

Warmer world threatens 500 million people more with water scarcity

More than 500 million people might face increasing water scarcity. This is according to studies published by scientists of the Potsdam Institute for Climate Impact Research (PIK).

"We managed to quantify a number of crucial impacts of climate change on the global land area," says Dieter Gerten, lead author of one of the studies. Mean global warming of 2°C, the target set by the international community, is projected to expose an additional 8% of humankind to new or increased water scarcity.

"If the population growth continues, by the end of our century under a business-as-usual scenario these figures would equate to well over one billion lives touched," Gerten points out. "This is on top of the more than one billion people already living in water-scarce regions today." Parts of Asia and North Africa, the Mediterranean and the Middle East are particularly vulnerable.

Global first online water footprint tool launched

The Water Footprint Network has launched the world's first online tool to calculate and map water footprints and assess their sustainability.

The Water Footprint Assessment (WFA) Tool 1.0 was created by the Water Footprint Network in collaboration with the University of Twente and three funding partners: DEG, IFC and Unilever.

The tool is free and can be used by anyone interested in sustainable, efficient and fair water use, including businesses, governments, non-governmental organisations, investors, researchers and communities. It provides them with insight into how water is used and the impacts resulting from those uses.

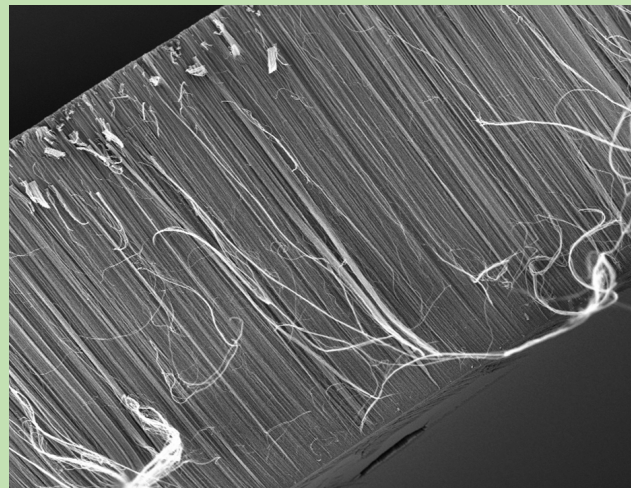
Plasma-treated nano filters cited to help purify world water supply

Access to safe drinking water is a step closer to being a reality for those in developing countries, according to research published in *Nature Communications* earlier this year.

The study paves the way for the next generation of portable water purification devices, which could provide relief to the 780 million people around the world who face every day without access to a clean water supply.

An international team of researchers – led by Associated Professor Hui Ying Yang from Singapore University of Technology and Design – showed that water purification membranes enhanced by plasma-treated carbon nanotubes are suitable for removing contaminants and brine from water. According to Dr Han, these membranes could be integrated into portable water purification devices the size of a tea pot that would be rechargeable, inexpensive and more effective than many existing filtration methods. Contaminated water would go in one end, and clean drinkable water could come out the other.

"Small portable purification devices are increasingly recognised as the best



way to meet the needs of clean water and sanitation in developing countries and in remote locations, minimising the risk of many serious diseases," said Dr Han. "The large industrialised purification plants we see in other parts of the world are just not practical – they consume a large amount of energy and have high labour costs, making them very expensive to run."

The team's study showed that carbon nanotube membranes were able to filter out ions of vastly different sizes – meaning they were able to remove salt, along

with other impurities.

Now that the researchers have proven the effectiveness of the method, they plan to extend their research to investigate the filtration properties of other nanomaterials. They will begin by looking at grapheme, which has similar properties to carbon nanotubes, but could be made considerably denser and stronger.

To access the original article, Visit: <http://www.nature.com/ncomms/2013/130813/ncomms3220/full/ncomms3220.html>

The tool takes users through a structured process to quantify and map their water footprints. This can be carried out for a geographic area (by specific location, such as a river catchment, in multiple locations or across an entire country), or for a single production process/multiple processes (by sector, company, individual facility, throughout the supply chain).

Then the tool analyses the sustainability of water footprints in terms of water scarcity. This means that users can identify whether their water footprints are in a 'water hotspot' – a location where water use exceeds freshwater availability.

To access the WFA Tool 1.0 free of charge Visit: www.waterfootprint.org/?page=files/waterfootprintassessmenttool

Water advice to African farmers via cellphone

The information revolution has transformed farming in many parts of the world. Sophisticated computer models can now process huge quantities of data from satellites to local hydrological stations, producing accurate forecasts for even the remotest regions.

Poor farmers in Africa, however, often struggle to get even basic information about water, weather and other factors that might affect their crops. Recent innovations in computing have enabled extension workers with access to the Internet to partly address this information gap. However, coverage is patchy and the

information supplied can be too vague or too late to be of much use.

To address this, the International Water Management Institute (IWMI) and its partners at eLeaf have been exploring the use of information and communication technology to increase agricultural productivity. The outcome of this project was launched in Turkey earlier this year at the First World Irrigation Forum.

"The project aims to provide farmers with irrigation, agriculture and weather-related advice and information direct to their cellphones," said project leader, Bharat Sharma. "The tool enables growers to make more informed decisions, and negotiate more efficient and equitable transactions with water- and farming-related service providers."

The project is currently being

Despite progress high rates of child mortality still plague southern Africa

Southern Africa, along with Eastern Africa, has managed to improve its child survival rate by more than 50% since 1990 – and in the past seven years has been among the best performing regions in the world.

This is according to the latest report from the United Nations Children's Fund (UNICEF).

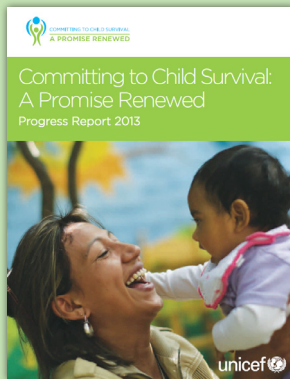
Yet, the region has high rates of mortality, with one in every 13 children dying before the age of five.

According to the report, *Committing to Child Survival: A Promise Renewed*, despite rapid progress in reducing child deaths since 1990, the world is still failing to renew its promise of survival for its most vulnerable citizens.

Diarrhoea, which is largely preventative through measures such as safe drinking water and improved sanitation, accounts for 9% of all under-five deaths – a loss of more than 580 000 child lives in 2012. Most of these deaths occur among children less than two years old.

The good news is that from 2000 to 2012, the total annual number of deaths from diarrhoea among young children decreased by more than 50%, from almost 1,3 million in 2000 to about 0,6 million in 2012. Three-quarters of all child deaths occur in just 15 countries, most of them in Africa.

"Child survival is a shared responsibility," writes UNICEF Executive



Director, Anthony Lake, in the Foreword of the document. "Every segment of society has a role to play. Through investments in domestic production, as well as research and development, the private sector wields enormous influence over the availability, affordability and quality of life-saving commodities and medicines.

"Equally important are the civil society groups that advance the child survival agenda through action and advocacy. Whether delivering life-saving vaccines to the women and children in greatest need, or advocating on their behalf, civil society networks are powerful agents of change. They, like few others, can mobilise their communities to denounce the inevitability of preventable deaths. Each voice that speaks out against the death of a child is a reminder of unfulfilled promises and a call for urgent action."

implemented in Egypt, Ethiopia and Sudan. At the time of writing, about 60 farmers at each of four sites had been trained to use cellphones that can provide instant access to real-time agricultural and climatic data. This is customised to each individual farmer, allowing them to plan at the individual field scale not just what to plant but when the weather conditions will be just right for achieving maximum success. Satellite images, which can depict

areas as small as 20 m², are analysed weekly for particular characteristics such as changes in field soil moisture.

The imagery is combined with various data, including weather records, river flow measurements and calculations of how well a particular crop may be growing at any given point. "Providing individual farmers with specific advice enables them to plan, at field level, what to plant and irrigate, and they can also

find out when weather conditions are just right for achieving maximum success," noted Sharma.

The system is interactive, so farmers can request information via SMS and then receive instant irrigation advice. As the harvest matures, the system will be able to dispense crop-specific advice on when, and how much, to water each

field. This will contribute to more efficient use of water resources, and improve the livelihoods of some of the world's poorest farmers.

After the initial phase has been evaluated, researchers plan to explore partnerships with local telecom service providers to further develop and expand these services throughout Africa.

Drip irrigation firms wins international water award

Israeli firm Netafim, a global leader in drip- and micro-irrigation solutions, has won the Stockholm Industry Water Award for 2013.

Currently, more than ten million hectares of farmland are irrigated with drip irrigation, a technology that dramatically improves water, energy and labour productivity. The use of drip irrigation typically halves water use compared to other irrigation solutions, and at the same

time increases crop yields.

"Globally, 70% of our freshwater is used for irrigation and, with rapidly expanding demand for agricultural products, there is a dire need to improve water productivity. Netafim's remarkable achievements, helping farmers across the world to 'grow more with less', are directly contributing to a more water and food secure world," said the Stockholm Industry Water Award Committee in its citation.

Recycling, proper waste management can be 'gold mine' – UN study

Some 3.5 billion people, half the world population, lack crucial waste management services, significantly harming the environment, health and economies.

This is according to the United Nations study, *Guidelines for National Waste Management Strategies: Moving from Challenges and Opportunities*. The report further stresses that recycling and proper management can be a literal and metaphorical gold mine

"Open dumping, the most prevalent waste disposal method in many countries, can lead to acute health impacts for those living closest to dumping sites, most often the urban poor," the UN Environment

Programme said. "In addition, poor waste management can lead to significant environmental hazards: leachate from waste can contaminate soil and water, open burning of waste can cause air pollution and a failure to use recycled materials from waste means acceleration in the depletion of 'raw' materials," it added.

Beyond the potential amount of recovered gold possible from electrical and electronic waste, the study notes that recovered copper, aluminium and rare metals would exceed by many times the levels found in typical ores. Printed circuit boards are "probably the richest ore stream you are ever going to find," it says.



New from the WRC

Report No. 1723/1/13

Technical support document to the development of guidelines for the utilisation and disposal of water treatment residues (JE Herselman)

Water treatment residues (WTRs) are produced on a daily basis and should be managed. Therefore guidelines for the use and disposal of these residues are important. This guideline has been developed to ultimately allow regulatory bodies to distinguish between wastewater sludge and WTR in their land disposal requirements, and should enable water treatment works to dispose of their residues onto nearby land, thus saving on transport and landfill costs.

Report No. 1942/1/13

Operational and design considerations for high rate clarifiers in the South African water treatment industry (S Budhram; M Nyuswa; R Rajagopaul & P Thompson)

This study was initiated with the intention of contributing to bridging the current knowledge gap that exists in developing countries regarding the use of high-rate clarifiers for water treatment. The project aimed to contribute to the current understanding of the operation, maintenance and process requirements as well as limitations for high-rate clarifiers, based on investigations conducted on a demonstration plant, and to provide practical guidance on the selection, design and operation of high-rate clarifiers, among others.

Report No. KV 308/12

Potential climate change impacts on Karoo aquifers (R Dennis; I Dennis; P Ramlhomela & C Hogan)

To date, very little research has been conducted on the future impact of climate change on groundwater resources in South Africa. Climate change can affect groundwater levels, recharge and groundwater contribution to baseflow. This document serves as a first step in

assessing the impact of climate change on South African Karoo aquifers.

Report No. 1680/1/13

Thyroid-disrupting activity in the South African aquatic environment (JH van Wyk)

Global concerns have been raised about the possibility that environmental chemicals (mostly man-made) may interfere with the endocrine systems of wildlife and humans. The overall objective of this project was to set up and evaluate the so-called XEMA approach to identify thyroid disruption activity, and to evaluate the potential to actually screen environmental water using *Xenopus laevis* tadpoles. At the same time the potential to include freshwater fish species as models was also investigated.

Report No. TT 564/13

Social franchising partnerships for operation and maintenance of water services: Lessons and experiences from an Eastern Cape pilot (K Wall & O Ive)

The franchising concept to operate and maintain water services was implemented on rural schools and household water and sanitation facilities in the Eastern Cape with funding from the WRC and Irish Aid following extensive research. The primary objectives of the pilot project were to demonstrate the suitability of social franchising partnerships and to develop a model which can be used for rolling out similar services to more schools. This report records the success of the project in terms of the quality and reliability of service delivered.



Report No. 2111/1/14

Remote and manual radio telemetry methods to monitor and use fish behaviour in South Africa's inland waters (TJG O'Brien; F Jacobs; M Burnette; P Krüger; IF Botha & JA Cordier)

Remote and manual monitoring techniques are internationally recognised as an effective way of acquiring a wide range of behavioural information of freshwater fishes and other aquatic animals over extended periods within their natural environments. This WRC-funded study was established to develop remote and manual radio telemetry methods to monitor and use fish behaviour in South Africa's inland waters. The system was then successfully tested during four case studies.

Report No. 2090/1/13

Upscaling community-based partnerships in South Africa (M Goldman; K Gull; T Jooste; N Kola; L Loate; V Munnik; I Palmer & BF Rawat)

The objectives of this study were to undertake an assessment of the current scale of community-based service provision in South Africa and locate places where good practice is being applied; identify the key factors of success for the large-scale implementation of community-based service provision; draft a strategy discussion document on integration of community-based water services provision; and further develop and/or refine the draft strategy through interactive engagement with key stakeholders responsible for water service provision in rural areas.

Report No. TT 552/13

WATCOST – Manual for a costing model for drinking water supply systems (CD Swartz; P Thompson; P Maduray; G Offringa & G Mwiinga)

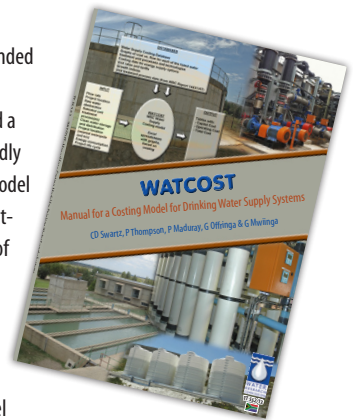
A WRC-funded project developed a user-friendly costing model for estimating costs of drinking water-supply systems.

This model allows economic comparison between different water treatment and supply options being considered for a water-supply scheme. It further allows costing reports to be created for existing water treatment systems, which assists with budgeting and asset management processes. The aim of this manual is two-fold: firstly, it can be used as a reference document for information on costing data for water-supply projects, with actual costing figures that can be obtained from the tables and graphs in the document. Secondly, the manual is also an aid to using the WATCOST model to obtain costing data for water-supply projects, either in total or for specific components in the drinking water-supply cycle.

Report No. 1930/1/12

The estuary health index: A standardised metric for use in estuary management and the determination of ecological water requirements (J Turpie)

This manual sets out a standardised and tested method for assessing the health of an estuary as a baseline and against which to set future objectives and measure progress according to management targets. Its intention is for use in the determination of the freshwater Reserve for estuaries, as well as for use in management of estuaries generally. The manual is written for use by estuary scientists in carrying out the assessment as well as for water, catchment and estuary managers who manage the process.



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Water diary

Ecosystem health November 20-21

North West University is hosting its fourth Annual Eco Health Research Forum at Golden Gate Highlands National Park, Clarens. The theme for this year's conference is 'Multidisciplinary Reflections on Environment, Health and Well-being Research in Southern Africa'. *Enquiries: Yolandi Krone (Conference administrator); Email: yolandi.yevents@gmail.com; Cell: 082 553 6463.*

Microbiology November 24-27

The South African Society for Microbiology is holding its 18th Biennial Congress at Forever Resorts Warmbaths in Bela Bela. The theme of the congress is 'From Africa to the World: Trending Microbiology'. *Enquiries: Shelley Abrahams (Conference Secretariat); Tel: (011) 463-5085; Fax: (011) 463-3265; Email: shelley@soafrica.com or Visit: www.sasm2013.co.za*

Water history November 29 to December 5

North West, Pretoria and Great Zimbabwe universities, together with the Kara Heritage Institute are hosting an international conference on water research and heritage. The safari style conference will take delegates to the Modjadji and Mapungubwe World Heritage sites in Limpopo as well as the Great Zimbabwe World Heritage Site in Zimbabwe. *Enquiries: Dr Marika van der Walt (Email: marikav@law.co.za) or Prof Johann Tempelhoff (Email: www.johann.tempelhoff@nwu.ac.za)*

Food security and climate change December 3-5

The third Global Conference on Agriculture, Food and Nutrition Security and Climate Change will be held in

Johannesburg. The conference will include high-level discussions on a Climate Smart Agriculture Alliance. The conference is organised by the governments of South Africa and the Netherlands, in collaboration with partners such as the FAO and the World Bank. *Visit: www.arc.agric.za*

Young Water Professionals December 7-10

The 7th International Young Water Professionals Conference will take place in Taipei, Taiwan. The deadline for abstract submission is 31 March 2014. Conference topics include water treatment and management, water reuse and desalination, energy saving, nutrient removal and recovery, health-related issues, nanotechnologies, sludge management and wetlands and climate change. *Email: ywp2014@iwahq.org or Visit: www.iwa-ywp7.org*

Young Water Professionals December 9-11

The Third East African Young Water Professionals Association Conference will take place in Nairobi, Kenya, with the theme 'Securing our water and energy resources in the face of climate change'. *Email: keywpa@gmail.com*

Gender and water February 19-21

A conference on Gender, Water & Development will be held at the ICC East London with the theme 'Gender, water and development – The untapped connection'. The conference is hosted by the Water Research Commission, together with the Department of Water Affairs, the African Ministers' Council on Water, the Women in Water Partnership and the Southern African Development Community. *Enquiries: Conference Secretariat, Glaudin Kruger, Tel: (028) 316-2905; Email: Kruger@kruger-associates.com; Visit: www.global-water-conference.com*

Water by numbers

95% – The probability that most of the global warming since 1950 has been caused by human influence, according to the latest report of the United Nations (UN)-backed Intergovernmental Panel on Climate Change (IPCC).

74% – The number of South African citizens who have access to a stable water supply, according to Science & Technology Minister, Derek Hanekom. In addition, about 3,2 million households are at risk of sanitation service failure or are experiencing service delivery problems.

R2-billion – The money the South African government plans to spend over the next four years to rid the country of malaria, *News24* reports. The money will be spent on spraying, providing nets and treating those who contract the disease.

4% – The percentage of water in the Vaal River catchment being used by Sasol's Secunda and Sasolburg operations. This is significantly less than the 17% of water losses currently being experienced in the catchment, the group reports.

2,5 billion – The number of people who lack proper sanitation, according to the United Nations. A further 1,1 billion are forced to defecate in the open. In order to bring attention to the importance of safe attention in preventing illness and improving dignity, the UN has declared 19 November 'World Toilet Day'.

40 Mℓ – The additional water required to address growth in Rustenburg local municipality, according to the Department of Water Affairs (DWA). The town, along with others in the North West province, has initiated water restrictions to due to drought.

Report No. 2035/1/13

Assessment of the long-term response of two wetlands to Working for Wetlands rehabilitation (C Cowden; D Kotze & T Pike)
This WRC-funded project investigated the long-term response of two selected wetland systems in KwaZulu-Natal to the rehabilitation that was undertaken by Working for Wetlands. The study included an assessment of the integrity and survival of the rehabilitation interventions; a rapid assessment of the ecological integrity and ecosystem services supplied; a more detailed investigation of the response of aspects of the system, particularly

vegetation, to rehabilitation interventions; and documenting lessons learnt in terms of rehabilitation planning and the challenges of the long-term monitoring of wetland rehabilitation efforts.

Report No. 2012/1/13

Extended investigations into recovery of water and salts from multi-component hypersaline brines using eutectic freeze crystallisation (D Randall; A Lewis; M Rodriguez-Pascual; J Nathoo; T Reddy; G Apsey; M Kapembwa; T Egan & J Chivavava)
Hypersaline inorganic brines are generated by a number of industries, including

mining operations, power generation and petrochemical refining. In addition, because of water resources, and thus further water recycling and reuse, these brines present an increasingly significant global problem. Eutectic freeze crystallisation (EFC) has been identified as a possible novel brine treatment method, but to date it has not been applied to multi-component streams such as brines. Therefore, the overall aim of this project was to investigate the applicability of EFC to the multi-component hypersaline brines produced by major South African industries.