



# Synthesis Report:

## State of Water in Cities

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Analysis of water resource and its management in Cities

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# Executive summary

It is essential for cities to have access to reliable, safe water and sanitation services, to be protected against water related risks like flooding, drought and water pollution, and to manage freshwater ecosystems and catchments in a manner that supplies ecosystem services.

South Africa is a water scarce country and water resources are highly variable across the country, both over time and space. As a result, and to create security of water supply, South Africa has a highly regulated and engineered water infrastructure with some of the highest levels of impoundments worldwide. Water resources are necessary for basic human needs, economic development, social needs, and ecological and environmental requirements. Within a water scarce country this means water is already in most instances allocated to existing uses and competing demands. Unfortunately, water is not valued as a scarce resource and often used in wasteful manner, polluted and poorly managed. As cities and the economy grow there will only be increasing demands for the limited water supplies that are available.

Challenges to managing water relate to water availability (both where it is and when), water quality or its fitness for use (issues like acid mine drainage have become increasingly prominent), development and maintenance of water infrastructure to ensure its usability for people and the economy, and maintaining the ecological services that water provides us (flood mitigation, water purification). Cities in South Africa are responsible for providing, maintaining and collecting revenue for water supply and sanitation. Balancing the needs for infrastructure to new residents, maintaining existing infrastructure and collecting revenue to fund these services where many residents cannot afford to pay will remain a complex challenge going forward. Skills and human capacity in the water sector, particularly at a local level, are often too small to cope with the scale and complexity of the challenges.

Current water usage in South Africa already exceeds the reliable supply, so during dry periods (like the current drought conditions) water shortages can be expected and many cities are forced to implement water restrictions.

Going forward, water scarcity, poor water quality, infrastructure and capacity challenges and water pricing will be at the forefront of local government agendas. The question of how to provide broader social and economic access to a scarce and undervalued resource will require new approaches and innovation to urban planning and management.

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# List of acronyms

DWS – Department of Water and Sanitation
IDP - Integrated Development Plan
MBI – Municipal Benchmarking Initiative
NWRS - National Water Resources Strategy
SACN – South African Cities Network
SALGA – South African Local Government Association
WCWDM – Water Conservation and Water Demand Management
WMA - Water Management Areas
WRC – Water Research Commission
WSA - Water Service Authority
WSP – Water Service Providers

# 1 Introduction

The South African Cities Network (SACN) has included water management on its agenda as one of its focus areas: Dealing with City Vulnerabilities, owing to the growing threat of freshwater scarcity largely as a consequence of increasing demand, pollution, unsustainable use and climate change. To facilitate the reporting on water and its management by the SACN, a detailed technical report was commissioned of which the main objective was to conduct an assessment of the current state and quality of water infrastructure within cities as well as the condition of the freshwater resources (rivers and wetlands). SACN would then be well placed to understand city related issues to improve their alignment with the national imperatives of good water management to achieve food and energy security, ecosystems conservation and reduction of risks from water scarcity (climate change).

Water issues are currently a highly topical and key concern for cities. Challenges relating to water quality (drought conditions, supply issues), water quality (water treatment, poor runoff) and condition of the catchment (reflected in the state of rivers and wetlands) are evident in all urban areas. South Africa is a semi-arid country with highly variable rainfall (about half the global average) so cities have been faced with the challenge of providing security of supply of water for urban needs (people and the economy) through an extensive network of infrastructure. Water security is defined by the United Nations as:

*“Water security is defined as the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability.” (UN-Water, 2013)*

The concept of water security is important as it defines many of the challenges that cities face, including; biophysical, infrastructure development and maintenance, organizational, political, social and financial. Urban residents often have far greater water security than rural residents due to the extensive infrastructure networks, yet are still affected by dry periods. The priority, and challenge, for cities is the provision of basic water services to all, meeting the water needs for economic growth and maintaining the environmental integrity of water resources.

South Africa’s available water resources are already being intensively used and controlled and most urban areas rely on inter-basin transfers to move the

water over large areas to where the demand is. Most surface water has already been allocated for use, but there are still groundwater resources available that can be exploited. While water availability is a challenge, water pollution and managing the quality of water is probably an even greater challenge. Tshwane, Ekurhuleni and Johannesburg are located on the headwater which means that (i) available water from local sources cannot meet the demand and (ii) the rivers are polluted from poorly treated effluent and solid waste.

## 1.1 Project method

This summary report addresses water issues through the following topics:

- Resource availability at city level in relation to its use
- Fitness for use of water (water quality)
- Condition of freshwater resources (ecosystems) and impacts on people and infrastructure
- Condition of water infrastructure and management in the cities
- Responses to climate change impacts
- Revenue management, pricing and budgeting for water supply services, including water loss management.

For each of the above topics, indicators were determined through an extensive literature review which brought the total number of indicators tracked for this research to a set of 142 indicators. The indicators used are indicators already monitored by various role-players. Data per city was then collected to see how cities performed in relation to these indicators (SACN, 2014).

This report provides a summary of key findings from the data collection and analysis done, as well as a desktop study of the current available literature and research on water in cities in South Africa. The full report is available from the SACN website ([www.sacities.net](http://www.sacities.net)).

**Table 1: Number of water indicators monitored per area of concern.**

Source	Number of indicators per topic area					
	Water availability	Fitness for use (water quality)	Freshwater ecosystems	Infrastructure	Climate change responses	Finance
SALGA/WRC Municipal Benchmarking Initiative (2014)	18	14	4	20	13	13
SACN (2008)	10	5	7	11	5	2
Desktop Research	44	38	28	86	31	16

It is essential for cities to provide access to reliable, safe water and sanitation services. Furthermore, cities ought to protect ecosystems against pollution and degradation. The obligation to deliver basic services and maximise water resource availability, requires careful management of water resource types available to the city, level of capital expenditure on the infrastructure necessary to abstract, treat and convey the water to the ultimate user, level of operating expenditure, and availability of technical capacity to ensure the infrastructure remains in good working condition.

To ensure that water resources are protected and conserved for the long term, the national government has through the development of a National Water Resources Strategy (NWRS) of 2013 provided a framework that also contributes to the attainment of the social and economic goals of the country. The Department of Water and Sanitation (DWS) has divided the country into Water Management Areas (WMA) to reflect the variation in water availability and water requirements, the large spatial variations in climate, the level and nature of economic development and population characteristics.

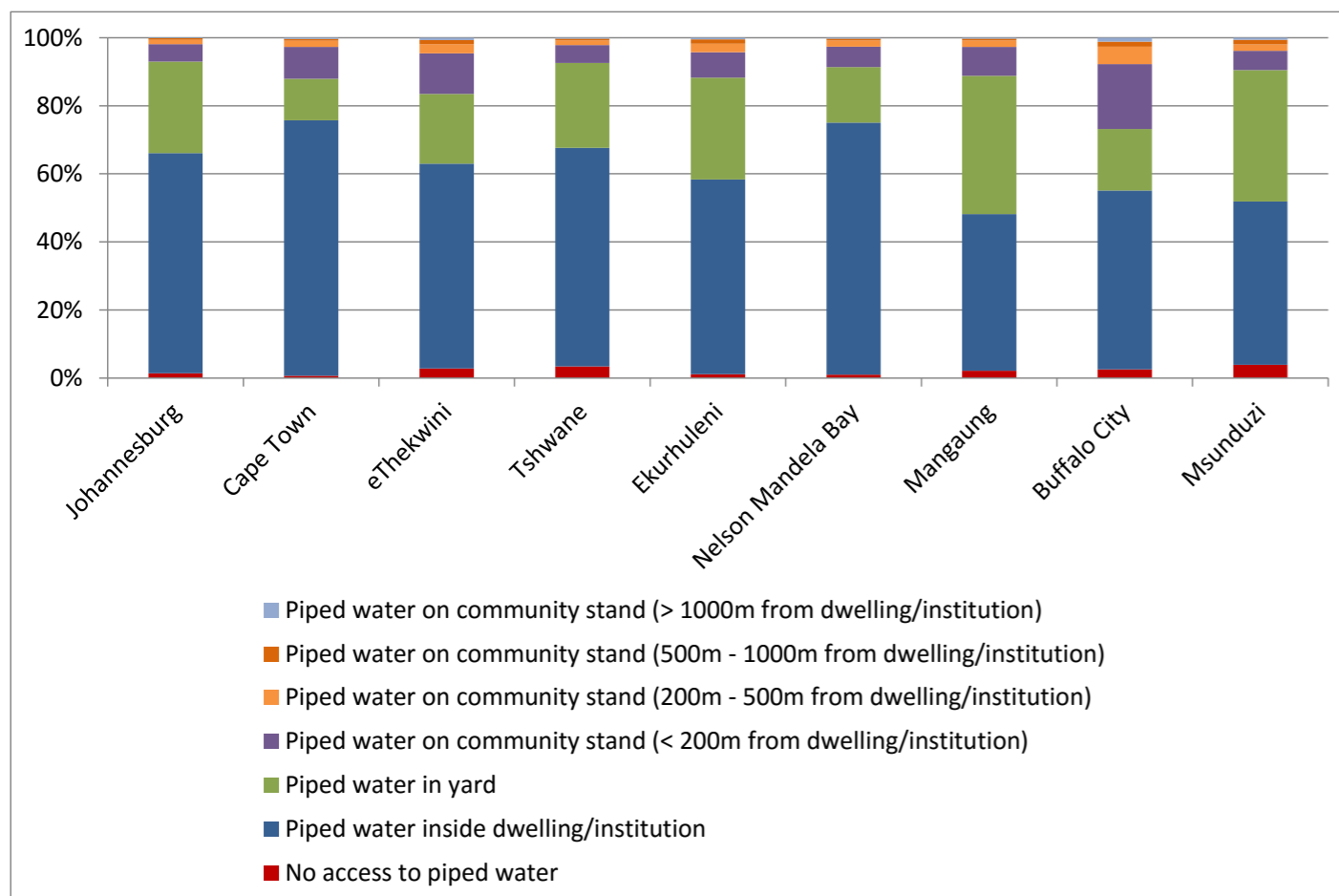
Currently the national government through the DWS is responsible for water resources planning, development and management, with the role for Municipalities being that of “Water Service Authority” (WSA). Under this arrangement, DWS is responsible for the bulk water resources infrastructural systems that provide water to the WSAs, while the WSAs are tasked with ensuring access to water services as prescribed in the National Water Act. Some municipalities have Water Service Providers (WSP) that provide water services in accordance with the Constitution, the Water Services Act, By-laws and any specific conditions set by the respective WSA.

South Africa is faced with water quality challenges which are mainly induced by human activity. However it is also important to note that there are those water quality challenges which result from natural causes. The anthropogenic problems are associated with industries that produce chemical waste; mines that introduce metals to water resources; Wastewater Treatment Works that discharge untreated or poorly treated effluents introducing excessive nutrients, phosphates and coliforms; and agriculture that uses pesticides, herbicides and fertilisers introducing salts and other toxic substances in the water.

Analysis suggests the existing water and wastewater infrastructure in Cape Town is the most adequate on account of the proportion of households

and persons with access to water and sanitation and the city has relatively lower new infrastructural needs in relation to other cities. However, that does not account for the quality of the service provided, for example, if there are service interruptions. Along with Nelson Mandela Bay Metropolitan Municipality, Cape Town has the highest proportion of households with piped water inside dwellings (as reported in 2010) and along with eThekweni, Mangaung and Msunduzi, has the highest percentage number of metered connections. In addition, Cape Town along with eThekweni, Tshwane, Ekurhuleni, and Nelson Mandela Bay demonstrate the best performance with respect to budgeting for spending on asset management.

Figure 1 shows that access to potable water services has increased dramatically in urban areas over the last 20 years. Most cities have managed to supply water within the yards of over 90% of households, except for Buffalo

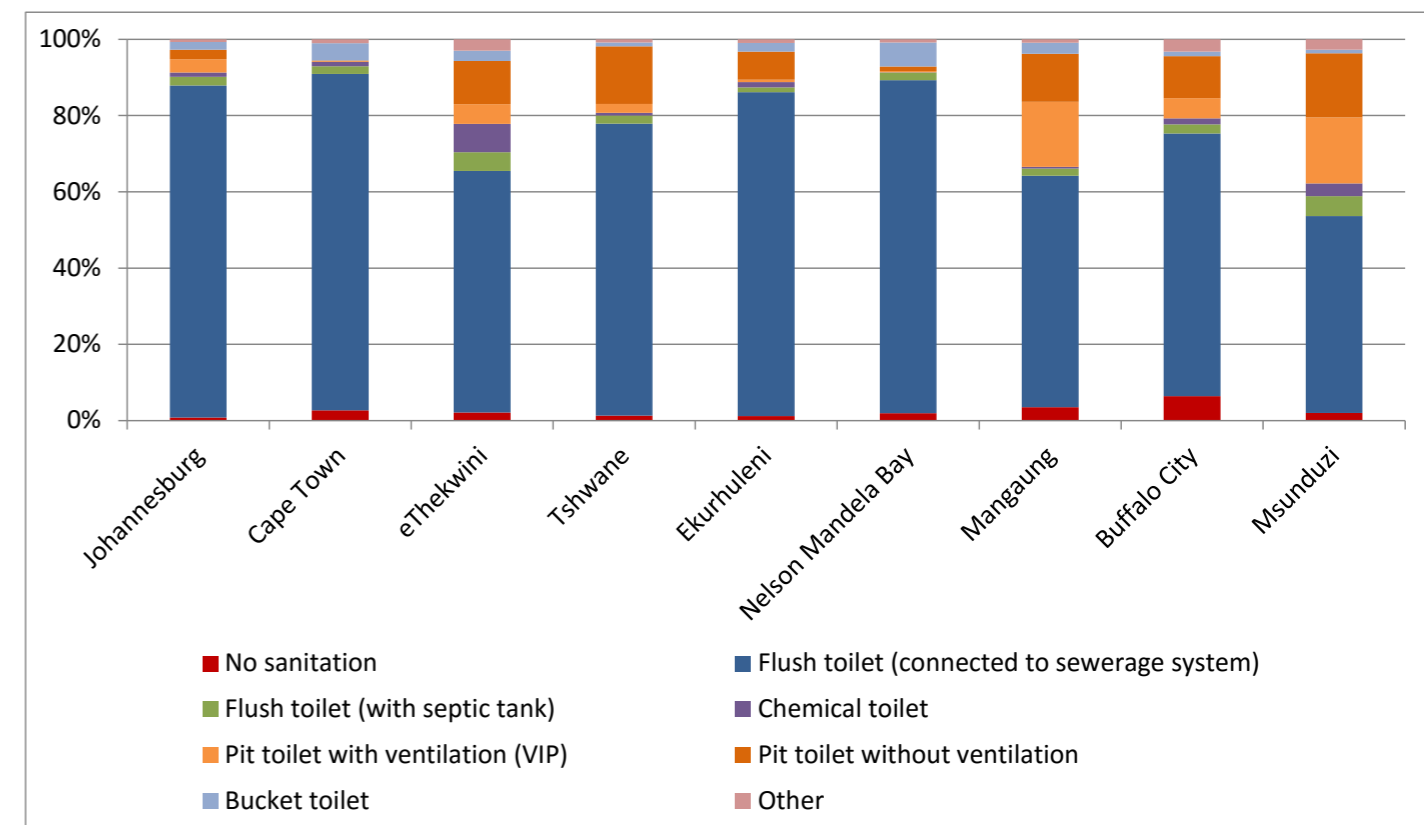


**Figure 1:** Percentage of households with access to potable water services (SALGA/WRC Municipal Benchmarking Initiative, 2014).

City and eThekweni who have large rural areas that are more difficult to supply. These cities have developed innovative options for water and sanitation service delivery outside of the urban edge. In 2014 eThekweni was awarded the winner of the Stockholm Industry Water Award, for its transformative and inclusive approach to providing water and sanitation services.

Cities still face challenges to provide adequate sanitation services to households and access to sanitation does vary across cities and regions. Inadequately collected and/or treated wastewater can compromise the quality of water resources receiving such polluted run-off, resulting in effects on human health and reduced fitness for use of that water, relative to use. When untreated or poorly treated water is released into rivers, downstream communities are negatively affected.

The proportion of the population with access to flush toilets is highest in the City of Johannesburg, City of Cape Town, Ekurhuleni Municipality and Nelson Mandela Bay Metropolitan Municipality while in the cities of Msunduzi



**Figure 2:** Access to sanitation (SALGA/WRC MBI, 2014).

and Mangaung there is increased use of other sanitation options. The type of sanitation system and how well it is maintained has implications for control of outbreaks and spread of water-borne epidemics. Cities with a high proportion of the population with access to flush toilets connected to the sewage system have the infrastructure to collect and convey sewage to the point of treatment and thus a lower risk of polluting the environment. However this type of sanitation comes at an expense to both the consumer and the city.

The overall condition of freshwater resources and wetlands in the country needs to be monitored to prevent further deterioration and the subsequent impact on people and the environment. The risks to human health are relatively lower in the larger cities because they are better able to attract and keep the technical skill essential for delivery of adequately treated water to the final consumer and deal with problems when they arise. However treatment of wastewater to an adequate level for discharge into the environment remains a challenge across all cities and it impacts negatively on the condition of freshwater resources.

The Free Basic Water Programme aims to ensure that poor households receive 6,000 litres of free basic water per month (or 25 litres per person per day) and free basic sanitation services. Unfortunately, for those South Africans who do have access to potable water gross average consumption is very high at 235 litres per person per day. In other words, South Africa is a semi-arid country, with highly variable rainfall, yet South African urban residents use nearly double the amount of water when compared to the rest of the world (DWA, 2013a). There is an immediate and urgent need to look into water conservation and managing demands for water.

Current water usage in South Africa already exceeds the reliable supply, so during dry periods (like the current drought conditions) water shortages can be expected and many cities are forced to implement water restrictions. There is a great need for cities to actively implement water conservation and water demand management practices.

## 3 Water management in SACN member Cities: City perspectives

In this section, the member cities of the SA Cities Network (SACN) are discussed in brief. The discussion draws on and summarizes, for each city, the findings from the analysis of the data collected as part of this study and is meant to give the reader a general idea of the state of water and its management in the respective cities.

### 3.1 City of Johannesburg

The data obtained suggested that the City of Johannesburg is investing in extending and maintaining its water and wastewater infrastructure. These investments exceed by more than 100% the investment levels of the closest SACN member city. However, on a per capita basis and at just over R100 per person, this level of investment is only the third highest of the other cities compared in this study. The investment in maintenance of water infrastructure is not adequate to cover the extent of maintenance that is required. It is therefore not surprising that even its operating expenditure per capita is the highest among the SACN member cities. This level of expenditure may explain in part the city's performance on such measures as the proportion of the city's dwellers with access to flush toilet sanitation and drinking water quality where the assessment done in this study found it to be among the better performers and therefore less vulnerable to outbreaks of water-borne diseases.

The City of Johannesburg is showing a positive trend observed with respect to water loss management, infrastructure asset management as judged by the Municipal Benchmarking Initiative (MBI), and the fact that the City's income from sale of water services is the highest. This suggests an appreciable combination of adequate levels of financial and technical skill. Improved management becomes critical especially when the size of the water and wastewater infrastructure is already extensive and is still being extended to address the water and sanitation backlogs. It is essential that the growth in technical skill levels continue to match the growth in infrastructure and while this would result in a rise in budget allocation to staff salaries, it will ensure that the value from the city's water and wastewater infrastructure is maximised.

The city achieved a good score with respect to information management practices as judged by the MBI. Having an adequate information management system is essential for supporting management decision making.



However challenges remain and these include the negative impact on rivers and wetlands from rapid urban expansion and poor land management practices within catchments as well as impacts from mining which may be responsible for instance for the salinity observed in the Vaal, Crocodile and Olifants River systems. Treatment costs associated with water in these systems would as a necessity rise if the water quality is to meet user/use requirements.

Another challenge the study found was with respect to the pricing of the city's water services, in some years the revenue generated was less than the cost of the water service. The levels of non-revenue water, while are slowly improving, need to be watched carefully and water efficiencies put in place.

### 3.2 eThekweni Metropolitan Municipality

Assessment of information on the state of water and its management in the eThekweni Metropolitan Municipality revealed a number of positives among which is the level of capital investment in water and wastewater infrastructure which on a per capita basis is second only to that of the Nelson Mandela Bay Metro. It was also found that the city enjoys a very high metered connection coverage and the highest technical skill capacity level among the SACN cities. It is possibly on the account of its technical skill capacity that it reported a per capita operating expenditure level that is second highest among the SACN members. With such infrastructure spending and technical capacity, the city is well placed to meet the challenge of serving a growing population as it has the capacity to improve water use efficiency through improved monitoring, billing and revenue collection, and to improve operation and maintenance of infrastructure which would result in improved service levels due to a reduction of downtime as well as leakages and blockages within the systems. It is also reflected in Blue Drop Assessments which suggests that the management of the water treatment works is on average acceptable and the quality of the drinking water supplied consistent with the required standards. This may have contributed to its being recognized with the 2014 Stockholm Industry Water Award.

The data assessed also suggests that the Financial Management practices of the eThekweni Municipality are adequate. The current ratio it maintains suggests that the municipality maintains an adequate level liquidity. The city has also demonstrated considerable skill in budgeting for the manage-

ment of assets as reflected in the low variance of actual spending levels from the corresponding budgeted amount.

Finally, the city is demonstrating monitoring capacity through its compliance with the objectives of the Green Drop assessment as reflected in the trend showing improved wastewater management audits.

However, the city still needs to address some challenges which the assessment undertaken in this study revealed. Amongst others, many of the freshwater ecosystems in eThekweni Municipality have been highly impacted by agriculture and urban development and are in a poor condition requiring management intervention to manage the environmental impacts, pollutions and storm water management. The impacts on rivers and wetlands are largely from poor land management, pollution, and sewage and effluent return flows, invasive alien plant species, changing flow regimes and over abstraction of water. As a result the ability of these freshwater ecosystems to provide ecosystem services (regulating the impact of flooding, cleaning water) has been compromised. This means that the municipality should be mindful of the need to mitigate the impact on freshwater systems so as to ensure humans continue to derive ecosystems services.

### 3.3 City of Tshwane

Like Johannesburg and Ekurhuleni, the City of Tshwane receives most of its water from the Vaal river system through transfer schemes. The data obtained suggested that City of Tshwane still has more to do for its water and wastewater infrastructure to be considered adequate. On a per capita basis, the level of investment is about R60 per person per year, yet the proportion of the connections that is metered still falls below the benchmark of 100% for metered connection. Other measures such as the percentage of households with piped water inside dwelling also suggest it is on par with the other large cities and likely facing the same issues associated with extending services to informal settlements. However, investment in improved infrastructure needs to be prioritized as this has implications regarding how effectively it can improve non-revenue water levels and manage leaks.

With respect to operating expenditure, the level of spending is on par with the rest of the SACN member cities. In addition, its management of consumer debt levels came across as sufficient as it has the lowest consumer debt on its

books reflecting a capacity to enforce regulations. This is also reflected in the income levels derived from the sale of water services.

The data analysed in the study suggests that the technical capacity can be increased to bring it closer to the skills levels in the other larger SACN members. This is essential if the backlogs especially in the informal settlements are to be addressed. In addition, there needs to be a strategy to address the likely impacts of economic activities on freshwater ecosystems of activities such as mining which may be responsible for instance for the salinity observed in the Vaal, Crocodile and Olifants River systems. The treatment costs associated with water sourced from these systems would as a necessity rise if the drinking water quality is to meet the requirements.

It however has to be commended for the considerable skill in budgeting for the management of assets as reflected in the low variance of actual spending levels from the corresponding budgeted amount.

### 3.4 Ekurhuleni Metropolitan Municipality

Ekurhuleni Municipality faces the similar challenges as the cities of Johannesburg and Tshwane with regard to the challenges posed by urbanisation activities such as mining on the water sources the municipality depends on. It also is faced with the challenge of extending services to the informal settlements that are mushrooming to accommodate economic migrants from rural areas. Consumer debt associated with water services, wastewater services and refuse collection are high. This is not consistent with sustainable financial management and has implications for the equitable access to water for all in the municipality.

The data collected for this study also suggests there is a need to raise the technical capacity as the indications are that this are lower for the municipality when compared to its peers in Gauteng. Addressing this issue may be key to improving the capital expenditure to levels essential to support economic growth. The municipality's per capita investment level in its water and wastewater infrastructure is lower than its peers in Gauteng. The inadequacy of the water infrastructure is reflected in the volume of non-revenue water experienced by the municipality. Management and improvements in non-revenue water management is probably the biggest challenge the City faces from an infrastructural perspective.

The operating expenditure level in contrast to the capital expenditure is consistent with the rest of the SACN cities and its asset management spending is prudent with the actual spending matching the budget figure. This is also reflected in the Blue Drop assessments that point to good water supply asset management and the MBI health check.

A unique feature of Ekurhuleni is the high number of pans within its boundaries due to the flat topography. Past mining activities have resulted in a number of lakes and dams. Also within the city is the Blekbokspruit Ramsar site, a wetland that is of international importance. These are important areas which affect catchment and land management practices and unfortunately many of the water features are in a deteriorating condition.

As with the other cities, the above issues constraint the municipality's ability to properly budget as achievement of the revenue projections gets compromised by technical capacity limitations, and a high proportion of non-revenue water. The consequences of these were observed in the data that was obtained and analysed. For instance, in the past the cost of water service provision for the municipality has exceeded the revenue generated from water services; a condition that is not sustainable.

### 3.5 Nelson Mandela Bay Municipality

Nelson Mandela Bay's performance with respect to water resource availability has been commendable. The data analysed indicates the municipality is investing on a per capita basis the highest amount on capital investments for water and wastewater infrastructure and is why it has a relatively high proportion of people with access to water within dwelling. In fact it has the highest proportion of houses with piped water inside dwelling as well as flush toilets (connected to the sewage system) of the eight SACN members. The study also found that it has a very high metered connection level and this makes it well suited to implement adequate water monitoring and billing practices thereby managing its levels of non-revenue water. This is further reinforced when the actual spending figures are compared to the corresponding budget allocations.

The City receives its water from the Algoa Water Supply System, of which it is the largest user in the supply system. A Water Conservation and Water Demand Management Strategy for the City has targeted a 13.6 million m<sup>3</sup>/a reduction in demand to decrease pressure on limited resources (DWA, 2013b).

The City has achieved well with Green Drop Assessments. However, the assessments do show it may need to increase its technical staff capacity. This would ensure sustainable water resource availability essential for supporting economic development. The declining quality of rivers and wetlands within the municipality need to be managed as these in turn affect the health of estuaries and coastal systems.

From the data obtained under the MBI the municipality could improve on drinking water quality. The human health risks arising from any compromise in water quality are well known and potentially expensive.

The greatest challenges for the municipality relate to managing non-revenue water and reducing the levels of unaccounted for water as well as increasing the levels of investment in the maintenance of water infrastructure. Acute drought conditions and demands for water from growth in the City mean the City has prioritised demand side management initiatives to reduce the pressure on limited water supplies. Options for the City to supplement its current water supply include developing further groundwater sources, water re-use and seawater desalination.

### 3.6 Mangaung Municipality

Water management in Mangaung is challenging due to limited water availability for the demands placed on it. The Integrated Development Plan (IDP) for Mangaung has identified access to adequate and reliable supply of water as one of the top challenges to the City, along with inadequate roll out of basic water service provision to households and high levels of non-revenue water. In recent years a number of water restrictions have been in place across the City. The Water Reconciliation Strategy Study for the Large Bulk Water Supply systems within Mangaung showed that the estimated potential water saving can be up to 20% of the total consumption (DWA, 2013a).

Water and sanitation infrastructure within the City are also under pressure. While the City has made great progress in increasing access of households to potable water, there are still challenges with accessing sanitation services. This is particularly challenging where there are rapidly expanding informal areas and in peripheral areas.

The proportion of households with no access to sanitation is significant and is a priority area for the City. The Blue Drop drinking water quality assessment

shows that there is room for improvement. The municipality would also need to boost the technical skills capacity levels as these would be essential to grow and offer operational and maintenance support to a growing infrastructure network.

Aging infrastructure with inadequate investment in maintenance along with illegal connections has contributed to the levels of non-revenue water. One of the more difficult aspects to manage for water is finding a balance in spending a limited budget on expanding access to basic services and investing in the maintenance of existing infrastructure. When non-revenue water levels are high, this becomes increasingly challenging.

Adequate storm water management is challenging due to urban growth increasing impermeable surfaces which interferes with the natural discharge of storm water. In periods of heavy rainfall high volumes of discharge, as well as peak flows, increase radically, creating pressure on road and water infrastructure.

With respect to its financial management practices, it became evident from the data analysed that the municipality's budgeting skills need to be improved. This would go a long way in addressing situations where actual spending on asset management is greatly in excess of the corresponding budget allocation.

### 3.7 Buffalo City Municipality

Buffalo City is supplied water by five major dams in the area that capture most of the available surface water. This means that there is little potential for new surface water development in the supply area. Given the expected population growth in the city the current water availability is expected to be sufficient in the medium term, given a number of necessary interventions. These interventions include improvements to operations, infrastructure upgrades, and the implementation of WCWDM measures, reduction of non-revenue water and water re-use (DWA, 2013b). Desalination of seawater is considered to be a viable future option for water supply. Wastewater treatment facilities are nearing capacity and require further investment.

A large amount of water is wasted through physical and economic water losses reflected in high levels of non-revenue water. Investment in maintenance of existing infrastructure, fixing leaks and expanding metering services is essential to impact on the non-revenue water levels. The City also places great importance on water demand management practices to manage con-

sumption through WCWDM. The Amatole Water Supply System Reconciliation Strategy recommended a water use target of 1.2 million m<sup>3</sup>/a for the City, with the goal to achieve this set to 2020 (DWA, 2013b).

As with most cities, there remains a challenge in delivering basic water services in new and informal areas. The backlogs in infrastructure delivery are due the inability to roll out services in line with the levels of growth.

With respect to water resource availability Buffalo City's capital expenditure on its water infrastructure is the lowest of the SACN members. While the corresponding expense for wastewater infrastructure is comparable to its peers, there is need for improvement. With the level of coverage for metered connections below expectations the municipality is not well placed to manage the levels of non-revenue water and the associated revenue loss. The data suggests that while the technical skills levels are adequate, the numbers of skilled staff are too low.

The City needs to ensure the drinking water quality improves as the MBI data suggests that there is room for improvement. With respect to its financial management practices, consumer debt for water and wastewater services as well as refuse collection are showing an upward trend suggested laxity on the municipality's side. This should be addressed as a priority as it would help the municipality move closer to a financially sustainable status. Moreover it would also result in further improvements in the already acceptable level of asset management by the municipality.

### 3.8 Msunduzi Municipality

The bulk water supply system for both eThekweni and Msunduzi consists of an extensive infrastructure network of water conveyance and treatment infrastructure that transfer water from the main storage dams of Midmar, Albert Falls, Nagle and Inanda in the Mgeni River System and Hazelmere Dam on the Mdloti River (DWA, 2010). The Mooi-Mgeni Transfer Scheme augments the supply of the upper Mgeni River into Midmar Dam. Drought conditions in the catchment have created recent water shortages.

Most of Msunduzi has adequate bulk water supply but new areas and areas of urban expansion such as Vulindlela require additional reticulation to accommodate growth. Rapid growth of settlements in some areas is driving

the need to upgrade and extend current reticulation systems. It is important to note that the current demand for water exceeds the reliable yield of the Umgeni system and in order to secure reliable supply in the future augmentation from other river systems is needed. The current drought and water restrictions in the municipality highlight this. In the short term WCWDM interventions and managing very high levels of water losses can reduce some pressure, but increased capacity is needed.

With respect to water resource availability Msunduzi municipality's infrastructure is the least developed of the SACN members. Moreover its capital expenditure on a per capita basis would need to be raised if the infrastructural capacity is to be improved. With a relatively low proportion of households with piped supply inside dwelling, it is likely that the revenue per unit of water supplied in the city is lower than for those cities with a high proportion of dwellings with piped supply. Increased capital expenditure would be necessary to remedy this situation. Related to this, the municipality can expect a rise in demand for water as the proportion of households with access to piped water and sanitation rises. The data analysed suggests that the technical skills capacity is not optimal and additional technical capacity is needed.

Msunduzi Municipality is contained almost entirely within one catchment area. Poor land management practice in some areas and the loss of wetlands has impacted on the catchment quality. The wetlands have generally been transformed and most of the remaining wetlands are degraded. Water quality varies across the City and is evident through the urbanised portions of the municipality where poor storm water management has made an impact. The decrease in water quality compromises development opportunities and tourism, for example on the Duzi Canoe Marathon.

An underinvestment in the maintenance of storm water and sewage infrastructure has had an effect on the quality of water within the municipality and is of concern. Along with poor land management practices and control of runoff, it creates water quality and infrastructural problems. A large challenge has been keeping pace with the spread of expansive urban growth, creating an infrastructural challenge for in-situ upgrading of infrastructure in residential areas as well as providing basic services in informal settlements.



## 4 Summary of findings

Those member cities whose water management practices have achieved recognition were identified and are discussed in this section per topic.

It was observed that generally, operating expenditure for the SACN member cities was closely correlated with the population size within each city. However, the data on capital spending revealed that Nelson Mandela Bay Metro incurs the most capital expense per person followed by eThekweni and it may be a consequence of rapid urbanization and/or huge backlogs that may be getting addressed. All cities are under investing in the maintenance of existing infrastructure and it is an area of critical concern.

With respect to the condition of freshwater resources and likely impacts on people and infrastructure, the existing wastewater collection and treatment capacity within the larger cities are relatively good and the risks to human health lower. This is due to the ability to attract and keep the technical skill essential for delivery of adequately treated water to the final consumer and treat wastewater to an adequate level such that its release into the environment has a lower impact on the freshwater resources. Attracting and retaining highly skilled workers in smaller cities and towns is difficult.

The Cities of Johannesburg, Cape Town and Nelson Mandela Bay performed better than the other SACN member cities on information management aspects and as such can be expected to be best placed to assess the water resources challenges they face and anticipate those yet to manifest themselves. Indeed, the City of Cape Town, from the data obtained, while able to impose a relatively low tariff for water services, has along with the Cities of Tshwane and Nelson Mandela Bay consistently kept the percentage of water losses below 30%.

In terms of revenue Management, pricing and budgeting for water supply services, the City of Cape Town has performed well with the highest proportion of persons with piped water inside dwelling and with among the best metered reticulation system. It is perhaps not so surprising that Cape Town and the City of Tshwane are among the cities that manage the water losses better and subsequently get paid for most of the water supplied. What distinguishes the City of Cape Town, however, is that its unit water consumption (per person and per household) figures are not as high as the corresponding figures for the City of Tshwane which has the highest unit consumption for both measures of all the SACN Cities. Moreover when the income contribution per person per year

and per household per year respectively are considered, it is observed to have unit income figures that are less than 50% of what the City of Johannesburg derives for both the individual and the household. This supports the earlier conclusion that the tariffs for water services in the City of Cape Town are significantly lower than tariffs imposed by the other cities. On this basis one can say the City of Cape Town has struck the best balance between ensuring their cost of service delivery are covered by the revenue generated, and keeping the cost to consumers as low as possible.

The research also found the following information gaps that can impact on the ability to make reliable assessments on the water resources at City level and the sustainability of the existing management:

- Data for all the indicators identified was not readily available particularly for the smaller cities that are only beginning to raise the level of performance of their information management systems and report in detail. While the gaps vary from city to city for the different topics, it was observed for all cities that there is a lack of adequate monitoring for water quality indicators at city level.
- Even when available, the reliability of the audited finance figures as contained in financial reports was brought into question by the adjustments noted in some financial reports that carried different figures for the same item.
- The likely climate change scenarios for the region paint a grim picture where cities are likely to face greater climate variability, including droughts and flash flooding. However, these issues have not been mainstreamed into planning at city level although most cities are developing climate change strategies and action plans. Whether or not these plans adequately identify and address water related challenges, still needs to be done.
- Finally, it was suggested that to manage water resources sustainably and to support social and economic development of the country, managers of water resources and infrastructure need to be adequately acquainted with a number of issues that can be broadly grouped into the following four categories:
  - Intimate knowledge about their ultimate customer, the consumer of their product, namely water and the user of the ecosystem.
  - An appreciation of the different water resource types that are available.
  - An appreciation of the existing and any emerging threats to reliability of delivery of this product to the consumer.
  - Building the necessary capacity (technical and financial) to address the challenges.

## 4.1 Challenges to water management

Cities face a number of current and emerging issues related to effective water resource management. Whilst there is potential for development of groundwater resources in some areas, surface water resources are already constrained and moved over large areas to our cities and in some catchments potential water shortages are predicted for the future. Current drought conditions have brought water concerns to the forefront of city planning and management. The water quality challenge is linked to the variability of the available water quantity in South Africa and poor infrastructure maintenance as well as human impacts and poor management of the water and catchments. Climate change, and possible further variability in water supplies, will add another layer of complexity to the problem. Addressing these challenges will require an integrated and multi-disciplinary approach.

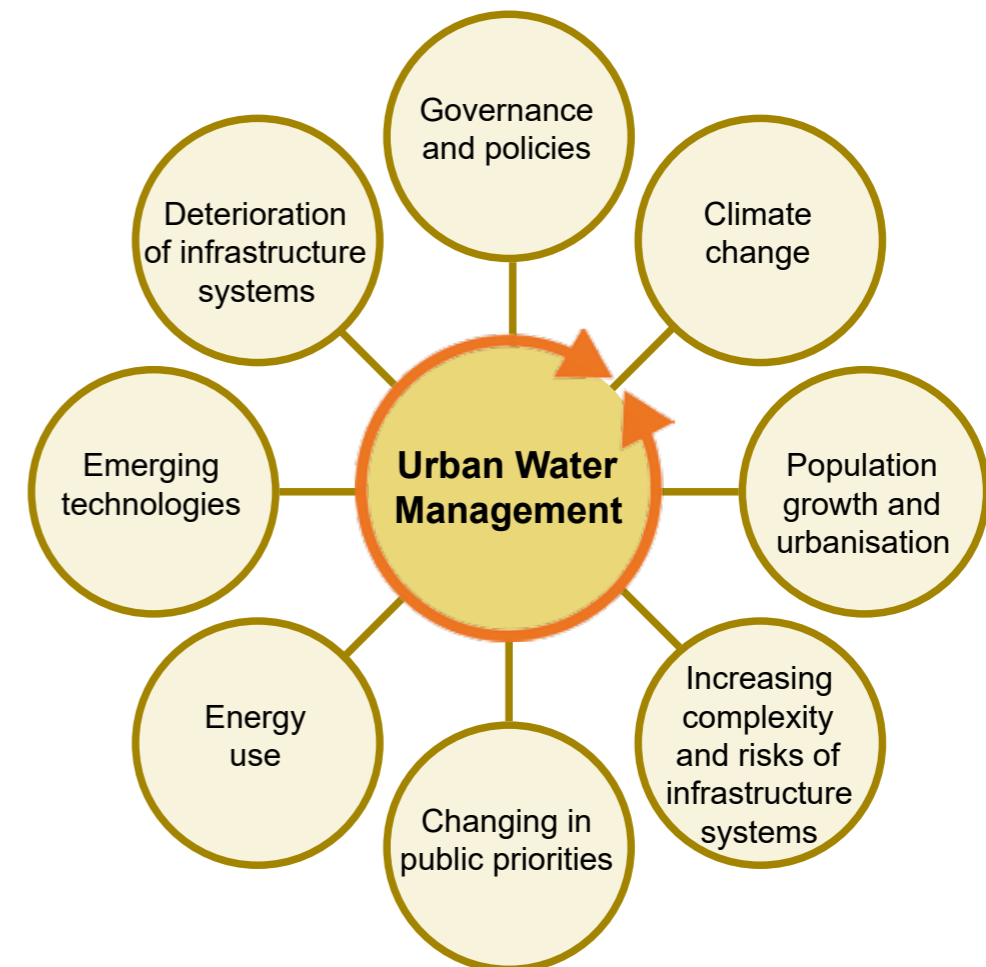


Figure 3: Future urban management challenges (Howe et al, 2011).

The Free Basic Water Programme aims to ensure that poor households receive 6,000 litres of free basic water per month (or 25 litres per person per day) and free basic sanitation services. Significant progress is being made to ensure access to water supply and sanitation services within homes and to schools, clinics and informal settlements. Access to clean drinking water, along with access to health facilities and services, plays a major role in addressing water-related diseases and improving the health and quality of life of all people (UNESCO, 2011).

A secure and safe water supply is essential for economic development, poverty reduction and improved livelihoods. The complexity to this challenge for cities is that most of this economic development will happen in the established metropolitan areas where water resources are often already oversubscribed creating a spatial disconnect between where the water resources are and where they are needed (DWA, 2009).

## 5 Conclusion

Water and sanitation services are one of the fruits of the 20-year development the country has enjoyed. However, a number of information gaps remain. These may impact on the ability to make reliable assessments on water resources and the sustainability of the existing management. These include:

- Even when available, the reliability of the audited finance figures as contained in financial reports was brought into question by the adjustments noted in some financial reports that carried different figures for the same item.
- The likely climate change scenarios for the region paint a grim picture which the cities would be well advised to be already planning to address. However, there is evidence that at city level that this was being prioritized through the development of specific detailed action plans. These efforts are being complemented by efforts of the national Department of Environmental Affairs.
- Finally to manage water resources sustainably and to support social and economic development of the country, Cities need to address a number of issues that can be broadly grouped into the following four categories:
  - Improving knowledge about the relationship between water and water users and the importance of ecosystems.
  - Consider the different water resource types that are available.
  - Improve understanding of the existing and any emerging threats to reliability of delivery of water to consumers.
  - Building the necessary capacity (technical and financial) to address the challenges.

Going forward, water related challenges are only going to become more important for city management, with higher risks to people and infrastructure if the challenges are not adequately tackled. Cities have made good progress with access to water services, however the maintenance and renewal of existing infrastructure is lagging behind resulting in aging networks. If the operation and maintenance issues are not prioritised there are risks to the economy (escalating costs, impact on the economy), human health and ecosystem health. Cities are changing and adapting and in some cases infrastructure designed and built decades ago (and within an Apartheid regime) may not be able to meet and adapt to future conditions. For example, storm water systems need to cope with increased flooding due to increasing impermeable surfaces and loss of natural areas as well as possible climate impact. This can lead to sewers being unable to cope with peak rain periods and causes sewer overflows and wastewater being released in the environment without treatment. The DWS has highlighted that the levels of investment in water infrastructure are inadequate and declining. Cities face the challenge of increasing water costs and rising water tariffs, but with a constrained revenue base.

# 6 References

Department of Water Affairs (DWA), South Africa, 2009. Strategic planning for water resources in South Africa. A situation analysis. Report No: P RSA 000/00/7809.

Department of Water Affairs (DWA), South Africa, 2010. Water Reconciliation Strategy Study for the Kwazulu-Natal Coastal Metropolitan Areas: Second Stage Reconciliation Strategy Report. Prepared by: WRP Consulting Engineers, in association with DMM Development Consultants cc, Golder Associates Africa, Kwezi V3 Engineers and Zitholele Consulting. Report No. PWMA 11/000/00/1007.

Department of Water Affairs (DWA), South Africa, 2013(a). Strategic overview of the water sector in South Africa. DWA Directorate: Water Services Planning & Information. Version 1.5 - Printed - 27 May 2013.

Department of Water Affairs (DWA), South Africa, 2013(b). National Water Resource Strategy II: Water for an Equitable and Sustainable Future, June 2013 Second Edition, available at [www.dwa.gov.za](http://www.dwa.gov.za).

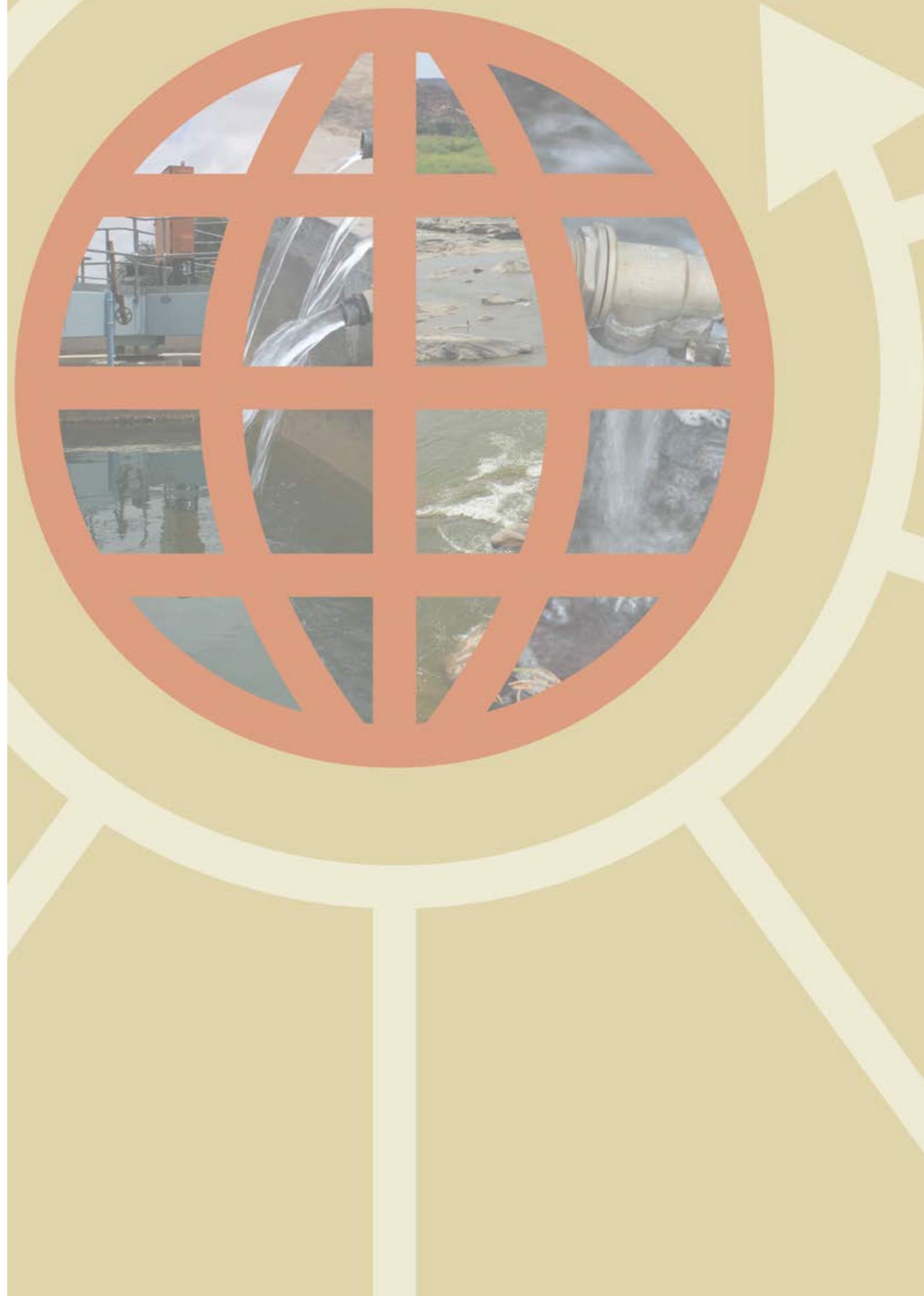
Howe, C.A., Vairavamoorthy, K. and van der Steen, N.P. 2011. Sustainable Water Management in the City of the Future: Findings from the SWITCH project 2006 – 2011. SWITCH.

SALGA/WRC MBI, 2014. Supporting Water Services Performance Measurement and Improvement. The Municipal Benchmarking Initiative.

South African Cities Network, 2014. The State of Water in Cities: Analysis of water resource and its management in Cities, available at [www.sacities.net](http://www.sacities.net).

UN-Water Analytical Brief on Water Security and the Global Water Agenda, 2013.

UNESCO, 2011. United Nations Educational, Scientific and Cultural Organization. [www.unesco.org](http://www.unesco.org).







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