8

Water and sanitation

Introduction

Water is fundamental to life, the environment, food production, hygiene and power generation

In 2002, South Africa hosted the World Summit on Sustainable Development in Johannesburg. At this summit, former President Nelson Mandela said: 'Among the many things that I learned as president was the centrality of water in the social, political and economic affairs of the country, the continent and the world'.

Water is central to life. In South Africa, water-borne diseases are a major concern, and are listed as a leading cause of death in children under the age of five. Water is also a critical input to almost all forms of economic activity. Statistics South Africa reported that the water industry, made up predominantly by the water boards and other national agencies, contributed about R6.4 billion or 0.4 per cent to the country's annual gross domestic product (GDP) in 2006.

Demand for water in South Africa will exceed supply by 2025 if nothing is done to supplement current water resources

South Africa is facing a number of significant challenges in relation to water, both at the level of the resource as well as in the actual provision of water services by municipalities. Recent studies have estimated that demand for water in South Africa will exceed supply by 2025 if nothing is done to supplement current water resources. The sustainability of the sector as a whole is also at risk due to the poorly maintained and often ill-equipped infrastructure, general under-pricing of water across the value chain and the deteriorating quality of sanitation services in a number of municipalities.

Ensuring the future sustainability of water and sanitation services is critical and must be addressed through collective efforts.

This chapter looks at:

- water availability and demand
- water resource management
- the water services sector

- access to water and sanitation
- funding of basic water and sanitation infrastructure
- factors influencing the efficient provision of the water service.

Water availability and demand

South Africa is a semi-arid, water scarce country

South Africa is a semi-arid, water scarce country. Rainfall levels average 450mm per year compared to the world average of 860mm per year. Rainfall patterns also differ between the western and eastern parts of the country, with rainfall levels as low as 100mm per year in the west and as high as 1 500mm per year in the east. This means that water availability varies greatly. While the total annual surface run-off is estimated to be 49 000 million cubic metres, only 14 200 million cubic metres per year or 29 per cent of the total surface run-off is available as a reliable yield.

Ground water resources are also not abundant, as most of South Africa is made up of hard rock formations that do not contain major ground aquifers that can be used on a national scale. It is estimated that only 20 per cent of South Africa's ground water can currently be used. Ground water resources are used extensively in rural and arid areas and it is estimated that about two-thirds of the population are dependent on ground water for domestic needs. Research is currently being undertaken to explore the artificial recharging of ground water resources as one of the mechanisms to meet the country's growing demand for water.

The national water resources strategy (2004) estimates that at current usage and price levels, available water resources will be insufficient to meet demands by 2025. The projected total water requirement in 2025 will be approximately 17 billion cubic metres versus a reliable yield of 15 billion cubic metres (that is at a 98 per cent assurance of supply level). Table 8.1 shows the projected deficit per water management area:

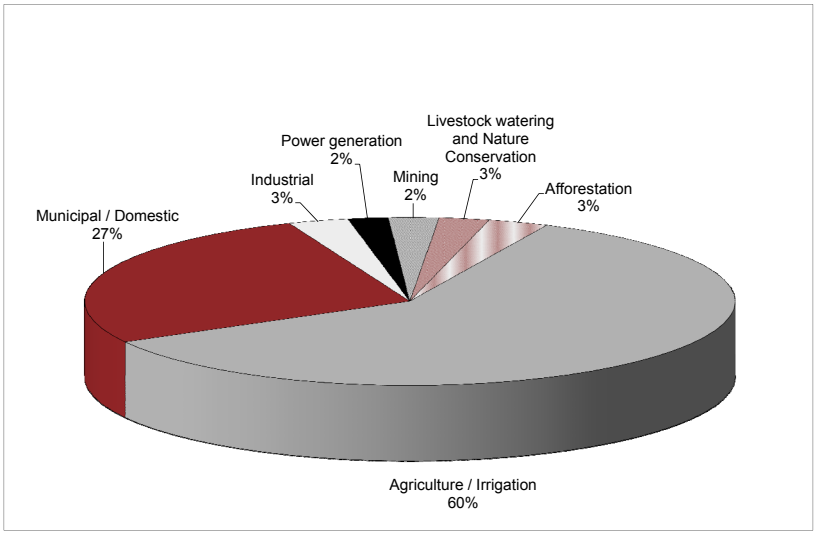
Table 8.1 Reconciliation of requirements for and availability of water for the year 2025

Water management area	Reliable local yield	Transfers in	Local requirements	Transfers out	Balance
m^3/annum					
Limpopo	281	18	347	–	-48
Luvuvhu/Letaba	404	–	349	13	42
Crocodile West & Marico	846	727	1 438	10	125
Olifants	630	210	1 075	7	-242
Inkomati	1 028	–	914	311	-197
Usutu to Mhlathuze	1 113	40	728	114	311
Thukela	742	–	347	506	-111
Upper Vaal	1 229	1 630	1 269	1 632	-42
Middle Vaal	55	838	381	503	9
Lower Vaal	127	571	641	–	57
Mvoti to Umzimkulu	555	34	1 012	–	-423
Mzimvubu to Keiskamma	872	–	413	–	459
Upper Orange	4 734	2	1 059	3 589	88
Lower Orange	-956	2 082	1 079	54	-7
Fish to Tsitsikamma	456	603	988	–	71
Gouritz	278	–	353	1	-76
Olifants/Doring	335	3	370	–	-32
Breede	869	1	638	196	36
Berg	568	194	829	–	-67

Source: Department of Water Affairs and Forestry, National Water Resource Strategy, First Edition, September 2004

South Africa's water resources are comprised of 77 per cent surface water, 9 per cent groundwater, and 14 per cent re-use of return flows. Of the available resources, the demand for water is dominated by agriculture, at 60 per cent of total demand. Domestic demand accounts for 27 per cent in total: 24 per cent for urban areas and 3 per cent for rural supply.

Figure 8.1 The use of water per main economic sector



Source: Department of Water Affairs (Strategic Overview of the Water Sector in South Africa 2010)

There needs to be a balance between urban and rural water needs

It is expected that future growth in water requirements will be mainly in the metros and large cities. However, this needs to be balanced with rural water needs, particularly agriculture, to safeguard food security. Specific attention will therefore need to be given to ensuring adequate future water supplies to urban growth areas, as well as ensuring equitable access to the existing supplies.

The Department of Water Affairs is in the process of updating the National Water Resource Strategy (NWRS). The updated strategy will present the latest picture of water requirements versus availability.

Composition of the water sector

The water sector in South Africa is divided into two main sub-sectors, namely water resources management, guided by the National Water Act (1998), and water services provision, guided by the Water Services Act (1997). These sub-sectors include stakeholders across the national, regional and local level.

Water resource management

The management of water resources is an exclusive national competency

Water resource management is concerned with the management, protection, utilisation, development, conservation and control of the country's water resources in a manner that will promote sustainability and equity and which will benefit all people. It involves the management of the dams and catchments, as well as the transfer and storage of raw water.

Although water can be treated and discharged back into the environment, it is also a finite resource with no substitute.

Management of South Africa's water resources involves catchment management functions, river systems management, water storage, water abstraction and return-flow management. Water resources must therefore be managed in an integrated way to ensure that water is protected and used to its full potential. As water is a scarce resource, it is critical for water resource management to balance the growing social and economic needs with the sustainability of the resource and environmental health considerations.

Water is a national asset and the Minister of Water Affairs is the custodian and national manager of water resources. The Department of Water Affairs is directly responsible for most of the large water resource infrastructure and undertakes the planning and implementation of large water resource development projects, such as the construction of dams and inter-basin transfer schemes.

The management of water resources has been decentralised

In South Africa, the management of water resources has been decentralised. To facilitate this, the country has been divided into 19 water management areas (WMAs). It is envisaged that each of the 19 WMAs will have a catchment management agency (CMA) established in terms of chapter 7 of the National Water Act (1998) and are classified as schedule 3A public entities in terms of the Public Finance Management Act (1999).

The main responsibility of a CMA is to manage water resources at the catchment level. Each CMA must develop a catchment management strategy and advise on the protection, development, use and conservation of water in each catchment. CMAs need to work in collaboration with local stakeholders, including the water user associations and local communities. This is to ensure that decisions made with regard to water use balance meeting basic human needs, promote equitable access to water and facilitate social and economic development.

To date, only two catchment management agencies (Breede River and Inkomati) have been established with active governing boards. The two were delegated full CMA functions in 2010. The process for establishing the remaining CMAs will be finalised once the Department of Water Affairs institutional realignment process has been completed. It is envisaged that this process would guide the total number of CMAs to be established.

Spending on water resource infrastructure

It is critical that appropriate investments be made to upgrade current infrastructure, as many of these assets are approaching the end of their useful lives

The majority of capital investments in water resource infrastructure were made in the 1970s and 1980s. Given that there has generally been a history of underinvestment on maintenance and renewal of assets in the water sector as a whole, it is now critical that appropriate investments be made to upgrade existing infrastructure, as many of these assets are approaching the end of their useful lives. Therefore, funding for major rehabilitation is required to ensure that the useful life of these assets can be extended.

Water resource infrastructure is financed either by the national budget or through the Trans Caledon Tunnel Authority (TCTA). In addition, a Water Trading Entity (WTE) was established within the Department of Water Affairs to promote the efficient management of bulk

infrastructure. However, the entity is currently facing significant technical, financial and management challenges, which are severely limiting its capacity to finance and manage the bulk water infrastructure efficiently.

The TCTA operates as a special purpose vehicle responsible for the financing and building of large water infrastructure that is identified by the WTE. The TCTA borrows finance from markets in its own capacity, with government providing explicit guarantees in certain instances. Once the infrastructure is built, the WTE is then responsible for the operation and maintenance of this infrastructure. The TCTA services the debt (usually over 20 years) with payments from the WTE. After the debt is repaid, asset ownership is transferred to the WTE.

The TCTA currently has approximately R22.9 billion worth of infrastructure reflected on its balance sheet and is planning for additional projects to the value of R21 billion over the next few years. The Department of Water Affairs currently owns R120 billion worth of infrastructure.

The national backlogs in water resource infrastructure are estimated to be approximately R13 billion

The national backlogs in water resource infrastructure are estimated to be approximately R13 billion, of which R10.1 billion alone relates to dam safety and rehabilitation. Over the next five years, the Department of Water Affairs plans to spend in the region of R15 billion on new capital projects, rehabilitation and maintenance programmes. It is expected that of this amount, approximately R1 billion per year will be spent on capital maintenance programmes, while just over R2.2 billion per year will be spent on dam safety rehabilitation programmes.

In 2010, the department spent approximately R850 million on the construction of the De Hoop Dam and dam and canal rehabilitation. The total estimated cost of this project is R16 billion, which will be financed partly from the fiscus and partly from agreements between industry and the WTE.

The water services sector

The Department of Water Affairs, water boards and municipalities are the primary players in water services sector

Water services refer to water supply and sanitation services and include regional water schemes, local water schemes, on-site sanitation and the collection and treatment of wastewater. The Department of Water Affairs, water boards and municipalities are the primary players in the water services sector.

National government

The Department of Water Affairs plays the role of sector leader and is responsible for policy development, regulation, monitoring and support functions. The department has phased out its role as an implementing agent by transferring water schemes to the relevant municipalities. 61 transfer agreements were signed to transfer 1 600 individual water schemes from the department to municipalities. The cost of this exercise was approximately R6.6 billion. As a transitional arrangement, a water services operating subsidy grant has been made available to the department and municipalities to ensure

that the transferred schemes are fully functional and operated by skilled personnel to ensure optimal service delivery by the municipalities concerned.

Water boards

Water boards are established in terms of the Water Services Act (1997) as national government business enterprises, in terms of schedule 3B of the Public Finance Management Act (1999).

Water boards are primarily responsible for bulk water provision, but some water boards also provide retail and reticulation services

Water boards act as intermediaries to distribute raw and potable water across vast distances to multiple users (the regional water supply schemes). Water boards are primarily responsible for bulk water provision, but some water boards also provide retail and reticulation services. However, in such cases, the water board must be appointed by the relevant municipality as a water services provider.

There are currently 14 water boards in the country. Ikangala Water was recently disestablished and incorporated into Rand Water. Namakwa Water and Albany Water are expected to be disestablished in 2011, leaving the sector with 12 water boards.

Not all municipalities are dependent on regional bulk water supply infrastructure and hence operate independently of the water boards. Where this is the case, norms and standards of the Water Services Act (1997); the National Water Act (1998) and related regulations and strategies govern their operations.

Currently, the 14 operational water boards supply approximately 2.39 billion cubic metres of water per year to approximately 28 million people and several large industries. The average bulk potable water tariff is R3.84 per cubic meter, but varies widely from R2.78 to R7.26 per cubic metre subject to the availability of water, the distance of distribution and raw water quality. According to information published by the Department of Water Affairs, total revenue generated by water boards in 2009/10 was approximately R8.1 billion against total operating expenditure of R4.9 billion. Total aggregated surpluses for that financial year were approximately R910 million. Between 2008 and 2010, aggregated surpluses have declined by almost 35 per cent. The decline is due to several of these institutions incurring operating deficits in 2009/10. The reduction in surpluses can largely be attributed to the stronger role that the Department of Water Affairs and National Treasury are playing in the tariff setting process, which is compelling water boards to absorb increases in operating costs through improving operational efficiency.

The growth in other income of water boards since 2007/08 is significant and indicates that water boards are increasingly being contracted by municipalities to act as water service providers.

Rand Water accounts for most revenue and operating expenditure

The water boards vary greatly in terms of budget size and the area they serve. Rand Water and Umgeni Water are the two largest water boards in the country. Rand Water's budget accounted for 62 per cent of the total revenue and 48 per cent of total operating expenditure for all water boards, followed by Umgeni Water, which accounted for 17.6 per cent of the total revenue and 19.2 per cent of total operating expenditure. Although Rand Water services a relatively small area

compared to other water boards, it serves the most customers and has the largest number of staff, which reflects the high density of Gauteng's population.

Water boards do face a number of challenges. Many boards find it difficult to conclude long-term bulk water supply agreements with municipalities, which affects their ability to make long-term infrastructure capital projections. Furthermore, a number of municipalities have defaulted on payments to water boards and in some cases these have posed a threat to the financial viability of the water board.

Local government

The provision of water services is a municipal competence

The provision of water services is a municipal competence in terms of Part B of schedule 4 of the Constitution. However, not all municipalities are authorised to provide this function. The two-tiered local government system requires that powers and functions be divided between category B and C municipalities to avoid duplication and coordination problems. An asymmetric approach has been followed in relation to water and sanitation, where all category A (metros) municipalities are authorised, category B (local) municipalities are authorised in certain instances and category C (district) municipalities in others.

A total of 169 municipalities have been authorised to provide water and sanitation services. An authorised municipality may appoint another organisation (including another municipality) to provide the water services function on its behalf. These 'external mechanisms' are referred to as water service providers.

Municipal membership of fire protection associations

Fire Protection Associations (FPAs) play a key role in preventing and combating forest and veld fires. This is critical to the protection of water catchment areas, and securing reliable flows of water and preventing the degradation as raw water from burned areas carries increased levels of sediment, organic debris and chemicals into rivers and dams. Section 4(7) of the National Veld and Forest Fire Prevention Act reads as follows:

> (7) Where a fire protection association has been registered in an area –
> (a) all or part of which is controlled by a municipality and that municipality has a service; or
> (b) in which there is a designated service, the municipality or designated service must become a member of the fire protection association.

There is thus a legal obligation on municipalities to join their local fire protection associations, and as members to participate fully in their operations, including paying their membership fees, and ensuring appropriate fire protection measures, such as fire breaks and the eradication of exotic vegetation, are implemented on all municipal land.

The sharing of the water services function between category B and C municipalities has contributed to some of the difficulties currently being experienced in providing the service, including problems in the allocation of resources through the intergovernmental fiscal system. The current practice is that the only recipients of the national grant for water and sanitation are the authorised municipalities. This becomes a problem in cases where authorised district municipalities delegate the responsibility for service provision to local municipalities without passing on the necessary funds.

Access to water and sanitation

Government's objective is to ensure that all South Africans have access to basic water supply and sanitation services

Government's objective is to ensure that all South Africans have access to basic water and sanitation services. Government has prioritised not only the rollout of infrastructure necessary for the rendering of these services but also the provision of free basic services to poor households.

A basic water supply service refers to the infrastructure necessary to supply 25 litres of potable water per person per day from a source within 200m of a household and with a minimum flow of 10 litres per minute (in the case of communal water points) or 6 000 litres of potable water supplied per formal connection per month (in the case of house connections).

A basic sanitation service refers to the provision of a basic sanitation facility which is easily accessible to a household, and the sustainable operation of the facility. This includes the safe removal of human waste and wastewater from the premises where this is appropriate and necessary, and the communication of good sanitation, hygiene and related practices.

The sustainability of existing infrastructure cannot be neglected and is requiring more and more funding as infrastructure ages

While there have been substantial improvements in the rollout of water services infrastructure and the rendering of free basic water and sanitation, the sector does face some challenges going forward as implementation capacity remains a constraint. Furthermore, the sustainability of existing infrastructure cannot be neglected and is requiring more and more funding as infrastructure ages. Also, the cost of extending the network infrastructure to outlying communities is not cost-effective or sustainable, which points to the need to explore alternative service delivery options.

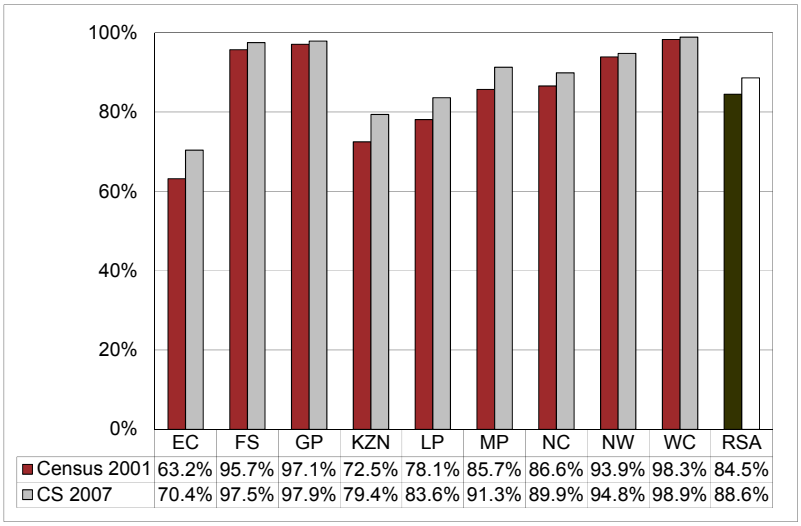
Progress with basic water infrastructure rollout

Between 2001 and 2007, access to piped water increased in all provinces

In 1994, only about 59 per cent of South Africa's population had access to water supply infrastructure. This meant that about 15.9 million people had no access to basic water supply.

Figure 8.2 shows the percentage of households with access to piped water in all nine provinces, based on the Census 2001 and the Community Survey 2007 results. The province with the lowest percentage of access is Eastern Cape (70.4 per cent), followed by KwaZulu-Natal (79.4 per cent) and Limpopo (83.6 per cent). However, these three provinces made the most progress in percentage terms from 2001 to 2007, where access percentage in the Eastern Cape increased by 7.2 per cent, KwaZulu-Natal by 6.9 per cent and Limpopo by 5.5 per cent, compared to Western Cape, which increased by 0.6 per cent and Gauteng, which increased by 0.8 per cent.

Figure 8.2 Percentage of households with access to piped water by province, 2001 – 2007



	EC	FS	GP	KZN	LP	MP	NC	NW	WC	RSA
Census 2001	63.2%	95.7%	97.1%	72.5%	78.1%	85.7%	86.6%	93.9%	98.3%	84.5%
CS 2007	70.4%	97.5%	97.9%	79.4%	83.6%	91.3%	89.9%	94.8%	98.9%	88.6%

Source: Stats SA, Census 2001 and Community Survey 2007

The current backlog is estimated at 3.63 million people

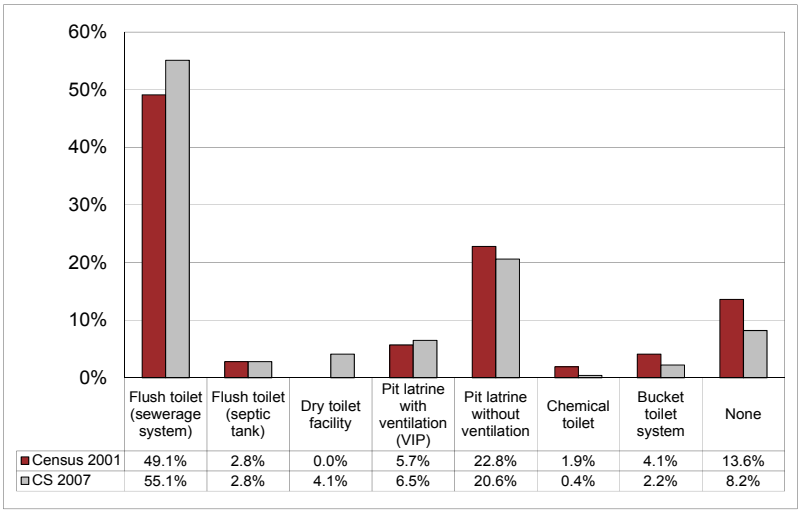
The Department of Water Affairs reports in its 2009/10 annual report that overall access to water supply infrastructure has since increased to 97 per cent. Currently, about 1.65 million people have no access to water infrastructure, while 1.98 million people have access to infrastructure that is below minimum standards. The current backlog is therefore estimated at 3.63 million people as at March 2010. Based on the availability of funding, backlog eradication targets for 2010/11 have been set at 1.5 million people per year or 390 000 households, which suggests that South Africa will come very close to achieving its Millennium Development Goals in relation to access to water.

Progress with basic sanitation infrastructure rollout

Many different types of sanitation technology are currently used in South Africa, including buckets (priority has been given to eradicating this system), pit latrines (with or without ventilation), chemical toilets (also to be replaced with more appropriate technology types), flush toilets with on-site septic tanks and disposal, and flush toilets with waterborne and central treatment works. In 1994, only 49 per cent of people had access to sanitation facilities.

Figure 8.3 shows the percentage of households by type of toilet facility in 2001 and 2007.

Figure 8.3 Percentage of households with access to flush toilets, 2001 – 2007



	Flush toilet (sewerage system)	Flush toilet (septic tank)	Dry toilet facility	Pit latrine with ventilation (VIP)	Pit latrine without ventilation	Chemical toilet	Bucket toilet system	None
Census 2001	49.1%	2.8%	0.0%	5.7%	22.8%	1.9%	4.1%	13.6%
CS 2007	55.1%	2.8%	4.1%	6.5%	20.6%	0.4%	2.2%	8.2%

Source: Stats SA, Census 2001 and Community Survey 2007

It is estimated that approximately 10.6 million people or 2.6 million households still do not have access to basic sanitation services

The figure shows that the percentage of households in the country with access to flush toilets has increased from 49.1 per cent in 2001 to 55.1 per cent in 2007, while households with no toilet at all decreased from 13.6 per cent in 2001 to 8.2 per cent in 2007. Gauteng, Free State, Northern Cape and Western Cape were the only provinces that had more than 50 per cent of households using flush toilets. Although progress had been made with the eradication of the bucket toilet system (from 4.1 per cent in 2001 to 2.2 per cent in 2007), backlogs remain. Government remains committed to fast-tracking the completion of the bucket eradication programme.

The Department of Water Affairs reported that in 2009/10, the overall access to sanitation had increased to 79 per cent. It is estimated that approximately 10.6 million people or 2.6 million households still do not have access to basic sanitation services.

Bucket eradication programme

The bucket eradication programme was established in 2005 with the aim of replacing the bucket system in established settlements with more acceptable forms of sanitation. The target date for completing the programme was December 2007. At that stage, an estimated 252 254 households still needed to be reached. 244 258 buckets had been replaced by September 2009. In 2009/10, a further 1 048 buckets were replaced with alternative sanitation arrangements. This left 7 996 buckets in the Free State, Eastern Cape and Northern Cape.

Delays in the programme have been attributed to the slow performance of contractors and the need to complete sewer networks and pump stations, before bucket systems are stopped.

Funding of basic water and sanitation infrastructure

As they can cross-subsidise more easily, metros are less reliant on transfers

Water and sanitation services are financed through the water and sanitation components in the local government equitable share and capital spending on water and sanitation assets are financed through the basic services component of the municipal infrastructure grant (MIG). Metros contribute substantial own revenues towards supplying water and sanitation services to complement the local government equitable share, while other categories of municipalities do not do so (this is indicated by the 'Difference' columns in table 8.2). This could

be because metros serve a larger variety of customers, including businesses and industries, compared to smaller municipalities that largely serve a residential customer base. Metros are therefore more able to cross-subsidise between and within different types of customers and services. Infrastructure grant funding is supplemented by internal sources and external borrowing for all types of municipalities, with the exception of district municipalities, where less is spent on water and sanitation infrastructure than what is allocated through the water and sanitation component of the MIG. This may be because the funds are being passed on to local municipalities that are water service providers, or because the funding is being used for other municipal services.

Table 8.2 Water and sanitation expenditure and grants per capita

R thousands	Bulk purchases per capita	LGES per capita	Difference	Capital expenditure per capita	Water and sanitation component of MIG per capita	Difference
Category A (Metros)	238	166	72	111	29	82
Category B (Locals)	54	216	-162	56	30	26
Category C (Districts)	5	57	-52	47	53	-6

Source: National Treasury local government database

Free basic water and sanitation

Table 8.3 shows the number of households that benefited from free basic water and sanitation services. The total number of households that received basic water increased by 7 per cent or 695 000 between 2008 and 2009, while the number of households that received basic sanitation increased by 7.6 per cent or 657 000.

There has been an increase in the number of households receiving free basic water and sanitation

Table 8.3 Number of households receiving free basic water and sanitation, 2007 – 2009

Province	2007	2008	2009	2007	2008	2009
	Basic water services			Free basic water		
Eastern Cape	1 213 142	1 524 805	1 500 132	574 165	775 360	786 263
Free State	626 011	656 725	681 369	569 622	402 978	470 333
Gauteng	2 566 240	2 419 367	2 725 965	2 060 021	1 461 966	1 496 021
KwaZulu-Natal	1 941 653	1 800 759	1 881 332	1 537 122	1 246 349	1 329 741
Limpopo	935 766	1 206 009	1 296 625	535 471	567 194	609 114
Mpumalanga	798 967	817 719	877 148	517 861	342 915	359 510
Northern Cape	212 499	207 321	222 800	87 432	90 530	94 267
North West	678 501	658 440	697 445	497 481	353 125	342 752
Western Cape	917 684	991 085	1 093 934	846 112	834 372	892 850
Total	**9 890 463**	**10 282 230**	**10 976 750**	**7 225 287**	**6 074 789**	**6 380 851**
	Basic sanitation services			Free basic sanitation		
Eastern Cape	855 035	1 001 158	1 035 712	402 467	534 148	590 419
Free State	616 898	642 072	664 045	250 566	181 873	202 797
Gauteng	2 120 324	2 217 385	2 485 321	889 946	592 101	710 015
KwaZulu-Natal	1 678 489	1 669 120	1 732 153	348 514	322 514	330 574
Limpopo	596 899	626 576	720 631	193 444	155 780	177 207
Mpumalanga	545 136	760 870	811 493	110 975	93 114	101 837
Northern Cape	187 688	184 571	194 810	66 096	64 955	69 658
North West	567 800	547 126	563 394	119 167	98 887	100 037
Western Cape	934 675	989 041	1 087 274	737 059	709 430	752 968
Total	**8 102 944**	**8 637 919**	**9 294 833**	**3 118 234**	**2 752 802**	**3 035 512**

Source: Stats SA, Non-financial census of municipalities for the year ended 30 June 2009

While there has been good progress in extending access to basic water and sanitation services, there has been a decline in the overall number of households receiving free basic water and free basic sanitation. This is due to many municipalities moving away from providing these services free to all households to targeting the provision of free services to indigent households only. This is a positive development

as it strengthens the sustainability of the free basic services programmes of the municipalities.

Municipal and municipal entity budgets

The water services function is an important municipal function, which comprised 11 per cent of total municipal budgets in 2007/08. Municipalities budgeted to spend R32 billion on water and sanitation in 2010/11, compared to the R8.4 billion spent in 2006/07.

Municipal water budgets

The significant cost drivers for operating expenditure are bulk water purchases, employee costs and repairs and maintenance

Table 8.4 indicates that most of the operating expenditure associated with the provision of water occurs in metros and large urban municipalities. In the 2010 MTREF, operational expenditure is expected to increase significantly among all categories of municipalities. Between 2009/10 and 2012/13, operational expenditure is expected to increase at an annual average rate of 35.0 per cent. The significant cost drivers for operating expenditure are bulk water purchases, employee costs and repairs and maintenance.

Table 8.4 Budgeted water expenditure by category of municipality, 2006/07 – 2012/13

	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
		Outcome		Revised	Medium-term estimates		
R million				Estimate			
Operating expenditure							
Category A (Metros)	6 807	6 844	9 038	6 027	14 254	14 554	15 976
Category B (Locals)	852	1 814	3 772	3 987	6 834	6 774	7 274
Secondary cities	*658*	*1 541*	*2 272*	*2 468*	*3 686*	*3 852*	*4 208*
Remainder	*194*	*273*	*1 501*	*1 519*	*3 148*	*2 922*	*3 066*
Category C (Districts)	42	94	1 889	1 067	3 757	3 698	3 984
Subtotal operating	**7 702**	**8 752**	**14 699**	**11 081**	**24 844**	**25 027**	**27 234**
Capital expenditure							
Category A (Metros)	470	1 050	2 945	3 087	1 889	2 335	2 320
Category B (Locals)	189	452	1 356	1 020	2 151	1 965	1 996
Secondary cities	*118*	*293*	*602*	*579*	*824*	*788*	*880*
Remainder	*70*	*158*	*754*	*442*	*1 327*	*1 177*	*1 116*
Category C (Districts)	–	11	1 528	2 409	3 128	3 569	4 189
Subtotal capital	**659**	**1 513**	**5 829**	**6 516**	**7 168**	**7 869**	**8 505**
Total							
Category A (Metros)	7 277	7 894	11 983	9 114	16 142	16 889	18 296
Category B (Locals)	1 041	2 266	5 128	5 007	8 985	8 739	9 270
Secondary cities	*776*	*1 834*	*2 874*	*3 046*	*4 510*	*4 640*	*5 088*
Remainder	*265*	*431*	*2 255*	*1 961*	*4 475*	*4 099*	*4 182*
Category C (Districts)	42	105	3 417	3 476	6 886	7 267	8 173
Total	**8 361**	**10 265**	**20 528**	**17 597**	**32 012**	**32 895**	**35 739**

Source: National Treasury local government database

Capital spending on water infrastructure by the metros falls significantly in 2010/11, and does not recover to 2008/09 levels over the medium term. However, spending on water infrastructure among the category B and C municipalities is expected to increase significantly in this period.

Municipal sanitation budgets

Municipalities are prioritising the rollout of sanitation infrastructure

Table 8.5 shows that overall spending on municipal sanitation is expected to increase at an average annual rate of 31.9 per cent between 2009/10 and 2012/13. Most of this increase is attributed to increases in operational expenditure. Total capital expenditure on sanitation is expected to grow at an annual average rate of

36.3 per cent between 2009/10 and 2012/13, indicating that municipalities are prioritising the rollout of sanitation infrastructure. But good sanitation includes acceptable, affordable and sustainable sanitation services and appropriate health and hygiene awareness and behaviour. It is therefore important that municipalities complement any sanitation infrastructure investment with initiatives focused on behaviour change.

Table 8.5 Budgeted sanitation expenditure by category of municipality, 2006/07 – 2012/13

	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
	Outcome			Revised Estimate	Medium-term estimates		
R million							
Operating expenditure							
Category A (Metros)	1 949	2 427	2 917	2 196	5 293	5 729	6 135
Category B (Locals)	367	805	1 865	2 186	3 291	3 114	3 204
Secondary cities	*273*	*661*	*1 098*	*1 458*	*1 850*	*1 802*	*1 852*
Remainder	*94*	*145*	*767*	*728*	*1 441*	*1 312*	*1 352*
Category C (Districts)	107	80	246	178	443	608	637
Subtotal operating	**2 424**	**3 312**	**5 029**	**4 559**	**9 027**	**9 451**	**9 975**
Capital expenditure							
Category A (Metros)	735	588	1 207	1 250	2 086	2 486	2 819
Category B (Locals)	170	548	1 208	645	1 894	1 993	2 029
Secondary cities	*95*	*446*	*564*	*331*	*926*	*1 128*	*1 110*
Remainder	*75*	*102*	*644*	*313*	*968*	*864*	*919*
Category C (Districts)	–	–	757	247	689	522	569
Subtotal capital	**905**	**1 136**	**3 172**	**2 141**	**4 669**	**5 001**	**5 416**
Total							
Category A (Metros)	2 684	3 015	4 124	3 445	7 379	8 215	8 954
Category B (Locals)	537	1 353	3 073	2 830	5 184	5 107	5 232
Secondary cities	*369*	*1 107*	*1 662*	*1 789*	*2 776*	*2 930*	*2 962*
Remainder	*169*	*246*	*1 411*	*1 041*	*2 408*	*2 176*	*2 270*
Category C (Districts)	107	80	1 003	424	1 133	1 130	1 206
Total	**3 329**	**4 448**	**8 200**	**6 700**	**13 696**	**14 452**	**15 392**

Source: National Treasury local government database

Water services pricing and tariffs

The water pricing cycle consists of various stages. These are:

- raw water tariff (water resources development charge)
- bulk water tariff
- retail water tariff
- sanitation charge
- bulk waste-water tariff
- waste water discharge charge.

The cost of one stage will form an input cost into the next stage of the pricing chain

All the stages are interrelated and individually costed, except for the waste water discharge charge. The cost of one stage will form an input cost into the next stage of the pricing chain. It is therefore imperative that the costs at each stage are determined as accurately as possible to avoid overall under-pricing of water throughout the value chain.

This charging system is complemented by nationally-funded subsidies for infrastructure and ongoing services to poor households.

Water charges and tariffs

As noted above, the Department of Water Affairs is the custodian of all raw water resources, and owns most major dams. The department sells raw water to either a water board or to the water service

authority, i.e. the municipality. Certain municipalities, such as Cape Town, operate their own dams. Municipalities that purchase raw water directly from the department are responsible for purifying the water. In most cases, water boards purchase raw water from the department, purify and refine it and then sell the purified water to municipalities.

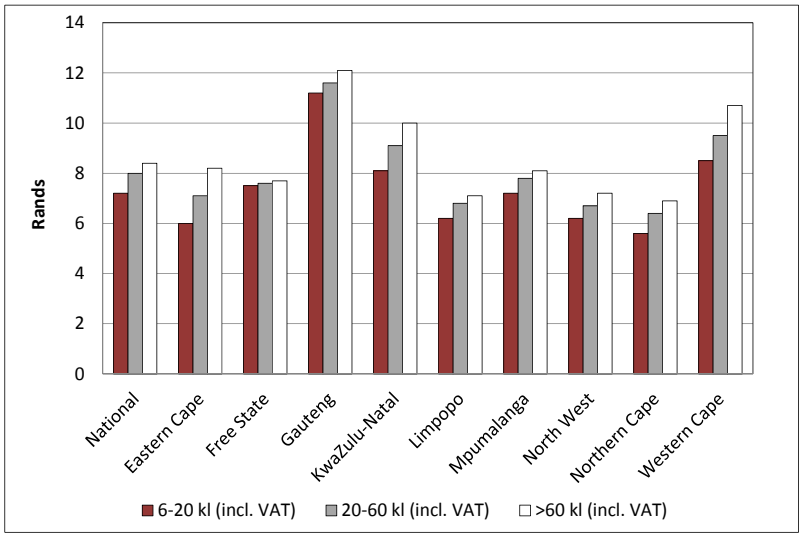
The Department of Water Affairs regulates the tariff charged by water boards to municipalities

The tariff charged by water boards to municipalities is regulated by the department. Several factors influence the tariffs that each water board charges. These include the actual purchase price of the raw water, the methods and cost of the purification of water and the cost of the capital investment requirements of the water board. The average bulk price charged by water boards will be approximately R5.12 in 2011/12. The highest bulk water tariff for 2011/12 is R10.07 per kl by Namakwa Water, while the lowest will be approximately R3.55 per kl for the Overberg Water Board. This partly indicates differences in the scarcity of water. These prices for treated bulk water impact directly on municipalities' retail water tariffs, as bulk water forms a large proportion of the overall retail tariff.

The Department of Water Affairs prescribes norms and standards for water services tariffs in terms of section 10 of the Water Services Act (1997). These are aimed at promoting equitable, financially viable and environmentally sustainable tariffs. The regulations apply to all water services institutions and they may not use a tariff that is substantially different from any of the prescribed norms and standards.

The Department of Water Affairs surveys all tariffs along the water provisioning cycle, including water management charges, raw water tariffs, water board tariffs and the municipal tariffs for domestic, commercial and industrial users. The following information relating to tariffs has been extracted from the Strategic Overview of the Water Sector in South Africa (2010).

Figures 8.4 Average domestic water tariffs in 2009/10



Source: DWA Strategic overview of the water sector in South Africa 2010

Figure 8.4 shows that the highest average domestic water tariffs are in Gauteng, while the lowest average domestic tariffs occur in the Northern Cape.

Sanitation charges and tariffs

Municipalities need to take a number of issues into account when setting appropriate tariffs for sanitation. The servicing of on-site sanitation systems is not a monthly activity and is also highly dependent on the type of sanitation system installed, the households' responsibilities for maintaining the system and the accepted final disposal method of the wastes. An investigation of the emptying of pit latrines, for example, has indicated that these should be scheduled for emptying once every five to eight years and will cost between R600 and R1 200 each to empty (2007 prices). The approach to collecting tariffs for providing such a service may either be built into the water bill, to charge a fee for emptying or a number of other alternatives.

Factors influencing the efficient provision of water services

A range of external and internal factors impact on the ability of municipalities to provide the water services function. These include:

Non-revenue water

Non-revenue water represents the level of losses or unauthorised use from a water supply scheme. It is defined as the volume of water for which no income is received by the water services provider.

In South Africa, non-revenue water is estimated to be around 35 per cent of the water supplied. This estimate is informed mainly by information supplied by metros and other large municipalities. Non-revenue water may even be higher in rural municipalities, due to the maintenance backlogs that exist in these municipalities.

The primary concern is with water losses due to poor maintenance, inaccurate or incomplete billing and water theft

Free basic water is regarded as revenue water charged at a zero rate and is therefore not included in the calculation of non-revenue water. The calculation also excludes non-payment of accounts as these constitute water that is billed for. Although South Africa's non-revenue water is lower than that of other developing countries, much scope still exists for improving operating efficiency. The primary concern is with water losses due to poor maintenance, inaccurate or incomplete billing and water theft.

Municipalities are expected to develop a comprehensive water conservation and water demand management strategy which provides strategic direction to reduce non-revenue water. Included in the strategy, could be programmes for leak detection and repairs, passive leakage control, consumer meter audit and management, water use efficiency education and awareness, water and sewer network information management, water audits and determination of water balance for each of the water network in the supply area. The strategy should also aim at implementing internationally accepted water balance model developed by International Water Association (IWA).

Figure 8.5 shows the 2009 national water balance according to the standards set by the International Water Association.

Figure 8.5 Standard International Water Association water balance: national, 2009

<table>
<tr><td rowspan="4">System Input Volume

(Total supply from own + external sources)

100%</td><td rowspan="2">Authorised Consumption
(Billed metered + Billed unmetered + unbilled metered + Unbilled unmetered)

70.3%</td><td>Billed Authorised

(Billed metered + Billed Unmetered (flat rate) + Free basic water)

65.3%</td><td>Revenue Water

(Volume of water for which an income is received. Assumes all billed water is paid for)

65.3%</td></tr>
<tr><td>Unbilled Authorised

5.0%</td><td rowspan="3">Non-revenue Water

(Volume of water for which no income is received)

34.7%</td></tr>
<tr><td rowspan="2">Water Losses (Real + Apparent Loss)

29.7%</td><td>Apparent or Commercial Loss

5.9%</td></tr>
<tr><td>Real or Physical Loss

23.8%</td></tr>
</table>

Source: Department of Water Affairs: Strategic overview of the water sector in South Africa 2010

Maintenance of existing infrastructure

Most municipalities in South Africa have not paid sufficient attention to the maintenance of their existing infrastructure

There has been under-investment in the maintenance and refurbishment of infrastructure, which is evident in the number of service delivery failures across the country today. In the water sector, water quality is an important indicator of the performance of a water treatment plant. If the quality of water entering a reticulation system is poor, it usually indicates that there are operational problems with the treatment plants, either in the forms of plant breakdowns, poor maintenance or delayed maintenance, and plants operating at above their build capacities. The Blue Drop system implemented by the Department of Water Affairs in 2008 demonstrates clearly the extent of the maintenance challenges in South Africa.

The high volume of technical water losses, due to pipe bursts, leakages, and so on, also results in substantial revenue losses for municipalities – revenue which could have been used for further maintenance.

Many municipalities, especially the smaller and more rural municipalities, do not manage their assets strategically

This infrastructure problem is further compounded by the fact that many municipalities, especially the smaller and more rural municipalities, do not manage their assets strategically. They are often unaware of what assets they have, where those assets are located, how old those assets may be and what investments are required to extend the useful life of these assets. Without this information, it is almost impossible to determine the investment needs required. The development of an asset register is also a costly exercise, as many municipalities outsource this function as they do not having the requisite in house capacity. As a result of funding constraints, this exercise is often deferred or completed through a phased approach.

Municipalities generally allocate approximately 5 to 12 per cent of their annual operating budgets for repairs and maintenance. However, these are budgeted figures. Information on the actual repairs and

maintenance spend by municipalities per asset class is currently not available.

Possible reforms to South Africa's water services sector

The problems that the water services sector faces are similar to the problems experienced in the electricity sector. Many smaller municipalities do not have the necessary economies of scale, skills and specialisation to provide a water services function efficiently and effectively. The Department of Water Affairs is currently supporting a number of institutional reform investigations that are aimed at advising water services authorities (municipalities) on the most appropriate institutional options applicable for that service provision area. Three areas in which reform investigations are currently taking place, are Central Eastern Cape, Western Highveld (Mpumalanga) and Southern Free State.

The department is also exploring the establishment of an independent regulator for water to improve overall efficiency and effectiveness of water provision

The department is also exploring the establishment of an independent regulator for water to improve overall efficiency and effectiveness of water provision, and to ensure appropriate price setting at each stage of the water cycle.

Impacts of climate change

While it is difficult to quantify and cost the likely impact of climate change on the country's water system, it is acknowledged that these possible climate change impacts complicate the planning for future water supplies and investment needs. The most likely scenario is that climate change will reduce water availability, though these effects will be unevenly distributed across the country. In general, climate change is likely to lead to weather events that are more intense and variable compared to past patterns, for example, sudden high volumes of rainfall leading to flooding, in addition to severe droughts in other areas.

Possible climate change impacts complicate the planning for future water supplies and investment needs

Increased variability in rainfall patterns will result in less reliable stream flows, which will consequently lead to an increase in the unit cost of water from dams. This cost will need to be passed through the water value chain, which will ultimately result in increases in consumer tariffs.

Climate change also presents challenges to water infrastructure. More extreme wetting and drying cycles causes greater soil movement resulting in water and sewerage pipes being more prone to cracking, resulting in a greater need for rehabilitation and replacement of this infrastructure.

Acid mine drainage

Acid mine drainage refers to the outflow of acidic water from disused mines. In 2010, several warnings issued by environmentalists stated that South Africa could face a potential water pollution crisis leading to health problems as a result of spillage from acid mine drainage. These warnings focused on the Gauteng gold fields, but acid mine drainage has also been reported in the Mpumulanga and KwaZulu-Natal coal fields, and even the O'Kiep copper district in Northern Cape.

An inter-ministerial task team was appointed in 2010 to determine the risk that acid mine drainage poses to the environment and water quality

In response to these concerns, an inter-ministerial task team was appointed in 2010 to determine the risk that acid mine drainage poses to the environment and water quality. The task-team's report found that the flooding of mines and the subsequent spillage of acid mine drainage can result in the contamination of shallow groundwater resources required for agricultural and human consumption, cause geotechnical impacts such as the flooding of underground infrastructure in areas where water rises close to urban areas, and lead to increased seismic activity that could have a localised effect on property and infrastructure. It was also found that acid mine drainage does pose a serious risk to the environment, with localised ecological impacts and regional impacts on major river streams.

The task-team's recommendations have been approved by Cabinet, and the 2011 Budget allocates R3.6 billion for water infrastructure and services, part of which is for projects to deal with acid mine drainage.

Skills shortage

Whereas in 1994, there were 20 engineers per 100 000 people, this has now dropped to 3 per 100 000 people

The water sector is currently experiencing a severe shortage of critical skills - qualified engineers, water scientists, technicians and artisans. This poses a risk to the sector's continued capacity to provide water services effectively. Research[2] indicates that the civil engineering capacity (expressed as civil engineering professionals per 100 000 people) in local government is too low to deliver, operate and maintain local government infrastructure in a sustainable manner. Whereas in 1994, there were 20 engineers per 100 000 people, this has now dropped to 3 per 100 000 people, a ratio that is clearly indicative of a crisis.

Water availability

Issues relating to water availability and the shortage of water have already been noted above. However, it is important to emphasise water is a public good and therefore it is not just the responsibility of national or local government, but the responsibility of the public to ensure that water is appropriately managed and conserved.

Water quality

People and firms need access to water, but it is essential that the water being made available for different uses meets the quality standards relevant to that use, either human consumption, industrial purposes or for the maintenance of ecosystems.

The WSSD recognised the importance of adequate and clean water supplies

Recognising the importance of adequate and clean water supplies throughout the world, participating countries at the World Summit on Sustainable Development (WSSD) held in Johannesburg in 2002, agreed to:

- intensify water pollution prevention to reduce health hazards and protect ecosystems by introducing technologies for affordable sanitation and industrial and domestic wastewater treatment, by mitigating the effects of groundwater contamination and by establishing, at the national level, monitoring systems and effective legal frameworks

[2] Alison Lawless, (2010) '*Numbers and Needs in Local Government'*

- adopt prevention and protection measures to promote sustainable water use and to address water shortages.

The blue drop scoring system monitors the management of drinking water quality

Historically, South Africa's tap water has been of a very high standard, but due to problems in some areas, quality outside the metros is not always assured. The Department of Water Affairs' Blue Drop Report for 2009/10 shows that only 38 water supply systems in 26 municipalities were awarded the highest blue drop status certificate.

The green drop certification programme evaluates the management of waste water systems

Similarly, a green drop certification programme was launched to evaluate the management of waste water systems. This assessment revealed that about 75 per cent of South Africa's sewerage treatment works are not up to standard. Of the 852 waste water treatment plants, just over 400 could not be assessed. Of the remainder, only 203 plants scored more than 50 per cent.

In addition to the above systems, the Department of Water Affairs has also developed a wastewater discharge charge system that works on a 'polluter pays' principle. The aim is to recover the costs associated with different wastewater treatment and water quality management programmes and to provide incentives for large water users to treat their waste in-house rather than discharging it untreated into a water resource. The major sources of direct pollution include industrial effluent, domestic and commercial sewerage, acid mine drainage, agricultural runoff and litter. These wastewater charges will be payable by polluters who exceed certain pollution load standards.

Conclusion

The quality and availability of the water and sanitation services are of extreme importance to the quality of human life and living standards. The most recent information confirms that progress in extending access to these services continue to be made. However, these efforts are being constrained by skills shortages within the sector.

Several reforms and measures are being implemented to improve the efficiency of the water sector as well as measures to improve sanitation and prevent outbreaks of related diseases. A concerted effort is required from all stakeholders in the water sector to address challenges, such as deterioration in the water services infrastructure, which impact on the quality and reliability of service and ultimately the quality of water itself.