## African consultants select female chair

*Madame Mayen Adetiba from the Association of Consulting Engineers Nigeria was elected as Chair of GAMA for 2009. She will be assisted by Arthur Taute, the newly-elected Deputy Chair from South Africa. Seen here with Adetiba is outgoing GAMA president Exaud Mushi and John Boyd, President of the International Federation of Consulting Engineers (FIDIC) to which GAMA belongs.*

*African consulting engineering association collective, the Group of Africa Member Associations (GAMA) has selected its first female Chairperson at a conference in Durban earlier this year.*

## Namibia forges ahead with plans to mine the sea

Namibian bulk water supplier NamWater is forging ahead with longstanding plans to establish a large-scale seawater desalination plant outside Swakopmund. This is despite the fact that the project has suffered long delays as a result of political and financial hurdles.

Water demand in Namibia's Erongo Region is set to rise sharply as a result of new and expanding uranium mining operations in the area. World uranium oxide demand is estimated to reach 114 700 t/year by 2020. Seven percent of this will come from Namibia. According to reports the existing mine at Rössing is already expanding, while new mines have been or are being developed at Trekkopje, Valencia, and Langer Heinrich, while several others are in the exploration phase.

At present the Erongo area is supplied with water from two alluvial aquifers in the Kuiseb and Omaruru rivers. However, according to Dr Kuiri Tjipangandjara, General Manager: Engineering and Scientific Services at NamWater, these resources are fast approaching the end of their sustainable yield. "The company has been exploring the possibility of augmenting its conventional supplies with alternative resources since 1995. Among the possibilities investigated were such grand engineering schemes as towing icebergs, tanking water from the mouth of the Congo River or piping it from the Kunene River on the Angolan border, 800 km away."

While these projects might be technically possible none were economically feasible and the company settled on seawater desalination. The proposed 25 million $m^3$/year plant will be situated near Mile 6 on the northern outskirts of Swakopmund. The project will cost about N$1,8-billion (One Namibian Dollar is equal to one Rand) and have a minimum lifespan of 20 years.

Engineering technologies to be applied will consist of screening, dissolved air flotation, flocculation, ultrafiltration, cartridge filtration, reverse osmosis and post treatment. About 60% of the seawater abstracted will be returned to the sea as brine. The desalinated water will be linked via pipeline to NamWater's existing water supply network.

Dr Tjipangandjara told delegates at the recent Water Security Africa 2009 conference that the project started off well and that by 2007 the main technical components had been identified. However, there had been little progress on the financial side and it proved difficult to get buy-in for a technology that is still not considered mainstream. Cabinet finally approved the project in July last year and a National Desalination Task Force, made up of several ministries, was made up to oversee the process. Several financing options, including build-own-operate-transfer and public-private partnerships are being considered. NamWater now hopes to commission the new desalination plant before the end of 2011.

"We remain convinced that the sea provides a potentially unlimited source of raw water, and that the only way to secure Namibia's water is through desalination," concluded Dr Tjipangandjara.

## Engineering skills champion gets honorary doctorate

Former president of the South African Institution of Civil Engineering (SAICE), Allyson Lawless, has had an honorary doctorate conferred on her by the University of Stellenbosch.

Lawless received the degree Doctor in Engineering (Deng), *honoris causa*, for her excellence as a civil engineer and scientist, leadership as a businesswoman and being a role-model for young people from all backgrounds.

The first female president of SAICE, Lawless has a lively interest in the technical skills of engineers, particularly those from disadvantaged backgrounds. After identifying large-scale skills gaps in local government, she devised a government intervention under the banner of SAICE by which retired professional engineers are reappointed in the service of local governments. Here they support (primarily formerly disadvantaged) students who need practical training or graduates who cannot find work.

Following extensive research, she published two books on skills development, *Numbers and Needs* and *Numbers and Needs in Local Government*. In the latter she provided a turnaround strategy for service delivery in local government, which could change the face of this crucial sector. The findings resulted in the launching of major national initiatives, including increased funding to tertiary engineering departments. Lawless gives guidance on skills development from primary education through to professional development.

She has won numerous awards, among others the Shoprite-Checkers/SABC 2 Woman of the Year Award in the category Science and Technology in 2007. She has also won a National Science & Technology Forum Award in the category outstanding research in science, engineering and technology by an individual.

*Allyson Lawless with Prof Russel Botman, Rector and Vice-Chancellor (left) and Dr Frederik van Zyl Slabbert, Chancellor of the University of Stellenbosch (right).*

## East Rand wastewater treatment firm gets thumbs up from government

The East Rand Water Care Company (ERWAT) has become one of the first organisations in the country to qualify for the Department of Water & Environmental Affairs' (DWEA's) Green Drop status.

The department has initiated the Blue and Green Drop certification system to acknowledge excellence in drinking water and wastewater quality management. The first certification process was finalised in May. According to DWEA, water services authorities will receive Green Drop status only when they comply with comprehensive and stringent criteria determined for the collection, treatment and discharge of wastewater.

Apart from Green Drop certification, ERWAT has also received an Excellence Award: Large System from DWEA. The company operates some 19 wastewater care works, treating a combined capacity of some 600 Ml/day of wastewater from the Ekurhuleni area.

ERWAT Executive Manager for Operations Jurie Terblanché reports that the certification and excellence award are testimony to the fact that the company offers innovative and advanced technologies developed to meet the ever-growing demand for improved quality in the industry. At the same time, the company is working towards meeting the DWEA 2010 standards for water quality.

*Receiving the Green Drop certification and the Award for Excellence to ERWAT are sitting: Jurie Terblanché (Executive Manager: Operations), Pat Twala (MD), Loura Roode (District Manager) and standing: District Managers Johan Hendricksz, Fortune Mabunda and Werner Rössle.*

## Firms amalgamate to form global consulting giant

Two of South Africa's leading consulting engineering firms, Africon and Ninham Shand have come together with one of Asia Pacific's firms, Connell Wagner, to form a new multi-disciplinary global group.

The newly-created group, Aurecon, will provide professional technical services on large-scale integrated infrastructure projects to clients across Europe, the Middle East and Africa (AME) and the Asia Pacific. The global group will be headquartered in Singapore and employ over 6 700 people across 87 offices in 28 countries.

Paul Hardy, previously CEO and Chair of Connell Wagner, has been appointed Aurecon's Global CEO and the former non-executive Chair of African, Prof Jakes Gerwel, will be Aurecon's non-executive Global Chair. Dr Gustav Rohde, previously CEO of Africon and Arnie Möhr, past MD of Ninham Shand, will assume the roles of CEO AME and the Deputy Chair of the Leadership Team, AME Zone, respectively.

# New from the WRC

**Report No: 1492/1/08**

***Model Output Statistics Applied to Multi-model Ensemble Long-range Forecasts over South Africa (WA Landman; F Engelbrecht; A Beraki; C Engelbrecht; M Mbedzi; T Gill and L Ntsangwane)***

Improved seasonal forecasts would greatly assist managers in the fields of water resources and agriculture in adapting to climate variability and, more particularly, in preparing adequately for seasons characterised by climate extremes. The main emphasis of this project was, therefore, to develop a multi-model forecasting system for South Africa that would be able to produce objective operational seasonal rainfall, streamflow and global sea-surface temperature forecasts skilfully.

**Report No: TT 371/08**

*The Impact of Large Consumer Unit Size on Water and Sanitation Services in Lower Income Urban Areas in South Africa (Kim Walsh)*

Palmer Development Group was appointed by the WRC to conduct research into the impact of large consumer unit sizes on access to and affordability of water and sanitation services in lower income formal urban areas. The purpose of this research is to assess whether being a member of a large consumer unit, defined as more than eight people sharing a stand, results in inhibited access to water and sanitation services, and whether large consumer units find water and sanitation services to be unaffordable. The research concluded that large consumer units cannot be viewed simply as a homogenous group. Different types of consumer units, and different households making up those consumer units, face different challenges with respect to water and sanitation. Nuanced policy approaches will be necessary to help to alleviate these differing challenges.

**Report No: TT 369/08**

*Training Manual for Small-scale Rainbow Trout Farmers in Net Cages on Irrigation Dams: Water Quality, Production and Fish Health (K Salie; D Resoort; D du Plessis and M Maleri)*

This training manual for fish farmers provides guidelines for dealing with water quality and improving the success of trout farming in net cages on irrigation dams. Its aim is to provide a quick reference to procedure and practices for the farmer. It will furthermore contribute to the production of quality fish and to the maintenance of environmental integrity. The manual has been written to address aspects of farming that requires hands-on management, namely, site selection, operational procedures (i.e. water and feed management), monitoring and evaluation. It also gives the contact details of people who can advise the farmer on urgent questions regarding procedures or abnormalities in production.

**Report No: TT 364/08**

*Towards a Socio-ecological Systems View of the Sand River Catchment, South Africa: An Exploratory Resilience Analysis (Sharon Pollard; Harry Biggs & Derick du Toit)*

Several initiatives in southern Africa (such as integrated water resource management) are attempting to adopt a more holistic approach to natural resource management than historically used. In this study, the authors test resilience thinking and its associated concepts to explore if the potentially scarce water-based ecosystem services of the Sand River catchment can be mobilised and sustained in a sustainable and equitable manner.

**Report No: TT 375/08**

*Guideline to the Inspection of Wastewater Treatment Works (LA Boyd and AM Mbelu)*

This guideline documents deals with the requirements for undertaking an inspection at a wastewater treatment works. The purpose of the guideline document is to assist the process controller to prepare for an inspection at the works and take corrective action where a problem is identified. It also allows the inspector to undertake an inspection and give guidance where a problem is identified. Checklists are provided for those unit processes that are most frequently encountered at South African wastewater treatment works.

**Report No: TT 372/08**

*Development of a Knowledge Management System for Operation of the Algal Integrated Ponding System – a Training and Operations Tool for Small Wastewater Treatment Plants (KJ Whittington-Jones; PD Rose; W Leukes; G Lok; S Naidoo and D Lok)*

The WRC had embarked upon the Integrated Algal Ponding System (IAPS) project in Grahamstown as a means of promoting low-cost sanitation for low-income consumers. The IAPS plant was designed as a demonstration plant and a research facility with the objective of promoting acceptance and advancing knowledge in the operation of low-cost photosynthetic water treatment systems. The primary objective of this initiative was to capture the expertise, skills and knowledge developed by the people who have performed demanding tasks at the IAPS.

**Report No: 1541/1/08**

*Production of Enzymes for Industrial Wastewater Treatment: Proof of Concept and Application to the Textile Dye Industry (C Mutambanengwe; O Oyekola; C Togo and CG Whiteley)*

A previous WRC project into the enzymology of solubilisation of municipal sewage sludge identified the involvement of a plethora of hydrolase enzymes. Furthermore, it was found that these enzymes could be used, in situ, to bioremediate effluents from acid mine drainage, tanneries and abattoirs. This research project exploited this idea further through an investigation to show that hydrogenase enzymes could be used to bioremediate industrial waste effluent from the textile dye industry.

**Report No 1671/1/08**

*A First Order National Audit of Sewerage Reticulation Issues (BW de Swardt and B Barta)*

This solicited WRC project aimed to identify key issues and develop appropriate research responses in the field on reticulated sewer infrastructure in South Africa. The main objectives were to identify and characterise the sewerage reticulation issues

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on the background of international and regional research work available from accessible databases; prioritise the sewage reticulation issues requiring attention within the context of integrated urban water resource management in South Africa; and to develop strategic guidelines for dealing with the issues above. The findings of this project will form the framework for solicited projects and lead to a roll-out of focused research projects dealing with specific needs in the industry.

### Report No: 1729/1/08

*Reactor Design for Metal Precipitation in Mine Water Treatment (A Lewis; J Nathoo and T Mokone)*

While research to date in South Africa has led to a detailed understanding of the biological sulphate reduction process and the implementation of a potential process, key aspects require further understanding and optimisation for the successful implementation of this technology. The biological treatment process is partly motivated through its ability to generate easily separated metal sulphide precipitates. However, metal sulphide precipitation is well known to be an extremely difficult process to manage and control. The main aim of the research was to understand the fundamental mechanisms in the metal salt precipitation component of the sulphate reduction bacteria process; and define the operating conditions to achieve effective metal precipitation in a fluidised bed reactor as an individual unit operation in the sulphate reducing bacteria process.

### Report No: 1625/1/08

*Development of a Complete Process Integration Framework for Wastewater Minimisation in Multipurpose Batch Plants (T Majozi and JF Gouws)*

Wastewater minimisation in the processing industry is becoming ever more important as sources of fresh water become limited and environmental legislation becomes more stringent. This has prompted researchers to look into cost-effective means of reducing effluent discharged into the environment. To date, however, much has been on continuous processes and the reduction of wastewater within these processes, rather than on batch processes. Thus the main objective of this project was to develop a mathematical optimisation technique for wastewater minimisation that could be applied to industrial scale problems. A final model was derived for application at an industrial site, which produces mainly liquid products and women's sanitary products. At this plant, which uses the batch process, the amount of water used per washout was between 22% and 55%.

### Report No: 1371/1/07

*Dual-Stage Ceramic Membrane Bioreactors for the Treatment of High-strength Industrial Wastewaters (W Edwards; WD Leukes; CC Bezuidenhout; KJ Riedel; VM Linkov; PJ Jansen van Rensburg; HWJP Neomagus and J Burgess)*

This project focused on the development of a unique operations strategy employing membrane bioreactors for the treatment of wastewaters of industrial origin. The process facilitated a continuous development and acclimation design strategy for generating groups or consortia of microorganisms capable of degrading specific industrial wastewaters. These adapted consortia were then harvested to be used in the continuous operation of 'hydrolysis' reactors. The hydrolysis reactors were operated under similar conditions as conventional wastewater treatment tank facilities. However, the continuous addition of adapted microbial populations developed within the seeding reactor configuration facilitated, firstly, significantly decreased adaptation periods associated with conventional treatment strategies, and, secondly, an inherent robustness facilitated by obviating the requirement for adaptation within the hydrolysis reactor configuration.

### Report No: 1563/1/08

*Water Resources Management in Rainwater Harvesting: an Integrated Systems Approach (J Mwenge Kahinda; BBP Sejamoholo; AE Taigbenu; JR Boroto; ESB Lillie; M Taute and T Cousins)*

This three-year project revisited the practice of rainwater harvesting in South Africa. The overall objective of the project was to support efforts of integrating rainwater harvesting into the water demand and supply equation by providing an understanding of its associated potential impacts as well as a policy framework for its broad-scale adoption from a water resource perspective.

### Report No: 1701/1/09

*Assessment of the Feasibility of Using a Dual Water Reticulation System in South Africa (AA Ilemobade; JR Adequmi; and JE van Zyl)*

The main aim of this study was to assess the feasibility of implementing dual water reticulation systems in South Africa based on local and international experience. The project found that dual water reticulation systems are feasible water supply options, especially for communication located in arid areas, provided there is an enabling environment (i.e. regulations, guidelines, institutional capacity etc). If all treated effluent produced within an area is recycled, total water supply to the area will increase by nearly 100%.

### Report No: KV 222/09

*A Scoping Exercise to Investigate the Potential Need for, and Nature of, Water Trading in South Africa (A Pott; K Versfeld; M van Rooyen, A Muir)*

This project concluded that there is a high need for water trading in South Africa. Inter and intra-sectoral trades promise to be the most important types of trade in the future. Very few inter-sectoral trades are happening at present, but will probably take place after the completion of the compulsory licensing process (i.e. the initial allocation of water use entitlements.

### Report No: TT 373/08


*Assessment of the Occurrence and Key Causes of Drinking Water Quality Failures within Non-Metropolitan Water Supply Systems in South Africa, and Guidelines for the Practical Management Thereof (Grant Mackintosh & Unathi Jack)*

This project investigated drinking water quality management in the Western Cape, Free State and the Eastern Cape (as being broadly representative of the conditions in South Africa) and identified the minimum requirements for effective and sustainable drinking water service delivery within non-metropolitan water distribution networks in order to ensure an acceptable drinking water quality is supplied to all consumers in South Africa. From the experiences gained, guidelines were then developed.

### Report No: 1664/1/09

*Development of a Model for Determining Affordable and Sustainable Sanitation Demand in Dense Settlements of South Africa (R Martin and P Pansegrouw)*

The main objective of this study was to determine the effective sanitation demand of residents in dense settlements by making use of an adjusted computer housing program, developed by Sigodi Marah Martin. This computer model determines the effective demand for services according to the integrated affordability of all the services to the residents of dense settlements by making use of a cognitive process called contingent valuation. It is, as far as could be ascertained, a world first in terms of the integration of the affordability of all the services to determine the sustainable demand for these services.