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TRANSFORMATION TOWARDS SUSTAINABLE  
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**Municipal-academic partnerships for innovation in  
sanitation delivery: a case study in Durban, South Africa**

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*Service delivery for the diverse communities of eThekweni Municipality requires innovative solutions. The partnership between the Pollution Research Group (PRG) at the University of KwaZulu-Natal (UKZN) and eThekweni Water and Sanitation (EWS) began informally in the 1960s and was first formalised in 2006. The Memorandum of Agreement (MoA) between the two organisations included a retainer that allowed greatly flexibility than would have been possible with project-to-project funding. This allows the PRG to act as an in-house research and development team for EWS and gives the PRG access to numerous research sites. The partnership has led to global recognition for progressive policies and innovative service delivery. It has benefited from interdisciplinary research, trust between organisations and individuals that is built on open and transparent communication, and strong leadership. EWS and the PRG are keen to support similar municipal-academic partnerships across Africa to support locally relevant applied sanitation research.*

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## **Background**

Approximately a quarter of people in urban areas of South Africa have less than basic sanitation (WHO and UNICEF, 2017). In eThekweni Municipality, the administrative entity of Durban, South Africa, approximately 30 % of the municipality's customers for service delivery live in informal settlements and a further 15 % live in rural housing (eThekweni Municipality, 2015a). Provision of water and sanitation for these diverse communities is complicated by the hilly topography and the water constrained environment. In 1996, the South African Constitution introduced the right to access basic water and sanitation, although at that time this basic service provision did not have to be free (Constitution of the Republic of South Africa, 1996). Expansion of the eThekweni municipal boundary in 1996 and 2001 led to a rapid increase in the number of people requiring service provision. The municipality, through the water and sanitation unit, recognised there was a need for step changes in their approach to service delivery, and that it would be necessary to find innovative solutions to address these challenges. As municipalities generally lack the capacity to undertake research, there was a need to outsource this work to trusted research partners.

## **Developing a partnership between municipal and academic actors**

Over the last few years, eThekweni Municipality has established a good working relationship with the tertiary institutions in and around Durban and Memoranda of Agreements have been signed which govern their interactions. Despite this, historically there has not been a coordinated response, or a planned and strategic research agenda and interactions were ad-hoc and potential synergies were not maximised.

The partnership between the Pollution Research Group (PRG) at the University of KwaZulu-Natal (UKZN) and eThekweni Water and Sanitation (EWS) began informally and has evolved over time. From the 1960s, the relationship between the University of Natal (the precursor to UKZN) and the Durban City Engineer's Department was through the funding of a Pollution Research Scholarship, which promoted experimental research on wastewater treatment with the research topics often driven by UKZN. The PRG

was formed in the late 1960s and took on projects in the greater Durban area focusing on the textile industry. The relationship between the PRG and the municipality changed in 1971 when the creation of the South African Water Research Commission (WRC) established a formal research funding mechanism. Whilst research for the municipality remained ad-hoc, it laid the foundations for a more formal partnership.

With the expansion of the municipal boundaries, the number of people living in the municipal area increased significantly, particularly in rural and peri-urban areas and informal settlements. EWS recognised that to meet the service needs of these new customers, innovative approaches to sanitation service delivery would be required, as conventional sewerage sanitation options would be prohibitively expensive. There was a need to base decisions about new sanitation services on scientific evidence, which was often lacking. Thus, a long-term approach to locally applied research was needed. Based on its existing relationship with the PRG, EWS asked eThekweni City Council for financial support to enable the PRG to provide the evidence needed to determine the relative merits of different service options. This represented a shift in the driving force of identifying research topics from the PRG to EWS.

In 2006, EWS and the PRG signed a Memorandum of Agreement (MoA) that cemented and formalised their partnership. The MoA provided the PRG with a retainer of ZAR 1 million/year for 3 years. EWS was to identify and prioritise issues they were facing in terms of service delivery, provide relevant data and internal expertise, and provide field support and access to municipal facilities. The PRG recruited postgraduate students to carry out research projects to address these issues, and provided access to a laboratory designed for research on faecal sludge and other excreta streams to produce credible results. By paying a retainer rather than funding specific projects, the PRG was able to work on a number of small, targeted projects allowing EWS to answer particular research questions, whilst both organisations learned how their systems operated, and supported joint capacity building activities. Furthermore, the retainer meant the PRG had the flexibility to explore avenues of research that may be beneficial to EWS outside of agreed projects and were able to invest in interdisciplinary research. This was stipulated by the MoA, which called for “a transdisciplinary team including, but not limited to, engineers, scientists, medical professionals, social scientists and economists, conducting research into and developing research capacity in new areas” (eThekweni Water and Sanitation and Pollution Research Group, 2006).

The MoA between EWS and the PRG has been renewed or extended in 2010, 2012 and 2015. The partnership has supported the development of spatially differentiated service provision in Durban. This approach is aligned with the Urban Development Line (UDL), a planning instrument that demarcates the urban and rural development zones of the city (Sim et al., 2016). Within the UDL, sanitation can be sewerage due to the location of the waterborne sewerage network. As individual connections are not feasible in densely populated informal settlements, communal ablution blocks have been installed (Crous et al., 2013). In peri-urban areas where localised sewerage connections are an option, decentralised wastewater treatment systems (DEWATS) can be installed (Pillay and Mwale, 2014). Beyond the UDL, in rural areas served by free basic water, waterless sanitation solutions are preferable; 80 000 urine diversion dehydration toilets (UDDTs) have been installed and options for treating source-separated urine have been investigated (Udert et al., 2015). Where the municipality has inherited existing ventilated improved pit (VIP) latrines, the PRG has been involved in identifying appropriate treatment options (Still et al., 2012; Septien et al., 2016).

### Value of partnership

As with all successful partnerships, both parties contribute to and benefit from the collaboration. A summary of these contributions and benefits are shown in Table 1.

<b>Table 1. Contribution to and benefits of the municipal-academic partnership between EWS and the PRG</b>		
<b>Stakeholder</b>	<b>Contribution [to partnership]</b>	<b>Benefit [to stakeholder]</b>
EWS	Prioritised research questions, data, internal expertise, facilities, field support, funding	Scientific basis for decision-making, pilot-scale trials that can inform strategy and policy, skills building relating to water and sanitation
PRG	Production of knowledge, students, laboratory, credible scientific results and analysis	Applied research projects, attracting local and foreign talent, access to funding, recognition, ability for applied research to influence policy and practice.

Within the partnership, the PRG acts as an in-house research and development team for EWS. The data and results generated are used to provide scientific confidence in innovative solutions, which can address the challenges the municipality faces in water and sanitation service provision. A major benefit to the PRG is access to facilities that the partnership offers. At the time of writing (February 2018), the PRG has access to the following research sites through EWS:

1. Newlands Mashu Research Site – facilities for testing pilot-scale decentralised wastewater treatment system (DEWATS), constructed wetlands and reuse of treated wastewater for agriculture
2. Amanzimtoti wastewater treatment works (WWTW) – laboratory-scale (5 L) and a 1 ML digester and associated tank farm for testing the co-digestion of industrial and municipal effluents
3. Southern WWTW – pilot-scale anaerobic digesters (30 kL) investigating the digestability of three different incoming sewers to the works.
4. Isipingo WWTW – full-scale (20 tonne/d) plant for treating UDDT sludge using black soldier fly larvae
5. Northern WWTW – fully automated and instrumented 30 kL digester for testing thermophilic digestion of different sludges
6. Prior Road – nitrifying reactor treating urine from the urinals in the Customer Care Centre
7. Community sites – household, community and school sites where innovative sanitation systems can be tested to treat waste streams from urine diversion toilets, toilet blocks and community ablution blocks

Access to full-scale equipment and systems and community sites enables the PRG to carry out applied research at a larger scale than many research organisations. This opens up new areas of research and attracts researchers to the PRG from across South Africa and the world. Additionally, it opens up funding opportunities that would not have been available if the partnership with the municipality was not in place.

## Successes

The partnership between EWS and the PRG has resulted in international recognition for both organisations. The latrine dehydration and pasteurisation (LaDePa) unit developed by municipal engineers as a solution to treating pit latrine sludge was awarded the Hardware Award at the 2<sup>nd</sup> IWA Development Congress and Exhibition in Kuala Lumpur, Malaysia in 2011. Similarly, EWS was awarded the Stockholm Industry Water Award at World Water Week in 2014 (SIWI Stockholm International Water Institute, 2014) for its transformative and inclusive approach to providing water and sanitation.

Meanwhile, in eThekweni Municipality, since 2000 more than 1.3 million people have been connected to piped water and over 700,000 people have been provided with access to toilets. Poor families (defined as those living in properties with a rateable value of less than ZAR 250 000, approximately USD \$20 000) pay nothing for basic water provision (up to a limit of 9000 L per month). Higher levels of water consumption or service delivery are charged using a step tariff whereby the cost increases as consumption increases (eThekweni Municipality, 2017) thus ensuring that EWS remains financially sustainable and meets the constitutional right of water and sanitation for all.

In 2015, the Municipality signed a Memorandum of Understanding (MoU) with several universities based in eThekweni: University of KwaZulu-Natal (UKZN), Durban University of Technology (DUT), Mangosuthu University of Technology (MUT), University of South Africa (UNISA), University of Zululand (UZ) and the Human Sciences Research Council (HSRC). The aim of this MoU was “strengthening and synergising initiatives on a range of issues, through closer collaboration in order to enhance research, experiential learning, share resources, knowledge and expertise anticipated to impact positively on service delivery within the municipal context” (eThekweni Municipality, 2015b). This has come about in part due to the impact of the partnership between EWS and the PRG.

## Challenges

There have been a number of challenges associated with the two organisations working together, not least that both municipalities and universities often operate as large bureaucracies. This has required both partners to understand the limitations imposed on each other, particularly in terms of finance and timelines. The two organisations operate on different time frames, with the PRG using research projects of one or three years (for Masters and PhD students respectively), whilst EWS expects pilot projects to run for a minimum of three to five years. EWS timelines are also heavily influenced by the political cycle of campaigning and municipal elections, and an understanding of how this cycle affects projects is useful for the PRG.

For EWS, there are often regulatory barriers preventing non-standard projects that may not be in-line with existing policy from being implemented. This can challenge the environment of innovation fostered by the partnership. However, the partnership allows EWS greater flexibility to pursue these projects by allowing them to be led as pilot-scale trials by the university, which is not bound to adhere to the same policies as EWS. This can pose problems with adopting trialled technologies if changes to policy do not keep up with research and can lead to a funding gap between pilot-scale testing and acceptance of a system as business as usual. This issue has been identified by the WRC and they hope to address it with new forms of funding to support new ideas to reach scale (Naidoo, 2018).

Finally, dissemination of knowledge generated within the partnership is often limited. Whilst much of the learning generated in eThekweni Municipality would be applicable in other South African municipalities, knowledge transfer is poor. In fact, there has been more knowledge transfer between eThekweni Municipality and municipalities outside South Africa than within South Africa, where effective communication continues to be a problem. To address this, the Municipal Institute of Learning (MILE) was set up in 2009 to facilitate greater cooperation between municipalities in South Africa and the Southern African Development Community (SADC) region (Municipal Institute of Learning, 2009).

### **Lessons learnt**

Over more than a decade of working on water and sanitation challenges in eThekweni Municipality, there have been several valuable insights into sanitation service delivery, in part due to the common focus of the leadership of both EWS and the PRG on serving the communities of eThekweni Municipality, in particular poor and unserved communities. With this goal in mind, the leaders of both organisations foster an environment of innovation, adaptation and learning. Setting up such an environment requires leaders to accept and support a degree of risk-taking. If the PRG are able to demonstrate that an innovative concept is scientifically sound at the laboratory scale, then EWS is willing to support a pilot-scale trial (often on a scale of 500-1 000 households) with the capital necessary to fix issues for between three and five years. During these pilots, the PRG is able to monitor and critically assess the operation, performance and social acceptability of the system. Successful pilots can then be scaled up to business as usual for EWS. This approach to incremental learning has led to EWS being recognised for its progressive policies for water and sanitation (Barclay, 2011; Sutherland et al., 2013).

An advantage for the PRG is that many of those engaged in research in conjunction with EWS are students or early career researchers. The PRG has found that young researchers are more accepting of interdisciplinary research and the flexibility it entails. In turn, the interdisciplinary nature of the research has shown the value of this approach, when the government tends to concentrate funding on technical solutions to problems that are inherently social in nature (Sutherland et al., 2013). This reinforces the value of interdisciplinary research and strengthens the “new normal” of interdisciplinarity for early career researchers.

Strong working partnerships are built on trust at both individual and organisational levels. By developing trusting relationships and networks on an individual level, this trust is recreated at an organisational level, and is vital if applied research is to be considered and implemented in a way that has a real effect on the lived experiences of the beneficiaries of an intervention. This trust is partially built on open, honest and transparent communication. It has been aided by a politically and managerially stable municipality, which has allowed long-term municipal employees to develop working relationships over several years. Additionally, this trust supports an environment of knowledge sharing where individuals are willing to ask for help and to offer solutions that are localised and individual to the context of eThekweni Municipality, rather than general recommendations that may or may not be relevant.

### **Moving forward**

The impact of the EWS-PRG MoA has shown municipal and university departments the value of close working relationships for both parties. Other departments have since replicated, to a greater or lesser extent, this partnership with individual MoAs and sectoral sub-agreements detailing the terms of engagement across the areas of expertise. Further afield, the partnership has been showcased to universities and municipalities in a number of African countries through the work of MILE and under the RASOP programme (Reinforcing Capacity of African Sanitation Operators on non-sewer and FSM Systems through peer-to-peer learning Partnerships) (African Water Association, 2016). With this in mind, the PRG has taken an active decision to support other African university departments in developing

partnerships with local government to carry out locally relevant applied sanitation research rather than offering technical support to other municipalities.

Locally, the close working relationship between EWS and the PRG allows the PRG to develop long-term insights into the ongoing needs of the municipality. For example, a high level of cooperation between the two organisations to produce the 25-year plan for EWS means that the PRG is well aware of the challenges that face EWS in the next 25 years and can begin to align research projects to municipality challenges early on in the programme. Additionally, the involvement of the PRG in long-term planning means that innovative solutions to future water scarcity can be underpinned by scientific knowledge.

## Conclusion

The formal partnership between EWS and the PRG has proved successful for over a decade. The interdisciplinary nature of the partnership yields benefits for both partners and the communities served by EWS. It is seen as a pathfinder for similar municipal-academic partnerships in eThekweni Municipality and across Africa. Its success and mutual benefits for the partners are based on a shared vision, strong leadership and a deep level of trust between the organisations involved. This trust is brought about by open, transparent and honest communication and the establishment of long-term working relationships between individuals. EWS and the PRG are committed to supporting the development of similar municipal-academic partnerships across Africa to build locally relevant applied water and sanitation research.

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