Water and Sanitation: Municipal Water and Sanitation Infrastructure

12 February 2015

1. Introduction

Water and Sanitation Infrastructure, the topic of the 31st Infrastructure Dialogue focused on a critical strategic priority within South Africa. The forum brought together a panel of speakers from government and business, with representatives from the Water Research Commission, Strategic Water Partners Network (SWPN) and the Development Bank of Southern Africa (DBSA).

An introduction and word of welcome was given by **Kaemete Tsotetsi**, Chief Director: Economic Policy Development, Economic Development Department. **Alex McNamara** of the National Business Initiative (NBI) facilitated the dialogue after introducing the following panel members:

Mr Sanjeev Raghubir	Corporate Safety, Health and Environmental Sustainability Manager, Nestlé (South Africa); Chair of SWPN leakage reduction and water use efficiency working group
Mr Dhesigen Naidoo	Chief Executive Officer, Water Research Commission
Mr Faried Manuel	Investments Manager, SA Financing, Development Bank of Southern Africa

2. Global context

South Africa faces an estimated backlog of adequate water supply to 1.4 million households and basic sanitation to 2.1 million households. Prior to discussing the local context, the dialogue kicked off with a discussion around the global scale of challenges with regard to water and sanitation.

Water scarcity has been rated as one of the top five issues in the world. According to the 2014 Global Risk Report the imminent water crisis is ranked as the foremost global risk. Translating this into the current South African environment, discussion focused on four factors, which make countries successful in water provision (tabled below).

Table 1: Water Provision Drivers

Factors Defined	South African Context
Good Infrastructure	
Infrastructure that is appropriate for the time in which it is utilised.	The country is dealing with inherited service backlogs and 80% of municipalities have infrastructure that is inappropriate for current needs. Although work has been done over the past 20 years to rectify the situation, success has been limited due to inappropriate infrastructure solutions.
Skills	
Appropriate skills pool that is available and deployed to solve problems at implementation level.	South Africa has a dire shortage of engineering and technical skills that are required at the interface level. Although these skills are available, it resides in areas of planning and management with little practical capabilities.
Science and Technology	
Continuous implementation of newly developed and acquired know-how that translates into fruitful interventions.	The country is ranked 18th in the world in terms of production of knowledge and the publishing of technical and white papers, yet practical implementation of knowledge does not take place effectively. Support for the commercialisation of innovative water and sanitation technologies is required.

Factors Defined	South African Context
Water Behaviours	
Includes but is not limited to aspects such as optimum water usage, limited water leakage and water loss, and generation of revenue for water use.	Although water usage of South Africans per sé cannot be categorised as bad, the country is not performing well in terms of other contributing behavioural factors. A survey by the Department of Water and Sanitation found that 37% of the country's municipal water is non-revenue. An effective revenue generating system that includes a pricing strategy, meter monitoring of water usage, billing and payments, is lacking. The country also has a cultural issue related to non-payment.

3. Key issues & proposed solutions

A broad range of issues impact the effective provision and management of water and sanitation. There has increasingly been a rise in communities engaging in legal and illegal service provision demonstrations and strikes against non-delivery of basic services. If issues and related problems are not effectively managed, the country faces a serious water and sanitation crisis in the near future.

3.1 Inappropriate infrastructure

South Africa has a mix of obsolete, old and new but in many cases over-designed water and sanitation infrastructure, which is not fit-for-purpose. Furthermore, over the past two decades the majority of municipal managers (approximately 80% in the 1990s) have possessed limited knowledge of appropriate technological solutions. But there is good news, as it has recently come to the fore that there is positive movement in establishing the right knowledge when it comes to the assessment of technology requirements. The comment was made that according to a recent survey, at least 90% of municipal managers demonstrated that they have a meaningful understanding of the required technology. Although the right knowledge is not completely in place yet, development is taking place.

3.2 Accountability imperative

The country may have made progress around water accessibility since 1994, but the challenge remains massive. Communities are increasingly upset about a lack of service delivery and only 10% of municipalities have successfully performed in line with the Regulatory Performance Management system requirements since this was established. A 40% average relating to reliable water supply in some areas is unacceptable and municipalities, municipal managers and implementation managers must be held accountable for failures and under-achievement.

A formal top-to-bottom and bottom-to-top system is required to engender a culture of accountability. Municipalities and municipal managers should be assessed using a top-to-bottom approach, while communities need open and workable channels through which to lodge complaints. Formal communication channels through which to escalate non-response from government are imperative.

The panel put forward the following governmental system:

- National government: Leadership of the Department of Cooperative Governance and Traditional Affairs (CoGTA) needs to ensure that Local Government and municipal managers are equipped to perform tasks and that this is being done.
- Provincial government: Regulation of service delivery should result in the assessment of service delivery. Where needed, training should be provided and responsible managers assessed and held accountable for performance.
- Local government: Service delivery should be provided and assessed. Where there is a shortage of skills, service delivery should be outsourced to technically capable contractors. Community and customer liaison plays a critical role at this level. The right mechanisms for complaints need to be implemented and community engagement should take place to ensure that people know their rights and responsibilities. This should be supported by a community-wide and/or nation-wide awareness campaign.

The issue of accountability could partly be managed by instituting an Ombudsman. The scenario could be investigated from within municipalities. Civil society too needs to hold municipalities accountable through a workable accountability structure. Every office and pay point should provide information about the complaint process and access points to facilitate this.

3.3 Operations and maintenance

A survey cited in the dialogue found that 96% of the South African population has access to infrastructure but only 85% of this infrastructure is operational. At a national level only 65% of this infrastructure is considered to provide a reliable service, whereas in rural areas this figure is much lower. In Limpopo the figure stands at 40% and in Mpumalanga, 39% while other provinces rank as low as 20%. Another study found that 70% of infrastructure has collapsed due to no maintenance and vandalism.

There is a lack of alignment between political processes and technical requirements in Local Government. Politicians exhibit little understanding of what it entails to operate and maintain infrastructure in a way that provides sustainable services. They lack knowledge of what is required to rehabilitate and develop new infrastructure for growth. As a result, in the allocation of funds and especially where budgets are tight, operations and maintenance bears the brunt.

The underlying problem is firstly due to an excessive focus on new infrastructure. This is evident in engineering, where the majority of new capital project submissions focus strongly on new infrastructure, with little attention to or inclusion of maintenance or infrastructure life cycle management. Although new infrastructure is required, it needs to be balanced with maintenance and refurbishment of old infrastructure to ensure sustainability and avoid excessive costs. Planning needs to incorporate total life cycle management and should be accompanied by financial implications to show cost savings over the long-term.

The root of the problem also lies in a general shortage of funds in rural areas. Local Government in rural areas struggle to secure funding and generate revenue, as there are limited industrial customers, and most of their household customers are poor and do not have the ability to pay for water usage.

3.4 Skills shortages

There is a significant skills shortage problem around engineering, planning, management and social skills, at both the Local Government and municipal levels. On the whole, South African engineers choose not to work in these environments. The reasons for this need to be investigated and municipalities must ensure that they create the right environment and align remuneration with market related salaries.

3.5 Planning and budgeting

Inefficient planning and budgeting is at the heart of the many issues pertaining to the infrastructure challenge. This is an awareness and skills shortage problem. Local Government and municipalities should ensure that planners, managers and decision-makers understand the importance of planning and budgeting and are adequately equipped to develop and execute plans. Strategic plans should also make provision for appropriate staff recruitment, training and upskilling as well as performance management.

3.6 Water pricing

It was debated "whether water is too cheap in South Africa". In terms of consumption and usage behaviour, water is perceived to be too cheap. The comment was raised that South Africans do not realise the value of water and use it extravagantly. By increasing the price of water, consumption behaviour may be influenced positively, resulting in improved water demand management and water savings. This comment was challenged. If water is cheap, does it mean that everyone can afford it or will pay for it?

The current price of water does not necessarily include the cost of making water accessible and other related service costs. South African water consumers can be categorised into a wide range of sectors. The user-pay principle can be incorporated, ensuring that everyone pays for water usage, however large water consumers should pay higher prices. The pricing strategy should take into account the social element of allocating a certain amount of water "free" for all users (currently this amount is at 6 kilolitres) and pricing should be economically viable for households as well as businesses and industries.

It was suggested that a governing board, similar to NERSA in the case of electricity tariffs could be instituted to develop a workable pricing schedule and oversee the implementation thereof as well as pricing increases. A certain percentage of income can also be allocated to maintenance, to channel part of the revenue flow back to maintenance. However, this should be enforced, monitored and measured.

At first glance, this proposal sounds complex. But if approached in the same way as the Back to Basics principle, it becomes about reducing losses. From a municipal point of view, it will become increasingly important to ensure that the cost of water supply and sewerage systems are properly assessed and incorporated into the pricing schedules, and that big consumers are properly served and correctly billed.

Innovative interventions such as the Sebokeng Intelligent Pressure System can be duplicated in various areas to realise cost and water savings. Municipalities will have to become proactive, assessing potential solutions, driving implementation and engaging with communities, handling enquiries and managing expectations while ensuring provision of the necessary service levels.

If water pricing is used as a tool to improve consumption levels, this should be implemented with care and consideration around what is affordable. It should also be accompanied by a broad public awareness campaign, ensuring that people understand the rationale behind it and that expectations are properly managed.

3.7 Revenue flow

Local Government and municipalities face a serious problem of non-payment for water. Local Government, for example is allocated 10% of the national fiscus and is expected to be self-sufficient. Yet people relocate to cities and towns looking for suitable economic opportunities that, in many cases, are not available. Although these people continue to reside in areas that demand services, the majority of them are unable to pay for service delivery.

In many township areas too, water supply and access points are communal, which makes revenue collection extremely difficult and in some cases impossible. Where revenue can be collected, many cases of non-payment remain. This can be traced back to two underlying issues, namely affordability and a culture of non-payment. The non-revenue issue is also linked to operations and maintenance. Without adequate revenue income, operations and maintenance cannot be sufficiently managed and infrastructure deteriorates further.

4. Urbanisation - an underlying dynamic

Urbanisation, which was phrased as being "about the growth of metros, cities and towns" is a process and not a problem. Unplanned urban sprawl and impoverished communities that result from the rapid movement of people is at the heart of this issue in South Africa. In the search for employment and opportunities, people relocate to areas that do not allow easy access to opportunities, and have little or no supportive municipal infrastructure and services.

> "Urbanisation is only a problem if not planned for. In reality, it presents interesting opportunities. Densification solves some of the biggest problems for water planners. It gives municipalities the ability to do things that they otherwise would not have. With the right kinds of volumes, we can have specialised systems for water reuse. It allows infrastructure around grey water systems and urban ecological systems that act as wetlands inside cities and become part of waste water treatment. On the one hand urbanisation is a challenge that we need to deal with but it also holds numerous opportunities that we have to capture." Dhesigen Naidoo, Chief Executive Officer, Water Research Commission

However, urbanisation presents opportunities for water planners and in terms of this, infrastructure planning and development for communities and households needs a shift. Although an increase in water supply for more people is a requirement, there is also the need for more connections and increased services. Current plans have not yet taken these shifts into account.

Planners and decision-makers need to recognise the link between spatial planning and water demand management. It is important to get people in the right places for economies of scale to match technologies that will enable improved water demand management. Effective water management is interlinked with land management and smart cities planning.

5. Holistic approach to addressing the challenge

5.1 Water demand management

Water demand management includes water regulation, water conservation, water leakage management and more. According to the Gauteng Planning Commission, which is responsible for the Gauteng Integrated Infrastructure Master Plan, South Africa is not managing its water demand effectively.

Water demand management takes place at two levels. At a usage level to regulate behaviour through incentives, namely instituting block tariffs, and at the point of supply and access. Some of the drivers for water demand management come from other sectors such as Energy, which is the largest user of water in South Africa. Pumping water from its original source to access points consumes substantial energy but the demand for water can be optimised and effectively managed, saving not only costs but water itself.

SEBOKENG PRESSURE REGULATOR INTERVENTION

The Sebokeng pressure regulator is an intelligent pressure regulation system that is water demand sensitive. It is not a shut-off system but works with the water use pattern for the day. With this automated pressure regulation, Sebokeng saves 33% on water usage with an associated decrease in energy usage of 14 000 kilowatt hours and a decrease in carbon emissions of 2300 tons. The project took approximately 8 months from start to completion.

Where it comes to the installation of smart water reticulation systems in established communities with existing water supply systems, barriers such as high retrofitting costs make implementation difficult. However, in informal settlements where there is no infrastructure to retrofit, the installation of intelligent water management systems makes perfect sense, provided that the informal settlement in question is not planned for resettlement.

The country currently has a number of opportunities for smart and effective water management practices to be deployed. These opportunities should be identified and promoted as such. As a result, investment not only in terms of funding will be attracted, but so too will appropriate skills.

5.2 No Drop system

The Strategic Water Partners Network, comprising companies such as SA Breweries, Eskom, Sasol, Coca-Cola, the Water Research Commission and the Department of Water and Sanitation, has investigated the water situation in three strategic areas:

1. Effluent management, with a focus on role players in the Mining and Industrial sectors
2. Agriculture, irrigation schemes and agricultural supply chain management
3. Water consumption and the optimisation of water usage, with a focus on water efficiency and leakage reduction.

As a result, the No Drop system, based on the Blue Drop and Green Drop Regulatory Performance Management systems, was developed to measure and reduce non-revenue water. A scorecard including skills, infrastructure, planning and budgeting was developed for municipalities to assess performances and determine issues. An ambitious goal to reduce non-revenue water to 18% by 2025, which is equivalent to 600 billion litres of water and R2.5 billion, was adopted.

> "The No Drop system is applied as a tool for water demand management and water conservation. It assesses how effectively municipalities do planning and manage budgets. Certain expectations are set and where there are gaps, interventions are required." Sanjeev Raghubir, Corporate Safety, Health and Environmental Sustainability Manager, Nestlé (South Africa)

The private sector can play a role in this regard. For example, where a company such as Nestlé has a manufacturing plant in a rural environment, there is an opportunity for the company to engage and work with the municipality in optimising their water treatment facilities, while addressing issues in broader terms. In addition to managing water within its own factory, the company becomes involved in water management and conservation in the community outside of the fences of its own factory. Being involved on this scale provides improved returns in terms of water savings.

Only 20% of municipalities are actively striving to achieve Blue and Green Drop status. Approximately 30% of municipalities signed up but are not actively engaging in activities to improve performance, while 50% of municipalities have not yet responded with regard to the performance assessment. South African municipalities are signing up and achieving Blue and Green Drops, although currently only 4% of all the waste-water treatment facilities achieved Green Drops.

5.3 Key priorities for Local Government and Municipalities

5.3.1 Understanding the issues

South Africa is a consumption-based society as opposed to an investment-based society, but a new service-based culture should be informed. This is evident when looking at the low priority of maintenance in the budgeting process.

Municipal managers need to become proactive and recognise the pertinent needs in their environments while understanding the priority that those needs require in the short-term to ensure long-term sustainability. Furthermore, an understanding of technical requirements is pertinent to ensure the implementation of the right and effective solutions. Where there is a shortage of skills, service providers should be contracted and effectively managed with the assistance from Government.

It was noted that municipal managers must be engaged with through information sessions to create awareness, obtain feedback, determine misconceptions and ensure understanding of the problems and the seriousness thereof.

5.3.2 Planning and budgeting

Municipal managers should ensure that their teams are equipped with the required and adequate skills in all infrastructure-related disciplines, including engineering, technical, management and social skills.

The planning and budgeting processes at a local government and municipality level should include holistic skills planning, spatial (cities and towns) planning as well as assessment requirements. In the planning and budgeting process opportunities around new technology implementation need to be assessed, especially in areas where it would be environmentally and cost efficient to do so.

5.3.3 Grants and funds

Municipalities need to be assisted to allocate and manage funding through employing a top-down approach. This could be influenced through the right financing instruments, which in turn can dictate spending behaviour. In addition, the equitable share granted by government, which at present is not always utilised for what it was intended, should stipulate what it should be allocated for.

To ensure that maintenance takes place, grants and funding should be prescriptive in how they are invested for maintenance. According to the Back to Basics approach, it is prescribed that 7% of the municipal budget be dedicated to operations and maintenance.

5.3.4 Regulatory assessment

In order to determine municipalities' specific problems, assessments such as the Blue Drop, Green Drop and No Drop Regulatory Assessments should be conducted. The good news about these regulatory assessments is that they can be done for free. Municipalities simply have to sign up for the process.

In addition, municipalities should join the National Benchmarking Initiative, which is managed by the South African Local Government Association (SALGA) and a selection of other partners. Through participation, municipalities will be put into contact with water engineers, through which knowledge transfer can be enabled. Problem sheets can then be shared and lessons learnt.

It was also emphasised that where municipalities have already signed up, benefits gained should be communicated as success stories.

5.3.5 Community engagement

Local Government and municipalities should engage with communities on a regular basis in a transparent manner. For example, with regard to sanitation and waterborne or non-waterborne systems, it is important not to make promises of systems that cannot be delivered. Municipalities should determine their situation. The environmental and economic viability of potential systems should be assessed upfront, including where it will not be possible to implement certain systems

in the short-term. Workable and affordable solutions should be identified simultaneously and implementation should be fast-tracked through available financial investment tools.

In the process, the community should be informed and educated on the system of choice. People need to understand why a particular system is best for their specific environment and why other traditional systems are not workable. However, where the implementation of new technology systems is environmentally viable, economic viability should be investigated. Improving quality of life through new technologies should be the first priority, and only where it is not viable from an environmental and/or economic point of view, should traditional infrastructure be implemented or refurbished.

5.3.6 Accountability

Municipal managers should establish accountability mechanisms that monitor performances at interface level. These mechanisms should not only motivate the implementation of plans according to regulatory standards, but should also help to render municipalities and municipal managers responsible for service delivery more accountable.

5.4 Responsibilities of other role players

In addressing the challenge, the dialogue emphasised the responsibilities of the role players in addition to that of municipalities (as tabled below).

Table 2: Role players and responsibilities

Role Players	Responsibilities
Government	- Set regulations surrounding water service delivery, price, technical and service standards benchmarks. - Determine balance in terms of investment between various infrastructure demands. - Ensure National Treasury has the right and appropriate financing mechanisms. - Monitor the flow of funds. - Create mechanisms for accountability that will be implemented within Government. - Enforce performance and punish non-performance. - Provide the required skills to assist in the management of private sector service providers.

Role Players	Responsibilities
Government affiliated and independent institutions	- Focus on research - Provide expert advice and guidance
Private Sector	- Ensure investment efficiencies and continuously monitor these. - Secure technical and management skills contributions. - Create shared value through involvement in water demand and conservation in communities where businesses are active. - Contribute engineering capabilities and assist with handovers to new and inexperienced engineers.
Civil Society	- Secure participation through dialogue. - Invest in water and sanitation related awareness campaigns.

6. Financing

6.1 Current situation

Financing water and sanitation infrastructure follows the same path as that for any other infrastructure development. Funds are currently raised by the provision of grants and revenue income.

The third option is to borrow the necessary or outstanding money against the balance sheet. But this is not often a workable alternative as the majority of municipalities do not have the required balance sheet strength to enable borrowing of funds. At present only about 30 municipalities have the capacity to borrow and in addition to this, National Treasury has laid down conservative measures for municipal loans.

PARTNERSHIPS

Partnerships between role players are critical to influence the complex issue of water demand management and water conservation. There is no single resolution and in the majority of water solutions, a number of role players are needed to plan, develop, implement, monitor, measure, regulate and manage accountability. Partnerships will also usher in more dialogue, which is pertinent for enhancing awareness and stimulating solutions, including financial instruments. One driver for partnerships is win-win solutions through broker and barter deals.

Funds raised through grants and revenue income have to cover operational costs as well as maintenance, leaving very little money for new infrastructure. In many cases, municipalities do not raise enough money through revenue income to cover maintenance. The majority of municipalities only attend to the basics and provide services at a minimum level, while new infrastructure planning and maintenance are neglected.

6.2 Proposals for an improved situation

Municipalities can improve their financing situation with the following support:

- Grant allocations dedicated to the funding of specific infrastructure developments that can generate revenue. Assisting municipalities to build capacity, the grant should be provided upfront. For example, where a grant is provided for dedicated infrastructure development that will take place over three years, money should be made available upfront and it should

stipulate that development and the building of facilities start in the first year. The facility should start generating income at the first possible opportunity.

Where infrastructure development is brought forward, it always comes at a cost. As long as the cost is justified by the benefits over a relative short period of time, it is acceptable given that there should be enough value in doing so, and the value should be measurable.

EKURHULENI PILOT PROJECT

The Ekurhuleni project required R3 billion to be initiated. The DBSA established a partnership with the municipality and provided R200 million upfront that was utilised for the first phase of development. As the development was realised, assets will be added to the balance sheet, which will allow for further borrowing. The partnership requires a degree of trust and continued cooperation and planning, ensuring that each phase is effectively managed and monitored, ensuring the required value is generated.

- The DBSA has investigated various financing options and shared information on the Ekurhuleni Pilot project. The rationale behind these investigations is that the amount that municipalities need to borrow lies beyond the scope of the fiscus. In many cases feasibility studies are a necessity and the money required to fund such studies can be in the region of R30 million.

- But prior to funding coming into play, planning and deal development must be addressed. Looking at water demand management and water conservation systems, extensive funding is a requirement. With municipalities not having the Capital Expenditure (CAPEX), the DBSA investigates how to fund such projects incrementally. Once development starts and small assets become evident, the balance sheet improves, which allows additional loans to be obtained. These incremental, small wins over a shorter period of time allow the allocation of capital and municipalities get the opportunity to gear up the balance sheet.

> "Investments should allow for assets to be developed that can generate revenue and allow liabilities that match it, but based on the revenue income that can be taken out over time. Such bolt-on borrowing deals are complex." Faried Manuel, Investments Manager, SA Financing, DBSA

Investments in the public services sector require the right financial instruments to match them. One-size fits all investments are not appropriate.

7. Conclusion

This report captures a complex water and sanitation predicament, which needs to be resolved to ensure sustainable water resources for South African generations to come. The Infrastructure Dialogue took a definitive and detailed approach to highlight and understand the underlying issues surrounding provision of safe water and first world sanitation. It was clear that there is no silver bullet, and no single solution. The challenge requires a multi-pronged approach, appropriate finance structures, enhanced accountability, effective long-term planning to solve existing problems, and the creation of paths for new and innovative developments to foster future sustainability.