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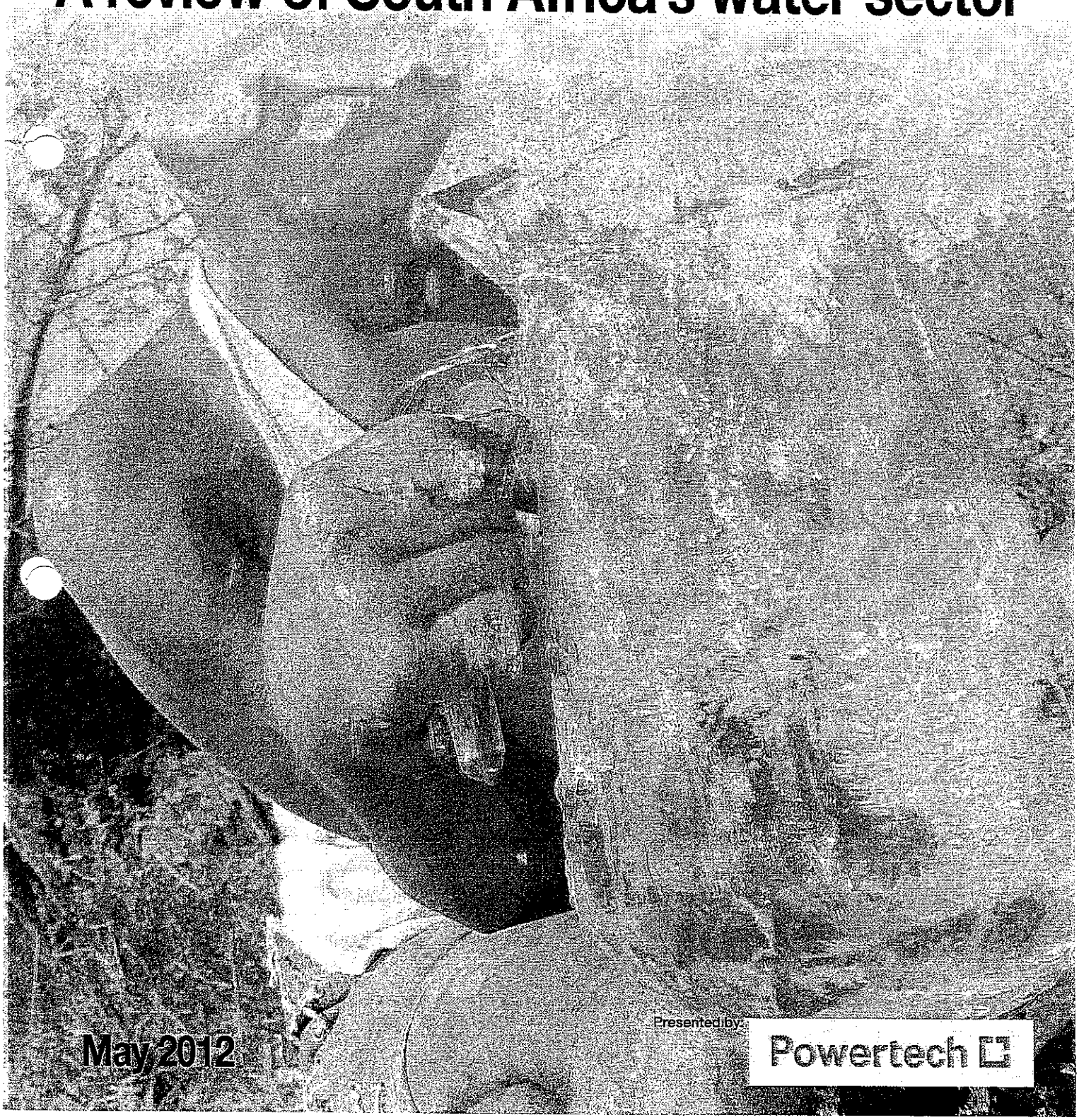
WATER 2012

A review of South Africa's water sector



May 2012

Presented by:
Powertech

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List of abbreviations

AfDB	African Development Bank
AMCOW	African Ministers Council on Water
AMD	acid mine drainage
CDR	Carbon Disclosure Report
CMAs	catchment management agencies
CSIR	Council for Scientific and Industrial Research
DoCG	Department of Cooperative Governance
DPME	Department of Performance Monitoring and Evaluation in the Presidency
DHS	Department of Human Settlements
DWA	Department of Water Affairs
ECL	environmentally critical level
EIB	European Investment Bank
GDP	gross domestic product
ISS	Institute for Security Studies
KZN	KwaZulu-Natal
LHR	Lawyers for Human Rights
LHWP	Lesotho Highlands Water Project
MTEF	medium-term expenditure framework
NPC	National Planning Commission
NRW	nonrevenue water
NT	National Treasury
SADC	Southern African Development Community
SAICE	South African Institution of Civil Engineering
SWPN	Strategic Water Partners Network
TCTA	Trans-Caledon Tunnel Authority
UN	United Nations
Unep	United Nations Environment Programme
UNECA	United Nations Economic Commission for Africa
Unicef	United Nations Children's Fund
WRC	Water Research Commission
WRG	2030 Water Resource Group
WCWSS	Western Cape Water Supply System
WHO	World Health Organisation
WWC	World Water Council
WWTWs	wastewater treatment works

Key developments

August 2011: Human Settlements Minister Tokyo Sexwale reveals that 86 443 households in 51 municipalities across South Africa still use the bucket toilet system.

September 2011: The United Nations Human Rights Council passes a resolution calling on member States to ensure enough financing for the sustainable delivery of water and sanitation services.

October 2011: The City of Cape Town issues a tender for a feasibility study into a seawater desalination plant for the city.

November 2011: South Africa's largest seawater desalination plant is opened in Mossel Bay.

December 2011: The Southern African Development Community unveils its climate change adaptation plan for the water sector.

December 2011: The Department of Water Affairs initiates a study to assess longer-term solutions for South Africa's acid mine drainage problem.

January 2012: The Trans-Caledon Tunnel Authority announces it is making some progress in implementing emergency near-term projects to tackle acid mine drainage.

February 2012: The Carbon Disclosure Project's Water Disclosure South Africa Report indicates that South Africa will experience a 17% gap between water demand and supply by 2030, unless urgent action is taken.

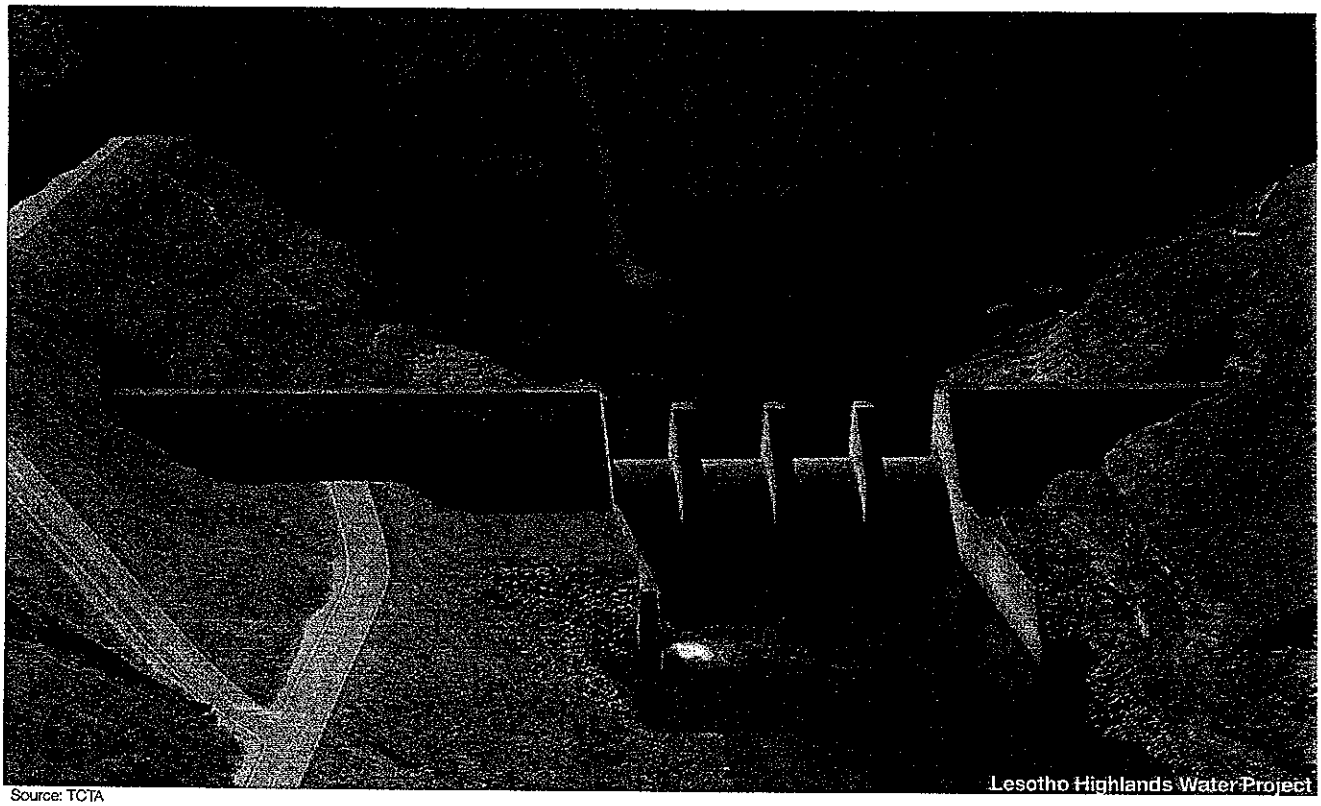
February 2012: Lawyers for Human Rights claim in a letter to Water and Environmental Affairs Minister Edna Molewa that 84 mines are known to be operating without a valid water licence.

March 2012: Water and Environmental Affairs Minister Edna Molewa announces that the South African government hopes to attract about R25-billion in water infrastructure funding from foreign investors.

March 2012: The World Health Organisation and the United Nations Children's Fund announce that the Millennium Development Goal of halving the number of people without access to clean water was met in 2010 – five years ahead of the 2015 deadline.

April 2012: The Water Resources Council inaugurates the 'Water Resources of South Africa 2012' study.

May 2012: The planned publication date for the Green Drop progress report for 2012.



Lesotho Highlands Water Project

Source: TCTA

Water: A global perspective

Water availability is vitally important for food and energy security, economic growth and sustaining the livelihoods of people across the globe. However, the world is far from being water secure, with demand for this precious resource already outstripping supply in many regions.

Failure to adequately invest in water services and to collect, treat and reuse water efficiently – mainly because policymakers and economic planners do not fully appreciate the importance of water – is exacerbating water shortages in many parts of the world and contributing to a situation where global demand for water could outstrip supply within 20 years, according to United Nations Environmental Programme (Unep) estimates.

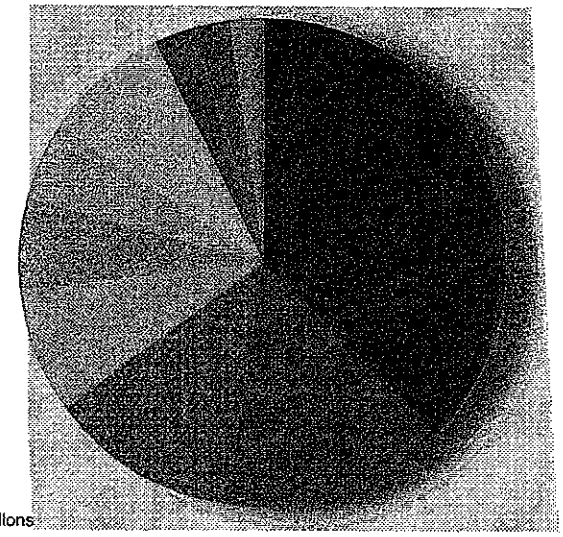
However, as the world's population grows (to an expected nine-billion people by 2050), coupled with factors such as increased levels of urbanisation, mounting demand from user sectors, a lack of investment in infrastructure, deteriorating water quality and the effects of climate change, the significance of water in economic and social development is increasingly being recognised.

While the World Health Organisation (WHO) and the United Nations Children's Fund's (Unicef's) 'Progress on Drinking Water and Sanitation 2012 Update', released in March 2012, brought the long-awaited announcement that Millennium Development Goal (MDG) No 7 – which calls for halving the number of people without sustainable access to safe drinking water between 1990 and 2015 – was met in 2010, five years ahead of schedule, the report brings the global picture regarding water and sanitation into sharp relief, showing that the job is far from done.

While two-billion people gained access to improved water sources and 1.8-billion people gained access to improved sanitation facilities between 1990 and 2010 – the WHO and Unicef note that over 780-million people still lack access to improved sources of drinking water and 2.5-billion lack improved sanitation[1]. The organisations warn that, if current trends continue, these numbers will remain unacceptably high in 2015, with 605-million people without an improved drinking water source; and the world unlikely to meet the MDG sanitation target, with 2.4-billion people still without access to improved sanitation facilities.

However, these statistics conceal another worrying fact – that drinking water from improved sources is not a guarantee of good quality and that, revealing the logic of pairing water and sanitation access targets, over

Ten countries with the largest population without access to an improved drinking water source in 2010

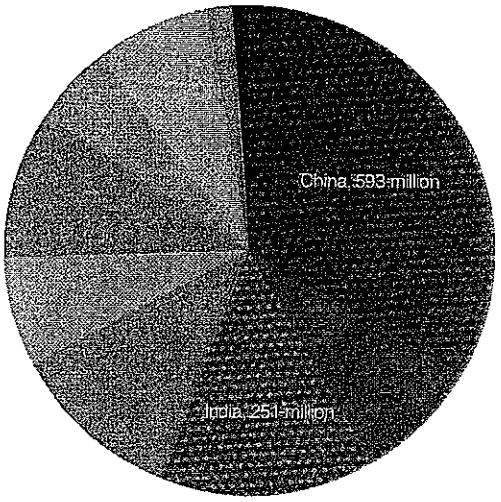


Millions

- Rest of the world 292
- China 119
- India 97
- Nigeria 66
- Ethiopia 46
- Indonesia 43
- Democratic Republic of Congo 36
- Bangladesh 28
- United Republic of Tanzania 21
- Sudan 18
- Kenya 17

Source: Progress on drinking water and sanitation – 2012 update.

Number of people who have gained access to improved sanitation from 1990 to 2010



Millions

- Eastern Asia 613
  - In China 593
- Southern Asia 399
  - In India 251
- South-Eastern Asia 204
- Sub-Saharan Africa 127
- Latin America and the Caribbean 169
- Developed countries 97
- Western Asia 74
- Northern Africa 62
- Caucasus and Central Asia 27
- Oceania 1

Source: Progress on drinking water and sanitation – 2012 update.

[1] 'Improved sanitation facilities' are defined by the WHO and Unicef as connection to a public sewer, connection to a septic system, a pour-flush latrine, a pit latrine or a ventilated improved pit latrine.

one-billion people defecate in the open, with no dignity and no privacy.

In terms of sanitation coverage, Southern Asia and sub-Saharan Africa are the worst performers, with coverage of 41% and 30% respectively. In Southern Asia, 692-million people – or 41% of the region's population – still resort to open defecation; however, this number represents a decline of 110-million since 1990. The situation is more bleak in sub-Saharan Africa, where the number of people practising open defecation has actually increased by 33-million over the last two decades. Sub-Saharan Africa has the highest proportion of people using some sort of unimproved sanitation – the proportion is actually growing, suggesting that the demand for sanitation is on the rise.

Compared with urban dwellers, the world's rural communities are at a clear disadvantage from the access-to-water and access-to-sanitation perspectives, with the WHO and Unicef noting in their latest update that 79% of the urban population use an improved sanitation facility, compared with 47% of the rural population. In terms of access to safe drinking water, an estimated 96% of the urban population globally used an improved water source in 2010, compared with 81% – or 653-million people – of the rural population in the same period. As the world's population grows, the global water situation will be exacerbated, with further strain coming from factors such as increased levels of urbanisation, mounting demand from user sectors, a lack of investment in infrastructure, deteriorating water quality and the effects of climate change.

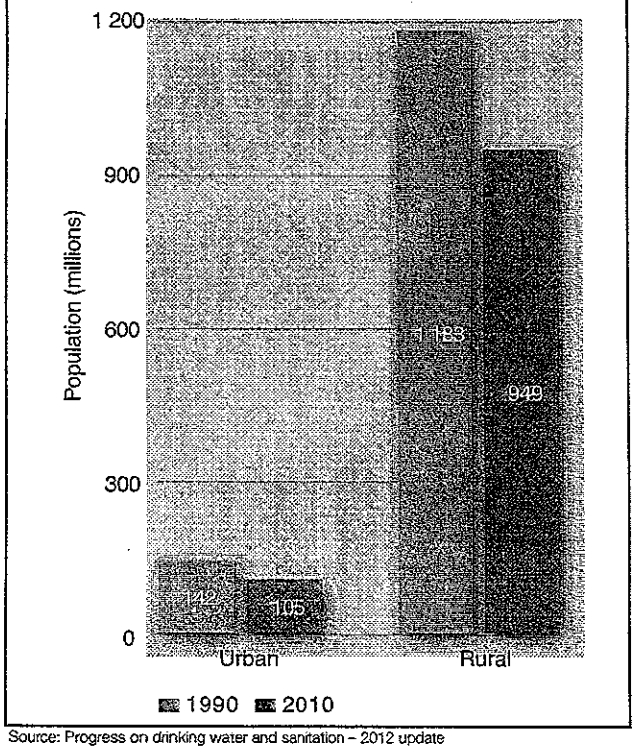
The World Water Council (WWC) notes that, while the world's population tripled in the twentieth century, the use of renewable water resources increased sixfold and that, within the next 50 years, the world's population is expected to increase by another 40% to 50%.

> There is already more wastewater generated and dispersed today than at any other time in the past, according to the World Water Council.

With an ever-increasing global population, ensuring food security for all will hinge on increasing food production and this, coupled with industrialisation and urbanisation, will result in increasing demand for water, as well as have serious ramifications for the environment. This means that ensuring the sustainable use of the world's most vital finite resource – water – is of utmost importance.

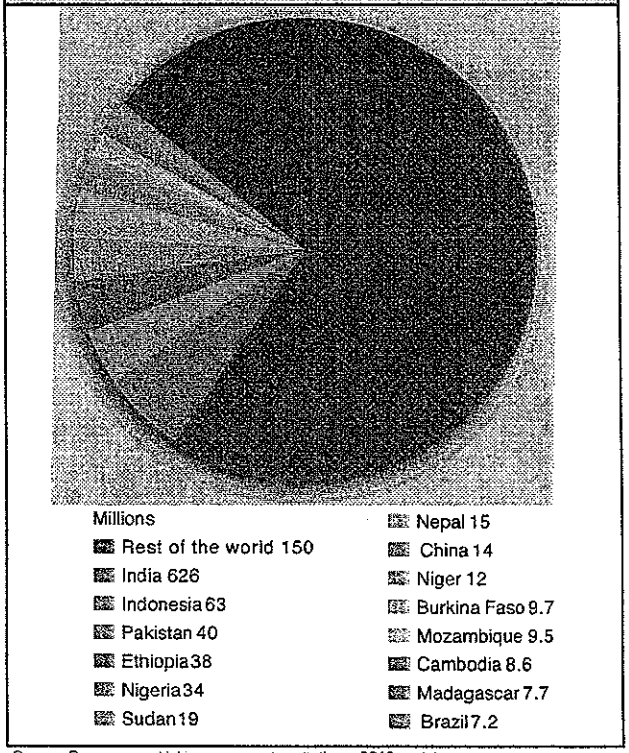
That said, ensuring sustainable food and safe, clean water for all will require the full participation of all sectors and actors. It will require the transfer of suitable water technologies, empowering small food producers and protecting essential ecosystem services. It will also require principles that promote water rights for everyone, stronger regulatory capability and gender equality, as women and girls are particularly negatively affected by lack of access to water and sanitation because of their

Number of people practising open defecation in urban and rural areas between 1990 and 2010



Source: Progress on drinking water and sanitation – 2012 update

Countries with the largest numbers of people practising open defecation



Source: Progress on drinking water and sanitation – 2012 update

traditional role in managing these services. In addition, investments in water infrastructure, rural development and water resource management will be essential.

World water consumption

Of the water that is extracted for human purposes, on average about:

- 70% is used for agricultural purposes
- 20% is used by industry (including power generation)
- 10% is used for direct human consumption

Source: Unep, Green Economy report 2011

According to recent estimates, 60% of the globe's citizens will be city dwellers by 2030. This will further burden water and sanitation infrastructure, which, in many countries, including the developed ones, is well below the required standards. This will further require governments, organisations, communities and individuals to actively engage in addressing the challenges of urban water management.

The need to urgently tackle the water and sanitation issues confronting the world have been well articulated by the United Nations (UN), which declared water a human right in July 2010. Further, in a May 2011 resolution, the WHO called on member States "to ensure that national health strategies contribute to the realisation of water- and sanitation-related MDGs, while coming in support of the progressive realisation of the human right to water and sanitation". The WHO also called on UN secretary-general Ban Ki-Moon to strengthen the WHO's collaboration with all relevant UN-Water members and partners, as well as other relevant organisations promoting access to safe drinking water, sanitation and hygiene services.

This was followed up with a UN Human Rights Council resolution – in September 2011 – calling on States to ensure enough financing for the sustainable delivery of water and sanitation services.

It is estimated that, with no improvements in water efficiency, water demand will outstrip supply by 40% by 2030. Unep notes in its 'Green Economy Report', released in 2011, that improvements in water productivity and increases in supply (from new dams and desalination plants, as well as recycling) are expected to narrow this gap by about 40%, but that the remaining 60% will have to come from infrastructure investment, water policy reform and the development of new technologies. Without such interventions, the world's water crisis will deepen.

Stressing the importance of investing in the water sector to avert the high social and economic costs resulting from inadequate water supplies, Unep says Cambodia, Indonesia, the Philippines and Vietnam, for example, lose an estimated $9-billion a year – or 2% of their combined gross domestic product (GDP) – owing to problems caused by poor sanitation, such as water-borne diseases.

And, in Africa, the African Development Bank (AfDB) estimates that 5% of GDP is lost each year owing to poor access to water and sanitation, between 5% and 25% is lost from droughts and floods in affected countries, while a further 2% is lost owing to power cuts.

Investment in sanitation and drinking water supply

Estimates put the cost of achieving the 2015 Millennium Development Goals (MDGs) for providing sanitation and drinking water to households at $142-billion a year and $42-billion a year respectively. The United Nations Environment Programme (Unep) notes that more investment is required for sanitation services than drinking water, as the number of households without access to adequate sanitation services is much higher.

Unep also observes that, while the amount of capital needed to achieve the MDGs for water and sanitation is considerable, when spread over a number of years and divided by the number of people expected to benefit from such expenditure, the investment case is strong. In Ghana, for example, the Organisation for Economic Development and Cooperation estimates that investment of $7.40 a person a year over a decade would enable the country to meet its MDG target, while estimates of the required per capita expenditure in Bangladesh, Cambodia, Tanzania and Uganda range from $4 to $7 per capita a year.

Source: Unep, Green Economy report 2011

Water in Africa

Africa is endowed with significant water resources – it has more than 160 lakes within its major water basins, many of which are located in the eastern half of the continent, with some of its rivers, including the Congo, the Niger and the Nile, among the world's longest and largest.

The continent also has abundant rainfall (averaging 670 mm/y) and relatively low levels of water withdrawal for its three major uses – agriculture, community water supply and industry – which are estimated to be about 3.8% of total yearly renewable water resources.

However, in the midst of this apparently substantial supply at continental level, freshwater resources are unevenly distributed across Africa, with West and Central Africa having significantly greater precipitation than North Africa, the Horn of Africa and Southern Africa. The wettest country, the Democratic Republic of Congo, has nearly 25% of average internal renewable water resources in Africa, with Mauritania – the driest country – having just 0.01%.

More than 75% of people are dependent on groundwater as their primary source of freshwater, particularly so in North African countries, such as Libya and Tunisia, as well as parts of Algeria and Morocco, and in Southern African countries like Botswana, Namibia and Zimbabwe. Problems with freshwater availability in Africa are, therefore, further complicated by highly variable levels of rainfall.

There are already some subregions and countries in Africa that are experiencing growing water scarcity and, unless adequate and timely interventions are made, the situation will worsen.

Further compounding the problem is the continent's ballooning population – expected to top the two-billion mark in the next 40 years – and unrelenting urbanisation, which will exert increased strain on towns' and cities' water resources. The United Nations Economic Commission for Africa (UNECA) projects that, by 2020, the continent will have 11 megacities with five-million or more inhabitants and more than 700 cities with populations of upwards of 100 000. Other studies project that about half the continent's population will be living in urban centres by 2030 and that by 2050, 60% of the projected two-billion-strong population will be urbanised.

That said, the challenge for future investment in water in Africa – which receives some 20 000 km^3 of rainfall a year, according to the UNECA – is less about the amount available and more about its distribution, costs of access and the fact that this vitally important resource is shared.

Across the continent, almost all countries share water with their neighbours, which presents not only a collective action problem, according to the WWC, but also an opportunity for tying together regional resource management and regional economic integration.

Progress made by African governments

Africa's leaders have shown increased political commitment to resolving the continent's water and sanitation issues in the last few years. In 2008, African heads of State ratified several significant water-related commitments and declarations. These included the eThekwini Declaration and the AfricaSan Action Plan, the Sirte Ministerial Declaration on Water for Agriculture and Energy in Africa and Challenges of Climate Change, the Tunis Ministerial Declaration on Accelerating Water Security for Africa's Socioeconomic Development, and the Sharma el-Sheikh Commitments for Accelerating the Achievement of Water and Sanitation Goals.

Besides other things, the signatories to the eThekwini Declaration committed to adopting national sanitation and hygiene policies within 12 months of the Africa Conference on Sanitation and Hygiene, or AfricaSan, held in the South African port city of Durban in February 2008; to establishing public-sector Budget allocations of a minimum of 0.5% of GDP for sanitation and hygiene; and to building and strengthening capacity for sanitation and hygiene implementation, including research and development.

The Durban AfricaSan conference – the fifth in the series – was held six years after the first AfricaSan conference, which helped to formulate a MDG specifically for sanitation – to reduce, by half, the number of people without access to basic sanitation and hygiene by 2015.

The 2008 AfricaSan conference mandated the African Ministers Council on Water (AMCOW) to monitor progress against countries' national plans. Established in 2002, the AMCOW provides political leadership, policy direction and advocacy in the provision, use and management of water resources for sustainable social and economic development and maintenance of African water systems. In 2009, the council became a specialised technical committee for water and sanitation in the African Union.

The AMCOW also keeps the state of Africa's water resources under review; facilitates regional and international cooperation through the coordination of policies and actions among African countries regarding water resources issues; supports transnational cooperation on water-related issues through the development of common positions on matters of global concern, as well as cooperation in implementing relevant

conventions and international agreements; encourages mechanisms that will promote best practices in water policy reforms, integrated water resources management, food security, water supply and sanitation and also assists in the delivery of national, regional and subregional programmes; promotes participation in regional studies regarding climate change; and constantly seeks to strengthen the financing of water-sector projects in Africa.

However, the commitments and declarations by African leaders have yet to translate into national policies that address the slow progress on the water and sanitation front.

While the world has met the MDG goal of halving the number of people without safe drinking water well in advance of the 2015 deadline, Unicef and the WHO indicate that only 61% of the inhabitants of sub-Saharan Africa have access to improved water sources, compared with 90% or more in Latin America and the Caribbean, North Africa and large parts of Asia. Over 40% of all people globally who lack access to drinking water live in sub-Saharan Africa.

The Progress on Drinking Water and Sanitation 2012 Update notes that sub-Saharan Africa is struggling with a low sanitation coverage of 30%, with 45% of the region's population using shared or improved sanitation facilities and 25% practising open defecation in rural areas. In fact, open defecation in sub-Saharan Africa has only decreased by about 11% since 1990, but, given population growth, this means that the number of people practising open defecation has actually increased by 33-million.

Given this statistic, sub-Saharan Africa has the highest proportion of people using some sort of unimproved sanitation of any region. This is worrying, since access to improved drinking water and sanitation are essential for economic growth, health and the alleviation of poverty.

With the exception of North Africa, withdrawals for agriculture, community water supply and industry are low as proportions of available water. The UNECA stresses that there are ample water resources in Africa that, if developed and managed sustainably, will enable the continent to reach its water-related goals defined in the UNECA's 'Africa Water Vision 2025: Equitable and Sustainable Use of Water for Socio Economic Development' framework – which has the ambitious aim of slashing the number of people lacking access to safe water and sanitation by 70% by the same year – and the MDGs.

However, a failure to invest in water infrastructure is holding back the economies of many sub-Saharan African countries. Speaking at the WWC's World Water Forum (WWF), in France, earlier this year, AMCOW executive secretary Bai-Mass Taal said that the council was unable to convince global leaders that investing money in water is a good economic investment, even though evidence pointed to every dollar spent on water ensuring a return of between $4 and $12.

As a result, AMCOW has started a dialogue with African Finance Ministers, stressing the importance of water in economic development, as there has been very little coordination between what has been said at AMCOW meetings and what is being done in some sub-Saharan African countries. There is a lack of funding, of buy-in on the ground, of policy coordination and of delivery.

COP 17: Plan devised for SADC water management

The Southern African Development Community (SADC), one of the regions whose water resources are most severely affected by extreme weather, launched a climate change adaptation strategy for its water sector at the United Nations Framework Convention on Climate Change seventeenth Conference of the Parties, which was held in Durban, South Africa, in late 2011.

Water resources in the SADC region are significantly affected by harmful climate change, which manifests itself in both droughts and floods.

The Intergovernmental Panel on Climate Change says temperatures in Southern Africa have risen by more than 0.5% over the past 100 years and, according to climate models, the region will become hotter and drier, possibly by 2 °C to 4 °C, in the next 50 to 100 years, with reduced rainfall projected in the winter months.

The SADC's regional strategy proposes a 20-year plan to integrate water resources management and also calls for mechanisms to mobilise financial resources. It points to the fact that, by December 2010, only $46.64-million had been channelled through bilateral and multilateral funding mechanisms to support climate change adaptation in Africa.

The strategy also proposes infrastructure developments like water-storage facilities and better water supply and sanitation, as more than 98-million people in the region do not have access to safe water and close to 154-million do not have access to improved sanitation.

Water in South Africa

South Africa is a water-scarce country, with high variability and unpredictability in its yearly average rainfall of 500 mm, which is a far cry from the world average of 860 mm. Rainfall is uneven and extreme weather – characterised by droughts and floods – is fairly common.

The available water resources are not equitably distributed and are sometimes used inefficiently. Thus, water is a precious resource and is monitored and regulated by the country's Department of Water Affairs (DWA), which is responsible for 250 schemes. The current replacement value of this resource infrastructure is R139-billion, with an additional R7.3-billion land valuation, according to Saice's 'Infrastructure Report Card 2011'.

Further, the State has interest in schemes dependent on water resources originating from other countries, such as the Lesotho Highlands Water Project (LHWP), which, besides generating electricity, transfers water from neighbouring Lesotho to Gauteng, South Africa's industrial heartland, through a system of tunnels and dams, and for which a second phase is planned.

South Africa's water infrastructure – with a weighted average age of 39 years – is subject to ageing effects associated with internal and external stresses and other effects, while inadequate maintenance and capital renewal have resulted in further deterioration.

Further, the DWA is struggling with serious capacity and funding problems, and estimates that an investment of R1.4-billion is required each year to maintain current infrastructure. The department is also faced with a shortage of skilled personnel to implement and supervise maintenance. The problems are compounded by fading institutional memory, as individuals retire or join the private sector.

Water and Environmental Affairs Minister Edna Molewa reported in February 2012 that, based on current projections, South Africa's water demand would outstrip supply between 2025 and 2030. The Minister is unequivocal: "If we don't act, we will face a near-crisis situation in the future."

However, while many immediate problems and future challenges remain, National Planning Commission (NPC) member Professor Mike Muller argues that significant achievements have been made, pointing out that access to safe water has increased from 60% of the population in 1994 to more than 90% at present, despite significant population growth during the same period.

Since 1994 – when the apartheid regime gave way to a democratically elected government – several construction projects have been implemented to meet the needs of major water users. These include the Berg River dam, to augment the Western Cape supply system; the Vaal river pipeline, to secure water for petrochemicals company Sasol and power utility Eskom; the raising of the Flag Boshielo dam; the implementation of the De Hoop dam, to meet mining and domestic requirements in parts of Limpopo; and the launch of the Spring Grove dam project to supply eThekwini and Msunduzi, in KwaZulu-Natal (KZN).

Muller, a former director-general of the then Department of Water Affairs and Forestry, notes that other successes achieved by South Africa on the water front include successful effluent interventions, the promotion of water savings and improvements in the efficiency of water use, particularly by power utility Eskom, which, in terms of current projections, will soon be able to reduce its water consumption, even as it doubles its electricity generation.

Other successes include ventures that span across the borders with South Africa's neighbours, such as the LHWP, the greatest achievement of which is the use of Lesotho's gravity rather than costly pumping. Agreements between South Africa, Mozambique and Swaziland enable cooperation on shared rivers that are under pressure, such as the Komati. Cooperation between water managers and farmers working together to make the most of limited water resources has benefited all three countries.

Water quality and availability

Water security depends not only on availability, but also on quality. The Council for Scientific and Industrial Research (CSIR) notes in its 'A CSIR Perspective on Water in South Africa in 2010' that the quality of the country's water resources has deteriorated during the last few years owing to increased pollution caused by industry, urbanisation, afforestation, mining, agriculture and power generation, with the situation being exacerbated by outdated and inadequate water treatment and sewage treatment plant infrastructure and unskilled operators.

Water quality

Domestic water supplies must conform to South African National Standards (SANS) 241 specifications, which are comparable to international drinking water quality guidelines.

Blue Drop certification

In a bid to tackle the country's water quality challenges, the DWA introduced a water quality regulation programme aimed at improving the quality of tap water through

compliance monitoring. This led to the initiation, in 2008, of an incentive-based regulatory programme termed the Blue Drop system. The initiative aims to test the quality of drinking water provided by the country's municipalities.

The latest available report on the Blue Drop system, the 2011 Blue Drop Report, released in June 2011, shows that the quality of South Africa's drinking water has improved over the last three years.

A total of 194 water supply systems in 162 municipalities were assessed in 2011. Fifty-nine per cent of these achieved Blue Drop scores of over 50%. This compared with 47% of the 787 water supply systems assessed in 2010 that achieved a score of over 50%.

All provinces improved their Blue Drop scores in 2011, compared with the results of the first assessment in 2009. However, when compared with the 2010 results, the Eastern Cape, Mpumalanga and the North West showed declines, with the decline of Mpumalanga, the worst performer, being the most dramatic – from 65.4% to 56.5%. Gauteng and the Western Cape achieved the highest 2011 Blue Drop scores of 95.1% and 94.1% respectively.

Blue Drop status is granted by the department should a town's water supply meet 95% of the regulatory criteria. It also serves as endorsement of the adopted risk-based management processes, which are encouraged to be in line with the guidelines set by the WHO.

The number of Blue Drop awards given increased from 25 in 2009 to 66 in 2011, with the Western Cape achieving the highest number of awards (29) in 2011 and the Northern Cape receiving no awards. Mpumalanga received the second-highest number of awards (8). Ugu district, in KZN, achieved the highest Blue Drop score of 98.8%, garnering Blue Drops for four of its water supply systems. Steve Tshwete local municipality, in Mpumalanga, achieved six awards – the highest number achieved by a single municipality.

Municipalities that use water boards to manage their water supply systems dominated the awards.

The improved performance in the 2011 Blue Drop assessment seems to be in tune with South Africans' high level of confidence in the water that comes from their taps. According to a survey conducted by the Water Research Commission (WRC) and the South African Local Government Association between March and May 2011 – the results of which were published only in early 2012 – 81% of urban dwellers from all income levels perceive their tap water to be safe for drinking.

Whether or not there is truth behind claims made by naysayers about the value of measurements of South Africa's water quality from year to year, the South African government is not resting on its laurels concerning performance. It is attempting to push through reforms to strengthen this area of governance. The DWA is planning amendments to water quality regulations, including requiring water service institutions to have a comprehensive drinking water quality plan in place. The water plan would include a programme of regular analysis of water samples by accredited or DWA-approved laboratories, with analysis results to be submitted to the DWA monthly and published yearly. These planned reports would compare the results obtained for municipal water against the SANS 241 standard for drinking water quality.

Also under consideration is a draft regulation concerned mainly with ensuring that the process controllers of water plants are properly qualified and correctly registered.

Green Drop certification

Recent studies indicate that South Africa's wastewater treatment sector is not complying with the relevant effluent quality standards and is currently considered to be in an unacceptable state. While the sector's lackluster performance has been largely blamed on a lack of funding to ensure that municipalities – which treat an average of about 7 589-million litres of wastewater a day – are compliant with their operational licences, consulting firm Frost & Sullivan blames other factors as well, including crippling skills shortages and failure to keep information on water treatment works, which means that many municipalities do not fully understand the maintenance and infrastructure funding requirements of these facilities.

To tackle the challenges in the wastewater treatment sector, the DWA introduced the Green Drop certification scheme – a continuous assessment of wastewater quality.

The Green Drop certification scheme is an incentive-based system that focuses on the entire wastewater business of water services institutions. The programme came at a time when the significance of successful regulation was acknowledged as a critical driver to improve and turn around second-rate wastewater management services, while recognising and rewarding excellence in the sector.

Should a water services organistaion be awarded Green Drop certification, it means that the wastewater system and management procedures carry a high level of confidence by the DWA, and that the particular wastewater system has undergone a thorough technical assessment and verification audit of all material presented by the participating municipality.

The latest Green Drop assessment, the results of which were released in June 2011, scrutinised 821 wastewater treatment plants.

The 2011 report showed a negative trend in the quality of wastewater treatment services, with the number of

systems that scored more than 50% dropping from 49% in 2009 to 44%.

The results showed that challenges remained in wastewater management and highlighted a lack of human capacity and maintenance of treatment systems, corroborating Frost & Sullivan's findings.

The 2011 assessment found wastewater treatment services in Limpopo and the Free State to be particularly dire, with these provinces scoring 24% and 32% respectively.

The highest Green Drop scores were achieved by the Western Cape (83%) and KZN (82%).

A total of 40 wastewater treatment systems achieved Green Drop status in 2011, compared with 33 in 2009. However, 20 of the wastewater treatment systems that had Green Drop status before 2011 lost that status in the 2011 assessment, and of all the Green Drop awards, 26 were for systems that received awards for the first time.

The Western Cape received 19 Green Drop awards, followed by KZN, with 11. Limpopo, the Free State and the Northern Cape received no Green Drop awards, which reflected their poor overall Green Drop scores of 24% for Limpopo and the Free State and 26% for the Northern Cape.

The next Blue Drop and Green Drop awards are expected to be published in May 2012.

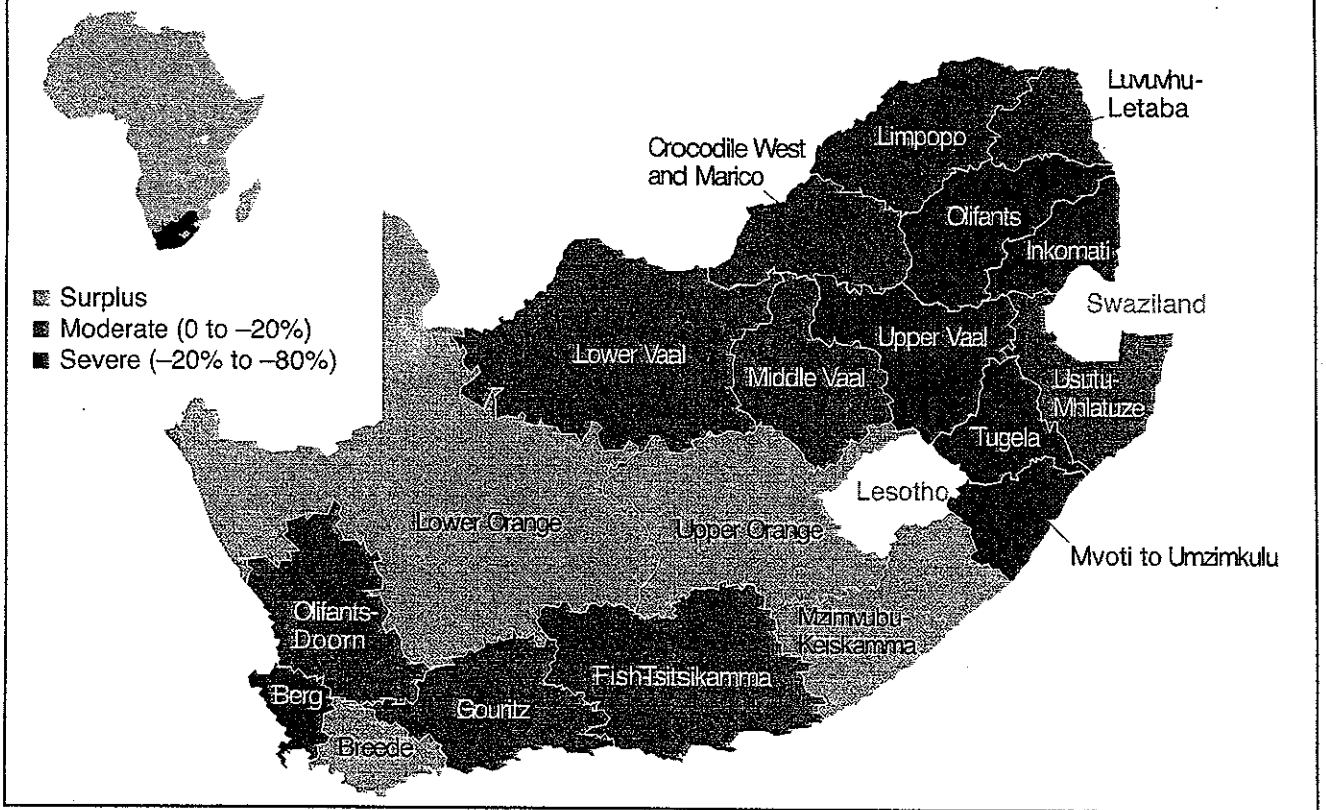
Water availability in South Africa

South Africa has been categorised as a water-scarce country; however, the degree of scarcity has been the subject of research by hydrologists intent on quantifying and understanding the relationship between rainfall and stream flow, as well as between rainfall and groundwater recharge.

Over the last 30 years, the WRC has commissioned numerous hydrological investigations, with the major ones including the 'Surface Water Resources of South Africa 1980' study, which was updated in 1990, and the 'Water Resource of South Africa 2005' study, which was completed in 2009.

A new study, titled 'Water Resources of South Africa 2012' and aimed at updating the 2005 study, got under way in April 2012. The study, being undertaken by a consortium led by consulting engineering firm SSI, seeks to quantify both the country's surface and groundwater resources. The study will also outline minimum monitoring conditions, which the WRC says has become urgent, in light of the declining number of rain and stream flow gauges, as prevailing monitoring gaps are increasing uncertainty and undermining decision-making.

Gap between existing supply and projected[1] demand in 2030



Source: McKinsey & Company, Confronting South Africa's water challenge, 2010

[1] Frozen irrigation levels and limited ability to increase rainfed land will drive an increase in virtual water trade between water-management areas and internationally with trading partners.

The conclusions of the study will serve as inputs to the water resource planning models of the DWA and will act as the foundation for the National Water Resources Strategy.

The WRC has also confirmed plans to shorten the intervals between updates from ten to four years, acknowledging that the current interval period is inappropriate in a water-scarce country like South Africa, where demand on existing resources is growing strongly.

The shortened intervals will also better serve the statutory requirement for the production of a water resources strategy every five years.

According to the 2030 Water Resources Group (WRG), established in 2008 by a consortium of business partners to contribute new insights about the ever-critical issue of water resource scarcity, the estimated demand for water in South Africa will reach 17.7-billion cubic metres in 2030. In comparison, current supply will total only 15-billion cubic metres and is acutely restrained by low levels of highly seasonal rainfall – estimated at 50% of the global median, an inadequate number of aquifers, and a reliance on water transfers between basins and from other countries – a prime example being the LHWP, from which South Africa purchases almost 25% of its total water supply.

These figures do not take into account the effects of climate change, which could further aggravate the problem. The WRG notes that even a small drop in South Africa's rainfall, and an equivalent increase in irrigation requirements, could result in a shortfall as large as 3.8-billion cubic metres.

In fact, Minister Molewa has warned that South Africa could face a water crisis within the next decade if urgent steps are not taken. It is against this background that an amount of R75-billion has been allocated over the next three years for water infrastructure, quality management, resource planning and support to local government to address the problem.

The Global Water Partnership reported in April 2012 that rising prosperity in South Africa was likely to increase water consumption and also result in a more unequal distribution of water resources.

To deal with its water needs, South Africa is considering options other than just surface water and groundwater, including desalination. In fact, the DWA forecasts that up to 10% of the country's urban water supply could come from desalination plants by 2030. The country's biggest seawater desalination plant – in the seaside town of Mossel Bay, in the Western Cape – opened in November 2011. Its five-million-litre-a-day output is used entirely by synthetic fuels company PetroSA, the town's biggest employer and biggest user of water.

Currently, South Africa has only a few desalination plants – the plant in nearby Knysna is the second biggest, pumping a mere 1.5 million litres a day. There are also plants at the Bitou municipality, Sedgefield, on the Garden Route, and Boknes, in the Eastern Cape.

While a large number of water users rely on surface water resources for their needs, the majority of water supply depends on groundwater, which, despite its relatively small contribution of about 13% to South Africa's total water supply, represents an important strategic water resource.

However, owing to a lack of perennial streams in the semidesert and desert areas, two-thirds of South Africa's surface area is largely dependent on groundwater, according to the Geological Society of South Africa.

Although irrigation is the largest user of groundwater, this resource also provides the water supply for more than 300 towns and smaller settlements.

In over 90% of the surface of South Africa, groundwater occurs in hard rocks – rocks with no pore spaces – where it is contained in faults, fractures and joints, and in dolomites and limestone, where it is contained in dissolved openings called fissures.

The WRC says the use of groundwater, in conjunction with surface water, could form a key part of tackling South Africa's water challenges. The commission estimates the volume of available groundwater in the country at 10.34-billion cubic metres a year, compared with the assured yield of South Africa's surface water resources of 12-billion metres a year, 80% of which has already been allocated.

In 2010, the DWA released its groundwater strategy, which aims to ensure that groundwater is fully integrated into all water resource planning processes and that the continued development and use of groundwater resources is funded in line with its importance.

Besides policy, legislation and regulation, the strategy also focuses on water resource planning, human capacity, sustainable groundwater management, institutional capacity, information management and research.

In March 2012, Minister Molewa approved the establishment of nine catchment management agencies (CMA). These will play a critical role in managing the country's scare water resources, including facilitating stakeholder input into the management of water resources.

The delegation of water management functions to the catchment level has only been partially implemented since the promulgation of the National Water Act in 1998.

The Minister decided to reduce the number of CMAs to nine from the originally proposed 19 CMAs owing to

reasons such as the technical capacity required to staff CMAs and the challenge regulating the performance of such a large number of institutions poses to the DWA.

The water management boundaries still need to be formally amended through the second edition of the National Water Resources Strategy. Once the boundary amendments have been gazetted, the DWA will launch a national programme for the establishment of the remaining CMAs. In the programme, the existing CMAs in the Inkomati and the Breede-Overberg water management areas will receive the first priority and be realigned into the Inkomati-Usuthu and the Breede-Gouritz CMAs respectively. This will be followed by the establishment of CMAs in Limpopo and the Vaal and Phongola/Umzimkulu water management areas.

The DWA says there are five remaining sets of water sector institutions whose alignment is still to be completed, including regional water utilities, water use associations, the WRC and its own management of national water resource infrastructure.

South Africa's water situation is identified in the NPC's Diagnostic Overview, released in June 2011, as requiring a multipronged intervention. Given the country's water use intensity of 31% – which is very high by world standards – and the predictions that, as a result of climate change, parts of the country will become drier and that water demand will increase as communities and their economies develop and living standards improve, the NPC says it will become increasingly difficult to meet domestic water needs and supply water to agriculture and industrial users.

> In 2000, a free basic water policy was introduced, in terms of which each household receives the first 6 000 ℓ/m of potable water free of charge.

The interventions that the NPC proposes include building new infrastructure to increase water supplies and reuse more water; improving water resource management; promoting more efficient municipal, agricultural and industrial water use; and protecting water resources from pollution. However, the commission notes that "implementation of these reforms is proving to be challenging, given the diverse and complex nature of the country's water resources and their use".

Water supply and sanitation

Section 27(1)(b) of the South African Constitution stipulates that "everyone has the right to have . . . sufficient . . . water". However, despite making strides in terms of improving water security and access to sanitation facilities, challenges persist, as noted in a South Africa-Netherlands Water Network report released in 2010, which highlights a number of challenges, including:

- That many municipalities are not served by water boards and do not have the money and skills to increase their sources of supply – this limits municipalities' ability to respond to demand for additional water and improved service levels.
- Current institutional arrangements in many municipalities are unable to deliver effective or sustainable services that meet people's needs.
- Significant skills gaps in may municipalities, which compromise service delivery; the pricing of water across the value chain (from source to tap and back), which remains problematic, leading to inequitable tariff structures, as well as the under-recovery of the real costs of sustainable water services.
- The poor state of wastewater treatment in many municipalities, which poses severe risks to people living downstream of the works, as well as to the environment.
- Water services are not ringfenced and managed as business units within municipal systems.

According to the Institute for Security Studies (ISS), dissatisfaction with the delivery of basic municipal services – including running water – is one of the major reasons behind the many protests that have flared up across South Africa in the recent past, with the other reasons being unemployment, poor infrastructure and a lack of houses.

The ISS contends that a solution to the protests lies not so much in the police maintaining order and enforcing the law, but in government interventions that deal with the factors that impede the efficient and effective functioning and service delivery of municipalities, including the provision of water and sanitation.

As the South Africa-Netherlands Water Network explains: "Citizens are aggravated with the gap between the water services they receive and the service levels and quality they expect and aspire to. Municipal water use is the fastest-growing sector of water demand, and there are significant challenges across the country in sourcing and delivering bulk water; a substantial proportion – over 40% in some areas – is being lost through leaks and bursts as a result of inadequate maintenance or underfunded renewal. Severe resource constraints – funds, skills and available land – suggest that it may be difficult to build the 2.1-million new houses (with services) required by 2014."

Access to basic water supply infrastructure

Deputy Finance Minister Nhlanhla Nene said at a conference of the Institute of Municipal Finance Officers in September 2011 that, of South Africa's population of just under 50-million people, 97% have access to water supply infrastructure and that, with a backlog of

3.63-million people, South Africa will achieve the MDG for water ahead of the 2015 deadline.

Local government's aim for 2009/10 was to supply 1.5-million more people with basic water supply, but the department provided basic water supply to 1.07-million people.

The DWA acknowledges that the less-than-optimal performance of the water sector is partly caused by a lack of leadership and management skills during the past 18 years. Hence, the department's business process re-engineering committee has come up with a turnaround strategy which, besides other things, focuses on institutions in the sector.

Access to basic sanitation infrastructure

The South African government has set itself the target of achieving universal access to at least functional and adequate basic sanitation by 2014. However, the rate of delivery of around 300 000 household units a year is not enough progress to achieve the target of universal access by 2014 and will need to be accelerated.

Sanitation services include the treatment of wastewater and the provision of sanitation facilities and are the responsibility of the DWA nationally and municipalities and water boards locally.

Since 1994, access to sanitation has increased from 49% to 69% of South African households, according to the South African Institution of Civil Engineering's (Saice's) '2011 Infrastructure Report Card for South Africa'. An additional 3.3-million people have gained access to basic sanitation facilities since the previous report card was published in 2006.

While these statistics reveal that access to basic sanitation facilities is increasing rapidly, Saice points out that South Africans are not benefiting fully because of high failure rates. Reasons include that most sanitation facilities do not comply with the relevant technical design standards and a lack of privacy and security at sanitation facilities, which causes people not to use them.

A political furore over 'open toilets', in the Western Cape and in the Free State, in the run-up to the 2011 local government elections and the subsequent High Court judgement in favour of the community of Makhaza township, in the Western Cape, compelled the Department of Performance Monitoring and Evaluation in the Presidency (DPME) to form a Ministerial sanitation task team, in collaboration with the Department of Human Settlements (DHS), the DWA, the Department of Cooperative Governance (DCoG) and the National Treasury (NT), to establish the quality of sanitation in South Africa.

In March 2012, the departments released the 'Report on the status of sanitation services in South Africa'. The report found that an estimated 11% of households (formal – no services and informal – no services), still had not been provided with sanitation services, which means that these households had never had a government-supported sanitation intervention. In addition, an alarming 26% of households had sanitation services that did not meet quality standards, owing to the decline of infrastructure caused by a lack of technical capacity to ensure effective operation, timely maintenance, refurbishment and/or upgrading, pit-emptying services and/or insufficient water resources.

The surprising discovery in the report was that, while access to sanitation was on the rise, from a functionality and sufficiency point of view, as many as 26% (or about 3.2-million households), apart from the 11% (or 1.4-million households) that had no services whatsoever, were at risk of service delivery failure and/or were experiencing service delivery failures.

The report concluded that the areas requiring the highest levels of infrastructure maintenance were located in Limpopo, KZN, the Free State, Mpumalanga, the Northern Cape and the Eastern Cape. The provinces with the highest proportion of communities with adequate services were Gauteng and the Western Cape – but these provinces themselves have large numbers of informal settlements that present particular challenges.

Particularly concerning is the condition of bulk sanitation infrastructure in South Africa. This primarily involves the communities served with waterborne sewerage systems, where the upkeep, refurbishment and/or upgrading of collection and treatment infrastructure has been ignored over the years. The general yearly assessment of the status of wastewater treatment works (WWTWs) in the latest Green Drop report indicates that only 40 out of the 826 WWTWs assessed in 2011 achieved Green Drop status. The results of the survey indicate that 317 WWTWs require urgent attention, 143 WWTWs have a high risk of failure, 20% of WWTWs are running over their design capacity and 90% of WWTWs are noncompliant on more than three effluent determinants.

A further challenge, however, is the financing of operations and maintenance of infrastructure, which, unless effectively tackled, will continue to result in rapid deterioration of sanitation structures and poor service delivery.

Based on 2011 pricing structures, it is estimated that about R44.75-billion is needed – about R13.5-billion to supply basic sanitation services to unserved households and about R31.25-billion to refurbish and upgrade existing sanitation infrastructure. This does not take into account financing requirements for bulk new service infrastructure, or upgrading of households in informal settlements.

Government battles to kick the bucket system

In a written response to a Parliamentary question in August 2011, Human Settlements Minister **Tokyo Sexwale** revealed that there were 86 443 households in 51 municipalities in South Africa that still used buckets instead of toilets.

A total of 38 366 of the households were in the Free State, with 28 887 and 14 797 in the Eastern Cape and the Northern Cape respectively. The problem also persisted in the North West (3 503 households), the Western Cape (832) and Gauteng (58). Sexwale said there were no bucket systems in KwaZulu-Natal, Limpopo and Mpumalanga.

The Minister said in most of the affected provinces, financing had been secured, or was being secured, to eradicate the bucket system.

In the early 2000s, government set the end of 2007 as the deadline for the complete eradication of the bucket system, but this deadline was not met.

According to the acting head of the national sanitation programme in the Department of Human Settlements, over 50% of South Africa's municipalities, especially in rural areas, are not emptying toilets. Further, according to findings of the Ministerial sanitation task team, sanitation service delivery is not prioritised in most of the municipalities visited.

That said, the report on the status of sanitation services in South Africa makes the following recommendations to improve the quality of sanitation provision:

- The establishment of a single unit responsible for policy formulation, oversight, monitoring, regulation and support of the entire sanitation service value chain and its linkages with water resource management and water service delivery within the DWA, with sufficient capacity to support planning, and ensure effective regulation and monitoring, which includes an early-warning mechanism.
- Legislative amendments to better manage oversight, planning, financial allocations and accountability.
- Improved and coordinated support programmes to municipalities at national and provincial level.
- The upgrading of municipal staff skills (and/or the interim establishment of a municipal infrastructure support agency – one national agency or nine provincial agencies).
- Support for basic service delivery planning in municipalities where backlogs are most acute through sector-based service delivery management structures.

Water infrastructure

In addition to water policy and regulation, the DWA is responsible for much of South Africa's water infrastructure, comprising bulk abstraction and conveyance infrastructure, including local treatment and distribution, which for the most part is reaching the end of its life and will require upgrading or replacing. Municipalities or municipalities in conjunction with water boards are responsible for local water quality and provision.

The department supervises and manages 151 water and wastewater infrastructure projects in various stages of completion throughout South Africa, with a total estimated cost between 2008/09 and 2014/15 of R69-billion.

The projects include those where new infrastructure is being built or existing infrastructure is being refurbished, rehabilitated, upgraded or maintained. Infrastructure spending includes direct expenditure on national water resources infrastructure projects through the DWA's public entities and indirect expenditure on regional bulk water and wastewater infrastructure projects through transfers to water services authorities and water boards.

In recent years, the South African government has increased investment in the water sector. In his 2012 National Budget Review, Finance Minister Pravin Gordhan announced an allocation of R75-billion over the current medium-term expenditure framework (MTEF) period, to finance water infrastructure, quality management, resource planning and support to local government. The Minister also confirmed that government would invest huge amounts in large water infrastructure projects over the next two decades. Spending on infrastructure has increased from R2.3-billion in 2008/09 to R4.4-billion in 2011/12, and is expected to increase further to R6.4-billion each financial year over the medium term,

> Since 2006, a mismatch between water demand and bulk infrastructure development has come to light, with the result that water users in the strategic Vaal and Umgeni systems face the prospect of water restrictions during the next decade should no action be taken to remedy the situation.

The capital expenditure allocated for infrastructure will be used to undertake a number of mega, large and small infrastructure projects.

Mega infrastructure projects

The State-owned Trans-Caledon Tunnel Authority (TCTA) is responsible for mega infrastructure projects. These include the Olifants river water resources development project, in Limpopo, which involves the construction of the De Hoop dam and bulk raw water distribution systems

that will deliver water for mining industry, agricultural and domestic use in the Greater Sekhukhune, Waterberg and Capricorn district municipalities in the province.

The total estimated cost for the construction of the dam is R3.1-billion and the distribution systems are expected to cost R13.1-billion. An amount of R2.5-billion was spent up to 2011/12 for the construction of the dam and R373.8-million will be spent over the current MTEF period. The surplus of R225.8-million will be reallocated to other infrastructure projects, such as the Mokolo-Crocodile water augmentation project, one of the DWA's large water infrastructure projects.

The TCTA is also managing the R1.7-billion Komati water scheme augmentation project, which will provide water to Eskom's power stations in Mpumalanga, as well as the R7.5-billion second phase of the LHWP, which will augment water supply for domestic and industrial users in Gauteng. The water aspect of Phase 2 of the LHWP will likely cost around R7.8-billion, including R2.4-billion for the development of the 165-million-cubic-metre Polihali dam, in Lesotho.

Another of the department's mega projects is the dam safety rehabilitation project, which ensures the continued structural and operational safety of the 315 dams the department owns. The project has an estimated cost of R2.9-billion, R1.6-billion of which was spent up to 2011/12 and R1.3-billion of which is allocated over the current MTEF period.

A further mega project under consideration by the DWA is the Mzimvubu water resources development project, in the Eastern Cape, for which a prefeasibility study was started in January 2012. The dam is intended to supply new water capacity for irrigation development and domestic and industrial water requirements in the Mzimvubu river catchment, as well as to potentially develop hydropower. The dam is expected to cost around R20-billion to build, including all ancillary infrastructure. This includes the cost of the dam and additional infrastructure, such as irrigation development, a hydropower plant and bulk distribution infrastructure.

In addition, the DWA is in the process of appointing a service provider for the Sedibeng regional sanitation scheme – a cross-border initiative between Gauteng and the Free State. The project is expected to cost in the region of R5-billion to develop.

Large infrastructure projects

Among the DWA's large infrastructure projects is the raising of the Clanwilliam dam, in the Western Cape, which will provide an additional yield of ten-million cubic metres of water a year. The total estimated budget for the project is R2.2-billion, of which R12.6-million had been spent by 2011/12. A further R1-billion will be spent over the current MTEF period. The project is in its design stage, pending approval of the final height of the dam wall, and is scheduled for completion by 2015.

Phase 1 and Phase 2 of the Mokolo Crocodile river (West) water augmentation project aim to deliver water to State-owned power utility Eskom's Medupi power station and other industries in the area, as well as for domestic use in the Lephalale local municipality, in Limpopo. The total estimated cost of the first phase is R2-billion, of which R435.4-million has been spent and R324.8-million will be spent over the current MTEF period. The project began in 2011/12, and is scheduled for commissioning in 2013/14.

Umgeni Water gets R385-million European loan, considers desalination

The European Investment Bank (EIB) has signed a R385-million long-funding loan agreement with Umgeni Water aimed at boosting water supply to five-million people in KwaZulu-Natal (KZN).

The funds will enable the water utility – the largest in the province – to build new infrastructure or upgrade existing facilities, including bulk potable water pipelines, water treatment works and pumping and service reservoirs that will connect to the supply systems of the municipalities of Durban, the South Coast, the North Coast and Msunduzi (Pietermaritzburg).

New water connections to unserviced areas are also planned in some municipalities. The finance provided is the first to be made available to a South African water board by the EIB. Since 2000, the European lender has extended financing amounting to €531-million for water projects across Africa.

Meanwhile, Umgeni Water has issued a tender for a detailed feasibility study on a seawater desalination plant for Durban.

Projections are that the coastal city will run short of water in the future and the desalination plant is one of the measures being considered to augment bulk water supplies.

Potential sites for either one or two plants with capacity of 150-million litres a day are near the Lovu river, on the South Coast, and near the Mdloti river, on the North Coast.

The cost of the proposed plants will be determined by the feasibility studies.

Other water augmentation projects in KwaZulu Natal (KZN) include construction of the R2-billion Spring Grove dam by the Department of Water Affairs. Further augmentation projects include an investigation into the use of wastewater from the Darvill wastewater works and the building of the Mhlabatshane dam by Umgeni Water to ensure water supply to rural communities in the Ugu district municipality, on KZN's South Coast.

The raising of the Tzaneen and Namitwa dams for the Great Letaba river development project aims to supplement the supply of water in Limpopo, to meet the growing demand from the domestic sector by 2025, improve water availability in the riverine ecosystem and stabilise water availability to the irrigation sector. The project is estimated to cost R2-billion, of which R13.8-million has been spent to date and R695.7-million has been allocated over the current MTEF period.

Another large infrastructure water project is the R2-billion Nandoni water treatment works and distribution networks project, which will augment water supply to the Vhembe district municipality, in Limpopo. A total of R811.4-million has been spent up to 2011/12 and R349.9-million will be spent over the current MTEF period. Construction began in 2006/07 and commissioning is scheduled for 2013/14.

Also scheduled for completion in 2012/13 is the R750-million Nandoni pipeline project, which will convey water for domestic use to the Vhembe district.

Small infrastructure projects

The DWA is also involved in more than 60 small regional bulk water and wastewater infrastructure projects that will enable connection of municipal reticulation infrastructure. These projects have a combined value of R9.6-billion over the current MTEF period.

Rustenburg water, sanitation expansion project in the pipeline

A water and sanitation services expansion project, valued at between R400-million and R500-million, is in the pipeline for Rustenburg.

Multidisciplinary engineering group Bigen Africa, a trustee of the Rustenburg Water Services Trust (RWST), is currently working on a desktop study on the project, focused on potable water and effluent.

The RWST is "poised to commence" with the next phase of expansion to meet the growing needs of the Rustenburg municipality, where growth continues to be driven by the mining sector.

The RWST, which has been in operation for nearly seven years, is meeting all its debt commitments and obligations, with a cash reserve of R96-million.

Minister Molewa said at the WWC's WWF, in France, in March 2012, that the South African government hoped to secure R25-billion in water infrastructure funding from foreign investors. She revealed a memorandum of understanding had been concluded with the WRG, which includes several large multinational companies, all keen to participate in the building of water infrastructure in sub-Saharan Africa.

The Minister added that her department was considering handing over the building and running of some of its wastewater treatment plants to the private sector. The DWA is currently developing 43 wastewater treatment plants, and if these projects were cofunded with private investors, the money saved could be spent elsewhere.

The new move is in tune with a recommendation by the Development Bank of South Africa, which argued in June 2011 that "using the private sector to operate and maintain infrastructure can overcome some serious challenges . . . [and ensure] strong institutional capacity and the mobilisation of skills". It noted that the national government faces a R10-billion backlog in the rehabilitation and maintenance of water resource infrastructure.

Water demand management and conservation

According to reports by South African partnership, the recently formed Strategic Water Partners Network (SWPN), "water demand in South Africa will rise by 52% within the next 30 years, while the supply of water is sharply declining; if current trends of leakage from aged and poorly maintained municipal infrastructure and the loss of wetlands persist, this growth in demand will intensify competition for water resources across all sectors of the economy."

And, if no urgent action is taken, South Africa will experience a 17% gap between water demand and supply by 2030, equating to a water shortfall of 2.7-billion cubic metres.

According to the first Water Disclosure South Africa Report, released in February 2012, in which a total of 26 South African companies took part, water issues are not receiving the same attention as climate change at board level; one-third of the companies do not exercise board-level oversight of water issues, compared with 90% of companies that deal with climate change at board level; and few companies are setting concrete, quantitative targets relating to water.

The report further notes that some of the country's most economically important catchment areas will be worst affected. As a result, the country will have to resolve tough trade-offs in water use between agriculture, key industrial activities like mining and power generation and supply to rapidly growing urban centres. These trade-offs will be further complicated by an increasingly uneven and unpredictable supply of rainfall as a result of climate change, declining water quality and reliance on significant water transfers from neighbouring countries, coupled with an ailing and overburdened water infrastructure system.

Carbon Disclosure Project's Water Disclosure South Africa Report 2011

The Water Disclosure South Africa Report is part of the international Carbon Disclosure Report (CDR), which conducts yearly surveys to determine the extent to which companies are dealing with climate change issues.

The South African participation in the CDR, managed by the National Business Initiative – a voluntary group of national and multinational companies that seek to ensure sustainable and development in South Africa – began five years ago.

The Water Disclosure Report was introduced internationally in 2010 with the backing of 354 investors representing $43-trillion (about R325.8-trillion) in assets. Fifty-six of the JSE's top 100 companies in South Africa and leading companies in Australia were invited to participate. The two countries were selected because they are particularly water stressed.

Other findings of the Water Disclosure South Africa Report include that:

- Seventy per cent of the South African companies surveyed believed they were at direct risk from water scarcity.
- Eighty-five per cent of companies reported some exposure to water-related risk in their direct operations, with 70% believing that risks to their direct operations could occur within the next five years.
- Forty-six per cent of the companies said most of their operations were located in areas where water scarcity was a risk.

That said, the need for aggressive efforts to improve water conservation (WC) and water demand management (WDM) is well understood by government.

Further, in a key public–private partnership, the DWA forged an alliance at the World Economic Forum, in Cape Town, in early 2011, with the WRG. This new public-private group, chaired by the director-general of the DWA, will oversee the activities of the SWPN, whose aim is to address critical water issues in South Africa.

The partnership between these stakeholders will enable South Africa to access best practice economics, projects and policies in water management from public, private and civil society sectors around the world, enabling officials to field-test and replicate actions for implementation domestically.

The group will focus on the key areas of WC and WDM, especially increasing water use efficiency (in agriculture, industry and households) and reducing leakage from distribution networks, and diversifying the water mix, with a particular focus on increasing the reuse of effluent and desalination (seawater and acid mine drainage (AMD)) and developing more sustainable management of groundwater resources, in particular for rural areas.

While problems regarding WC and WDM persist, the South African government has made some progress in this regard, with a project implemented in the Ndlambe local municipality, in the Eastern Cape, between 2008 and 2010 being one of the success stories. The municipality was facing a crisis in 2008 as a result of huge water losses, wastage and inefficiency in its water supply network. The Sarel Hayward, Bathurst Golden Bridge and Wellington dams were all almost dry. A WC/WDM initiative implemented by the Mvula Trust ensured that the municipality overcame its acute water problems. The project involved public awareness, identifying water leaks and repairing them promptly, mobilising dedicated WC/WDM funds for ongoing implementation support and developing and monitoring WC/WDM key performance indicators.

In KZN, the DWA says, WC and WDM initiatives implemented by the eThekwini, Ilembe, Ugu and Msunduzi municipalities have significantly shortened the water supply deficit period for the KZN coastal metropolitan area. As a result of the higher water savings, future water demand is estimated to be lower than previously expected.

WC and WDM have been identified as the most important immediate and ongoing initiatives to deal with possible water shortages in the area. However, the DWA has expressed concern about the sustainability of these initiatives, owing to budget cutbacks affecting further WC and WDM initiatives. Short- and medium-term options like the reuse of treated wastewater and effluent and seawater desalination – besides the development of additional water schemes – are also being investigated as measures to supply the region's projected water requirements beyond 2030.

In the Western Cape, the rapidly growing populations of Cape Town and surrounding towns, as well as economic growth, are putting such a big strain on the province's water supply that the DWA has called for the implementation of a WC and WDM programme. According to the department, the margin between available water and that used was about 8% (or 45-million cubic metres), which could be "fully utilised" within the next six to eight years.

Users of the Western Cape Water Supply System (WCWSS) include the City of Cape Town and the municipalities of Stellenbosch, Drakenstein, Swartland and Saldanha, as well as the farming community.

The DWA has indicated that the WCWSS can safely supply 556-million cubic metres a year. The 2010 water requirement was already 511-million cubic metres, of

which 32% was used by farmers and the balance by urban dwellers supplied by the system.

According to a study by the department, only a few surface water development options are available for augmenting water supply to the City of Cape Town and surrounding towns.

However, the department is exploring alternative strategies to ensure sufficient water is available for future use. These include a large-scale seawater desalination plant, for which a feasibility study was tendered on October 28, 2011.

The City of Cape Town also plans to undertake a feasibility study into the large-scale reuse of water. Other investigations by the city, into the potential for large-scale groundwater development and using the Table Mountain Group aquifer as a sustainable water resource, are under way.

The DWA is also mulling over two surface water options, one involving pumping winter rainfall from the Berg river into the Voelvlei dam and the other involving the diversion of water from the Dwars river, in Mitchell's Pass, near Ceres, into the same dam.

In Gauteng – South Africa's economic powerhouse – the DWA has set WC and WDM targets for all metros and municipalities within the Vaal river system, which collectively amount to a target of 15%. Municipalities are currently implementing various WC and WDM activities, some of which are financially supported by the department; however, metros and municipalities have been called upon to make a concerted effort to expedite their implementation efforts to meet the target by 2014.

Owing to the general underinvestment in WC and WDM in its area of supply, Rand Water has started to partially cofund approved water demand reduction projects with municipalities. The DWA and several municipalities have appointed Rand Water to implement WC and WDM projects in its area of supply as well as in adjacent areas, such as the Western Highveld.

There is also potential for WC in the mining sector, where government is making efforts to tackle the problem of AMD in the Witwatersrand mining basin, as well as in the bulk industrial and energy sectors. The mining and bulk industrial sectors account for a combined 8% of water consumption in South Africa, while power generation gulps down 2%. This compares with the agriculture sector's 60% and domestic and business consumption of 30%.

In a dissertation completed in 2010, University of Stellenbosch MPhil candidate Natalie Wassung calculates that coal-based electricity generation (including coal extraction, processing, pollution control and disposal of by-products) uses around 4.84% of national water supply rather than the oft-quoted 2%, which takes into account only coal combustion at a power station. By substituting coal-fired electricity with electricity from concentrating solar power, solar photovoltaic, wind, tidal or wave energy sources, 0.39 ℓ to 3.33 ℓ could be saved for every kilowatt hour generated.

South Africa's Integrated Resource Plan 2010 indicates that the country will introduce 17 800 MW of new renewable electricity generation capacity between 2010 and 2030, representing some 42% of all the capacity expected to be added over the 20-year period. The decline in the proportion of coal-generated electricity should translate into significant water saving by the electricity generation sector, argues Wassung.

For its part, power utility Eskom, which is overwhelmingly coal dependent, plans to move to a 65% reliance on coal over the next two decades.

In a report compiled in collaboration with the CSIR, the South African chapter of the World Wide Fund for Nature, says prospecting rights are being issued in the headwaters of sensitive catchments, noting that almost 25% of the 1.6-million-hectare Enkangala grasslands project, in Mpumalanga, is under threat from ever-increasing demand for prospecting and mining rights.

In her dissertation, Wassung proposes two types of investment options to prevent the excessive water use of coal-fired electricity and the coal mining that supports it.

The first are energy-related investment options that include energy conservation and efficiency through energy education, smart meters and the smart grid, and distributed generation. She argues that installing smart meters across just the mining, industrial and residential sectors in South Africa could lead to electricity savings of up to 13 132 GWh/y and coal-related freshwater savings of 38 437 Mℓ/y, while the implementation of a smart grid could lead to savings of up to 21 895 GWh/y and a coal-related freshwater saving of 63 980 Mℓ/y.

The second type of investment option that Wassung proposes is directly related to water and involves designing and implementing a fundamentally different water allocation system. She writes: "Water should no longer be allocated to sectors based simply on economic contribution. Rather, it should be allocated according to contribution to broad-based sustainability . . . the current amount of water given to the coal-mining and electricity industry is not a sustainable allocation decision."

However, the vigorous implementation of these recommendations would require political will.

South Africa's water problem is compounded by water loss through infrastructure leakage – the situation is so dire that some municipalities are consistently failing to meet WDM targets.

Nonrevenue water

South Africa's water sector has been dogged by the issue of nonrevenue water (NRW) for a long time, with a 2007 study of 62 water supply systems, conducted by the WRC, estimating that 774-million cubic metres a year – or 36% of the water supplied – was NRW. The study extrapolated national yearly NRW of 1 430-million cubic metres. If the estimated yearly potential savings of 263-million cubic metres were extrapolated nationally, the figure rises to 500-million cubic metres, representing about 12.5% of system input.

The South African government's response has been three pronged. Firstly, the Presidency has set a target for government to halve water losses by 2014, with the management of water losses addressed in the new Ministerial delivery and performance agreements.

Secondly, a recent NT budget circular articulates water loss issues thus: "There continues to be an urgent need to promote the careful use of water. Ensuring that water is correctly priced is the most effective means of getting households and businesses to conserve water. Municipalities are, therefore, encouraged to review the level and structure of their water tariffs carefully with a view to ensuring that water tariffs are designed to encourage efficient and sustainable consumption.

"To mitigate the need for water tariff increases, municipalities must put in place appropriate strategies to reduce NRW, particularly leakages and water theft. In this regard, municipalities must also ensure that water used by their own operations is charged to the relevant service, and not simply attributed to 'water losses'."

Further, the DWA has commissioned an initiative to support municipalities in assessing and reporting their NRW status in accordance with International Water Association Standards.

Illegal irrigation

In addition to dealing with the issue of nonrevenue water, the DWA is also taking steps to deal with illegal irrigation, which is a big problem in South Africa, where millions of litres of water are illegally used each year by farmers, particularly in the Vaal catchment area, which could have significant implications for the country.

The Vaal river, which flows into this area, is transferred from the Thukela and the Usuthu rivers in KZN and the Senqu river, in Lesotho, and serves as a conduit to transfer water to the Upper, Middle and Lower Vaal water management areas, providing about 60% of the national economy's water resource needs. In this river system, an estimated volume of 229-million cubic metres a year has been identified as possible unlawful water use.

To combat the problem, the DWA announced in March 2012 that it was stepping up its enforcement activities in the Vaal catchment area.

The department has identified a number of illegal water users and has warned that those not complying with the terms of their water use licences, thus going against the prescripts of the National Water Act, will be prosecuted.

The Blue Scorpions, the Green Scorpions and the Compliance, Monitoring and Enforcement task team will oversee these enforcement initiatives.

The theft of water from the Vaal system is compounded by South Africa's water loss through infrastructure leakage – the situation is so dire that some municipalities are consistently failing to meet WDM targets.

To add insult to injury, water pollution, the major causes of which are poor management of WWTWs, the discharge of poor-quality effluent by industries and mines and AMD, is a continuing problem. To improve the quality of the water in the system, the DWA is implementing a number of interventions, including the determination of in-stream resource water quality aims, improving controls to prevent or reduce water pollution at source and improving management of water resources through more effective monitoring, assessment and reporting.

Acid mine drainage

The problem of AMD – not only in the Witwatersrand area but also in other parts of South Africa, including the Mpumalanga and KZN coalfields, as well as the Northern Cape's Okiep copper district – was described in 2010 by a team of water and geology experts as an issue that should be tackled "as a matter of urgency" to "avert impending crises and stabilise the situation".

In a 146-page report that was presented to the Inter-Ministerial Committee on AMD, it was noted that concerns about the flooding of mine voids and/or AMD include that:

- AMD extensively contaminates surface streams and could precipitate devastating ecological impacts.
- Rising mine water levels have the potential to flow towards and pollute groundwater resources.
- Rising water levels could flood urban areas and result in geotechnical impacts that may jeopardise the integrity of urban infrastructure.
- Rising water levels in mine voids may lead to an increase in seismic activity, posing serious safety risks to deep-level underground mining operations and some risk to safety and property on the surface in the vicinity of the mines.
- Flooding may result from intermine water migration and may threaten neighbouring operational mines, limiting access to economic reefs.

However, the TCTA is making some progress in implementing emergency near-term projects designed to deal with AMD arising from the eastern, central and western basins of the Witwatersrand goldfields. But it cautioned in January 2012 that the money set aside for the implementation of the Phase 1 projects may be inadequate.

These Phase 1 interventions are aimed at preventing the acid water from rising above the so-called environmentally critical level (ECL) across the various basins, while drawing the level below that level in the western basin, where the ECL has already been breached.

A due diligence review undertaken in 2011 by BKS and Golder Associates indicated that the capital costs associated with Phase 1, inclusive of a 15% contingency and escalation, would be R924-million.

The TCTA was initially allocated R225-million, which the NT increased by a further R208-million after both the TCTA and the DWA made representations. In other words, the funding shortfall is currently estimated at R492-million for Phase 1 projects, which include the installation of pumps to extract water from a mine void to on-site treatment plants, the construction of an on-site water treatment plant in each basin, with the option of refurbishing, upgrading of existing plants, which are owned by mining companies, and the installation of infrastructure to convey treated water to water courses.

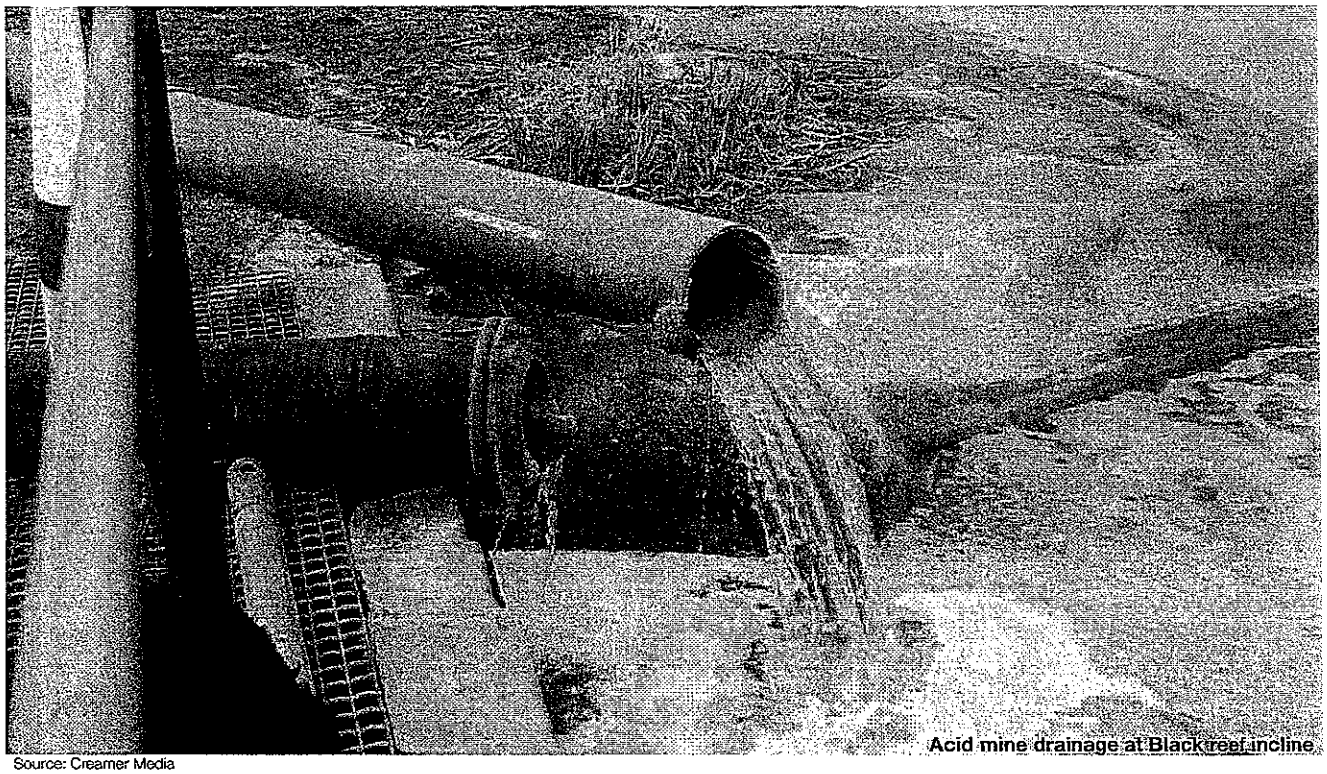
The allocations also do not cover estimated yearly operating costs of R210-million for an intervention the TCTA acknowledges is a mere "interim solution to prevent an environmental catastrophe". Therefore, the DWA and the Department of Mineral Resources are exploring the possibility of testing the 'open market' for input in finding a sustainable solution. Minister Molewa expects the responses to address all aspects of AMD, including institutional matters, financial matters, technology and the operation and implementation of the treatment plants in the Witwatersrand.

Further, as part of the 'immediate' solutions to the decanting of AMD on the western basin, the TCTA has entered into a partnership with Rand Uranium to upgrade the mining company's treatment plant to a level where it will be able to process 36-million litres a day instead of the current 12-million litres a day.

After September 2012, additional capacity will be introduced under what has been described as a 'short-term' solution. Tender documents for this short-term solution were issued in September 2011 and closed in January 2012. The evaluation of the bids was initially expected to be completed during February 2012, with construction starting a month later.

The TCTA has acknowledged that water released into rivers after the implementation of Phase 1 may still contain high salt levels, which require dilution using expensive and scarce freshwater sources to mitigate the impact.

Meanwhile, the DWA has initiated a feasibility study to assess the longer-term solutions for South Africa's AMD problem. The investigation began in December 2011 and should be completed in 18 months.



Acid mine drainage at Black reef incline

Source: Creamer Media

The feasibility study, which will cost R17-million, is probing solutions over and above those identified by the TCTA for implementation across the Witwatersrand goldfields in the 'immediate' and 'short' term. The emergency interventions are focused on the western basin, where AMD is already decanting into the Tweelopiespruit.

However, despite current initiatives by government to deal with the environmental risks and hazards associated with AMD, environmental protection group the Federation for a Sustainable Environment contends that the issue is not being taken seriously enough, with the group noting that the destruction of ecosystems caused by AMD is generally irreversible. In many cases, the polluted sites may never be fully restored, as AMD pollution is so persistent that there is no available remedy.

Further, long-term exposure to AMD-polluted drinking water may lead to increased rates of cancer, decreased cognitive function and skin lesions.

Another area of concern is the number of mines operating without valid water licences. In a letter submitted to Minister Molewa in February 2012, Lawyers for Human Rights (LHR), acting on behalf of 18 organisations linked to the Mining, Environment and Community Alliance, noted that the Minister had stated in Parliament in December 2011 that 84 mines were known to be operating without licences. The LHR urged the Minister to put an end to illegal water use by mines. Complying with the law would ensure that the mines practised good water use and waste management, and proper rehabilitation would be undertaken once mining ceased.

Water and climate change

South Africa launched its climate change policy in October 2011. The policy, developed over six years, gives the country a clear roadmap to respond to the urgency of climate change as it seeks to push towards a green economy.

The aim of the policy is to effectively manage climate change impacts through interventions that build and sustain South Africa's social, economic and environmental resilience and emergency response capacity, and to make a fair contribution to the global effort to stabilise greenhouse-gas concentrations.

Speaking earlier that year in response to a question about the threats that had been identified by her Ministry and initiatives to promote adaption to climate change, Minister Molewa said, specifically about the water sector: "South Africa is, overall, a water-stressed country, with [a] mean annual rainfall of about 490 mm, compared with a global average of about 876 mm."

She added that the higher temperatures bought about through climate change are one of several drivers currently influencing water resources in South Africa's rivers and that it is highly likely that changes in hydrological processes, such as increased evaporation, are related to increasing temperatures. The projected increase in temperature will partially offset an expected increase in rainfall – for some areas due to an increase in potential evaporation of about 5% per 1 °C.

Since South Africa's industrial, domestic and agricultural users are highly dependent on a reliable supply of water, a reduction in rainfall amount or variability or an increase in evaporation would further strain already limited water resources and water supply.

One of the major water-related climate-change-linked projects being implemented in South Africa is the eMalahleni water reclamation plant, a partnership between Anglo American's thermal coal business, BHP Billiton Energy Coal South Africa and the eMalahleni local municipality that takes into account the remaining 20- to 25-year life of the contributing mines, in the Mpumalanga coalfields. It will also cater for postclosure liabilities and, ultimately, will help to address long-term climate adaptation risks and promote a sustainable future for the region, providing better flexibility and self-sufficiency in terms of water use.

The project was endorsed by the United Nations Framework Convention on Climate Change at its seventeenth Conference of the Parties, in December 2011.

Mines will have to deal with 'too much or too little water'

According to global consulting engineering group SRK Consulting partner and hydrologist Peter Shepherd, climate change will make some areas of South Africa wetter and others drier. This will affect the way local mines need to plan and build their infrastructure, particularly water management infrastructure.

Shepherd believes that climate change will primarily reduce the available water supply in the main mining areas in the country, as well as increase evaporation. This will result in having to increase the makeup water requirement at these mines.

It is predicted that, in the eastern areas of the country, mines will experience an increase in the amount of water that the mine will need to deal with to prevent spillage into the environment, while those in the western parts will need to reuse and reclaim their existing water to assist in minimising the use of local water resources.

In areas where more rain is predicted, mines face the prospect of breaking the law if their infrastructure is not able to limit mine spillage into the environment surrounding the site. In these cases, facilities in these areas will have to be designed or modified to account for the changes in rainfall patterns.

Outlook

Despite the fact that water is important for food and energy security, as well as economic growth and sustaining the livelihoods of the world's poor, both developing and developed regions are far from being water secure – a state of affairs that is blamed on policymakers who do not fully grasp the need to adequately invest in water services and to collect, treat and reuse this precious resource efficiently.

However, as the world's growing population exerts increasing pressure on the available resources, as do factors such as unrelenting urbanisation, deteriorating water quality and the effects of climate change, water is now a top-priority item for governments and other stakeholders, with the UN having declared access to water a human right. Towards the end of 2011, the UN Human Rights Council passed a resolution imploring States to ensure enough financing for the sustainable delivery of water and sanitation services.

This report highlights the water and sanitation issues not only in South Africa but also on the rest of the African continent and in the world at large.

In South Africa – a water-scarce country – a much bigger capital injection than is currently budgeted is required to ensure adequate water supply, with the DWA calculating that current allocations amount to only 44% of the R573-billion that should be invested in water infrastructure, services and demand management over the next decade.

The need to invest such a huge amount, which government – faced with many other priorities – cannot easily afford, strengthens the case for private–sector participation in water infrastructure provision. Minister Molewa announced in March 2012 that government hoped to secure R25-billion in water infrastructure funding from foreign investors. This is a good start but, given the magnitude of the required investment, there is a need for government to be more aggressive in wooing private–sector investors.

The Minister acknowledges that the prevailing state of affairs in the water sector can be partly blamed on a lack of leadership and management skills during the last 18 years, with undemocratic decision-making leading to poor institutional performance.

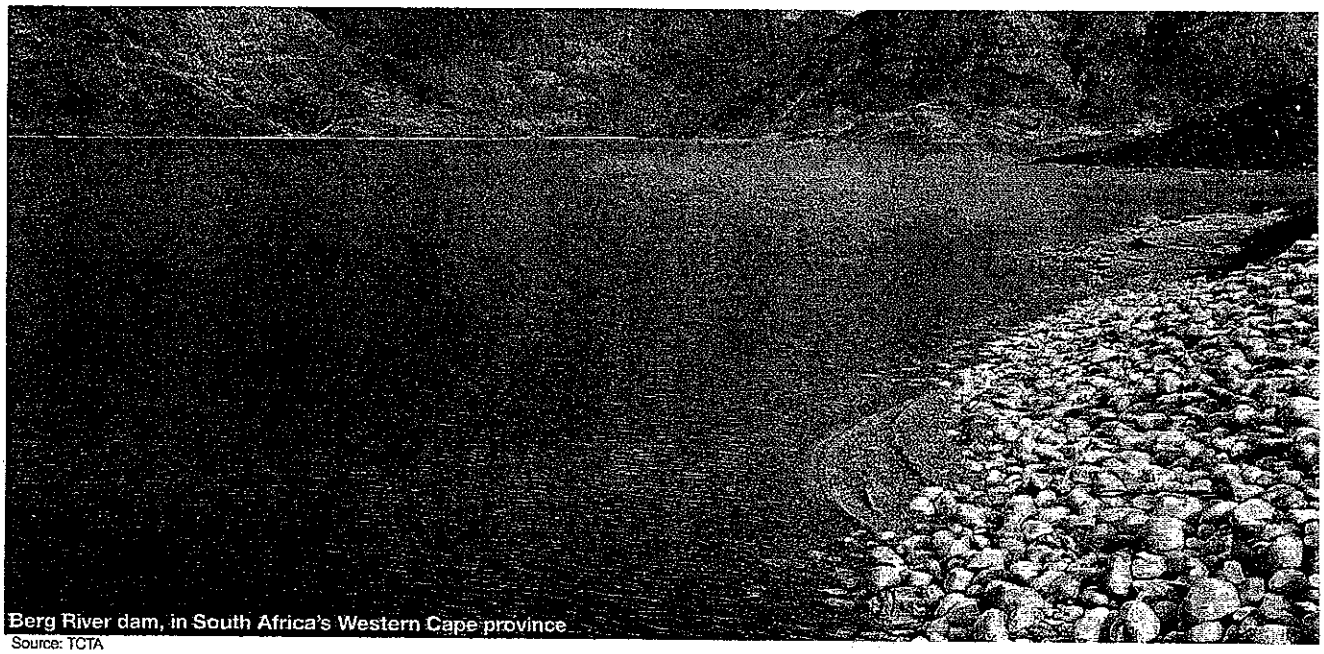
Hopefully, a turnaround strategy for the sector, crafted by the DWA's business process re-engineering committee, will correct much that is wrong with South Africa's water sector.

The focus of the turnaround strategy will be on institutions in the sector, which tend to exclude the experiences of marginalised and poor communities.

The DWA has announced the intention to reduce the number of CMAs and water boards, as well as the introduction of a national tariff for water to replace the myriad tariffs charged by provinces, municipalities and national agencies.

And, to ensure increased supplies to the poor, those who pay for their water will pay more.

The political will to implement this turnaround strategy seems to be there, and this gives hope that, in a few years, South Africa's water sector will be a far cry from what it is today.



Berg River dam, in South Africa's Western Cape province
Source: TCTA

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