## Counting the cost of eutrophication

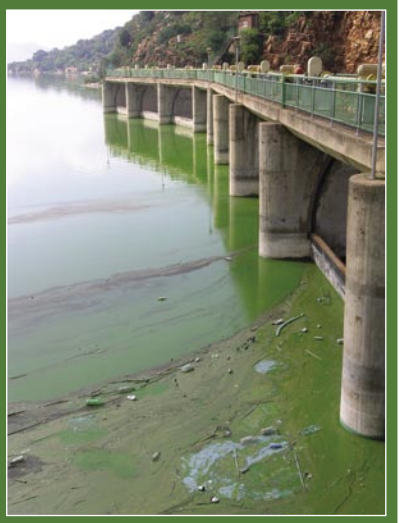
A Water Research Commission funded study has been launched into the costs associated with eutrophication.

Eutrophication, or the enrichment of the water environment with plant nutrients, and its accompanying negative effects are some of the intractable symptoms of water pollution associated with modern society.

Eutrophication causes excessive growth of phytoplankton (free floating algae) and rooted macrophytes, causing problems such as increased water treatment cost, taste and odour problems in drinking water, potential health risks, interference with recreation and a reduction of the amenity values and conservation status of water resources. This has knock-on cost implications for economic sectors as diverse as providers of potable water, industry, agriculture, real estate, recreation and for ecosystems.

The study, which should be completed by mid-2007, is aimed at developing a general model to assess the costs associated with eutrophication in South Africa. The model will then be tested in a case study to be performed on the Vaal River.

In the prevention versus cure debate, it is important to not only focus on the



cost of prevention, but also to recognise the costs associated with eutrophication and the knock-on effect it has on the economy. These costs need to be estimated for different levels of eutrophication to consider and justify often expensive preventative measures.

It is believed that a quantification of the cost associated with eutrophication will also assist in justifying the introduction of waste discharge charges as a preventative strategy and in setting the levels of charges that would be required to compensate users that are negatively affected by it.

## Call for proposals

The South Africa-Norway Programme for Research Cooperation has called for proposals. The goal of the programme is to establish the basis for long-term research cooperation between the two countries through the funding of joint research projects. Priority will be given to projects in the categories of (among others): health and medical sciences, environment, education and energy.

The deadline for submissions is 12 October. For more information, go to www.nrf.ac.za.

## 'Extinct' science revived through report

A new Water Research Commission (WRC) funded report hopes to revive the scientific interest into the study of South Africa's dams.

South Africa is hugely dependent on its 520 large dams which intercept and capture more than 50% of the country's mean annual runoff. These man-made lake ecosystems are complex entities that exhibit their own distinctive peculiarities. To continue to manage these dams effectively an understanding of their biological, physical, chemical, hydrological and other aspects is necessary.

South Africa is reported to have had an internationally renowned pool of expertise studying the characteristics of these impoundments. However, the art of so-called reservoir limnology all but disappeared after the focus shifted to the study of rivers some 20 years ago.

The latest WRC report is the result of a comprehensive literature survey (involving some 1 450 publications) undertaken by the School of Biological and Conservation Sciences at the University of KwaZulu-Natal. It considers and addresses present and emerging issues in respect of reservoir limnology. The report serves as a point of departure for development of a reservoir limnology thrust.

The report offers an overview of the functional and operational attributes of reservoirs that variously influence, modify and determine the quantity, quality and/or sustainability of the impounded resource. In addition, the physical, chemical and biological structures, functions and interactions that underpin the natural ecology and utilitarian operation of dams are outlined. A chapter on the factors affecting water quality of dams, their consequences and their management is also offered.

To order the report (WRC Report No KV 1713/06), contact Publications at Tel: (012) 330-0340 or E-mail: orders@wrc.org.za

## More female scientists please

The International Council for Science (ICSU) has called on the scientific community to actively encourage the participation of women in the science sector to solve societal problems.

"In our modern, technology filled world, there remains a lack of appreciation of science by society, compounded by the fact that the benefits brought about by science have yet to reach those places they are needed most," lamented ICSU spokesperson Lineo Mosia.

"It is proper to acknowledge that South Africa has made strides in mainstreaming women in science and technology through the initiatives of, inter alia, the Department of Science & Technology, and the National Research Foundation."

## Hand-washing still underrated in SA

Hand-washing remains underrated in South Africa as an effective method of preventing the spread of disease, an international survey has revealed.

According to a global hygiene survey, undertaken in South Africa, the US, UK, Italy, Germany, the United Arab Emirates, India and Malaysia, 55% of South Africans believed that disinfecting surfaces, avoiding close contact with others and not letting animals into the house were more effective in preventing disease than washing hands. About 1 000 people were surveyed in each country.

Americans reportedly wash their hands most often (68%), followed by Britons (57%). Interestingly, only 15% of Indians wash their hands regularly.

## Tennis stars unite for water

This year's Wimbledon tennis championship was not all about strawberries and cream.

Veteran South African tennis player, Johan Kriek, took the opportunity to launch the Global Water Foundation (GWF) to raise public awareness, contribute technical assistance and fund water and sanitation programmes in schools, rural areas and other communities across developing nations. Initial efforts will focus on training, mobilisation and education in regions of Africa. "I was taken by the sense of urgency expressed by world leaders to find solutions to the problem, not only in Africa but other parts of the developing world," said Kriek at the launch in July. "A source of healthy water is a fundamental right to everyone on earth, and there is so much the international community can do to help where the need is greatest."

Tennis legends John McEnroe, Martina Navratilova and Jim Courier have already pledged to act as 'Clean Water Ambassadors' for GWF. Along with Kriek, GWF's founding directors are Minnie Hildebrand, Joe Cox and Leigh Peric. Other non-executive members include Dr Darren Saywell (UK), Prof Eugene Cloete (South Africa) and Godfrey Mbala (Cameroon).

For more information, go to www.globalwaterfoundation.org

## Water by Numbers

- **R50-million** – The funds budgeted by the Nelson Mandela Bay Municipality to eradicate shared toilets in New Brighton, one of the oldest townships in the Eastern Cape.
- **One third** – The amount of all death and disease in developing countries attributed to unhealthy environments, according to a new report by the World Health Organisation. The report shows that Africans are most vulnerable to death, disease and disability caused by unsafe drinking water, poor hygiene and other environmental factors.
- **151** – The number of countries that are members of the Ramsar Convention on Wetlands.
- **R5-million** – The maximum fines that can be issued by the country's new environmental policing unit. The so-called 'green police' will have powers of search and seizure, will be able to set up roadblocks, issue enforceable compliance notices and carry out routine inspections.
- **166 000** – The estimated number of buckets which still need to be eradicated in South Africa, according to Social Development Minister Zola Skweyiya. The majority of these are in the Free State.
- **92%** – The percentage of municipalities who had adopted Integrated Development Plans by July.
- **R3,34** – The price Rand Water's customers are paying for a kilolitre of water from July, after the bulk potable water supplier increased its price by 5%.
- **915** – The full supply level of the proposed De Hoop Dam, planned as part of the Olifants River Water Resources Development Project. The dam is expected to have a gross storage of 347 million cubic metres and a basin area of 1 690 ha.
- **R2,6-million** – Rand Water funds set aside in the present financial year to deal with encroachment of informal settlements on its pipeline network. This is up from R1,3-million budgeted last year.
- **17%** – The remaining percentage of South Africans who do not have access to potable water, according to President Thabo Mbeki.

# Natural wealth could lift Africa's poverty

Africa could lift itself out of poverty if the continent's wealth of natural resources is effectively, fairly and sustainably harnessed, according to a new report by the United Nations Environment Programme (UNEP).

From freshwaters to forests, and from minerals to the marine environment, the region is only realising a fraction of its nature-based economic potential, the report, *Africa Environment Outlook 2*, points out. The report says, for example, that the potential for tourism based around nature and cultural sites is huge but relatively untapped. "Africa has numerous tourist attractions, yet it contributes only 4% a year to the multibillion Dollar global tourism industry."

Similar arguments are made in terms of food in a region with "sufficient land resources to produce enough to feed its people, and yet one in three is undernourished at present." The report also overturns the popular view that Africa is short of water, rather it underlines how little of it is used for irrigation, drinking water and power generation.

Africa's renewable freshwater resource is close to 4 000 km$^3$ a year, about 10% of the global freshwater resource. Yet, in 2005, only about 5% of the development potential is being used for industry, tourism and hydropower, notes the report. There are about 50 internationally shared rivers and lake basins in Africa, making cooperation and collaborative management a key concern.

Availability is affected by natural phenomena, such as rainfall and climate variability, as well as human factors, such as population growth, inequitable water management, inefficient use and pollution. Extreme variability in rainfall – across time and space – results in uneven distribution of surface and groundwater resources, from areas of severe aridity such as the Sahara and Kalahari deserts, to the tropical belt of mid-Africa with its abundant freshwater resources.

*By enhancing its nature-based economic potential, Africa could lift itself out of poverty, according to a new UN report.*

One freshwater opportunity that remains particularly poorly utilised is hydropower. At present, less than 5% of this potential is utilised. The Congo River accounts for nearly 30% of Africa's surface water reserves, and has the largest hydropower potential in the world – much of it untapped. It is estimated that it could generate 40 000 MW, sufficient power supply for the whole of Africa with enough for export.

Alien invasive species from toads to trees are among the emerging issues facing Africa, says the report. Experts have pinpointed large numbers of life forms, deliberately or accidentally introduced into the region, which are poisoning cattle, damaging water supplies, carrying infections and affecting tourism. The highest number of alien species is found in South Africa, followed by Mauritius, Swaziland, Algeria, Madagascar and Kenya.

Black wattle, a tree introduced into South Africa about 150 years ago, is undermining river banks and harming wildlife in the Cape Floral Kingdom, one of the world's greatest biodiversity hotspots. Since 1995, the South African government has removed and destroyed some five million black wattle trees.

## Water Diary

**HEALTH & HYGIENE – SEP 18-29**
A two-week course on Linking Water, Hygiene & Sanitation to HIV/AIDS will be held in Nairobi, Kenya. The course is being organised by NETWAS International. Enquiries: Tel: 254-020-890555/6/60; Fax: 254-020-890553/54; E-mail: training@netwas.org; Web: www.netwas.org

**IRRIGATION – SEP 25-27**
The International Workshop on Global Irrigated Area Mapping, organised by the International Water Management Institute (IWMI) will be held in Colombo, Sri Lanka. Visit: www.iwmidsp.org/iwmi/giam-workshop/

**IWRM – SEP 26-28**
The Third International Symposium on Integrated Water Resources Management will take place in Bochum, Germany. Enquiries: Tel: +49-3641-35 33 221; E-mail: water@conventus.de; Visit: www.conventus.de/water

**MUNICIPAL ENGINEERING – OCT 11-13**
The 70th Conference of the Institution of Municipal Engineering of Southern Africa will be held at the University of Johannesburg, Soweto Campus. The theme is 'Knowledge for Action'. Enquiries: The Secretariat, Tel: (012) 667-3681;

**(continued on p 8)**

## New Group Executive for CSIR

Khungeka Njobe (36) has been appointed as Group Executive of CSIR.

Her portfolio includes research and development outcomes and strategic human capital development.

Her appointment follows the departure of Dr Phil Mjwara who is now Director-General at the Department of Science & Technology.

Before joining the CSIR Executive, Njobe headed CSIR's unit for Natural Resources and the Environment which spans the domains of mining, forestry, pollution and waste, water, resource-based sustainable development and ecosystems. "As part of its renewal process, CSIR has embarked on a targeted intervention with the long-term goal of growing its pool of skilled people in science, engineering and technology. Transformation and quality will be the main characteristics of this pool of expertise, with staff being trained in scarce science skills," commented Njobe.

## New life for pipelines

Rand Water has been upgrading two of its bulk water supply pipelines.

Reconditioning of the 48 km long B4 pipeline, which runs along the Umfoleni region, was reportedly completed in May at the cost of about R103-million.

In August, the bulk water supplier was to start reconditioning of its O2 pipeline, which runs from the Palmiet Pump Station to Modderfontin, on the East Rand. This 9 km pipeline is being renovated at an estimated cost of R40-million.

## Pipeline in progress

Civil Engineering Company Sanyati Holdings has secured a R37-million contract to construct a new pipeline for Umgeni Water.

The project, which is being undertaken by company subsidiary Afriscan Construction, involves the construction of a steel water pipeline from Amanzimtoti Water Works to Quarry Reservoir. As a social responsibility initiative, the local schools' water infrastructure would also be upgraded.

## Company briefs

- Prof Mzamo Mangaliso, formerly of the Isenberg School of Management at the University of Massachusetts, in the US, has been appointed as the new president of the **National Research Foundation**.
- **Gold-mining** companies Simmer and Jack, Harmony Gold, Anglogold Ashanti and Siltfontein Gold have joined forces to create a new water company to control, and sell underground pumped water from the Klerksdorp-Orkney-Stilfontein-Hartbeesfontein area in the North West.
- **Thames Water** was fined more than any other firm in England and Wales for pollution last year. The company, which received penalties totalling £128 000, was joined by other water giants Southern, Severn Trent and United Utilities in the top 10 list.
- The **Coca-Cola company** has severely polluted the groundwater around its bottling plant in Plachimada in south India, according to a new report. The Hazards Centre and the People's Sciences Institute, which conducted the study, reports that the nine samples collected showed excessive levels of chromium, while eight showed excessive levels of cadmium and six showed excessive levels of lead.

## Water Diary (continued)

Fax: (012) 667-3680; E-mail: confplan@iafrica.com; Web: www.imesa.org.za

**BIOFUELS – OCT 10-12**
South African Institute of Agricultural Engineers, Pretoria. Biofuels and various other relevant agriculture-related topics. Enquiries: Colin Talanda, Tel: 084 555 8044; Fax: (012) 842-4067; E-mail: dafelfp@arc.agric.za

**WASTEWATER – OCT 28-30**
The First International Symposium on Water and Wastewater Technologies in Ancient Civilisations will be held in Crete, Greece. Organised by the IWA, the symposium will examine which ancient water and wastewater technologies may still be relevant today. Enquiries: Dr AN Angelakis; Tel: +30 3810 245851; Fax: +30 2810 245873; E-mail: angelak@nagref-her.gr; Web: www.nagref.gr/symposium

**IWRM – NOV 1-3**
The Seventh Waternet/WARFSA/GWP-SA Symposium will take place at Capital Hotel, Lilongwe, Malawi. The joint symposia, which has the theme 'Mainstreaming IWRM in the Development Process' will provide a platform for researchers, policymakers and other stakeholders to meet and exchange ideas. Enquiries: Tel: +265 1 524 222 Ext 177 or 237; Fax: +265 1 524046; E-mail: symposium07@chanco.unima.mw; Visit: www.chanco.unima.mw or www.waternetonline.org or www.gwpsatac.org

**SUSTAINABLE DEVELOPMENT – NOV 13-17**
The 32nd WEDC International Conference will be held in Colombo, Sri Lanka. The theme is 'Sustainable Development of Water Resources, Water Supply and Environmental Sanitation'. E-mail: iesl@slt.lk or wedc.conf@lboro.ac.uk; Web: http://wedc.lboro.ac.uk/conferences/conference1.php?ID=7

**IRRIGATION – NOV 15-17**
The South African National Committee on Irrigation and Drainage is hosting a symposium on 'The Changing Face of

**(continued on p 10)**

# Regional Masters Degree Programme

## in Integrated Water Resources Management 2007

WATERnet

Building Capacity for Water Resources Management in Southern Africa

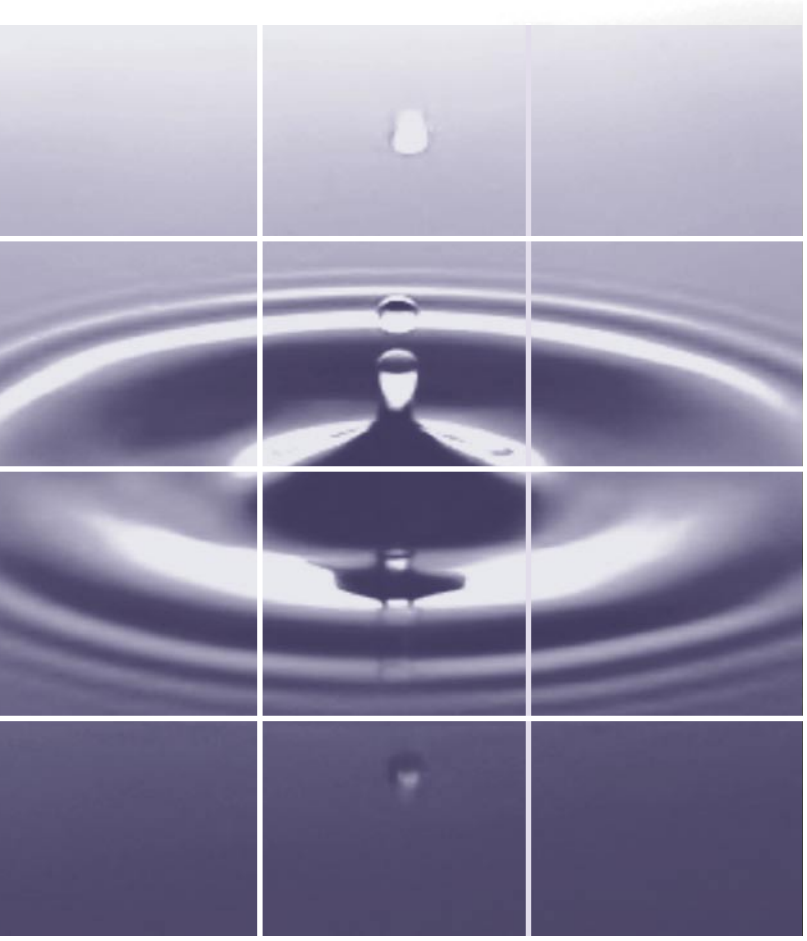
*Applications are herewith invited for admission to the regional Masters programme in Integrated Water Resources Management to be offered in 2007 by WaterNet member institutions.*

**Structure of the programme**

The programme comprises a compulsory core consisting of six modules, followed by a specialisation consisting of three modules and two electives.

**The compulsory modules are**:

Principles of IWRM; Principles of Hydrology; Socio-Economic Aspects of Water and Environmental Resources; Principles of Aquatic Ecology and Environmental Management; Policies, Laws and Institutions; Project



**The specialisations are**:

**Specialisation 1: Water Resources Management**

- Water Analysis and Planning
- GIS and Database Management
- Catchment Management

**Specialisation 2: Hydrology**

- Hydrogeology
- Remote Sensing and GIS
- River Engineering

**Specialisation 3: Water and Environment**

- Environmental Impact Assessment
- Water Quality Management
- Environmental Water Requirements

**Specialisation 4: Water for People**

- Water Supply and Sanitation
- Utility Management
- Waste Water Management

**Specialisation 5: Water and Society**

- Water and Security
- Environmental Education
- Water and Development

**Specialisation 6: Water and Land**

- Agricultural Water Management
- Wetlands, Ecology and Management
- Catchment Management

**Financial assistance**

WaterNet will offer scholarships to selected successful applicants. The scholarship covers tuition, fees, travel, accommodation, and reasonable living expenses.

**How to apply**

The initial application is made to the WaterNet Secretariat, who will then pass the application to the relevant member institution.

**The application should include:**

- An application letter in which first and second choices of specialisation are clearly indicated.
- A short curriculum vitae with academic background and professional experience.
- A one-page essay motivating why you should be selected for the Masters programme and the reason for your choice of specialisation.
- Copies of degree transcripts and certificates.
- A letter of support from your employer.

**Applications will only be considered upon submission of all of the above requisites.**

Submit the application in electronic form to waternet@eng.uz.ac.zw or in hardcopy to WaterNet, PO Box MP 600, Mount Pleasant, Harare, Zimbabwe. **Applications should reach WaterNet on or before 15 September 2006.** ***(PS: Please clearly distinguish your first name, other name(s), and surname in your application.)***

Only the successful applicants will be contacted. If you have not been contacted by the end of January 2007, please consider your application unsuccessful.

**For any further information, please contact the WaterNet Secretariat.**

T: +263-4-333248 or 336725
F: +263-4-336740
E: waternet@eng.uz.ac.zw
I: www.waternetonline.org

SADC

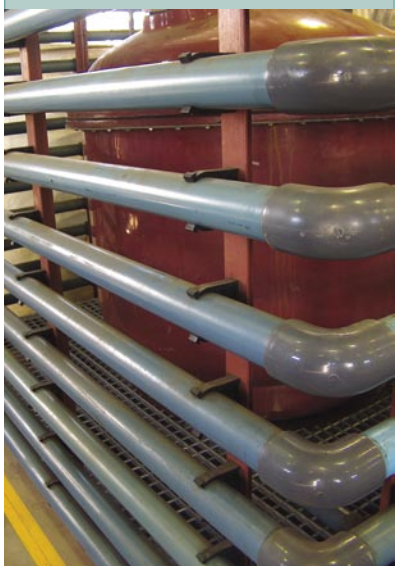
A strategic programme of the SADC Water Sector

## A fix for pipes before they fail

Researchers of CSIRO in Australia have developed a predictive model for estimating likely failures in underground pipeline networks made from a range of materials.

The model reportedly uses probability distributions – developed from anecdotal evidence from industry and forensic investigation of failed pipes – to estimate the probable defect size along a pipe, and the probable loading conditions the pipeline experiences.

"The model preserves the detail of physical degradation and failure mechanisms that occur in service, and can account for changes in operating loads and the surrounding soil environment," explains Dr Paul Davis of the Integrated Urban Water Systems research team. "However, we can also extrapolate the model to estimate network-wide failure rates, which are more meaningful for utility asset managers."



## World water briefs

- The **European Investment Bank** has signed a loan agreement with the Mozambican government for €31-million for the rehabilitation and expansion of the Maputo water supply system.
- **Portugal** has guaranteed €5-million for preliminary studies into the construction of the Bue Maria Dam on the Pungoe River in central Mozambique under a new agreement signed between the two countries in July.
- Despite being hit by one of the worst drought in 100 years, residents of the **Australian** town Toowoomba have said no to a scheme to supplement their drinking water with recycled wastewater. The 100 000 residents voted overwhelmingly against the idea, despite enduring tough water regulations.
- The world's largest cities are working together to tackle climate change under a new partnership spearheaded by former US president **Bill Clinton**. The partnership is aimed at reducing greenhouse gas emissions and increasing energy efficiency.
- Researchers at the University of Vermont, in the **US**, are developing a computer model that will give a sophisticated portrait of the ecosystem dynamics and value for any spot on earth.

## Rooftop harvested water quality questioned

An international review, published by the International Water Association, shows that the quality of harvested water from roof catchments often does not meet the drinking water guideline values.

Most of the studies from different parts of the world revealed that harvested water is heavily contaminated microbiologically unless special care is taken during collection and storage of rainwater. Heavy metals and trace organics could also pose problems in some cases.

Appropriate treatment of collected rainwater is necessary to make the harvested rainwater fit for drinking. The review also shows the need for further research on proper design and maintenance strategies to reduce contamination of roof-collected rainwater supplies.

To access the review, go to www.iwaponline.com/jws/055/jws0550257.htm

## Rare clouds spotted above Antarctica

Rare clouds spotted above Antarctica are a possible indication of global warming, Australian scientists say.

The so-called nacreous clouds can only form in temperatures lower than minus 80˚C, and are occasionally produced by air rising over Arctic and Antarctic mountains in high polar attitudes during winter.

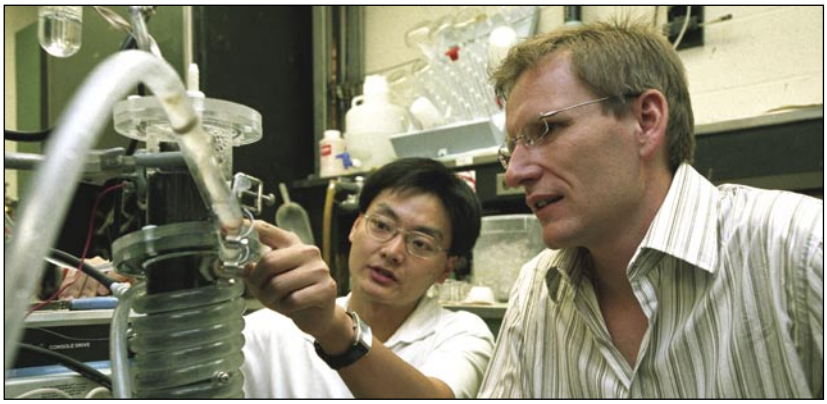
More than a curiosity, these clouds apparently reveal extreme conditions in the atmosphere, and promote chemical changes that lead to destruction of the vital stratospheric zone.

## Water Diary (continued)

Irrigation in Southern Africa' at Aventura Swadini, Mpumalanga. Enquiries: Isobel van der Stoep; Tel: (012) 420-2174; Fax: (012) 362-5218; E-mail: Isobel.vanderstoep@up.ac.za; Web: www.sancid.org.za

**AGRICULTURAL INNOVATION – NOV 20-23**
The Innovation Africa Symposium will convene a group of internationally recognised experts on innovation systems to share their latest thinking with agricultural researchers and development partners. Enquiries: Dr Susan Kaaria, Rural Innovation Institute, Tel: *+256 41 5678; Fax: +256 41 56 7635; E-mail:* s.kaaria@cgiar.org

## Energy from wastewater



*Jason He and Dr Lars Angenent seek to perfect a microbial fuel cell.*

Researchers at Washington University, in the US, are working on a microbial fuel cell that generates electricity from wastewater.

Advances in the design of this fuel cell in the last year have reportedly increased the power output by a factor of ten. Wastewater enters from the bottom of a system and is continuously pumped up through a cylinder filled with granules of activated carbon. The organic matter in the wastewater provides food for bacteria that have developed a biofilm on a simple electrode in the anode chamber. A U-shaped proton exchange membrane inside the anode chamber separates the anode from the cathode.

As the bacteria feed on the organic material in the wastewater they release electrons to the anodic electrode. These electrons then move to the cathodic electrode via a copper wire. The formed protons are transferred through the membrane towards the cathode where they react with electrons and oxygen to form water. A maximum of 29 Watts per cubic metre of solution has been achieved.

## New guidelines for drinking water quality

The Third Edition of the World Health Organisation's *Guidelines for Drinking Water Quality* is now available.

This edition reportedly includes significantly expanded guidance on ensuring the microbial safety of drinking water – in particular through comprehensive system-specific 'water safety plans'. Information on many chemicals has been revised to account for new scientific information and information on chemicals not previously considered has been included. For the first time, reviews of many waterborne pathogens are provided.

To access the report online, go to www.who.int/water_sanitation_health/en/

## Purification method uses less space, energy

Delft University Technology researchers, in the Netherlands, in partnership with DHV Engineering, have reportedly developed a compact and environment-friendly water purification method in which aerobic bacteria form granules that sink quickly.

With this aerobic granular sludge technology, aerobic bacterial granules are formed in the water that is to be purified. All the required biological purifying processes occur within the granules.

It is reported that the new purification system only requires a quarter of the space required by conventional installations, and uses 30% less energy.

## Save the environment, drink beer

Beer drinkers can now enjoy a pint with a clearer conscience after a Japanese university demonstrated that beer bran, a byproduct of the brewing process, can be used to clean polluted water.

*New Scientist* magazine reports that researchers at Kobe Pharmaceutical University found that the bran adsorbs hazardous organic compounds, including benzene and trichloroethylene (used in adhesives and paint) from chemical and industrial wastewater.

Companies commonly use activated carbon filters to remove pollutants from water. However, it is reportedly expensive and energy-consuming to produce.