

City wide inclusive sanitation: the Durban experience

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Figure 1 – Source: eThekwini Water and Sanitation.

Summary

eThekwini Water and Sanitation (EWS) is a municipal department providing water and sanitation services to the 3.7 million citizens of eThekwini Municipality in South Africa. EWS's vision is to ensure integrated use of resources through sustainable water and sanitation management, and by provision of services in a manner that is equitable; environmentally, socially and financially sustainable; and technically excellent. As a consequence of its committed work, EWS was awarded the 2014 Stockholm World Water Week Industry Water Award for its transformative and inclusive approach to providing water and sanitation services and being at the forefront of exploring both technical and social solutions. EWS was also the first water and sanitation

provider in South Africa to implement the national policy on free basic services in water and sanitation.

The eThekweni Municipal Area (EMA) is located on the eastern seaboard of South Africa within the Province of KwaZulu-Natal and covers an area of 2297 square kilometres. While the total area of the EMA is only 1.4% of the total area of the province, it contains just over a third of the population of KwaZulu-Natal and 60% of its economic activity.

The EMA was formed in December 2001. The boundary of the EMA increased the area of coverage of the previous Durban Metropolitan Area by 68% whilst increasing the population by only 9%; however, these stats have changed quite significantly due to migration. Some 35% of the EMA is predominantly urban in character, with over 80% of the population living in these areas. The remainder is rural in nature.

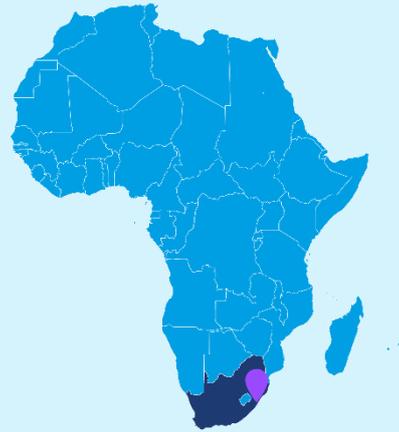
Overview

Geographical information

Country: South Africa

City: eThekweni Municipality (Durban)

City population: 3,700,000



Problem

- Large formal townships serviced by waterborne sewers with little to no maintenance, resulting in blockages and sewer overflows.
- Large sparsely populated rural areas and growing densely populated informal settlements with no formal services and exacerbated by high unemployment.

Solution

- Establishing a funding mechanism to address the entire value chain including reuse where possible.
- Application of different technological solutions to different areas based on cost, density and the degree of formality within the development.
- Provision of safe management along the whole sanitation value chain (containment, emptying, transfer and disposal or reuse/recycling) with a change in focus from rollout of containment infrastructure to service provision (operation and maintenance).
- Comprehensive community engagement, education and putting communities at the forefront of identifying solutions and driving change.
- Policy to ensure that 50% of the employees on projects are females in line with the city's gender mainstreaming guidelines.
- Application of a 'learn by doing' approach, followed by redesign based on research and user and stakeholder feedback.
- Creation of key partnerships with the private sector, target communities, local small businesses, research and developmental organizations (including academia) and funders.

Problem

Prior to the first democratic election in 1994, the then City of Durban was comprised of racially segregated areas with waterborne sewer systems throughout. In 2001, the boundaries of the municipal area were expanded to first include the township areas with waterborne sewers in most areas, and then the large sparsely populated rural and peri-urban areas where there were no formal services. The rapid urban migration in the late 1990s provided another challenge in the form of dense informal settlements which developed on open land close to work opportunities. These new informal settlements, which continue to expand and multiply, had no formal sanitation services.

Expanding the waterborne system to un-serviced areas provided a number of challenges including:

- Unaffordable cost requirements in rural/peri-urban areas, due in part to the unplanned nature of settlements and the low densities.
- No planned roads or services in informal settlements with high densities for installation of sewer lines, manholes, pump stations and other service requirements.
- Limited spare capacity of existing wastewater treatment works to treat additional sewage.
- The formation of informal settlements on land where connecting to the existing waterborne network is impractical or unaffordable.

Additionally, the incorporation of the townships into the EMA required EWS to address the challenge of 35 000 ventilated improved pit latrines (VIPs) many of which were full and overflowing. A sustainable solution to address this health hazard due to a lack of servicing was required.

A further challenge faced by the Municipality was balancing the income derived from water and sanitation tariffs and central government subsidies with the low affordability levels among citizens in areas needing sanitation services, particularly in rural areas and dense informal settlements. This challenge was exacerbated by an increase in community and political expectations with respect to reducing inequalities and providing the same level of services as that provided to middle- and high-income areas.

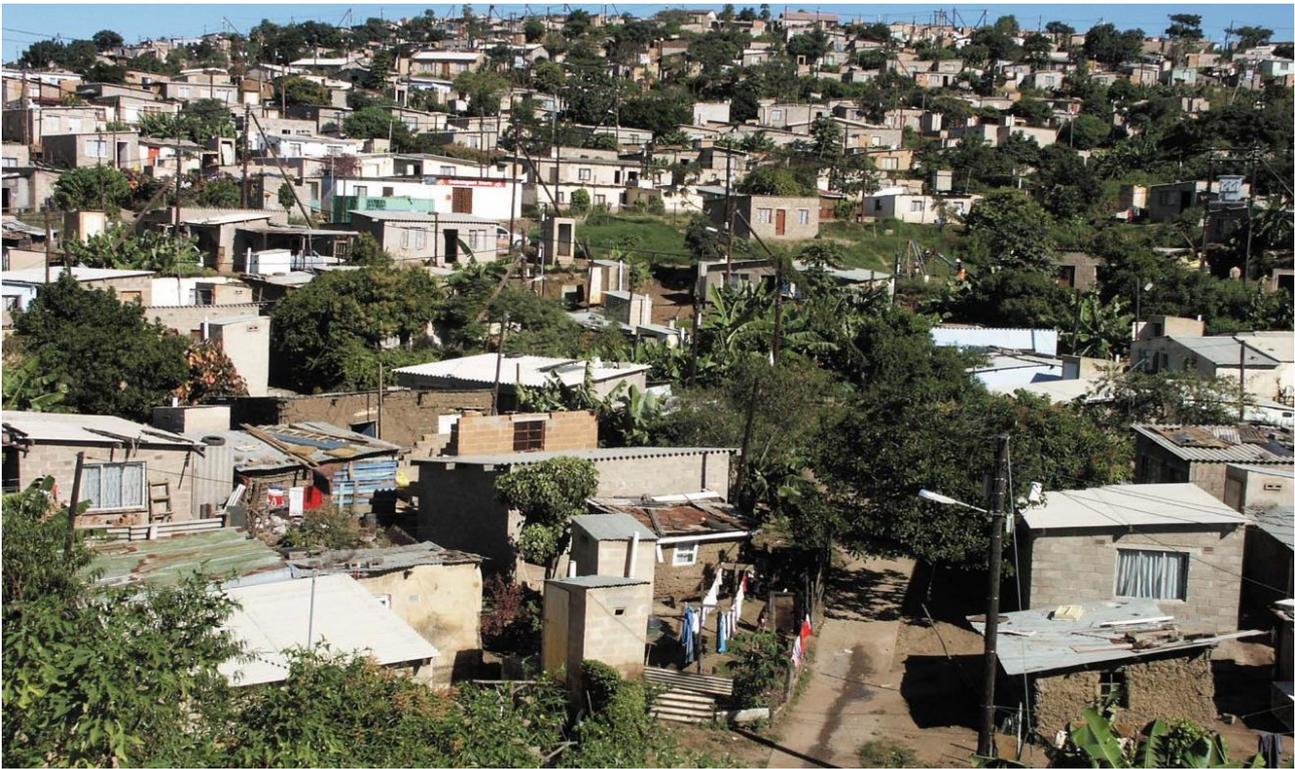


Figure 2 – Informal settlement in eThekweni Municipality. Source: eThekweni Water and Sanitation.

Solution

Due to these challenges, the municipality was forced to address a number of sanitation challenges in a relatively short period of time, and change from an infrastructure to a service delivery approach. This involved moving from ‘first world’ challenges of operating wastewater treatment works and sewer networks, to developing and applying a broader mix of technologies across the sanitation services chain.

- **One size does not fit all:** A key strategic approach was to implement varying solutions depending on the characteristics of the different areas such as density, degree of informality and cost. Where feasible, waterborne sanitation was provided. In areas of low density with limited water supply, dry on-site sanitation was supplied in the form of urine diversion dehydrating toilets (UDDT). Densely populated informal settlements were serviced by communal ablution blocks (CABs) in a prefabricated form or as refurbished containers with male and female blocks, toilets, urinals, showers, a washing area and a janitor.



Figure 3 – Urine diversion dehydrating toilets (UDDT). Source: eThekweni Water and Sanitation.



Figure 4 – Communal ablution blocks (CABs). Source: eThekweni Water and Sanitation.

- **Safe management along the whole sanitation value chain:** On-site sanitation systems require a regular emptying and disposal strategy. For the 35 000 VIP latrines this required the roll out of an emptying service every five years. Sludge is removed by

a managing contractor and trained local contractors, and disposed of either through on-site burial or by processing into pellets by means of the LaDePa (a machine that uses heat and medium wave infrared technology to remove pathogens). For UDDTs, an emptying service is provided every two years, through the appointment of a managing contractor with local contractors to remove and bury waste on site or transport to a centralized treatment plant. The use of a black soldier fly larvae processing plant (BSFL) was tested for three years but was not found to be sustainable for a private business to operate. Where burial on site is not an option, the sludge will be processed by the LaDePa.



Figure 5 – LaDePa. Source: eThekweni Water and Sanitation.



Figure 6 – Black soldier fly larvae processing plant (BFSL). Source: eThekweni Water and Sanitation.

- **Holistic development cycle:** The approach to development and deployment of new technologies and services has followed the development cycle (Figure 6). The development of a platform to field test prototype next-generation non-sewered sanitation (NSS) systems demonstrates this approach. Engineers, scientists and community members were able to give rapid feedback to technology developers to allow for redesign and reimagining of the technologies and services. Some of these technologies have now been commercialized by South African companies and are being rolled out as solutions to sewage and greywater processing where no waterborne system is available.

These innovative NSS solutions are being used to address free basic sanitation at CABs in dense informal settlements where there is resistance to non-flush solutions. Initial assessments show that these NSS solutions provide significant cost savings when compared to using the approach of connecting these flush systems to the bulk sewer network. Actual cost savings depend on the topography of each site and the distance to the bulk sewer network as this will affect the length of pipeline required and the need for pump stations.

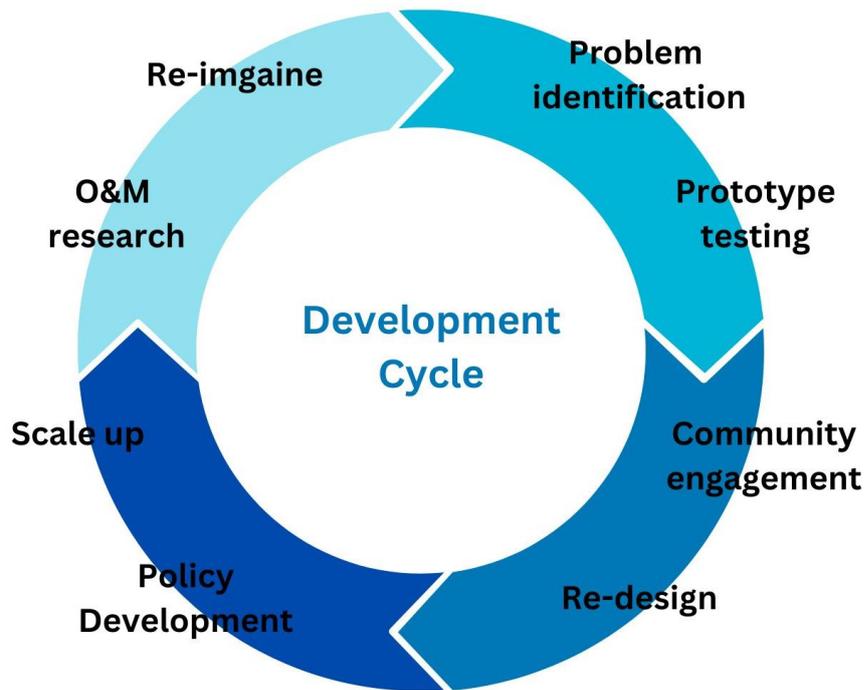


Figure 7 – Development cycle.



Figure 3 – Reinvent the toilet. Source: eThekweni Water and Sanitation.

- **Partnerships:** The eThekweni Municipality would not have been able to make progress on this front without partnerships. Key partners have included developmental

organizations and funders, private sector organizations, academic institutions, community leaders and community members, managing contractors and small businesses.

Lessons learned

During the sanitation development and scaling up process, EWS has tested several innovative technologies and learned important lessons, including that ‘one size does not fit all’ for community sanitation. Sustained community engagement and education are critical for success and acceptance, and continued academic research and assessment, will guide the implementation process and allow for reimagining and redevelopment of the solutions.

The municipality places a high priority on gender equity including gender awareness within its own organization and in implementing sanitation programmes. Promoting gender equality is important for advancing the fundamental development goals of human rights and social justice, poverty reduction, economic development and overall human development.

Other key lessons learned include:

- The need to shift from an infrastructure to a service delivery approach which is inclusive, i.e. sewerred and non-sewerred.
- The need for safe management of excreta throughout the sanitation chain.
- Set requirements for women’s participation in capacity development activities and training.
- Considering operation and maintenance budgets and not focus purely on building toilets.
- Recognizing the role that the private sector plays in bringing in innovation.
- Ensuring strong accountability at local level governed by regulatory authority at national level.

The need for policy makers and sector leaders to encourage calculated risk in order to continually improve service delivery.

Useful links

IHE Case Study Video 1 (2018) - Good Science makes Good Policy:

<https://www.youtube.com/watch?v=ioZf8TFdARY>

IHE Case Study Video 2 (2018) - Waste to Riches:

<https://www.youtube.com/watch?v=OIQfNF9mR6Q>

IHE Case Study Video 3 (2018) - Sanitation for the Future:

<https://www.youtube.com/watch?v=kkdQ7hr90q8>

IHE Case Study Video 4 (2018) - Raising People's Voices:

<https://www.youtube.com/watch?v=BfHrMsmRcjc>

IHE Case Study Video 5 (2018) - Safer Sanitation for all:

<https://www.youtube.com/watch?v=XwCD4TUsacU>

PRG Case Study (2015) - Full-scale LaDePa Process:

<https://www.youtube.com/watch?v=EodOwE0BESI>

Further reading and references

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- Sindall RC, Mercer, SJ, Sutherland, C, Buckley, CA, Gounden, G, Pillay, C, and Macleod, N, (2018) Municipal-academic partnerships for innovation in sanitation delivery: a case study in Durban, South Africa. Paper 2927, 41st WEDC International Conference, Egerton University, Nakuru, Kenya, 2018.

About the author

Teddy Gounden is an ex EWS employee and was employed as a Strategic Executive responsible for Research, Innovation and Knowledge Management at eThekweni Water and Sanitation in Durban. He is now a consultant to WASH R&D Centre at UKZN supporting the WRC SASTEP programme. He has approximately 36-years' experience in the water and sanitation sector and has been an integral part of EWS efforts to introduce and scale up innovation within its boundaries.

Nick Alcock is the managing member at Khanyisa Projects in Durban and is a professional civil engineer with a masters in urban infrastructure design and management who has been working in the water and sanitation sector for the past 20 years. He is currently a managing member of Khanyisa Projects, a developmental organization based in the eThekweni municipality (Durban), South Africa focusing on water, sanitation, biogas and other sustainable solutions.

About the institution / organisation

eThekweni Municipality (Water and Sanitation Services) is responsible for the provision of water and sanitation services to the citizens of the municipality. <https://www.durban.gov.za/pages/residents/water-and-sanitation-services>



Khanyisa Projects designs and implements water and sanitation solutions for municipalities and other government institutions. <https://khanyisapr.co.za/>



Water, Sanitation & Hygiene Research & Development (WASH R&D) Centre at the University of KwaZulu-Natal is a transdisciplinary research and development hub. <https://washcentre.ukzn.ac.za/>



About the IWA Inclusive Urban Sanitation Initiative

IWA's Inclusive Urban Sanitation initiative responds to a huge and growing public need - safe sanitation in combination with access to safe drinking water and hygiene underpins good health. The aim of this initiative is reshaping the global urban sanitation agenda by focusing on inclusive sanitation service goals--and the service systems required to achieve them - rather than the traditional singular focus on expanding sewer networks and treatment works. This forms part of IWA's larger agenda to promote inclusive, resilient, water-wise, and sanitation-secure cities.

About the Inclusive Urban Sanitation Stories

The Inclusive Urban Sanitation stories are documenting some of the policies, practices, and approaches that demonstrate how stakeholders especially those in urban areas (e.g., public sector, operators, academics, regulators, and other key actors) are taking part or contributing to Sustainable Development Goal 6 which require water and sanitation concepts and norms to look beyond technology and the usual focus on building infrastructure. Increased focus is on safety, inclusion, environment, public health, and multiple technology solutions tailored to different geographies and socio-economic contexts for building climate-resilient cities. The stories aim to inspire urban stakeholders to discuss ways for advancing inclusive urban sanitation, especially in low- and middle-income countries.