and the urgency around fully fledged implementation of the department's new functions.

Water resource management is often viewed as a much lower priority at municipal levels as it is often superseded by those priorities concerned with basic services provision despite the inextricable links between these two processes. A perception exists that water resource management is the key function of DWAF and catchment management agencies (CMAs) only. This has resulted in a lack of integrated planning from local authorities, with integrated development plans focusing only on the provision of basic water and sanitation services. Addressing this gap should receive priority especially as DWAF is preparing to hand over more of its traditional implementation functions.

While the existence of an Intergovernmental Relations Framework Bill enables DWAF as regulator and sector leader to execute its mandate at all levels of government, a lack of skilled resources at local government level cannot go unnoticed. A more vigorous bottom-up capacity building approach among local communities on water resource management (groundwater protection in particular) is therefore eminent to ensure

“There is currently no policy in South Africa that directly addresses the protection of groundwater used for drinking water.”

that they are able to assist water managers at grassroots level when implement integrated water resources management (IWRM).

2. Cooperative governance

A concerted effort was made by various government departments to assist the local municipality to bring the typhoid outbreak in Delmas under control. Efforts focused on the treatment of the disease, providing safe drinking water, providing education on the importance of proper hygiene and sanitation, and locating the possible origin of the epidemic.

3. Water governance monitoring and compliance

It remains the legislative responsibility of the municipality to perform water quality monitoring and compliance at regular frequencies, however, more attention should be paid to resource support to this municipality in terms of its own ability to continue with compliance monitoring in the long term.

To ensure adequate groundwater supply as well as an acceptable resource quality, groundwater protection zoning is deemed a necessity. This will allow the area of land included in a protection zone to be managed in such a way as to minimise the potential of groundwater contamination by human activities.

FUNDAMENTAL PRINCIPLES FOR UNDERTAKING GROUNDWATER PROTECTION IN SOUTH AFRICA

1. Public consultation and transparency

Public participation in decision-making, especially focusing on historically

disadvantaged and marginalised communities, concerning water resource protection is one of the basic principles of IWRM in South Africa. To sustain public participation and stakeholder involvement in overall groundwater management, transparency and openness is required.

2. Differentiated and risk-based approach

Authorities should strongly consider a differentiated and risk-based approach to groundwater protection. Its implementation can be achieved through careful consideration of the following legal provision reflected in the National Water Act (NWA):

- ◆ Implementation of source-directed control measures to prevent and minimise wherever possible, at source, the impact of development on groundwater quality by imposing regulatory controls and by providing incentives;
- ◆ Implementation of RDM to manage such impacts to protect the Reserve, and ensure suitability for beneficial purposes;
- ◆ Remediation of groundwater resource quality where practicable to protect the Reserve and ensure at least fitness for the purpose served by the remediation.

3. Practicable and phased implementation

As there is a legislative requirement for the protection of ground and surface water resources, groundwater source and aquifer protection zoning initiatives must be practical and robust to be implemented at a catchment level by trained DWAF staff, supporting local municipalities and established CMAs. There should be equilibrium between the costs of implementation and the confidence levels associated with the determination of a class.

4. Sustainability

The principal reason for protecting water resources is to maintain the ecosystem integrity at a level that ensures the continued delivery of the desired ecosystem goods and services (i.e. direct socio-economic benefits of society). The concept of limited trade-offs between costs and benefits should be considered in classification, for example, allowing development of one part of a resource

in exchange for rehabilitation of another degraded section of the same resource (thereby adding protection value).

5. Analysis of scale

If a process (such as a groundwater protecting zoning policy initiative) is to be legally defensible, it will be required that it is scientifically rigorous, and that all the concepts and information provided can be backed up by hard science that is able to provide a defensible and transparent decision. It is therefore important to assess the level of scale at which groundwater protection needs to be undertaken, especially in a country such as South Africa, where technical or geographical boundaries (in this case aquifers) are not always aligned with that of water resource management boundaries.

Different information available in various areas of the country and different levels of risks are associated with decisions. It is therefore prudent to have a number of methodological approaches that would assist in decision making accounting for these factors. It is suggested that a set of methodologies be adopted for different levels of information available when decisions are made with respect to the level or approach for protection zoning to be undertaken within a catchment.

The following three levels of decision making could be introduced at this stage:

“The Delmas incident, as an example, could have been prevented if strategic advocacy from all key roleplayers was considered upfront during the municipal planning phase, rather than a compulsory intervention or reactive approach by those roleplayers.”

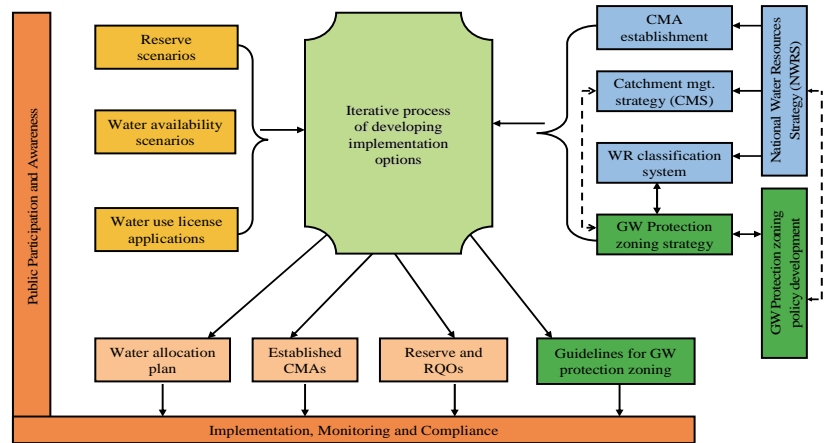


Figure 2: Overarching IWRM framework

- ◆ Protection at all costs;
- ◆ Protection as best as possible and reasonably practical; and
- ◆ Pollution is acceptable where absolutely necessary.

It must be recognised that the framework for groundwater protection needs to embody the changing physical and base conditions in a certain water management area. It is from this perspective that a risk-based approach is suggested. It is also recognised that the groundwater protection process needs to have a set of consistent measures which allow stakeholders in the catchment to assess the present situation and the future situation in terms of RQOs. The protection process should also embody three different entities, namely where we currently are; where we want to be; and how do we intend to reach the planned destination.

PROPOSED FRAMEWORK MODEL FOR GROUNDWATER PROTECTION

Figure 2 illustrates how water resources protection within an overarching IWRM framework should unfold. It is important to note the iterative process required for developing a cross-sector policy for groundwater protection zoning in particular. A further parallel process is also proposed whereby a strategy for groundwater protection zoning could be developed simultaneously while establishing a water resources classification system.

The various linkages between other IWRM processes are also outlined to illustrate that groundwater protection initiatives are considered during the planning processes of IWRM (i.e. water availability and Reserve scenarios). The ultimate outcome of such an approach is that elements of both the policy and strategy development process are being considered for the establishment of interim or preliminary guidelines for undertaking groundwater protection zoning.

The following three-tier approach should be considered in undertaking this mammoth task of groundwater protection zoning in South Africa:

- ◆ Implementation of guidelines/regulations to ensure that potential sources of contamination, such as inappropriate sanitation and poor borehole construction are dealt with immediately;
- ◆ An area planning and site-specific licensing of abstraction and discharges based on an aquifer classification system, which can differentiate between the required levels of groundwater protection. This classification will focus firstly on the importance of the aquifer, and secondly on its vulnerability; and
- ◆ A programme of special protection of vulnerable groundwater sources supplying domestic water to communities.

DISCUSSION

Interim measures as well as existing policy and legal instruments while developing a groundwater policy that enables the

protection of groundwater resources are critical, taking its account the time it takes to develop such a policy. DWAF is also in the process of updating its national water resources strategy during which process a number of shortcomings on groundwater can be addressed.

Important groundwater protection procedures include:

- Public involvement – awareness among communities is seen as the only permanent guard against degradation of groundwater resources.
- Reserve determinations – allow for the role of groundwater in sustaining aquatic ecosystems to be understood and promoted within the context of a balance between use and protection;
- Aquifer classification – provides a framework for implementing differentiated protection, and should be implemented at a catchment level;
- Land-use zoning – an effective source-based control that restricts potentially polluting developments on important or sensitive aquifer systems.
- Environmental management plans and environmental impact assessments – should be mandatory for activities known to induce groundwater contamination, or in areas of important or sensitive aquifer systems.

Processes involved in aquifer depletion and pollution, and related aquifer protection and conservation, are complex and require specialist input for correct management. IWRM is considered essential therefore to protect the country's groundwater resources.

Aquifer protection, however, is a public issue, and all water and land users have a role to play therein. The primary responsibility for groundwater protection therefore rests with any institution or person (i.e. local municipality) who is carrying out an activity that poses a threat to groundwater.

CONCLUSION

There is a definite need for a proactive approach to protecting the country's groundwater resources. The Delmas incident, as an example, could have been prevented if

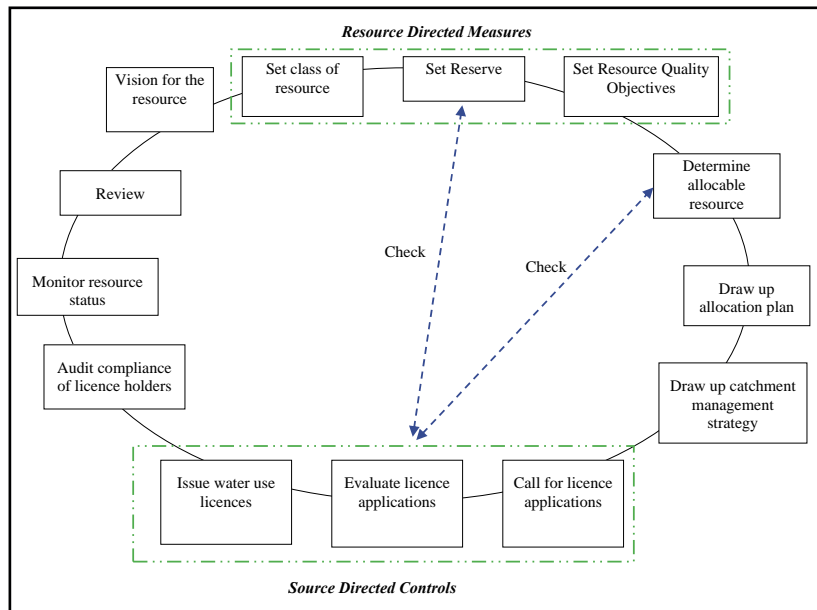


Figure 3: IWRM as adopted by DWAF

strategic advocacy from all key roleplayers was considered upfront during the municipal development planning process, rather than a compulsory intervention or reactive approach by those roleplayers.

Protection zoning provides guidelines for local planning and water use licensing authorities in carrying out their functions. It also provides a framework to assist in decision making on the location, nature and control of developments and activities to protect groundwater as well as maintain the beneficial use of groundwater. Such a framework also aims to maintain the quantity and quality of groundwater, and in some cases improve it by applying a risk assessment-based approach to groundwater protection and sustainable development. In this way, it will greatly assist local municipalities in particular to meet their responsibilities in protecting groundwater.

It is believed that the protection of groundwater under IWRM as adopted by DWAF (Figure 3) is adequately addressed under the RDM and that mitigating measures dealing with associated impacts on groundwater is dealt with under source directed controls. In practice, however, this presumption carries little weight as there is limited skilled capacity within DWAF and the wider water sector to cope with overall groundwater management.

The department's incomplete restructuring initiatives have led to groundwater management being addressed in a fragmented manner.

The intention of this approach was to ensure that groundwater is adequately incorporated into other IWRM disciplines. However, it appears that this approach was a bit premature given the lack of sufficient groundwater expertise throughout the department and the water sector, let alone the limited understanding of this subject given the lack of qualified data and information on groundwater issues. Furthermore, the adopted IWRM approach by DWAF only assumes an iterative approach to water resource management.

It is therefore necessary to propose an overarching framework that clearly illustrates groundwater management and its relevance to effective IWRM. This will ensure that less assumption is made to groundwater management and its role within the context of IWRM, and that real meaning is added to its meaningful contribution in making IWRM a reality.

- Harrison Pienaar is from the Department of Water Affairs & Forestry. Prof Yongxin Xu is from the Department of Earth Sciences at the University of the Western Cape.

The term 'harvesting' usually conjures up images of a farmer on his tractor, working in his field of mealies. But did you know we can also harvest rainwater?

Rainwater harvesting simply refers to the collection and storage of rainwater (or other forms of precipitation) for future use. Millions of people around the world, especially those living in semi-arid and arid regions (such as South Africa), lack access to good quality water for drinking, growing and preparing food. Water is also needed to provide water for animals, vegetables, crops and trees.

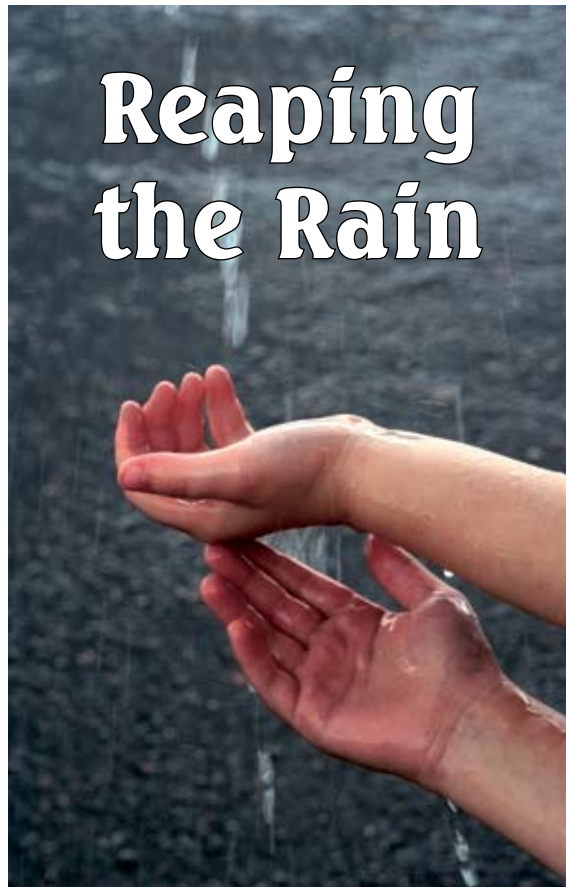
Where groundwater and surface water sources are in short supply, rainwater may be a sustainable alternative or supplement. Rainwater harvesting is practiced by many communities around the world. The practice is becoming more widespread as people realise the importance of conserving water.

RAINWATER HARVESTING AROUND THE WORLD

There are many examples of rainwater harvesting around the world, some dating back thousands of years. Extensive rainwater harvesting apparatus existed 4 000 years ago in the Palestine and Greece, for example. In ancient Rome, residences were built with individual cisterns and paved courtyards to

For more information:

- http://en.wikipedia.org/wiki/Rainwater_harvesting
- <http://www.soilforlife.co.za/docs/biophile/Biophile%205.pdf>



Reaping the Rain

capture rain water to augment water from cities' aqueducts.

Traditionally, in Uganda and Sri Lanka, rainwater is collected from trees using banana leaves or stems as temporary gutters. Up to 200 litres may be collected from a large tree in a single storm.

In Western Europe, the Americas and Australia, rainwater was often the primary water sources for drinking water. In all three continents it continues to be an important water source for isolated homesteads and farms. In Japan, several cities are using rainwater sources inside the city boundary to restore the original water cycle and secure water for emergencies.

Countries such as Germany have developed sophisticated rainwater harvesting systems. One such system incorporates clever computer management systems, submersible pumps, and links into the greywater and main domestic plumbing system.

CATCHING AND STORING RAINWATER

Catching and storing rainwater from the roof of houses, schools and other buildings is the most common form of rainwater harvesting. Even a small roof can collect a lot of water during light rain.

Water is usually channelled from the roof into a gutter and then channelled into clean drums, large buckets, old baths or any kind of water collection tank (plastic tanks of different sizes can also be purchased commercially). A mesh over the top of the downpipe keeps leaves out. It is best to cover the container to reduce water loss through evaporation. To prevent mosquitoes from breeding in the water, add a few drops of cooking oil.

If a large tank is used remember that silt could enter the tank, so to make sure it does not become a problem, the tank should have its tap placed at least 50 millimetres from the bottom. It is best to raise the rain tank about 300 millimetres off the ground so that a bucket can be placed underneath it to collect the water for use.

Another idea for catching rainwater is to bend a piece of iron sheeting into a V shape



and place it on wooden poles so that it is supported at a slant. Keep it from blowing away in strong winds by securing it with wire. A drum placed at the lower edge will catch the water. Rainwater can also be collected from gutters, paved areas and driveways.

This water can be used to flush toilets, wash laundry, showering or bathing, irrigation and

livestock watering. The water may require treatment before drinking.

In a country such as South Africa where 35% of the population are vulnerable to food insecurity (meaning families often do not have enough to eat) rainwater harvesting can go a long way in contributing towards increasing household food and/or income (through the sale of vegetables, for example).



An example of a closed reservoir used to store rainwater for food growing purposes.



Rainwater contributing to food schemes in many communities in South Africa.

GIS FOR SCHOOLS

The City of Cape Town with partner organisations is developing a hands-on geographic information systems (GIS) project for high schools based in urban nature reserves. The environmental education centres at Rondevlei and Tygerberg Nature Reserves are preparing to support GIS-based fieldwork. As part of this project, called Youth, Urban Nature & GIS, senior learners will be able to experience how nature conservationists use GIS technology to monitor and care for nature.

Learners will use hand-help global positioning system (GPS) units to locate monitoring sites and record coordinates; monitor plants, animals and the environment and record observations in a database; construct GIS layers; and display findings and digital photographs using GIS technology.

By monitoring the environment, learners will help the nature reserves to care for nature in the City of Cape Town. Schools will also have access to these records, and learners will be able to analyse data that different schools collect over months and even years. Based on the success of the project, the City plans to extend it to more nature reserves.

The Western Cape Education Department has already selected six schools to take part in the pilot project this year. In 2008, the reserves will make GIS-based fieldwork part of their senior high school programme.

For more information, contact Lindie Buirski at the City of Cape Town Environmental Resource Management Department, at Cell: 084 629 9305

Here's Looking at Algae

The Water Research Commission (WRC) and Rand Water hosted a four-day workshop on algal identification and microcystin analysis. This was part of a WRC-funded research project involving the compilation of an up-to-date methods manual for all algal-related analysis.

The workshop, held at Rand Water's Analytical Services in Vereeniging, focused on two methods, namely the identification and enumeration of phytoplankton and cyanobacteria and the determination of the algal toxin microcystin by means of the ELISA method. Sixteen delegates from all over southern Africa attended the workshop.

The lecturers who presented included Carin van Ginkel from the Department of Water

Affairs & Forestry and George Uys from Rand Water, who facilitated the excursion part of the workshop, where delegates were taught how to sample for all the different kinds of algal analyses. Drs Sanet Janse van Vuuren and Jonathan Taylor from North West University presented the identification of phytoplankton and cyanobacteria. Prof Hein du Preez and Annalie Swanepoel from Analytical Services of Rand Water, respectively handled the

design and importance of a monitoring programme and the practical determination of microcystin.

Feedback from the delegates indicated the need for more such workshops and the WRC has committed itself to the funding thereof. It is believed that projects such as these help to build much needed capacity in the South African water purification industry.



Above: Attendees paid careful attention to the lecture.

Below: Zelna Franken from Rand Water and Lebohanga Hanyane from Mhlathuze Water exchanging ideas while waiting for the reaction to take place during the analysis of microcystin with the ELISA method.

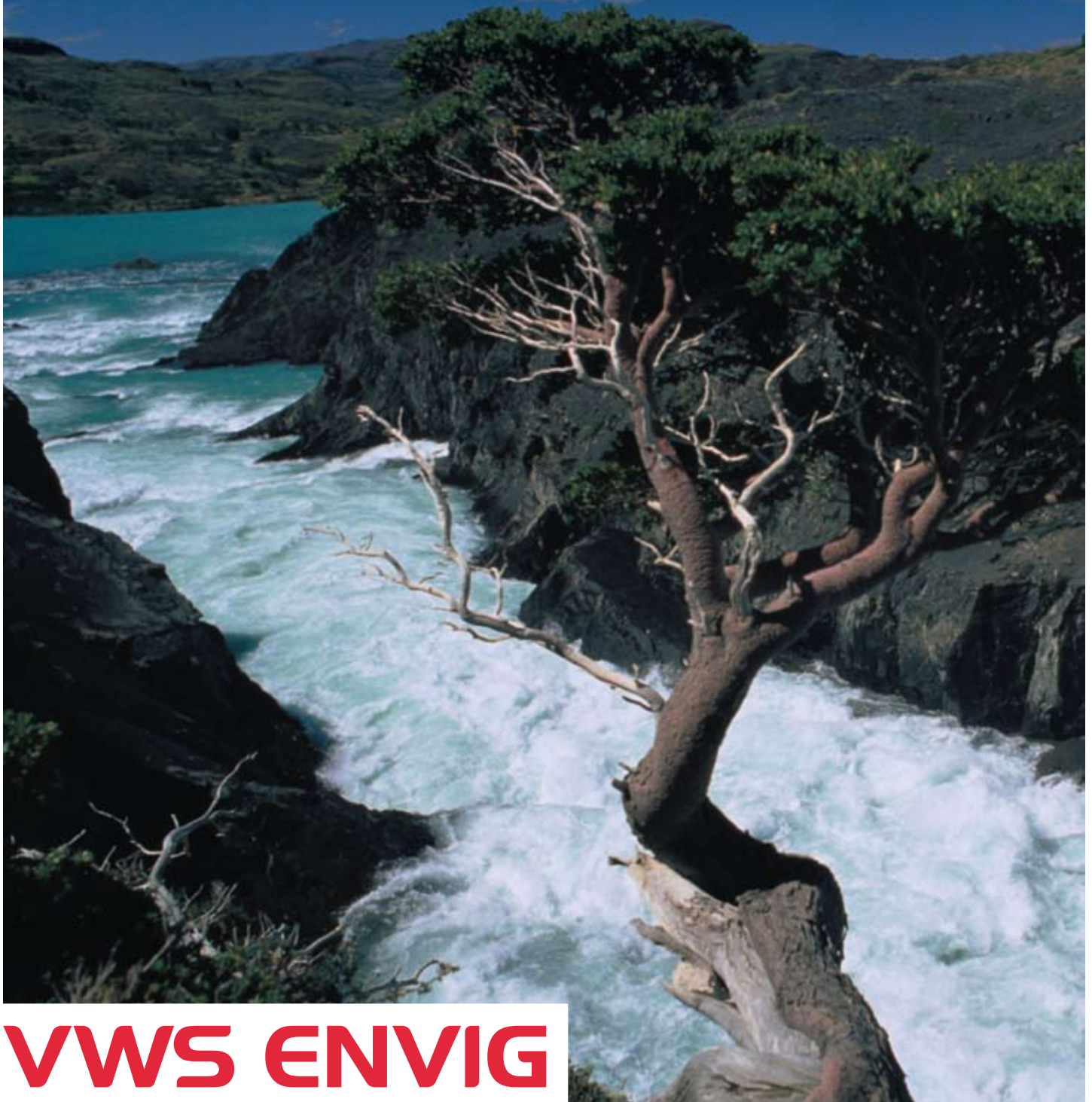


Above: Dr Sanet Janse van Vuuren explained the attachment of the flagellae on members of the Dinophyceae.

Below: Delegates from Namwater in Namibia (from left) Inge Kangootui and Elna Almirall also attended the workshop. With them is GP Kriel from North West University and Everton Barnes from Sedibeng Water.



Surging forward on a new course



VWS ENVIG

VWS Envig is the result of the recent, international acquisition of the Weir Techna Group of Companies by Veolia Water; the leading global provider of municipal and industrial water and wastewater solutions. Drawing on this confluence of knowledge, expertise and resources, VWS Envig is the only South African company to offer the full scope of water treatment activities from turnkey solutions through to specialised services.

VWS Envig offers complete engineered water treatment solutions:

- Design, construction, finance and operation of water treatment plants
- Supply of chemicals, services and consumables
- Service / maintenance contracts
- Expertise in large scale desalination, mining, food and beverage, demineralisation and water recycling projects



Solutions & Technologies

Tel: +27-11-663 3600

Fax: +27-11-608 4772

info.vwsenvig@veoliawater.com

www.vwsenvig.co.za

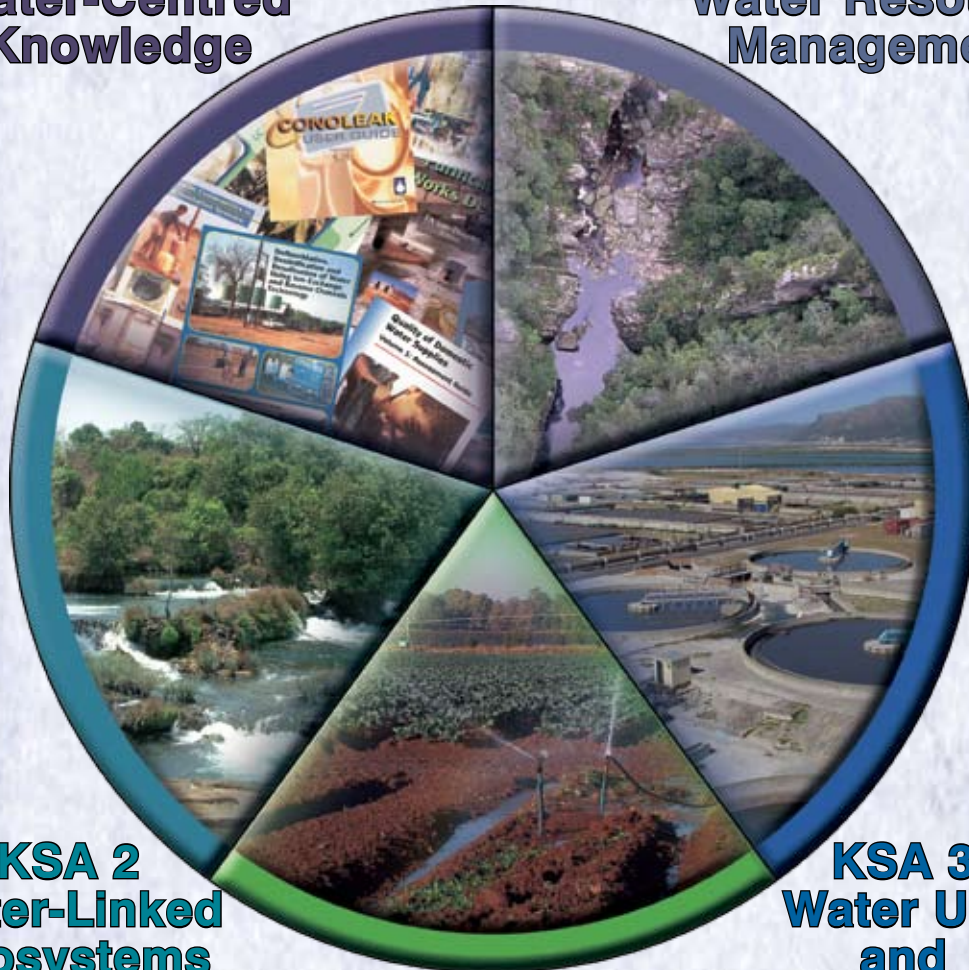


Water Research Commission

Invests in the creation, dissemination and application of knowledge in five Key Strategic Areas (KSAs)

KSA 5 Water-Centred Knowledge

KSA 1 Water Resource Management



KSA 2 Water-Linked Ecosystems

KSA 3 Water Use and Waste Management

KSA 4 Water Utilisation in Agriculture

SOUTH AFRICA'S WATER KNOWLEDGE HUB

Tel +27(0)12 330-0340; fax +27(0)12 331-2565; website www.wrc.org.za

