Water wins at consulting engineering awards

A number of water-related projects were winners at this year's Consulting Engineers South Africa (CESA) Glenrand MIB Engineering Excellence Awards.

The Awards is a celebration of innovation, quality, outstanding workmanship and professionalism. While WSP Africa Coastal Engineers received a commendation for the Dense Effluent Marine Outfall at Richards Bay in the category for projects valued at more than R100-million, Knight Piésold Consulting won the prize for the Ntimbale Dam project undertaken for the Botswana government in the category for projects valued at between R10-million and R100-million. SSI Engineers and Environmental Consulting received a commendation for the Nereda Wastewater Treatment works in Gansbaai in the same category.

In the category of Engineering Excellence with a value less than R10-million, Bosch Projects won the award for the Durban Harbour Tunnel Trolley System while Kwezi V3 Engineers scooped the commendation for the George Garden Route Dam project.

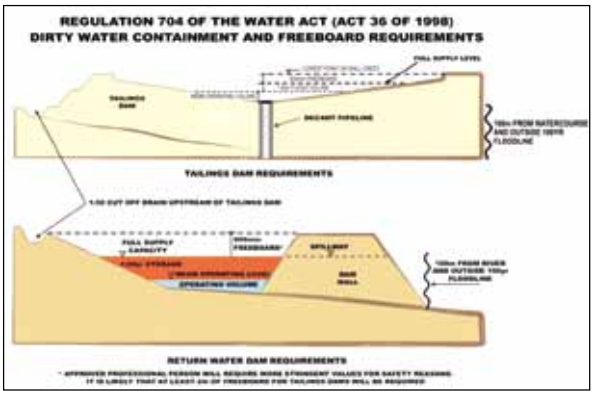
Winners pose at the CESA Glenrand MIB Engineering Excellence Awards 2009

Clearing the way for dirty water reuse

A dramatic change of attitude by mining bosses in African countries is smoothing the way to more sophisticated water management procedures being initiated that will lead to improved production and protection of the environment.

Five years ago, the mining industry baulked at the treatment and reuse of mine-water. Today, the industry can save up to 40% of its daily freshwater intake by reusing processed mine and sewage water, says Peter Shepherd, principal hydrologist and a partner in the Johannesburg office of SRK Consulting. He reports that the water unit of the consulting firm is currently busy with some 75 projects on mines, some as far north as Senegal, where the implementation of the latest techniques in water management is required.

Shepherd explains that in water-short areas water authorities limit the daily supply of freshwater to the mining industry, which could limit production. However, in some instances, this challenge is overcome and production is improved by treating and reusing sewage water and other used water in mining processes. "Management now understands what qualities of water may be reused within the various elements of a minerals recovery plant. Since there is no need to treat water to produce potable-quality water for reuse purposes, costs are reduced."



Illustrating Regulation 704 of the National Water Act regarding dirty water containment and freeboard requirements.

Considerable research has been done to find ways to reuse water with a minimal amount of treatment, and further research should be done to lessen industry's strain on the environment, maintains Shepherd. "There is a definite drive today, both from government and mining's side, to increase the reuse of water so as to reduce pressure on scarce water resources."

Among other important services being sought by the mining sector is flood prevention, which involves the design of infrastructure so that mine workings, either underground or openpit operations, are not flooded. The objective of this is to keep clean water clean and to prevent dirty water from leaving the mine. Dirty water is kept in stormwater control dams and reused.

"In the past 15 years there has been a change in the thinking of mining companies. Inititally, it was more compliance driven, but today management realises that they have to clean up their mess anyway because each mining operation has a mine plan in places that includes a procedure for eventual mine closure," notes Shepherd.

Power station water plants refurbished

VWS Envig has completed the refurbishment of the potable and demineralisation plants for Eskom's Grootvlei Power Station.

The power station falls under the power generator's return-to-service initiative to increase its reserve margin, and will once again see production after almost two decades of inactivity.

The contract, valued at R24-million, included a pre-treatment plant situated at the Vaal Dam, where water is put through coagulant pre-treatment processes, as well as a clarifying system. Treated water is then pumped to the Grootvlei Power Station where it is stored in terminal reservoirs. Once the water leaves the terminal reservoirs it is treated in a flocculation chamber to remove suspended solids.

The water is then put through two clarifying systems and rapid sand filters. From here the water is split into two separate streams: one destined for drinking water, which is chlorinated and disinfected; and the other for the demineralisation plant. Demineralised water will be used to produce super heated steam to drive the station turbines.

VWS Envig ran the plant for three months in collaboration with Eskom to ensure that plant personnel are adequately trained before the plant is handed over. "Each brownfield project has its own unique set of challenges which require unique solutions. The greatest challenge on the Grootvlei project has been adapting old technology commissioned in 1968 to meet modern standards," reported VWS Envig Project Engineer Julius Pistorius.

Peer pressure helps people to stay green

People are more likely to participate in conservation programmes if their neighbours do – a tendency that should be exploited when it comes to protecting the environment, according to a study from Michigan State University (MSU), in the US.

The research is believed to be the first to focus on the phenomenon of social norms in the context of China's conservation efforts, said Jianguo Liu, University Distinguished Professor and study co-author. The study focused on a mammoth government initiative called Grain to Green that pays Chinese farmers to convert cropland back to forest. While money is a key factor in whether people sign up for the voluntary programme, peer pressure also plays a surprisingly large role.

"That is the power of social norms," noted Liu. "It is like recycling. If you see your neighbours doing it, you are more likely to do it."

Xiaodong Chen, MSU doctoral student and lead author of the study, believed that government officials should leverage these social norms along with economic and demographic trends when deciding how to support conservation programmes. "We found that, without considering the social norm factor, the conservation payments may not be used efficiently. But if the government considers social norms as they decide where to invest money, they could possibly obtain more environmental benefits in communities that are more supportive of these programmes rather than those who are not."

Permafrost melt poses major climate change threat

New research shows that the amount of carbon stored in frozen soils at high latitudes is double previous estimates and could, if emitted as carbon dioxide and methane, lead to a significant increase in global temperatures by the end of this century.

"Massive amounts of carbon stored in frozen soils at high latitudes are increasingly vulnerable to exposure to the atmosphere," says Executive Director of the Global Carbon Project at CSIRO, Dr Pep Canadell. "The research shows that the amount of carbon stored in soils surrounding the North Pole has been hugely underestimated."

According to Dr Canadell, frozen high-latitude soils have the potential to release vast quantities of carbon and methane into the atmosphere and subsequently influence carbon-climate feedbacks. "Warmer temperatures at high latitudes are already resulting in unprecedented permafrost degradation," he reports. "Projections show that almost all near-surface permafrost will disappear by the end of this century exposing large carbon stores to decomposition and release of greenhouse gases."

Models developed in collaboration with Dr Canadell show that global warming could trigger an irreversible process of thawing. A number of feedbacks increase the vulnerability of these soils. For example, heat generated from increased microbial activity could lead to sustained and long-term chronic emissions of carbon dioxide and methane. In addition, 'thermofrost lakes' formed as permafrost thaws, would draw heat to deeper layers and bring methane to the surface. Increased fire frequency will also trigger permafrost degradation and thermokast collapse.

"Using the new carbon pool estimates from this research, permafrost degradation could account for the entire upper range of carbon-climate feedbacks currently estimated by climate models," notes Dr Canadell.

UN report promotes rain-water harvesting

A joint report from the Stockholm Environment Institute (SEI) and the United Nations Environment Programme (UNEP) outlines the advantages of investing in rainwater harvesting.

The publication, *Rainwater Harvesting: a Lifeline for Human Well-being*, highlights the potential of rainwater harvesting as a way to create synergies in landscape management and human well-being. The report explains how rainwater harvesting can serve as an opportunity to enhance ecosystem productivity, thereby improving livelihoods, human well-being and economies.

"Rainwater harvesting has often been a neglected opportunity in water resource management because only liquid water in surface and groundwater sources is usually considered. If we develop better ways of managing rainwater, we can improve water supply, enhance agricultural production and even sustain the ecosystem services we rely upon," reports SEI researcher Jennie Barron.

Rainwater harvesting is the collective term for a wide variety of ways of collecting and storing rainfall, be it soil as storage, man-made dams, tanks or containers. The intention is to improve water management for multiple purposes.

With farms being the most important ecosystem for human welfare, rainfed agriculture provides nearly 60% of global food value. Needless to say, rainfall variability constitutes a challenge to such agricultural systems.

"Low agricultural productivity often aggravates a negative spiral in landscape productivity, with degradation of ecosystem services through soil erosion, reduced vegetation cover and species decline," notes Barron.

She says that rainwater harvesting deserves serious consideration, as it is economic and reduces pressure to withdraw water from existing groundwater and/or surface water sources which could negatively impact ecosystem habitats and services.

"Rainwater harvesting is not a magic bullet but it can be effective as a complementary and viable alternative to large-scale water withdrawals, and as a way of reducing the negative impacts on ecosystem services, not least in emerging water-stressed basins.," Barron concludes.

To access the report, Visit: www.unep.org/Themes/Freshwater/PDF/Rainwater_Harvesting_090310b.pdf

Disaster risk on the rise – report

The world's disaster risk is increasing, according to the first *Global Assessment Report on Disaster Risk Reduction*, published by UNESCO.

Disaster risk is concentrated in a very small portion of the Earth's surface and is unevenly distributed, the report finds. A mere handful of countries have been struck by more than one mega-disaster in the past 30 years: Bangladesh, China, India, Indonesia, Japan and the USA.

Although mega-disasters remain rare, half of the 14 costliest disasters since 1976 occurred in the past five years. These include the Sichuan earthquake in May 2008, which killed at least 87 566 Chinese and affected more than 60 million.

The report argues for a radical shift in development practices and a fresh emphasis on resilience and disaster planning, especially in poorer countries which are more at risk. Addressing the underlying drivers of risk such as the lack of access to social protection requires specific attention.

The report observes that 'economic growth per se does not lead to reduced disaster risk: as economies grow, exposure tends to increase at a faster rate than vulnerability can decrease. Greater social equity can not only reduce vulnerability by also alleviate poverty.'

To read the report visit: www.preventionweb.net/english/hyogo/gar/report/

Bio-fuel thirstier than conventional power

Production of bioethanol – often regarded as the clean-burning energy source of the future – may consume up to three times more water than previously thought.

This according to a study of scientists from the University of Minnesota, in the US, published in *Environmental Science & Technology*.

Sangwon Suh and colleagues point out in the study that annual bioethanol production in the US is currently about 34 000 Mℓ and note that experts expect it to increase in the near future. The growing demand for bioethanol, particularly maize-based ethanol, has sparked significant concerns among researchers about its impact on water availability. Previous studies estimated that a gallon (3,8 ℓ) of maize-based bioethanol requires at least 263 gallons (996 ℓ) of water from the farm to the fuel pump. But these estimates failed to account for widely varied

regional irrigation practices, the scientists say.

The scientists made a new estimate of bioethanol's impact on the water supply using detailed irrigation data from 41 US states. They found that bioethanol's water requirements can be as high as 861 gallons (3 259 ℓ) of water from the field to the fuel pump.

To read the full article visit http://pubs.acs.org/stoken/presspac/presspac/full/10.1021/es8031067

Fellowships announced for African women in agriculture

International organisation African Women in Agricultural Research and Development (AWARD) announced its selection of 61 women scientists who will receive the AWARD Fellowship designed to boost the female talent pool for African agriculture.

Chosen from nearly 500 applicants these women bring with them scientific and development expertise that has great potential to tackle the food crisis and climate change while improving the daily lives of small-scale farmers. The winners represent ten African countries, including Ethiopia, Ghana, Kenya, Malawi, Mozambique, Nigeria, Rwanda, Tanzania, Uganda and Zambia.

An estimated 80% of Africa's farmers are women, while between 60% and 80% of Africa's food is produced by women. "Yet, only 5% of agricultural extension and 10% of rural credit reaches women," notes AWARD Director Vicki Wilde.

"Part of the reason for this is that women comprise only 25% of the agricultural research and development (R&D) pool and very few hold positions of leadership."

According to Wilde this means that there are not enough African women in a position to influence the priorities for agricultural R&D. "Much more needs to be done to ensure rural women's voices and needs are brought into laboratories and field projects."

AWARD is supported by the Bill & Melinda Gates Foundation and the US Agency for International Development.

Virtual farm modelling helps Aussie farmers grow profit

CSIRO, Queensland Primary Industries and Fisheries and the University of Queensland have joined forces to develop new agriculture modelling technologies to help farmers improve crop risk management and profitability.

The joint venture has been formed to further develop the Agricultural Production Systems Simulator (APSIM) – a computer simulation model which takes into account many of the factors affecting a farm's success, including different plant, soil and management approaches, to inform on-farm management decisions.

APSIM has a range of applications, including farming system design, assessment of seasonal climate forecasting, supply-chain planning, development of waste management guidelines, risk assessment for government policy making, as well as guiding research and educational activities.

Director of CSIRO's Sustainable Agriculture Flagship, Dr Brian Keating, says the initiative will help Australian agriculture respond to the critical challenges of increasing productivity while reducing its environmental footprint. "The research team is well placed to build on its past achievements and achieve new innovations in knowledge-based systems to support the productivity gains and enhanced management practices needed for the future prosperity of Australian agriculture."