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The WRC operates in terms of the Water Research Act (Act 34 of 1971) and its mandate is to support water research and development as well as the building of a sustainable water research capacity in South Africa.

TECHNICAL BRIEF

Sanitation

Tips for sewering informal settlements

A completed WRC project illustrates, through four case studies, a variety of socio-political and risk factors that cause sanitation facilities and projects to succeed or fail.

Background

In 2001 the Government introduced a Free Basic Services (FBS) policy which focused on infrastructure delivery to meet the basic infrastructure needs of the country's urban and rural poor. Municipalities consequently were mandated to provide limited amounts of clean water, electricity, sanitation, drainage and solid waste removal services for free to all South Africans.

Full flush toilets were deemed by Government to be the most appropriate sanitation technology for dense urban settlements, and generally preferred by users. Installing conventional (gravity) sewerage in informal settlements as part of the FBS policy, however, is not easy given various social and technological constraints.

Informal settlement residents often demand that local authorities upgrade services in the areas where they currently live because the settlements are close to existing formalised neighbourhoods, transport links etc., yet dwellings tend to be laid out in a manner that is not conducive for retrofitting drainage according to conventional engineering standards. Coupled with unfavourable ground conditions (ranging from settlements in flood-prone areas to discontinued landfills), retrofitting and/or installing conventional sewerage in such conditions is inherently problematic, particularly in situations where residents refuse to relocate (even temporarily) for fear of further marginalisation.

Alternative sanitation options

Alternative approaches to providing sewerage to informal settlements need to be investigated in order to determine whether there are other means of providing these areas with low-cost wastewater collection systems. Such alternative systems have been developed and applied worldwide, either through changing the design criteria and the implementation approach for conventional gravity sewerage (e.g. simplified and settled sewerage) or taking a somewhat different approach altogether (e.g. vacuum sewerage).

WRC research project objectives

This report builds on South African research into alternative sewerage systems by presenting the outcome of their utilisation and management in three Western Province applications: simplified sewers and vacuum sewers in two Cape Town informal settlements and settled sewers in the formal areas of Hermanus. The progress in planning a pilot settled sewer project for the Cape Town informal settlement of Barcelona is also presented.

The four case studies reported on endeavour to illustrate a variety of socio-political and risk factors that cause sanitation facilities and projects to succeed or fail, especially in informal settlements. A significant amount of 'best practice' literature and discourse were also reviewed on how best to develop alternative sewerage schemes and participatory approaches as a means to possibly improve urban sanitation conditions in South Africa's high-density informal settlements. What follows are the major technological, institutional, social and servicing lessons learnt from the research study on the implementation of alternative sewerage systems by South African municipalities.

Technology

The most common technical challenge with applying alternative sewerage technology in South Africa has been the lack of experience and familiarity of designing, constructing

or operating such infrastructure in densely settled informal areas. Skilled professionals are required to plan, construct and manage alternative sewerage systems for the purpose of minimising the risk of poor design, construction or operation and maintenance.

No matter what alternative system is installed, a teething period should be expected with unfamiliar systems where there will be initial design, construction and management problems. Problems, when encountered, should be immediately addressed and prevented as far as is possible by training responsible maintenance personnel. Furthermore, two potential issues that should be negotiated in advance are the prevention of unauthorised private connections to communal drainage services and building over shallowly-laid sewers as both of these risks can affect the integrity of the sewers.

National legislation and the National Building Regulations (NBR) often conflict with innovative methods for developing low-income areas. Furthermore, the NBR does not allow for non-licensed professionals to install or maintain drainage systems, thus defeating sweat equity principle in the condominial approach.

Lastly, involved parties should distinguish between technical problems caused by design or construction issues and systems malfunctioning due to poor management. Any sewerage technology – regardless of whether it is installed in a formal or informal area – will fail if no-one manages the components of the system and ensures that the technology is used according to design.

Institutions

South African municipal officials have reported the failure of shared sanitation facilities despite residential leaders' promises to manage them. Generally in practice, shared toilets are mismanaged because neither the local authorities nor users accept responsibility for them. From the users' perspectives 'community managed' toilets often fall into disrepair because the users do not want to take ownership of shared toilets.

Instead, residents generally expect that government-funded full-flush sanitation toilets should be accompanied with a government-funded janitorial and operation and maintenance service. This thus means that toilets in informal settlements functioned like toilets that are provided at publicly financed facilities, such as parks.

When modifying the policies that dictate practice, service providers should bear in mind that informal settlement residents expect to be provided with the same sanitation technology and service as neighbouring formal areas, thus sanitation service delivery should aim for this outcome. Service providers should thus not expect informal settlement residents to readily accept different levels of servicing based on their circumstances.

Given that the 'community managed' toilet management system is failing and informal settlement residents are reluctant to manage shared toilets, municipalities should provide public toilets with janitorial services in informal settlements as part of their FBS and water services authority obligations.

People

Many water services authorities (WSAs) are fragmented by severe decentralisation that has resulted in uncoordinated delivery of services from municipal departments, as well as the occasional ad-hoc duplication of roles and tasks. This subsequently makes it difficult for officials to establish clear lines of accountability in projects and coordinate services across rigid departmental management and budget silos.

Municipal sanitation delivery is further complicated by authorities' capacity and experience constraints, leading to significant project roles, such as engaging public participation, designing sewer systems and building toilets being outsourced informally to civil society organisations or contracted to private firms.

Municipal outsourcing of public engagement to civil society organisations – who are meant to represent the interests of municipal FBS services beneficiaries – has also been popular of late in South Africa due to the widely supported belief that all South Africans are collectively responsible for ensuring that those who lack access to basic services get them.

Participatory approaches have had merits in demonstrably building consensus between service providers, users and civil society organisation representatives, as well as obtaining users' input into and consent of technical designs. The popular theory that residents' sentiments of long-term ownership and responsibility will develop, however, is flawed in that such sentiments are not guaranteed as a result when managing municipality funded services, despite engaging beneficiaries in a participatory process. For example, the municipalities of eThekwini and City of Cape Town found they were held accountable for delivering services by residents, social movement advocates and university researchers regardless whether projects were planned in collaboration with users or not.

If organisations choose a 'partnership' approach as their main operating model then, as experience from the case studies

show, they should define each party's expectations and roles at the beginning of their projects. Moreover, each partner must be flexible because, as outlined in the report, partners need to constantly renegotiate and to redefine the terms of their partnership when partners' limitations and constraints turn out to pose significant obstacles. In instances where municipal services are provided as part of their FBS obligations, local authorities should be 'managing partners' in which they coordinate collaborations between stakeholders.

Services

A sanitation service is different from a sanitation facility in that a service requires those who have provided it to ensure that all waste that enters will be removed safely, whereas a facility simply ensures the possibility for that removal to occur.

It is important to recognise that municipal officials tend to provide shared sanitation facilities instead of services in that the officials expect that the users will manage the shared toilets collectively as a 'community'. Yet – just as the city or municipality has different departments and groups of professionals that have distinctive procedures and interests – an informal settlement comprises a diverse range of people who may not collectively organise as a coherent group.

The deteriorating state of community-managed shared toilets, for example, represents the consequences of imagining informal settlement residents as a community with shared purpose. Given the failure of commercial toilets in informal settlements, there is an undoubted need for WSAs to transition from providing shared facilities that are maintained collectively by users, to providing public toilets that are serviced by the municipality.

Many of the problems linked with sewerage can also be tied to the shortcomings of stormwater infrastructure and solid waste management. Even when formal stormwater drainage is provided, high volumes of litter often fall into catchpits and block drains. The location and design of solid waste skips and collection systems can also have an impact on the functionality of sewerage.

Conclusions

More cost-effective and flexible sewerage than conventional systems are needed to sewer South African informal settlements, and this need can potentially be met through alternative technologies, such as simplified, settled or vacuum sewerage. These technologies are technically proven to work elsewhere in the world, however, South African research to date has reached the conclusion that the ability of sewers to function as designed is closely related to how sanitation technologies are planned, managed and used. In other words, the social processes that underlie the planning provision and management of sewerage systems are just as significant as technology choice.

This report attempts to show that failure of communal toilet facilities in informal settlements is frequently linked to the users' expectation that sanitation services – rather than the toilets themselves – should be provided in the face of officials' explicit aims to provide only facilities that are managed by their users. This suggests that residents and users in South African informal settlements are driven by their expectation that toilets provided by the municipality should be fully subsidised and serviced by the municipality.

Given users' expectations and the difficulty of installing conventional sewerage in existing densely settled informal areas where urban planning conventions have not been followed, there is a need to consider alternative management arrangements and technologies. The WRC report's main goal is to demonstrate that the implementation of any kind of sanitation facility in an informal settlement requires that it be accompanied by a fully and carefully developed project management and operation and maintenance servicing plan that accounts in full for the social context in which the facility has been introduced.

In many instances, the local authority may have to introduce janitorial services as part of their FBS obligations. Such a sanitation strategy will ideally be accompanied with provision of solid waste, greywater and stormwater disposal services.

The authors aim to build upon this project in a follow-up study on the social and institutional constraints to providing and managing janitorial services that were encountered in this research. The ultimate intention of these studies are to create simple tools that officials can use to guide the management of effective sanitation services in South African informal settlements.

Further reading:
To order the report, *Tips for sewering informal settlements* (**Report No. TT 557/13)** contact Publications at Tel: (012) 330-0340, Email: orders@wrc.org.za, or Visit: www.wrc.org.za to download a free copy.