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Rethinking sanitation improvement for poor households in urban South Africa

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In South Africa, flush toilets have historically been associated with white privilege, and dry toilets with racial discrimination. The sector slogan 'Sanitation is Dignity' has deep resonance, and in urban areas, anything other than a flush toilet is regarded as inferior and at best an interim option. The emphasis on dignity, rights and aspirations has led to a focus on toilet technologies, rather than on integrated sanitation improvement. But rapid extension of reticulated water and sanitation infrastructure is creating significant bulk infrastructure bottlenecks; the focus on meeting coverage and bucket eradication targets far bolder than the MDGs is compromising sound operation and maintenance, and there is widespread evidence of wastewater treatment failures which have severe consequences for human health and the natural resource base. In a context of growing water scarcity, safe-guarding water quality is critical to ensure it remains fit for use.

This paper maps some challenges around service provision and sanitation improvement in urban South Africa. It argues that a rights-based approach to providing water and sanitation is a hollow promise if the service is not sustainable and prone to failure; and that a shortage of skills to operate and manage sewered systems is an even greater threat to sustainability than funding gaps. It is generally the poorest and most vulnerable who wait the longest for service improvements, and who are most risk when services fail. There are compelling reasons to pursue other approaches to sanitation improvement, but a comprehensive shift in approach is unlikely soon. In the interim, significant gains can be made by utilising two wastewater treatment technologies- decentralised wastewater treatment systems, and integrated algal ponding systems - that are low cost, have low skills requirements, and a low risk of failure. They also have the potential to offer better services, to more people, more sustainably, sooner. Given the urgency of service improvements in a context of extremely high HIV and TB infection levels, South Africa does not have the luxury of plentiful time.

Introduction

There has been a massive expansion in water and sanitation infrastructure coverage in South Africa since the country's first democratic election in 1994. In May 2008, South Africa's Minister of Water Affairs and Forestry Lindiwe Hendricks told Parliament that the country had now met its MDG goals for both water and sanitation (Hendricks, 2008a), having met the water targets seven years previously against a 1994 baseline. Water infrastructure has been extended to an additional 18.7-m people since 1994 – which is equivalent to providing new services to twice the population of Sweden; and improved sanitation facilities have been provided to an additional 10.9-m people, equivalent to more than the total population of Portugal or Belgium. This is a remarkable achievement, by any measure. What is even more remarkable, given significant poverty levels in South Africa, is that flush toilets have been provided to nearly nine million more people –nearly 20% of the population - since 1996, according to census data (StatsSA, 2005, 2007). This means that nearly 60% of households nationally now have flush toilets.

SA's development and delivery agenda is far more ambitious than the MDGs: by 2014, it aims to provide universal access to at least basic water and sanitation. In urban areas, there is strong resistance to the provision of anything other than flush toilets. Thus government has set itself a daunting task, as there is currently no debate about providing anything other than flush toilets in dense settlements. There are, of course, a wide range of technology options available, including many dry systems, which are arguably better suited to the realities of South Africa's growing water scarcity and declining quality of untreated water. But South Africa's emphasis on providing flush toilets throughout its urban areas has to be understood in the context of the country's history of apartheid, underdevelopment and statutory discrimination: flush toilets are a powerful symbol of dignity and aspiration to a better life, and anything other than a flush toilet is regarded as second-best, discriminatory, and at best an interim option until 'a proper toilet' can be installed.

But government has perhaps underestimated the intensive resource and skills requirements of conventional reticulated systems. Flush toilets need house connections for water, and water consumption rises significantly with higher levels of service; this calls for new water resource and bulk infrastructure development. Most of the network is buried and out of sight, and thus the extent and complexity of the water and sewer network is often not appreciated. Most water leaks and sewage spills are underground, and require specialized monitoring and maintenance equipment. Managing the biochemistry of safe water treatment and effluent management requires high levels of expertise, as well as ongoing laboratory testing to ensure compliance with health, safety and environmental standards. Quick response times are needed in case of bursts, spills and outages to minimize the risks to public health and the natural resource base. And failures, which are inevitable, impact most harshly on the poor – as they tend to have the least clout in getting their problems heard and fixed, and the most meagre resources to cope with the consequences of contaminated drinking water, faulty services, leaks and spills.

In its commitment to providing high level services, South Africa is at risk of developing service infrastructure which it does not have the financial and human resources to operate sustainably, and which has a high risk of failure with consequences for water quality and human health. Notwithstanding the ANC government's commitment to providing 'safe water and decent sanitation to all', the real issue is the reliability and sustainability of those services.

This paper maps some current challenges around service provision and sanitation improvement in South Africa. It argues that a rights-based approach to providing water and sanitation is a hollow promise if the service is not sustainable; and that a shortage of skills to operate and manage sewered municipal systems is an even greater threat to sustainability than funding. Moreover, in urban areas, realization of the right to 'decent sanitation' is being delayed for millions of people living in dire conditions in informal settlements because of the emphasis on providing free housing with full services in new settlement developments. This is a clear example of 'the best' being the enemy of 'the good'.

The paper argues that there are compelling reasons to pursue other approaches to sanitation improvement. A comprehensive change in approach is unlikely in the short-term, but significant interim gains can be made by utilising two wastewater treatment technologies that are low cost and have low skills requirements; they have the potential to provide better services, to more people, more sustainably, sooner. Given the urgency of service improvements in a context of extremely high HIV and TB infection levels, South Africa does not have the luxury of plentiful time.

South Africa's rights-based approach to sanitation improvement

The African National Congress (ANC) came to power in 1994, with a mandate to utilise South Africa's immense resources to achieve social justice for all. Reacting to the deep injustices of apartheid and statutory discrimination, the country's 1996 Constitution puts strong emphasis on building a culture of rights, and foregrounds human dignity as a founding premise of the new state. The Bill of Rights states that everyone has a right to dignity, a right of access to sufficient water', and a right to an environment that is not harmful to their health and well-being; it mandates the state to 'take reasonable legislative and other measures, within its available resources, to achieve the progressive realisation of each of these rights' (RSA, 1996).

Government has sought to honour this mandate with substantial grant funding and operating subsidies for infrastructure development and service provision. Municipalities provide toilets free of charge in low income areas, and the recurrent costs of flush toilets are subsidised in most areas.

Sanitation features prominently in national political discourse and in the discourse of human rights. See, for example, this statement by the Minister of Water Affairs and Forestry in March 2007:

> Since attaining democracy in 1994 and adopting our constitution in 1996, our government has an obligation to ensure that we promote and fulfil the rights of our people, importantly that includes the progressive provision of basic services such as water and sanitation. It is therefore fitting that we celebrate Human Rights Day in the same month that we have awareness campaigns such as the National Water Week and the Sanitation Week (Hendricks, 2007).

The sector slogan, 'Sanitation is Dignity' has deep resonance in South Africa, given the country's history of racial discrimination. The emphasis on dignity is echoed in the ANC's 2006 local government election campaign promise to ensure that all gain access to clean water and 'decent sanitation'. In urban areas, anything other than a flush toilet is seen as inferior and, at best, an interim expedient.

This emphasis on dignity, human rights and aspirations has led to a focus on toilet technologies, rather than on integrated sanitation improvement.

The water resources context

Climate change, water stress and the importance of good wastewater management

According to Paul Reiter, head of the International Water Association (IWA), eighty percent of future global water stress will come from population growth and development, not climate change (Reiter, 2008). This highlights growing water demand, particularly in a context of rapid urbanisation and the urbanisation of poverty; implicitly, it flags the complementary growth in wastewater generation, and the need for effective water quality management on a large scale. In developed economies, climate change has particular relevance for wastewater management, given the extremely high energy demands of activated sludge treatment systems. But in South Africa, a more immediate consequence of climate change is greater rainfall variability and a greater likelihood of water scarcity sooner. In a context of growing water scarcity, safe-guarding water quality is critical to ensure it remains fit for use. One of the biggest threats to South Africa's water quality is inadequate wastewater treatment, and a key contributing factor to deteriorating raw water quality is the declining performance of many – if not most - municipal wastewater works.

South Africa is categorised as a water stressed country. It has low rainfall by international standards – just 60% of the world average – and just 9% of rainfall reaches rivers, compared to an average 31% worldwide (DWAF, 2008a). FAO-Aquastat figures rank South Africa 11th from the bottom on an index of 50 countries in the world with the least annual renewable water availability per capita (UNESCO 2006), and the country is moving rapidly to being reclassified as water scarce. South Africa has invested heavily in large dams and elaborate inter-basin transfer schemes to collect and convey water to where it is needed in the

largely-dry hinterland (Eales and Schreiner, 2008). Population distribution tends to be concentrated in areas that are far from significant sources of water, and urban settlements are growing rapidly. With access to improved services and rising living standards, household water consumption is rising steadily, and urban water supply is the fasting growing sector of national water use (Eales, 2008; DWAF 2008a). This has implications both for water supply and wastewater management.

Because of low and highly seasonal rainfall, South Africa's rivers are fairly small by international standards. This means that they do not have the flow volumes to mitigate contamination by the discharge of untreated effluent, particularly in the dry season, and thus South Africa has stringent effluent discharge standards to regulate return flows. Unlike many parts of Europe, Asia and South America which use rivers as an extension of their municipal sewer systems, South African municipalities must treat all municipal wastewater before it can be discharged. This adds significantly to the cost, infrastructure and personnel required to support waterborne sewage.

The volume of wastewater discharged to rivers nationally is rising rapidly, while its quality is deteriorating in many areas. National Department of Water Affairs and Forestry (DWAF) data show that not one province scores above 40% compliance with the required wastewater management standards, using an aggregated performance indicator (DWAF, 2008b). Even where the standard of effluent treatment is good, the sheer volume of contaminants and nutrients discharged is impairing river health; over time, it is likely that even stricter wastewater quality management standards will be required, which will add further costs and complexities.

Declining raw water quality in many areas is raising new challenges around the availability of water and the fitness of water for use. 'Clean' water is needed to dilute contaminated return-flows and mitigate the effects of rising salinity and nutrient levels for agricultural and industrial users, and rising pollution levels mean increasing volumes of clean raw water must be diverted for blending, which adds to water stresses. The poor quality of discharged effluent is contributing to rising eutrophication and bacteriological contamination of rivers and dams. High nutrient loads stimulate the growth of blue-green algae, or cyanobacteria, which block sunlight in the water, which in turn prompts plant decay; the process of decay demands oxygen, and leads to visible fish kills and less visible ecosystem imbalances. Moreover, under the right conditions of pH and temperature, these cyanobacteria release toxins which can be harmful to humans if ingested – yet very few water treatment works are equipped to remove these. Bacteriological contamination from poorly treated sewage can result in the spread of water-borne diseases; those most at risk are people who drink untreated water, but where municipal water treatment is inadequate, even those drinking tap water are at risk.

The municipal services context

Wastewater treatment failure and service expansion

One of the most significant causes of deteriorating water quality in South Africa is the discharge of poorly treated municipal sewage. Addressing Parliament on 11 March 2008, Minister Lindiwe Hendricks said,

> "We have done an audit [of municipal wastewater treatment works] and found that the situation in many municipalities is dire, and must be addressed as a matter of urgency. The pollution in some of our rivers can be directly linked to failure on the part of these municipal waste water treatment plants, and there is no denying that some of these plants are in poor condition" (Hendricks 2008b).

The immediate reasons for the poor state of municipal effluent discharge in many areas were revealed in a 2006 survey conducted for government, which investigated a representative sample of 51 plants in eight provinces. The survey found a critical shortage of trained and skilled staff, particularly experienced process controllers and mechanical/electrical maintenance staff. It reported that 56% of the plants lacked the skilled staff to maintain the installed mechanical/electrical equipment and instrument adequately, while 50% were understaffed and needed additional skilled operators (Snyman, 2007). Just 4% of the plants surveyed were operated and maintained adequately, and 'immediate intervention" was needed in 30% of works to avoid health crises. Even fairly low-tech waste stabilisation, or oxidation, pond systems are suffering from

accumulated neglect and poor operation. A separate 2006 survey of 47 Free State oxidation ponds revealed that over half were illegally discharging effluent with high faecal coliform loads into local rivers or streams (Van Vuuren, 2006).

The risks of faecal contamination in incoming water at treatment works are high, because of the poor quality of effluent discharged from many treatment works, and because of localised contamination. The risks of malfunctioning treatment and poor water quality are highest in the smaller centres, through a combination of understaffing, underfunding, erratic chemical dosing, technical failure and poor monitoring (Momba et al, 2006; 2008). A recent sample of 53 small water treatment plants in the Eastern Cape showed that just 34% of plants complied with the mandatory national standard for faecal coliforms, while an even lower percentage – 29% - complied at the end of the distribution network, at point of use (Momba et al, 2008) These figures are cause for grave concern, as the Eastern Cape is the second poorest province in the country, and it is poor households who suffer the harshest consequences of unsafe drinking water. There have been a number of severe diarrhoea outbreaks where faecal contamination of water has not been neutralized through effective water treatment, and several instances of typhoid – most notably in Delmas, in Mpumalanga, where at least 13 people died in 2005 (NISC, 2005-2008). The recent deaths of more than 140 infants over a three month period in the Ukhahlamba district in early 2008 will perhaps prompt sober reflection on the extent and causes of current treatment failures.

Poverty, vulnerability and water contamination in Ukhahlamba

A high-level government investigation in May 2008 found that it was a combination of water contamination, malnutrition and poor health care which left more than 140 infants dead in the Ukhahlamba district of the north Eastern Cape between January and March 2008. Ukhahlamba is one of the poorest districts in the country. Unemployment is well above 60% in most areas, and the vast majority of the population live below the poverty line. HIV prevalence is 29.1% among adults who have been tested.

Investigation by the national Department of Health showed that while the infants died predominantly of diarrhoea, the deaths were not the result of a disease outbreak or single pathogen. Rather, they were the result of a combination of contaminated water, poor sanitation, inadequate health services and the vulnerability of impoverished people with high rates of infant malnutrition (DOH, 2008). A significant minority of the infants who died were HIV positive (ECDOH, 2008); this highlights the vulnerability to water-borne diseases of those with compromised immune systems.

Water quality tests on reticulated water indicated that during the period December 2007 to March 2008, when the highest number of child deaths were recorded, the *E.coli* count was high at testing points throughout the district; in February 2008, when water quality was worst, just 30% of water supplied met water quality requirements (Ukhahlamba, 2008). A subsequent report to Parliament highlighted inadequate chlorination of treated water, failing sewage treatment due to under-capacity and malfunction, insufficient preventative maintenance of the works due to a lack of funds, and a lack of skilled operators to operate water and wastewater plants (Ukhahlamba, 2008). Available capital funds have been allocated to eradicating water and sanitation backlogs, but the district lacks sufficient revenue to fund operations and maintenance.

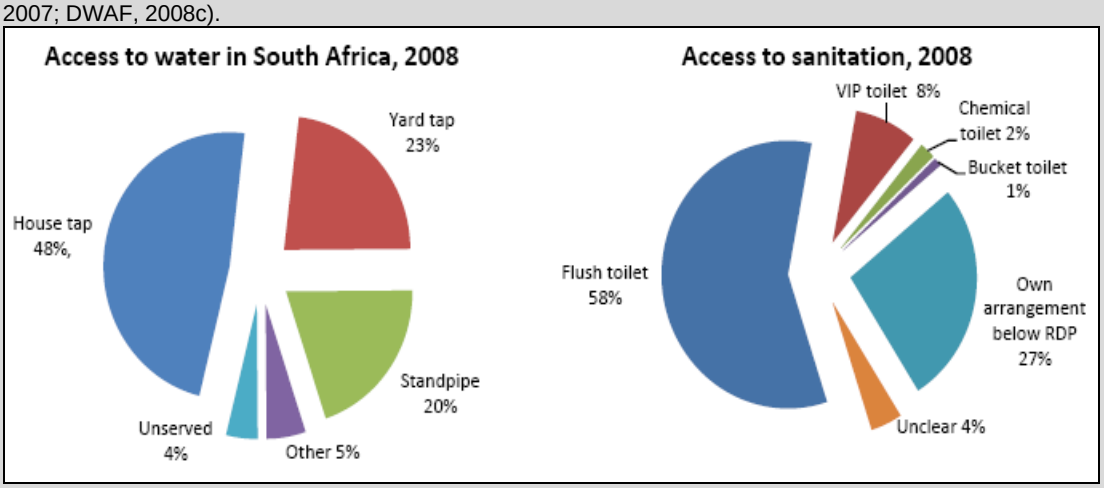
Twenty percent of Ukhahlamba residents live in towns, where a significant number are still served by bucket toilets; buckets provided pre-1994 have been replaced with flush toilets. Sanitation backlogs in the district are estimated at 76% (Ukhahlamba 2008).

The underlying cause of these failures is the rapid pace of new infrastructure development, in a context of far-reaching municipal restructuring and staff changes. Since 1994, nearly 2.5-million houses have been built and transferred, free, to poor households in urban areas; with few exceptions, these houses all have flush toilets. In addition, there has been a high profile national programme to eradicate bucket toilets. Since 1994, nearly 500 000 bucket toilets have been replaced, mostly with reticulated flush toilets[i] (Office of the Presidency, 2008); half have been replaced in the last three years (DPLG, 2008).

In South Africa, flush toilets have historically been associated with white privilege, and dry toilets with discrimination. The dormitory black townships of former 'white' South Africa generally had a lower grade version of the reticulation networks servicing 'white' areas, with bucket toilets and pit toilets servicing those not on the network; post-1994, there has been little debate about the merits of extending waterborne sanitation as swiftly possible, notwithstanding the poor condition of many existing networks, and the sheer magnitude of urban sanitation backlogs. Attempts to implement lower cost permutations of wet systems, such as non-sewered flush toilets with an on-site soakpit, failed in new settlements such as Ivory Park, outside Johannesburg, in the 1980s, primarily because of poor execution; and pilot projects to introduce condominial sewering in Johannesburg and Durban have not been scaled up or replicated, because residents regard them as a lower standard alternative, and are not willing to take on responsibility for local maintenance when adjacent settlements with conventional sewering are not required to. Thus the default service level in formal settlements is fully reticulated flush sanitation.

Access to water and sanitation in South Africa

Recent census statistics (StatsSA, 2007) indicate that nearly half of all South Africans have an in-house water supply, while a further quarter have a water connection reticulated to their yard. Twenty percent source their water from a communal standpipe within 200 metres – the supply standard for a basic level of service - and an estimated 4% do not yet have access to an improved supply. Five-six percent of the population has full water-borne sanitation, with a further 2% using a flush toilet that drains to a septic tank on-site. An estimated eight percent have a ventilated improved pit toilet, which is the default form of basic sanitation provided through government programmes outside of urban areas. Two percent are serviced by chemical toilets – a form of non-flushing on-site toilet treated with chemicals to inhibit odours, which requires frequent emptying. One percent use a bucket toilet – a crude form of on-site toilet, which relies on a weekly municipal emptying service, and 27% make their own arrangements – usually a rudimentary pit toilet or open defecation (StatsSA, 2007; DWAF, 2008c).



Source: Derived from StatsSA, 2007; DWAF, 2008

South Africa's national sanitation policy (RSA, 2001) speaks primarily to basic sanitation in a context where rural households use on-site dry toilets. It is silent on what sanitation improvement means in a context of urban reticulated services, and says almost nothing about greywater and wastewater management. Urban sanitation improvement focuses overwhelmingly on providing or upgrading toilets. There is no question that investment in infrastructure and effective service provision is an essential component of sanitation improvement in dense urban settlements. But sanitation improvement requires more than the delivery of infrastructure and access to toilets. It requires awareness of the linkages between water, hygiene and health improvement – which is critical given high HIV and TB prevalence; it calls for practical guidance around greywater management, and the importance of safe waste disposal, together with information on how poor solid waste management not only compromises public health, but can also clog sewers and stormwater systems and cause blockages and spills. But because of this emphasis on infrastructure and service

provision, sanitation improvement has become something that government delivers, rather than a public-private partnership in the most literal sense of all; the emphasis has been on toilets, not people.

Expansion of water and sanitation coverage since 1994 has been characterized by a tension between the urgent need to improve access to water and sanitation and the equally urgent need to build the institutional capacity to operate and maintain those services. The ability to source funds for new infrastructure has frequently outpaced the development of the institutional capability to operate and manage that infrastructure.

Moreover, the focus of infrastructure improvement has been on the 'user interface' – taps and toilets – rather than the broader infrastructure package and institutional arrangements needed to operate and maintain the system effectively. One inevitable result is significant bulk infrastructure bottlenecks. This is particularly evident in settlements where bucket toilets have been removed in an accelerated eradication programme since 2005.

The bucket eradication programme in the Free State

Eradicating bucket toilets has formed part of the MDGs since 2002. Spurred partly by the MDGs, South Africa's 2003 *Strategic Framework for Water Services* set 2006 as the target date by when all bucket toilets would be removed. This target was subsequently revised to refer to bucket toilets in formal settlements established before 1994, and the deadline was extended to December 2007. Bucket eradication was defined as a national priority, and government allocated grant funding of ZAR1.8-billion (US$225-million) to achieve the target of removing roughly 250 000 bucket toilets (excluding a comparable number falling outside the definition) (DPLG, 2008). The revised target was not negotiable; addressing a Round Table Discussion on Accelerating Infrastructure Delivery in March 2007, the Minister of Provincial and Local Government told over five hundred mayors, government officials and senior political leaders that '[t]argets that have been set are not open for review and no Municipality will be exempted from meeting them' (DPLG, 2007). Municipalities' performance was monitored closely and immense pressure was applied to ensure they met the target.

The greatest number of bucket toilets was in the Free State province. Between February 2005 and July 2008 the province reduced the number of targetted bucket toilets by more than 90%, from 127 658 to 12 572 (DPLG, 2008). The vast majority were replaced with flush toilets, as residents rejected VIPs vehemently.

A range of challenges were highlighted in a 2006 DWAF planning report (DWAF 2006), in the early stages of the Free State bucket eradication programme:

- Overall water consumption and wastewater generation would rise sharply in most municipalities, not just because of water use for flushing, but because of improved service levels associated with new on-site or in-house taps in some settlements for the first time
- Most towns did not have local water resource development potential and would have to import water from distant water sources, requiring regional bulk water schemes
- 35% of water treatment works required upgrading to accommodate increased water demand associated with new flush toilet connections
- Few of the existing wastewater treatment works had adequate spare capacity to accommodate increased sewage inflows. 41% (33 out of 80) were operating over-capacity already, and there was significant non-compliance with wastewater effluent quality requirements. 45% were failing on bacteriological indicators, 45% were not complying wtih COD standards, and 55% did not comply with ammonia standards. The main reasons cited for non-compliance included operational inefficiency, equipment shortcomings, lack of skills, inadequate monitoring equipment, and lack of proper chemical dosing equipment.
- 55% of sewage treatment works needed to be upgraded to accommodate increased wastewater production
- Aging infrastructure, with some water treatment works over fifty years old
- Skills deficits to operate and maintain infrastructure

– Concerns about the additional financial burden on municipalities due to their increased service responsibilities, a limited economic base, high rates of poverty and unemployment poor cost recovery and aging infrastructure.

The DWAF report estimated that a budget of just under R1.5-billion would be needed to implement the programme, excluding water resource development requirements (DWAF, 2006). Funds allocated by government and from municipalities' own sources fell substantially short of that amount; and spending to date has been even less. Subsequent unit costs ranged from R5 905 (US$738) to R32 306 (US$4308), but it was investment in bulk infrastructure rehabilitation and upgrading that was the main casualty of the funding shortfall. Despite evidence of effluent overflowing from both oxidation ponds and conventional works in several towns (Mafereka, 2007), 110 000 buckets had been replaced with new flush toilet connections by July 2008 (DPLG, 2008). Water supply shortages were remedied in at least six municipalities by using drought relief funds from government to drill new boreholes (National Treasury, 2008a; De Kock, 2008).

Data presented at a Free State water quality management meeting convened by regional DWAF office in July 2008 suggests that wastewater treatment failure has risen sharply in the province since 2006. In February 2008, treated effluent failed to comply with the required standards in 52 out of 81 towns (64%), with just seven recording few or no failures (DWAF 2008d).

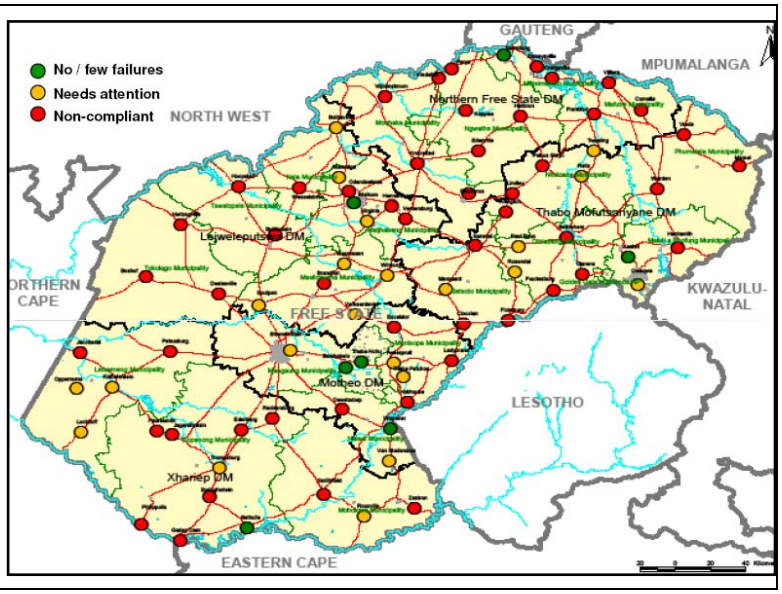


Figure 1. WEDC – Wastewater compliance in the Free State Province, February 2008

Source: DWAF, 2008d

To its credit, DWAF is working closely with Free State municipal councillors and officials to identify the causes of the problems and develop remedial strategies to fill posts, source funds for maintenance and repairs and improve local monitoring and responsiveness. The department is putting a big emphasis on raising awareness, particularly among municipal councillors, about why good effluent management matters, and has developed a simple 'dashboard indicator' to show compliance performance and promote greater accountability (De Kock, 2008).

But there are two major challenges facing the Free State, and South Africa as a whole, which stack the odds against successful remediation of the growing wastewater management crisis in South Africa for as long as we continue down the current path: money and skills.

Funding and affordability

In aggregate terms, South Africa is classified as a middle income country, with a GDP per capita (PPP) of US$11 100 in 2005 (UNDP 2007/08). This average masks extremes of wealth and poverty, worsening income inequality and one of the highest Gini co-efficients in the world. Nonetheless, one consequence of

South Africa's wealth and advanced economic development in many sectors is that the country has the resources to fund bold development programmes to remedy distorted access to water and sanitation, through high and rising public expenditure. Significant amounts of funding are being transferred to municipalities to address infrastructure backlogs and fund service provision to poor households.

Figure

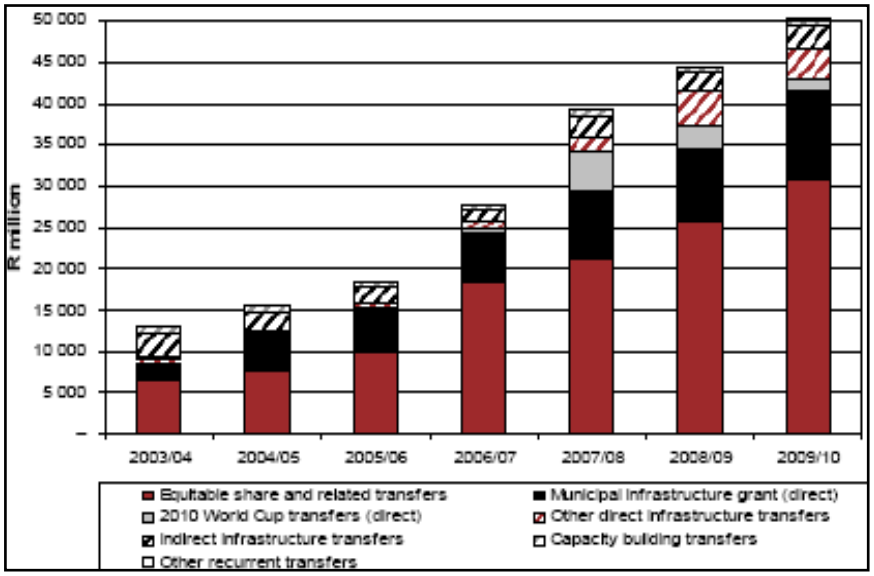


Figure 2: Funding transfers to municipalities, by type, 2003/04 – 2009/10

Source: National Treasury, 2008b

Beyond municipalities' own funding sources, the two most significant grants are the Equitable Share, which is intended to cover the costs of providing basic services to poor households; and the Municipal Infrastructure Grant, or MIG, which is intended to cover the capital costs of providing infrastructure for basic services for poor households. MIG funds enable the rapid development of infrastructure; but they also incentivise swift measurable spending, rather than enduring outcomes. When money is free, considerations of cost-effectiveness and life-cycle costing and sustainability requirements are not necessarily given the primacy they warrant. Even more worrying is growing evidence that the MIG programme is funding the construction of service infrastructure in many areas which requires greater subsidies than are currently available, and operating and managerial skills that are in short supply. The more the poorer municipalities extend infrastructure coverage to service poor people, the more their revenue needs rise; their financial viability is likely to deteriorate unless there is a decisive shift to more pragmatic service levels, or unless government steps in to fill the breach by raising subsidies for recurrent costs further. But in the absence of stronger municipal planning, technical and financial management systems and greater public accountability, there is little assurance that additional funding would necessarily remedy the deficit (Eales, 2008). Moreover, it would require extremely skilled political leadership and a very different style of public engagement to persuade people to accept lower service levels than those in adjacent settlements.

The stark reality is that over 40% of South Africans live in poverty, and the level of unemployment is exceptionally high. At present only about 43 percent of the working age population is working; in countries in Latin America, Eastern Europe and East Asia at similar levels of development, the proportion is about 50 percent higher (Hausman, 2008). Far-ranging economic restructuring has seen huge job losses in the three sectors – agriculture, mining and manufacturing – which traditionally employed unskilled workers, and the high growth sectors are mostly skills-intensive. The consequence is widespread joblessness. Welfare support through social grants has blunted some of the most acute forms of poverty over the past five years, but the reality is that a significant and growing proportion of South Africans cannot afford to pay for the services they receive.

Municipal revenue is rising less rapidly than the growing cost of providing services as coverage is extended (Savage, Eales and Smith, 2008). One consequence is growing municipal dependence on grant funding for their operating expenditure. Dependence on grants for municipal revenue requirements has risen from 16.1% in 2003/04 to 25% in 2007/08, and is projected to reach 31.9% by 2009/2010; this is most marked in the six big metros, where dependence has risen from 4.6% of total revenue to 16.9% in 2007/08, and is projected to reach 20.3% by 2009/10 (National Treasury, 2008b).

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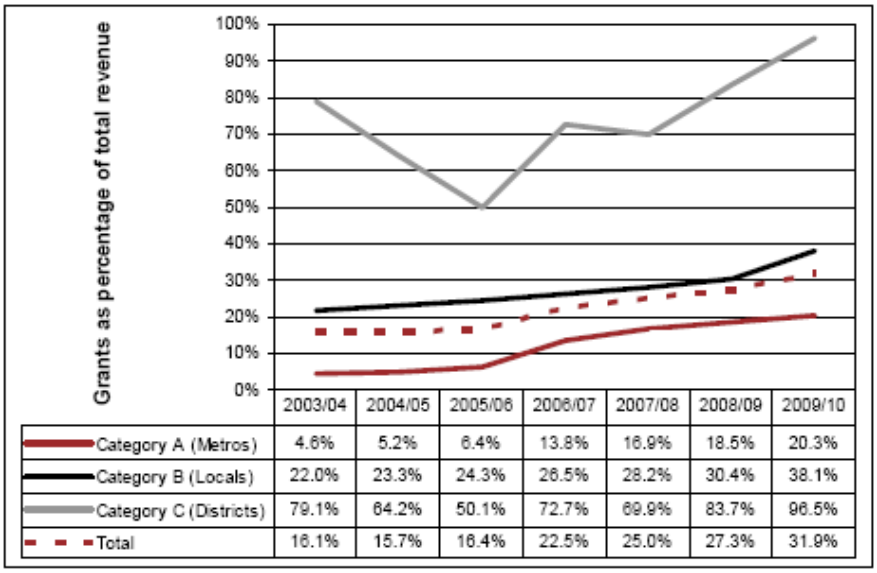

	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Category A (Metros)	4.6%	5.2%	6.4%	13.8%	16.9%	18.5%	20.3%
Category B (Locals)	22.0%	23.3%	24.3%	26.5%	28.2%	30.4%	38.1%
Category C (Districts)	79.1%	64.2%	50.1%	72.7%	69.9%	83.7%	96.5%
Total	16.1%	15.7%	16.4%	22.5%	25.0%	27.3%	31.9%

Figure 3: Average level of grant dependence for revenue, by category of municipality, 2003/04 – 2009/10

Source: National Treasury, 2008b

Further development of high level infrastructure and growing reliance on grants presupposes that South Africa will at least maintain its current economic performance and will be able to afford ongoing transfers on a large scale for the foreseeable future. This may well be achievable, but it is not without its risks.

An important consequence of this grant dependence is that it shifts the emphasis of municipal accountability away from its primary constituency, local residents and enterprises, to its relationship with national government (Savage, Eales and Smith, 2008). Local accountability is weakened. And what national government currently holds municipalities accountable for is their performance in spending funds and delivering quantifiable outputs - number of buckets removed, number of toilets delivered, and so on - rather than infrastructure quality and service performance; cost-efficiency is not a primary concern for municipalities when the emphasis is on absorbing large tranches of funding to avoid being reprimanded for underspending or penalised with reduced allocations next year.

Growing municipal debt is a further consequence of providing under-funded services to poor people. By December 2007, consumber debt to municipalities stood at R44.1-billion (US$55.1-bn) (National Treasury, 2008b). Financial administration is weak in the majority of municipalities, and there are enormous political sensitivities around taking action against poor debtors. In many areas, it is evident that the gap between expenditure and income is being funded through under-spending on maintenance and inadequate provision for rehabilitation and renewal, leading to infrastructure decay. Dry taps, pump failures, pipe bursts, spills, leaks and declining water and effluent quality all signal the need for urgent interventions, rehabilitation and renewal; increasingly, municipal maintenance is reactive (Lawless, 2007). This problem is particularly acute in the still predominantly black townships, because of their history of neglect and under-development, but leaks, bursts and sewer spills are becoming more frequent in all areas.

But municipal neglect of spending on maintenance, renewals and upgrades is not only a consequence of a funding squeeze; if it were, it could be remedied to some extent through further grant funding, at least in the short term. The far larger challenge is the skills gap in many municipalities.

Staffing and skills for municipal service provision

There has been a significant loss of institutional memory and technical expertise in most municipalities since 1994 which has undermined the development, operation and maintenance of water and sanitation services. Between 1994 and 2003, municipalities nationally went through a process of almost continuous restructuring and transformation – first to amalgamate and integrate previously race-based administration; then to bring all areas, including the former homelands, under newly demarcated municipal administrations; and then to assign powers and functions across metropolitan, district and local municipalities and build the capacity to execute them. All of this was accompanied by far-reaching staff changes, as personnel were 'rationalised', transferred, recruited, promoted or demoted. Pressure to meet employment equity targets added a further dimension, as municipalities sought to make appointments that reflected better the demography of the country. But the pool of available technical and managerial staff available in South Africa to power service delivery does not yet align with employment equity targets, and many municipalities have not filled key positions (Eales, 2008).

The enormous expansion in networked services over the past decade has not been matched by similar expansions in staffing and expertise. Since 1989, the number of municipal engineers per 100 000 people has fallen from 21 to below 3, while coverage with networked services has nearly doubled (Lawless, 2007). Municipalities – including the big metros – now employ far fewer engineering professionals than they did fifteen years ago, and there is an absolute shortage of at least fifteen hundred municipal engineering professionals (SAICE, 2007; Lawless, 2006). These shortages impact across the water services delivery chain and into water resource management; they also place immense strain on existing municipal technical staff. High turnover in professional staff erodes the institutional memory needed for durable service delivery. Staffing shortages impact particularly heavily on planning, design and project management; and reforms in artisanal training have led to a severe shortage of key skills needed for a range of operational and maintenance functions.

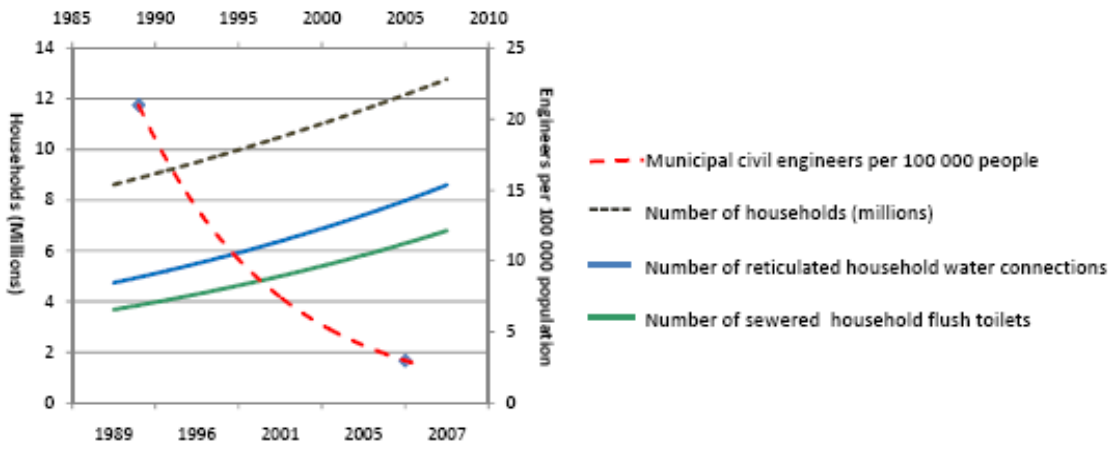

Figure 4: Key trends in networked water and sanitation, 1989 – 2008

Source: Derived from Lawless, 2007; StatsSA, 2001, 2007; DWAF 2008

Figure 5 below illustrates the findings of a national survey of technical capacity across all services in municipalities in 2005. The darker the shading, the more severe the skills gap, with red-shaded municipalities having no civil engineering professionals at all. The 2005 survey found that 83 municipalities had no civil engineering staff at all. The situation has deteriorated since this survey was done (Lawless, 2007, 2008).

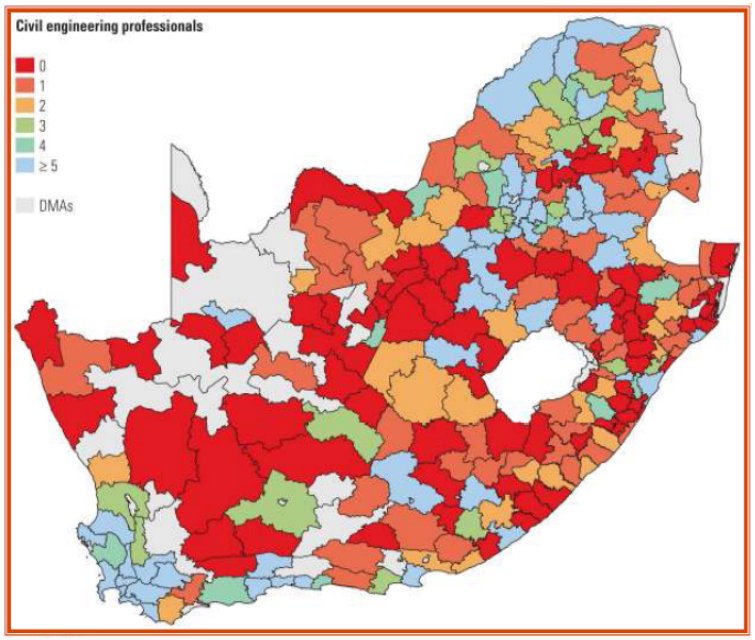

Figure 5: Civil engineering professionals in municipalities, 2005.
Source: Lawless, 2007

Engineers are now being seconded into local government through the Siyenza Manje programme, a joint initiative of government and the Development Bank of South Africa, and an innovative mentoring programme called ENERGYS (Engineers Now Ensuring Rollout by Growing Young Skills) is assigning experienced engineers to work in municipalities alongside recent engineering graduates to help build their skills base through structured experiential learning programmes (Lawless, 2007). There is growing recognition that the sector must grow its own pool of expertise to meet the sectors' demand for skilled professionals, artisans and practitioners. But it will be many years before new graduates acquire the experience needed to lead effective municipal service delivery.

The evidence suggests that South Africa is investing in new infrastructure which requires operating and maintenance skills that do not align with the skills pool available nationally. Perhaps the most significant constraint on sustainability is the managerial and technical expertise available within municpalities to plan and manage vastly expanded service provision.

Municipal delivery approaches

Municipalities interprete their responsibility for service delivery very literally, and very few seek to explore possible service partnerships with community-based organisations, let alone the private sector. There is significant opposition to anything resembling an abdication of responsibility by the public sector, and strong rejection of any form of privatisation in the water sector, in part because of a desire to retain and maximise public sector employment opportunities in a context of chronic unemployment. The sale of assets involved in the delivery of basic services is specifically prohibited by law.

One consequence of the target-driven approach to service improvements is that public involvement in planning and achieving service improvements has declined significantly. Equipping local residents to participate meaningfully in development planning, decision-making, implementation and oversight takes time, and with large budgets to spend and daunting targets to meet in tight timeframes, few municipalities have the resources to accommodate meaningful public engagement. The result is that rapid supply-side contractor-driven delivery becomes an end in itself, even if the quality and performance of the new infrastructure and services falls short of expectations.

Because government has set itself up as the sole driver of service improvements, and provides immense funding and resources to municipalities to deliver fully-funded infrastructure, there are few incentives and little support for independent self-help initiatives by citizens living in areas that are not yet on a municipal

project schedule. Inevitably, there is rising impatience and frustration with inadequate services. Political leaders generally respond by calling for patience, co-operation and understanding until improvements can be made (see for example Mokeyane, 2008), with a number of unfortunate consequences.

On the one hand, it entrenches a culture of passivity and dependence on government for service improvements, and growing resentment and frustration. There have been periodic explosions of protest and public violence – including the horrifying attacks on foreign nationals living in informal settlements in May 2008, which were stoked at least in part by the stress of sharing inadequate services; where there are already a fifty (or far more) people sharing a single toilet, each new resident adds significant stress, and outsiders are scapegoated.

On the other hand, it adds to the pressure to accelerate the pace of delivery, which in turn accentuates supply-driven, top-down infrastructure planning and delivery in ways that marginalise the intended beneficiaries and raise the risks of service failures.

Towards a new approach

Some drivers for a new approach

South Africa's population has doubled since the mid-1970s, and has grown by over 20% since 1996. Moreover, average household size has fallen, which means that the number of households who need services has grown from approximately 9-million in 1996 to 12.5-million; this translates to a 39% increase, on top of existing service shortfalls and backlogs. In Gauteng province, home to Johannesburg and two other metropoles, the number of households has grown by 56% (Office of the Presidency, 2008). This is putting immense strain on existing infrastructure, and enormous pressure on municipalities struggling to eradicate housing and service backlogs in a context of rapid household increase.

There has been a significant increase in informal settlement since the mid-1980s, when urban influx controls were lifted. Informal settlement includes both backyard shacks, where tenants share the services provided to the main house, and free-standing informal settlements on the edges of even the smallest towns, where service inadequacies are most acute. Government aims to eradicate all informal settlements by 2014 and, wherever possible, relocate residents to new houses with full services in formal settlements. But with an urban housing backlog of at least 2.2-million units, it is unlikely that this target will be met, unless the eradication of many informal settlements is achieved through cadastral adjustments to land registration and procedural formalisation, or through demolition. In-situ upgrading makes the most sense, but this is not feasible in areas where people have settled in floodplains or on severely dolomitic land. Resettling people elsewhere calls for alternative land parcels, but available public land close to the urban core has mostly been sold off to developers, which means new settlements are generally located far out of town. This perpetuates spatial apartheid and urban sprawl, and raises the cost of living for poor households. There is evidence that a growing number of re-housed people are renting or selling their new houses and moving back to informal settlements; some say they cannot afford the high costs of servicing, while others point to high transport costs (Hetherington, 2008; FinMark Trust, 2006).

Services in many informal settlements are severely inadequate. Some municipalities provide communal toilets, but maintenance problems, vandalism and the personal safety of users are endemic challenges. Some provide serviced chemical toilets, but their operating costs are relatively high, and the service intervals and number of facilities provided generally falls far short of what is needed. Some municipalities continue to issue buckets and provide a bucket service. VIP toilets are being built in some settlements where there is no imminent prospect of in-situ upgrading or relocation, but the density of many settlements means that these are often built around the periphery of the settlement and offer only a partial solution, particularly to women and children needing a toilet after dark in a context of high crime; and residents often reject VIP toilets, partly because they would prefer flush toilets, and partly because provision of VIP toilets is taken as proof that they will not be rehoused any time soon. Consequently many people in informal settlements rely on bad pit toilets, plastic bags or open defecation.

Improving sanitation and environmental health in informal settlements is an urgent priority for a range of reasons, but perhaps the most pressing is that the prevalence of HIV and AIDS is highest in informal settlements. National HIV prevalence among adult South Africas is now estimated at 19%; one recent study noted that while the prevalence of HIV nationally among women aged 25 to 29 is now one in three, this figure is even higher in informal settlements (CADRE, 2008). HIV, moreover, is now widely associated with TB, and South Africa now has the highest incidence of TB in the world, by far, at 998 per 100 000 people (WHO 2008).

HIV, AIDS and TB have profound implications for water and sanitation services. Unhealthy living environments heighten the risk of illness, and HIV positive people are particularly prone to diarrhoea, and need close access to sanitation facilities and safe water. Care-givers need additional water to cope with increased laundry and to support good hygiene and care. And households affected by AIDS often have reduced incomes and additional expenses, which has profound implications for their ability to pay for services.

There can be little question that South Africa urgently needs to find low cost, low skills ways of providing 'decent sanitation' through approaches which have a reduced risk of failure. Moreover, adaptation to climate change will require low energy technologies, and, increasingly, approaches which minimise the risk of water contamination.

Two promising wastewater treatment technologies

South Africans are unlikely to deviate from their insistence on flush toilets in the foreseeable future, and it is likely that any change in government's current target-driven top-down approach to service delivery and sanitation improvement will require several years of lobbying and debate. In the interim, two wastewater treatment systems offer immense promise as a response to some of the current challenges, Both are low cost, have low skills and energy requirements, are robust and have a low risk of failure.

DEWATS

DEWATS, or Decentralised Wastewater Treatment Systems, provide a modular technology for treating up to one megalitre of organic wastewater flows daily; the core of the system is an anaerobic baffled reactor. Over 500 DEWATS units have been installed in Asia over the past decade, primarily in India and Indonesia, and are used to serve dense urban settlements, hospitals and agricultural industries. For neighbourhood-level sanitation systems, DEWATS can be used as a shared facility – like a large septic tank - linking anything between ten and sixty households in poor and middle-income areas, often in combination with simplified sewers; or as the wastewater treatment facility for a community sanitation centre offering toilets and washing facilities (BORDA, 2005, 2008; Iswamati, 2007)

DEWATS proponents are emphatic that DEWATS is a technical approach, rather than a technology package (Ulrich, 2008). It is implemented through a partnership between local residents, the municipality, and an NGO implementing agency, and firm emphasis is placed on careful preparatory work to inform planning and decision-making by local residents. Local residents are required to contribute 2 - 4% of the capital cost, with the balance provided by the municipality and other funders. Each sanitation installation is customised to meet local needs and preferences. Construction of the facility is comparatively inexpensive, and responsibility for operation and maintenance is assigned to a local resident who receives training and is employed by a committee representing users. Users pay a small monthly fee for use and to cover maintenance costs, and the system is then financially self-sufficient (Ulrich, 2008; Iswamati, 2007). A significant benefit of this approach is that local users hold each other accountable for payments, responsible use and good maintenance, and are not dependent on a remote agency managing a costly, complex technology with onerous maintenance needs, over which they have no control.

Overview of the DEWATS technology

DEWATS relies solely on micro-organisms and biological processes to treat wastewater, and requires no external energy or chemical inputs; most installations capture the biogas generated during anaerobic digestion for use in cooking or heating. DEWATS is robust, low cost and low-maintenance.

The system is based on four basic technical treatment modules:

- Primary treatment: sedimentation and floatation
- Secondary anaerobic treatment in fixed-bed reactors: baffled upstream reactors or anaerobic filters
- Tertiary aerobic treatment in sub-surface flow filters
- Tertiary aerobic treatment in polishing ponds.

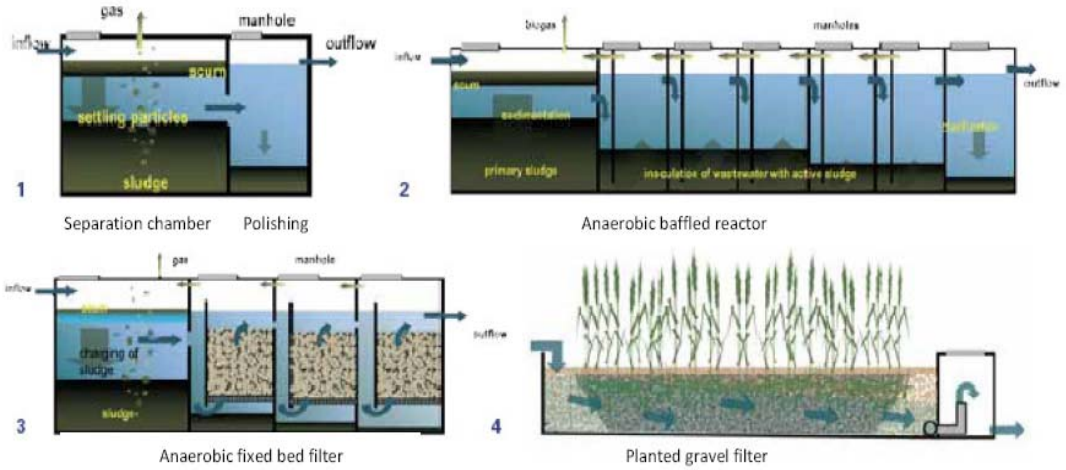

Figure 6. Diagram of DEWATS technology

Source: BORDA 2005

DEWATS produces ammonia concentrations that are acceptable for agricultural irrigation, but not for discharge into open water bodies (Pillay, 2008). But if the residual nutrient load is recognised as a valuable resource for agriculture, then the final effluent can readily be used for productive purposes.

DEWATS holds enormous promise for South Africa, particularly in informal settlements where there is an urgent need for improved communal facilities – certainly until such time as the settlement is upgraded, or until residents are relocated to a new settlement. eThekwini Metro Municipality – serving greater Durban - is now investigating the use of the DEWATS technology to help address the enormous challenge of providing better services in over 150 informal settlements by 2014 (Pfaff, 2008). Ethekwini is a highly effective municipality with a solid track record in innovative problem solving around water services provision; if any South African municipality can adapt DEWATS successfully to the local context, it is eThekwini. The Metro plans to provide fully-funded communal facilities with flush toilets and washing facilities, with an operator paid by the municipality, and use DEWATS as the technology where there is no sewer outfall nearby. The intention is to use the treated effluent for irrigation locally, and eThekwini is exploring the use of membrane technologies to improve final effluent quality further (Pillay, 2008).

Several hundred communal ablution blocks must be installed as an interim option in eThekwini's informal settlements over the next six years to meet the 2014 service provision deadline. This means the application of DEWATS in South Africa will be somewhat different to the demand-responsive participatory approaches found in India and Indonesia. Motivating local residents to share responsibility for service provision and management is complicated in South Africa by the prevailing rights-based municipal-delivery approach; and the possibility of developing CBO-run communal facilities in informal settlements is greatly complicated by the policy of free basic services, because the pivotal accountability relationship between users and the facility operator/cleaner is likely to break down when the operator is paid by the municipality, not by users.

Any technology evolves in a particular social context, and there are big risks in implementing a given technology in a very different context, with different social dynamics and accountability relationships. Moreover, DEWATS was developed to serve 'washers' who use pour-flush toilets, and water for anal cleansing. One of the first challenges in adapting this system for use locally is that South Africans are 'wipers'. Those who can afford to, use toilet paper, but newspaper is used widely; this significantly raises the risk of blockages, particularly in communal toilets where accountability for responsible use is more diffuse. Pour-flush toilets would need to be replaced with cisterns and a flushing mechanism, which add further maintenance challenges; but these can be overcome.

A key benefit of DEWATS in South Africa is that it would make flush sanitation feasible far sooner in urban informal settlements that are far from existing sewer networks. For people living in poor conditions in informal settlements, within and beyond eThekwini, this is very good news.

Integrated Algal Ponding Systems

IAPS, or Integrated Algal Ponding Systems, are a significant advance on conventional pond systems, and utilise both aerobic and anaerobic processes; the daily treatment capacity of IAPS is limited primarily by the space requirements of the pond system, and two mega litres a day is generally the limit. An experimental IAPS plant has been run at scale in South Africa successfully for over ten years, and its wider application is now being investigated carefully, both as a stand-alone system and to provide supplementary disinfection and nutrient removal capacity to boost the performance of failing treatment works currently contaminating local rivers (EBRU, n.d.; Timm, 2008).

Overview of an Integrated Algal Ponding System

Integrated algal ponding systems use anaerobic and aerobic biological processes to close the cycle of waste to primary biomass by converting organic wastes into an algal biomass that is rich in protein, while stripping out nutrients. The unit process operations are similar to conventional treatment plants: primary sedimentation, flotation, fermentation, aeration, secondary sedimentation, nutrient removal, storage and final discharge. Raw screened waste is introduced into the bottom of a deep fermentation pit, where solids settle in an oxygen-free (anaerobic) environment. Carbon dioxide in the biogas becomes available to support algal growth in the upper aerobic layer; and generation of photosynthetic oxygen supports the aerobic function of this layer, and trap and oxidise odour causing compounds. The system thus uses solar energy for oxygenation. No waste sludge handling is needed because of retention and digestion of solids in the anaerobic pit.

Effluent from facultative pond then flows to a High Rate Algal Pond (HRAP), which is a raceway with a five day retention time, churned slowly by a paddle-wheel powered by a low wattage electrical motor. The algae form stable flocks which settle readily, and may be removed in the Algal Settling Pond (ASP).

The algae strip the nutrients from the water and incorporate them into an algal mass which can be harvested for nutrients and used as fertilizer or animal feed. Retention of the treated water for five to six days in the HRAP has been shown to produce <1 E.Colio CFU/100ml; alternatively, the water can be chlorinated or stored in a deep maturation pond for ten to twenty days. Parasites and heavy metals in the wastewater remain trapped in the fermentation pit, and the alkaline conditions created in the process destroy pathogens in the wastewater. The final effluent is clear and pathogen free (EBRU, n.d.; Munnik, 2008; Timm, 2008)

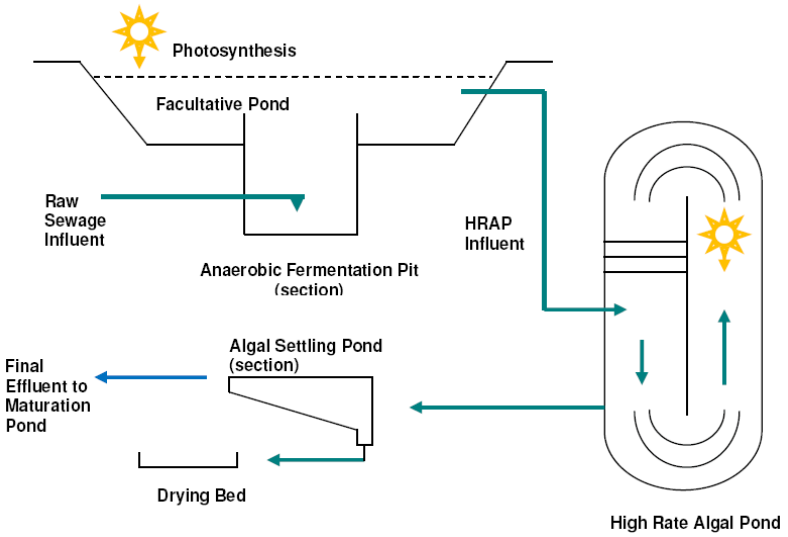

Figure 7: Schematic diagram of an IAPS plant

Source: EBRU, n.d.

Final effluent from the IAPS complies with all DWAF requirements for discharge to an open water course except for Chemical Oxygen Demand (COD), which is at around 100 mg/l; this is mainly due to the residual algal component that is not removed in the settling pond. This residual provides an oxygen-contributing rather than an oxygen-demanding component of the final stream, and arguably should be exempted for this reason; in an open stream, the algae would not consume oxygen, but would rather add to the supply of dissolved oxygen (Munnik, 2008).

Two Eastern Cape municipalities are now considering installing IAPS plants. The Amathole District Municipality is assessing whether IAPS plants could replace existing conventional treatment plants in several small towns which need extensive rehabilitation (Timm, 2008). And the Ndlambe Municipality

plans to incorporate a HRAP unit to boost the performance of its failing treatment works at Kenton, where pollution of the Bushmans River estuary by the current works is compromising the town's economic mainstay - tourism (Rose, 2007). Given the large number of small, understaffed, under-resourced treatment works around the country in urgent need of repair, upgrading or rehabilitation, wider use of IAPS plants or HRAP units offers a durable, low cost remedy to one dimension of the challenge of providing flush toilets as the default.

Limitations and opportunities

Key advantages of both the DEWATS and IAPS systems are that they can be operated by unskilled people, are extremely robust and have a low risk of failure. Capital and operating costs are significantly lower than conventional treatment works, there are few moving parts, no chemical additives are needed, and the electrical energy requirements are nominal (the HRAP uses a 25 kW electrical motor to turn the paddle wheel in the algal raceway). Neither system is vulnerable to power outages - unlike conventional systems, where power cuts can lead to severe process failures.

These systems are not cure-alls, and they are not a substitute for large-scale urban treatment works. Moreover, the quality of the final effluent does not comply fully with South African specifications for discharge to rivers, and is better suited to irrigation agriculture. But this should not be regarded as a problem, given growing demand for water for productive purposes, particularly when the alternatives are costly, complex, skills-intensive systems with a high risk of failure, and ongoing and worsening water contamination.

Conclusions

The sector slogan 'Sanitation is Dignity' has deep resonance in South Africa, given the country's history of statutory discrimination and grossly inequitable service provision. The importance of affirming people's right to dignity is not negotiable, but the emphasis on providing flush toilets as the default in urban areas is inhibiting more comprehensive sanitation improvements, and is leading to investment in infrastructure that has dubious sustainability. It is generally the poorest and most vulnerable who wait the longest for service improvements, and who are most risk when services fail. Extremely high HIV and TB prevalence rates, particularly in informal settlements, underline the urgency and importance of achieving sustained improvements in sanitation nationally.

The volume of wastewater discharged to South Africa's rivers nationally is rising rapidly, while its quality is deteriorating in many areas. The state of sewage treatment in many municipalities is indeed 'dire', as the Minister of Water Affairs has noted, because South Africa relies heavily on treatment technologies with high skills requirements, and because the costs and maintenance requirements of networked services have been underestimated. South Africa urgently needs to find low cost, low skills ways of providing 'decent sanitation' through approaches which have a reduced risk of failure. In the context of flush toilets, two immediate possibilities are decentralised wastewater treatment systems, and integrated algal ponding systems.

There is, however, a far larger and more important dimension to service improvements: the nature of the relationship between citizens and the government. Mathekga and Buccus argue that South Africa's new government erred in conceptualizing the primary role of municipalities as being the engines of service delivery, as this diminished the importance of actively engaging the citizenry in shaping and monitoring local development:

> 'The participation of citizens has been construed as a less important issue, and ultimately, secondary to service delivery' (Mathekga & Buccus, 2006).

To a large extent, citizens have been left on the sidelines of the local government system. Intent on delivering services, municipalities have forged ahead, with inadequate engagement with citizens in jointly determining needs, priorities and management approaches (Mathekga & Buccus, 2006; Nemeroff, 2006).

Manu citizens understandably have responded to government's commitments to deliver tangible improvements to their quality of life with high expectations and rising impatience; and this in turn is fuelling fast-tracked top-down delivery approaches and widespread service failures.

Residents have responded to poor servicing by blaming the new municipal structures and their councillors, and demanding that they perform better. Since 2004, the country has witnessed a significant number of service delivery protests, as marginalised citizens, frustrated with the quality of services they receive, have increasingly taken to the streets. There is no clearer signal that it is time that citizens reclaim their place at the center, shaping how services are delivered, and sharing responsibility for making them work.

Acknowledgements

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Notes

[i] In Adelaide and Bedford, two small towns in the Eastern Cape, and perhaps elsewhere, residents who received flush toilets as replacements for the bucket system have now reverted to using bucket toilets again, because the municipality cannot provide water for flushing and the sewage treatment works cannot cope with the increased volumes; residents complain that the revived bucket service is worse than it was before (Timm, 2008). Some Gauteng residents have insisted on keeping their buckets and bucket toilet structures, to serve their backyard tenants (Omigeer, 2007). Some residents use their old buckets to pour-flush their new flush toilets, because bad workmanship and cheap fittings means their plumbing leaks (Ndlovu, 2007).

And the Premier of the North West Province noted in her State of the Province speech in March 2008 that several municipalities which had succeeded in eradicating buckets were now re-issuing them to new residents:

> "In terms of the Presidential targets for bucket removal, the province has successfully eradicated all bucket toilets that were identified as 1994 backlogs. Sadly, we all know that a task of eradicating buckets, such as that of eliminating shacks, is an endlessly moving target. For every shack removed, another one or more mushroom elsewhere. For instance, by the end of November 2007, 16 500 buckets were eradicated across NMM, BDM, Maquassi Hills and Matlosana Municipalities. And yet another large number has mushroomed in the same municipalities. We have moved over many hurdles and battled the hard and unfriendly terrains of underdevelopment, in order to ensure that we serve our people to the best of our ability. Even this commitment is not sufficient" (Molewa, 2008).

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