



A water research and innovation framework for South Africa

The year 2014 represents a year of note for South Africa at the World Water Week to be held in Stockholm in September.

Two parties closely related to the South African water science and technology system have been confirmed as the recipients of its two highest annual awards. Dr John Briscoe, a South African trained in this system, who has been practicing as both an academic and water practitioner around the world, is the 2014 winner of the prestigious Stockholm Water Prize.

In addition, the City of eThekweni, a long-time partner of the Water Research Commission (WRC), has been named by the Stockholm International Water Institute as the winner of the 2014 Industry Award for its innovative record as a water utility. This is a unique double, and if, in addition, the South African entrant to the Stockholm Junior Water Prize manages to walk away with the honours, it would indeed be the first time that any country would have done so. (More about both these awards can be read

elsewhere in this issue).

In addition to these accolades, we know that the South African water science and technology community, in spite of being of modest size and means, is highly productive. The 2013 statistics on the ISI index confirm that in the water resources category, we contribute just more than 1.61% of the global share of papers. This puts South Africa at

number 18 in the world with respect to research output. In addition, our pulse studies also indicate that the water

sector has a higher conversion rate of research into patents when compared to most other sectors.

These are all laudable achievements, but in a country that has a combination of water services and sanitation backlog challenges toward the desired goal of universal sustainable access, wicked problems like non-revenue water and acid mine drainage, dealing with weather and climate change while pursuing a water intensive

economic growth agenda; we need to collectively up the research and innovation contributions to the implementation of the National Development Plan (NDP) in the long term and the five-year plan of the fifth democratic administration in the short term.

The WRC has as core components of its own Corporate Plan the principles of the multiplier effect and

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completing the innovation value chain from research to outcomes and impacts through the WRC Knowledge Tree con-

cept. The WRC has also partnered with the Department of Science and Technology to develop a Water Research, Development and Innovation (RDI) Roadmap to plot South Africa’s potential water technology pathways. This happens at a time when many players in the water industry are also investing in the research and capacity development domain through such interventions as research chairs and learning academies.

This provides the fertile ground to grow a Water Research and Innovation Framework for the country.

The development of the Water Research and Innovation Framework will provide an opportunity for the water sector and its partners to converge the different research agendas into a common vector toward a shared vision for both the future of water science and technology, as well as the future of the South African water industry. The Minister of Water and Sanitation is already starting a new dialogue on the alignment of the sector to better realise the goals of the NDP and a future water prosperous South Africa that could boast sustainable economic growth enabled by water security while simultaneously guaranteeing a dignified quality of life for all through universal safe water and sanitation access. The WRC will begin a process toward the development of a National Research and Innovation Framework in the coming months and will be encouraging all the players in the water sector and our various partners to actively participate in the process.

From the editor...

Thanks to our loyal readers

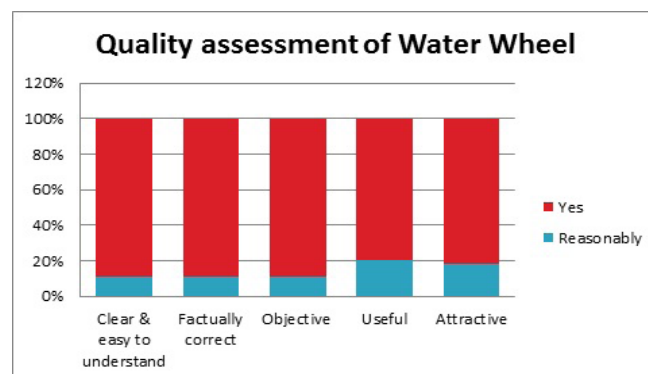
The *Water Wheel* would like to thank all its readers who participated in the recent reader survey. The survey confirmed the magazine's status as the most popular water magazine in South Africa. The survey also confirmed that this magazine remains one of the top knowledge products of the Water Research Commission, its publisher.

What pleasantly surprised *the Water Wheel* editorial team was the way in which the magazine is

shared – 60% of respondents indicated that they share the magazine with colleagues, family and friends.

We were also especially delighted with readers' response to the quality of the magazine. More than 80% of survey respondents indicated that they found *the Water Wheel* clear and easy to understand, factually correct, objective, useful and attractive.

The editorial team pledges to keep up the good work in bringing



you high-quality, well laid out news and information about the South African water and sanitation sector. We will also be looking

to implement some of the wonderful suggestions we received from our readers, so watch this space!

Lani van Vuuren (Editor)

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CSIR researcher elected to prestigious US science organisation

CSIR system ecologist, Dr Bob Scholes, has been elected as a foreign associate to the US National Academy of Science, an honour bestowed upon the world's best scientists as chosen by their peers.

Dr Scholes is well known for his contributions to the fields of global change, ecology and earth observation. With this achievement, he joins the ranks of a small number of elite South African scientists.

According to Thompson ISI, who maintains databases on scientific publications worldwide, Dr Scholes is among the top 1% of environmental scientists worldwide based on citation frequency, publishing widely in his chosen fields. He has a particular interest in the savannas of Africa, and has over 30 years of field experience in many parts of Africa and the world.

The Academy of Science is a non-profit society tasked to provide independent, objective advice to the US government on matters related to science, engineering and medicine. Nearly 500 of its members have won Nobel prizes.

Only 21 foreign associates are elected annually and there is no membership application process. Only Academy members may submit formal nominations of their peers. This is then followed



by an extensive vetting process that results in a final ballot at the Academy's annual meetings.

According to the Academy of Science, members are elected in recognition of their distinguished and continuing achievements in original research. Election to the Academy is regarded as one of the highest honours that a scientist can receive.

"I am blown away and I am humbled. It puts me in the company of internationally respected colleagues. It is a huge honour, both for myself and for South Africa," remarked Dr Scholes of his achievement. "I hope to spread the benefits by helping the South African Academy of Science, of which I am also a member, to reach its full potential."

Source: CSIR

New DWA-WRC partnership aims to build water capacity in South Africa

The Department of Water Affairs and Sanitation (DWAS) and the Water Research Commission (WRC) have signed a Memorandum of Understanding (MoU) appointing the latter as the implementing agent for the new phase of the Framework Programme for Education and Training in Water, also known as FETWater.

The programme, which will run until September 2017, is a joint UNESCO, Belgian and South African knowledge transfer and capacity building programme aimed to improve capacity in integrated water resource management expertise in areas where they are most required.

The end of the second phase, also implemented by the WRC, saw 1 052 professionals in the South African water sector receiving training through the FETWater programme. Concurrently, a vast amount of training material was produced, and two groundwater test sites were developed at the universities of Pretoria and KwaZulu-Natal. The programme places special emphasis on the training needs of women and previously disadvantaged individuals.

The new capacity building needs and requirements that will be considered in Phase III are the advancement of technologies in the water space, climate change and variability, strengthening of the water regulatory system and development of regulatory tools, local government capacity building using water as a catalyst



for economic growth and development, developing stronger inter-governmental relations, specialised skills and knowledge to manage water taking into account the whole value chain.

Phase III will be largely guided by the National Water Resources Strategy 2 (NWRS-2). Addressing participants at the signing ceremony earlier this year, DWAS Acting Director-General, Trevor Balzer (seen in the photograph with WRC CEO, Dhesigen Naidoo), said that FETWater provided a practical expression of the NWRS-2, and to making an impact in terms of capacity in the sector.

Said Naidoo: "The expectation is very high around Phase III, but it fits in well with where we are as a country. Capacity building in general, and scientific training in particular, is at another level of the game to where we were ten years ago. In the science and technology space, the water sector actually performs extraordinarily well."

Reptile Atlas a first for southern Africa

More than 26 authors and seven editors worked for nine years to complete the first reptile atlas for southern Africa. The collaborative 485-page *Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland* was launched earlier this year. The book contains the conservation status of 421 recognised species and subspecies of reptiles for in these three countries.

The University of the Witwatersrand (Wits University), one of the key

collaborators on the project, reports that data about reptiles were sourced from about 400 people and 14 organisations – 135 512 records in total. The bulk came from museums and nature conservation agencies, as well as from private collections, academic institutions and published literature.

According to Prof Graham Alexander from the School of Animal, Plant and Environmental Sciences at Wits University, the Atlas has the most up-to-date

distribution maps (for reptiles) ever produced for the region. "The data in these distribution maps represents all of the available data we have collected since people started studying reptiles in South Africa."

Another important aspect of the project has been the contribution of citizen scientists through the Virtual Museum of the University of Cape Town's Animal Demography Unit. Here the public could submit photographic records of reptiles.

"This citizen science participation has resulted in people focusing on areas where not much collecting has been done in the past. It filled the gaps in distribution maps and identified areas that need more attention," noted Prof Alexander.

For more about the Reptile Atlas and how to purchase a copy, visit <http://www.sanbi.org/news/sanbi-publishes-2-new-animal-publications>.

Source: www.researchsa.co.za



National dam conference a highlight on engineering calendar

The 2014 annual conference of the South African National Committee on Large Dams (SANCOLD), to be held at Birchwood, Gauteng, on 5-7 November, promises to be a highlight on the regional engineering calendar.

The theme for this year's conference is 'Towards sustainable dams in southern Africa'. Dams and their reservoirs need to operate over long periods (even centuries), and long-term sustainability is thus of prime importance. While the main theme is related to sustainable dam development, the conference will also highlight the construction of dams. With large projects such as Phase 2 of the Lesotho Highlands Water Project having been announced, the conference is bound to feature some interesting presentations.

"The construction industry in South Africa needs to have the expertise in dam

construction in order to provide such services in the region, and in Africa, where there is a great need for water resources development," SANCOLD says.

Conference delegates also have the opportunity to attend three technical visits during this year's SANCOLD conference, namely Central Basin acid mine drainage neutralisation plant construction site in Gauteng, the Petra Diamonds Cullinan Mine tailings dam, and the Kareerand Tailings Dam. The site visits aim to highlight the importance of tailings dams as a focus area of SANCOLD and the International Commission of Large Dams of which the South African committee is a member.

- To find out more about the conference contact Lerato Miyen at Tel: (011) 676-3464; Email: [secretariat@sancold2014.org.za](mailto:secretariat@ sancold2014.org.za); or Visit: www.sancold.org.za

New water technologies demonstration programme to help bridge innovation chasm

The Water Research Commission (WRC), in collaboration with the Department of Science & Technology (DST), has established a special programme to pull together the applied research and development and commercialisation stages of the water innovation continuum.

The failure to commercialise research effectively has been termed the 'innovation chasm', referring to the inability of academic research to reach the market as products and services. In other words, South Africa often produces good academic research and small-scale (laboratory level) piloting of new technologies but fails to commercialise.

In order to take research from this early stage to the market, where industry and entrepreneurs will invest in the technologies and where potential users will adopt them, larger scale real-world demonstrations are required to provide proof of technology and effectiveness.

This higher level demonstration is typically costly because large scale plants

need to be built and typically risky because there is no guarantee that the technology will actually work at a larger scale. Despite the costs and risks, demonstrations are important as they can help provide invaluable information for ramping up the technology, improve market awareness and confidence in the product/service, attract potential investors, communicate gaps in research, support evidence-based policy-making, and help technology developers/manufacturers legitimise the performance of their products.

The WTDP will act as an intermediary in the water innovation continuum to facilitate high-level water technology demonstrators, coordinate multi-sectoral partnerships, build networks, and foster knowledge sharing and knowledge transfer to help bridge the gap between water research and the market.

To become part of the programme contact WTDP Manager, Nirvashnee Seetal, at Tel: (012) 330 9010 or Email: nirvashnees@wrc.org.za

Benchmarking: How municipalities assist each other

The Municipal Benchmarking Initiative (MBI), a programme of the Water Research Commission and the South African Local Government Association (SALGA) in association with the Institution of Municipal Engineering in South Africa has made significant strides towards improving water management at the local level since its establishment in 2011.

Globally, benchmarking is recognised as a best practice, practical tool to guide and support effective performance assessment and continuous performance improvement. "The MBI signifies the right direction when it comes to improving water services delivery in South Africa. It is an innovative and inclusive approach to tackling service delivery issues," said SALGA national executive committee member, Pinky Moloi.

According to WRC Executive Manager for Water Use & Waste Management, Jay Bhagwan, specific progress has been made through the initiative in module and material development; municipal engagement, support and events/forums; development of a database and Web tool; business analysis and intelligence as well as business management and leadership.

Water Services Master Classes have been established as peer-learning exchanges designed to bring together senior technical and management staff, experts and professionals on key areas of the water services business. The exchanges are based on a blended learning approach that prioritises interactive discussions and cross-pollination of information

and experiences.

In order to structure peer learning around a specific topic, the establishment of various Working Groups has been encouraged. Furthermore, a well-attended national MBI workshop was held in 2013.

A critical aspect of the current MBI is its 'less is more' approach to benchmarking data collection. Wherever possible, performance indicators do not duplicate information being reported elsewhere against national sectoral objectives. Rather, the benchmarking focuses on core organisational and operational management parameters that are essential for good, sustainable service delivery, while building awareness within municipalities of why they matter.

"We will also vigorously market our initiative to external stakeholders both private and public with a view to sharing ideas and continuously improving water services performance, notes Bhagwan. "After years of pursuing benchmarking in the water services sector in South Africa, it makes me proud of the progress and innovations achieved to date.

The MBI's annual report for 2013 can be downloaded from the WRC website: www.wrc.org.za



International award recognises Durban's innovations in water and sanitation

A part of the Durban municipality, eThekweni Water and Sanitation, has been named the 2014 winner of the Stockholm Industry Water Award (SIWA) for its transformative and inclusive approach to providing water and sanitation services.

"This recognition reflects the work of our whole team over the past 22 years, and is a tremendous honour for all of us," said Neil Macleod, head of the department. "Our greatest achievement has been bringing water and sanitation services to so many poor people and changing their lives."

eThekweni Water and Sanitation was established soon after South Africa's democratisation in 1996. During that time Durban expanded its administrative boundaries to include 3.5 million people, more than a million of them living in poorly serviced rural areas with huge water and sanitation challenges.

In the past 14 years, 1.3 million additional people in the greater Durban have been connected to piped water and 700 000 people have been provided with access to toilets. In respecting the constitutional right to water while maintaining

financial sustainability, access to basic water supply and sanitation is provided at no cost to poor families, while higher levels of services and consumption are charged at full cost.

In addition to successfully providing basic services to a large and diverse population, eThekweni Water and Sanitation is at the forefront of exploring technical and social solutions. According to Macleod, innovation has underpinned the department's work over the last 22 years. Technologies explored have included electronic bailiff units, community ablution blocks, and the construction of 80 000 urine diversion toilets.

Another more recent example has been the department's mini hydropower project: Instead of using pressure reducing valves in pipes running down steep hillsides, the company is installing mini turbines using the excess pressure to generate electricity for the city's low tension grid (a project in partnership with the Water Research Commission and the University of Pretoria). The eThekweni municipality is also pioneering solutions to convert urban wastewater challenges to agricultural opportunities as well as

harvesting rainwater.

The municipal services provider is also looking for new innovations, particularly with regards to sanitation, noted Macleod. "There is a perception that the full flush toilet is the ultimately technology. But we are a water-scarce country that cannot afford to use purified water to flush toilets."

As a result the department is forging research partnerships with organisations such as the Bill and Melinda Gates Foundation and others in search for a 'future toilet technology'. "We are looking for a toilet that can be rolled out to any household, that uses little to no water, that doesn't smell, and is safe to use especially by women and children," said Macleod.

The award recognises eThekweni Water and Sanitation to be one of the most progressive utilities in the world. The open approach to experimenting and piloting new solutions across both technical and social aspects of service delivery has made eThekweni a forerunner in the world of utility-run services. One partner comments that "leaders at eThekweni have already been betting on new and



One of the 80 000 urine diversion toilets rolled out by eThekweni Water and Sanitation.



The municipality has provided basic services to 1.3 million additional people.

STOP PRESS: Hydropower project wins Green award

The Water Research Commission's (WRC's) conduit hydropower project, rolled out through partners in Bloemfontein, Pretoria, and Durban, has won a Mail & Guardian Greening the Future Award in the Community Renewable Energy category.

The technology, developed with funding from the WRC by the University of Pretoria, uses excess energy in pressurised conduits to produce clean and renewable hydroelectric power. This solution, known as conduit hydropower, uses micro-turbines installed within the conduit system.

According to the Mail & Guardian, its simplicity is what makes the solution so elegant: "harnessing energy that is already present within the existing infrastructure and that would usually be lost through the use of a pressure valve."

Following a successful trial in Tshwane, the project was expanded to eThekweni and Bloemfontein. At Bloem Water, 96 kW/h of clean energy is being produced from a pressurised conduit and has become the main source of power at the water utility's head office in Pellisier.



The conduit hydropower installation at Bloem Water.

risky approaches to test innovation that will ultimately have a long term benefit for the population, most municipalities refrain from exploring ideas out of the box, focusing on business as usual."

"eThekweni has championed the approach to provide sufficient water to sustain human life, as expressed in the South African constitution, now embedded in national policy. The methods used and results achieved by eThekweni Water and Sanitation serve as a sterling example for the many communities worldwide facing similar challenges," states the SIWA jury in its citation.

- Read the *Water Wheel's* profile on Neil Macleod ('Leading the way with innovation in water and sanitation') in the March/April 2013 issue.