eThekwini Water & Sanitation

Most innovative and progressive water utility in Africa

Selected Highlights

Winner of the 2014 Stockholm Industry Water Award

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SALGA
South African Local Government Association

WATER RESEARCH COMMISSION

South African CitiesNetwork

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- Staff members from eThekwini Water & Sanitation
- Pollution Research Group, University of KwaZulu-Natal
- Municipal Infrastructure and Services Directorate of SALGA

FOREWORD

XOLILE GEORGE
SALGA CHIEF EXECUTIVE OFFICER

The South African Local Government Association (SALGA) congratulates one of its member municipalities, eThekwini Metropolitan Municipality, on receiving the Stockholm Industry Water Award.

This award is a resounding game changer for South Africa and the entire African continent. It is a fitting recognition of a number of enablers, including our constitutional commitment to deliver water services at local level, the principle of funds follow functions, a coherent policy and legislative framework and, most importantly, the ability and capability of eThekwini political and administrative leadership to meet the ever-demanding consumer needs.

The journey travelled by eThekwini has not been an easy one, given South Africa's history. Like many municipalities, eThekwini has had to navigate post-1994 demands, by providing good quality and reliable services without compromising local and international standards. Competitiveness, both in the local and global arenas, remains one of the cornerstones in the delivery of water services. The recognition of eThekwini as a progressive water utility in Africa is testimony to this goal.

Going forward, Salga's quest is to drive performance and benchmarks at municipal level, through thinking globally and acting locally, in order to reach the water and sanitation sustainable development goals; goals that local governments across the African continent should embrace. Through its affiliation to international structures, such as the United Cities of Local Governments, SALGA will continue advance the sustainable development agenda and promote eThekwini's successes.

The SALGA family is proud of eThekwini municipality and encourages it to continue sharing the good journey and experiences thus far with the rest of the world. You are an inspiration to all of us and have set the benchmarks standards that we all strive to reach.

Congratulations again to eThekwini Water & Sanitation for winning the Stockholm Industry Water Award, a first for Africa.

CONTENTS

"eThekwini has championed the approach to provide sufficient water to sustain human life, as expressed in the South African constitution, now embedded in national policy. The methods used and results achieved by eThekwini Water and Sanitation serve as a sterling example for the many communities worldwide facing similar challenges." SIWA jury

"This award is a fitting tribute to the many vulnerable communities and thousands of individuals in those communities who have worked with the Municipality to affect positive change in quality of life of our citizens through promoting a rights-based approach in the provision of water and sanitation services. Not only have many individuals worked on projects themselves, but community leadership structures have engaged with our officials and departments to make appropriate decisions on service levels and technologies. Finally, the award has inspired us to continue striving for the upliftment of our communities and equally celebrate all that is good about serving our people." Teddy Gounden, Acting Project Executive, EWS

eThekwini Water & Sanitation

STOCKHOLM INDUSTRY WATER AWARD: RECOGNISING WATER EXCELLENCE IN THE BUSINESS WORLD

eThekwini Water & Sanitation, serving the Durban metropolitan area in South Africa, has been named the 2014 winner of the Stockholm Industry Water Award, for its transformative and inclusive approach to providing water and sanitation services.

The Stockholm Industry Water Award (SIWA) honours outstanding and transformative water achievements by companies that contribute to sustainable water management. In 2000, the Stockholm International Water Institute (SIWI) established the Award in collaboration with the Royal Swedish Academy of Engineering Sciences (IVA) and the World Business Council for Sustainable Development (WBCSD), and is supported by the International Water Association (IWA) and the World Wide Fund for Nature (WWF).

This booklet highlights some of the achievements that resulted in eThekwini Water and Sanitation receiving the SIWA. It shows why eThekwini is attracting so much attention locally and internationally and why...

- ...Unlike other municipalities, eThekwini is able to recover its consumer debt
- ...Bill Gates toured some of the most impoverished settlements in eThekwini
- ...Water officials from throughout Africa visit eThekwini
- ...the University of UKZN is asking people to donate poo and urine, and
- ...why the World Bank flew eThekwini's street theatre group to Washington.

MESSAGE

FROM NEIL MACLEOD, OUTGOING HEAD: ETHEKWINI WATER & SANITATION

Winning the Stockholm Water Industry prize is a recognition of the work of the whole team at eThekwini Water & Sanitation. It is a tremendous honour for us all. We hold SIWI and the Stockholm Water Week in very high regard and to be recognised by our peers and people we respect in the industry, makes this a very special award.

I think that our biggest achievement as a water service provider has been bringing water and sanitation services to so many poor people and transforming their lives. EWS was established as public water service provided in 1996, and in 2000 our boundaries were expanded, resulting in the challenge of bringing services to more than 1 million people that did not have access to water or sanitation. I think that providing water to 1.3 million people and proper sanitation to 700 000 people in such a short period of time has not been achieved in many countries.

Innovation has underpinned all of our work for the past 22 years. Technologies used to bring services to the poor such as electronic bailiff units, community ablution blocks, and the construction of 80 000 urine diversion toilets speak to our past. What we have realised is that into the future we need to find new technologies that meets people's expectations when it comes to sanitation.

The future to us is to therefore find a new toilet - a toilet that uses little or no water, that can be put inside a house, that doesn't smell; where the toilet can have a window rather than being a dark room like a VIP toilet, which makes it safe for women and children to use; and in this way we can bring safe sanitation at an acceptable level to rich and poor alike and do away with this perceived discrimination where flushing toilets are seen to be for the rich, and dry sanitation for the poor.

FROM EDNICK MSWELI, NEW HEAD: ETHEKWINI WATER & SANITATION

After working for nine years in the eThekwini Water & Sanitation Unit, and having re-joined the unit in April this year, I know the passion and commitment that the staff in this organisation have for their work. To a very large extent, this award is recognition of the dedication of the many men and women who work for our unit.

It is also recognition for Neil Macleod's leadership of EWS that has indeed put us on the map. We are humbled by this award from SIWI, which will inspire us to achieve even higher levels in the future. We'd like to also thank the political leadership of our city, including His Worship Councillor James Nxumalo, members of the Executive Committee, and the entire eThekwini Council for creating an enabling environment for the unit to deliver on the needs of the city.

ETHEKWINI MUNICIPALITY

The eThekwini Municipality is recognised as one of South Africa's more competent municipalities, offering many examples of excellent public service.[1] Within the municipality, one unit – eThekwini Water & Sanitation (EWS) – has demonstrated progressive management and innovative methods, many of which have been replicated across the country and the region.

ETHEKWINI MUNICIPALITY AT A GLANCE

- The largest city in the province of KwaZulu-Natal and the third largest city in South Africa.
- Formed in 2001, when the administrative boundaries of the previous Durban municipality were expanded by 68%, increasing the population by only 9%.
- Home to a third of the population (approximately 3.6 million people) and responsible for 60% of the economic activity in the province.
- Over 80% of the population live in urban centres, which make up about 35% of the municipality, with the rest being rural areas.
- The population is young, HIV/AIDS and TB are rife, unemployment and poverty levels are high, and combatting household food security is a municipal priority.

Source: eThekwini Municipality. 2011. Water Services Development Plan (www.durban.gov.za)

The Constitution of South Africa assigns the responsibility for providing water services (and setting tariffs) to local government. The Water Services Act (108 of 1997) sets out the regulatory framework and describes the different water services institutions to be established:

- the water services authority (WSA)-the responsible municipality.
- The water services provider (WSP) – the entity who physically provides the water supply and sanitation services to consumers.

Thus the eThekwini Municipality is the WSA and the Water and Sanitation Department is the WSP, responsible for providing water and sanitation services to more than 3.6 million people living in rural and urban areas.

Government policy provides for free sanitation for indigent households (at minimum a ventilated improved pit latrine) and access to free basic water. The challenge in providing water and sanitation services is to:[2]

- manage the conflict between different uses and users in different catchments,
- provide access to those who are still without services,
- maintain and improve services already supplied in a sustainable manner,
- assist those who cannot afford normal service charges, and
- provide water services in support of all forms of economic development.

The fact that South Africa is a semi-arid, water-stressed country adds to the challenge of providing water and sanitation services. The country's average rainfall is about 450mm, well below the world average of about 860mm per year. In eThekwini, despite many interventions to increase water supply, reduce losses and encourage water conservation, the demand for water is expected to outstrip the supply within the next 10 years. In addition, the continual increase in population and industrial growth places stress on water quality and the ecosystems.

[1] Models of public service excellence from the eThekwini municipality in Kwazulu-Natal, Impumelelo (2014); (www.impumelelo.org.za)
[2] Policies and Practices of the eThekwini Municipality Water & Sanitation Unit (2012) (www.durban.gov.za)

ETHEKWINI WATER & SANITATION

IN BRIEF

eThekwini Water & Sanitation Unit (EWS) must operate a ring-fenced, full-cost recovery service from a limited water resource to a growing number of poor customers. Those that need to be supplied include deep rural households, peri-urban housing estates and informal settlements. Furthermore:

- Many households are unable to pay for basic services.
- The profile of the major water users has shifted from industry to poor households.
- The beach and aquatic environment needs to be maintained pollution free, in order to maintain and grow tourism activities.

VISION

The vision of the EWS is to ensure an integrated use of resources through sustainable water management. This means providing water and sanitation services in a manner that is equitable, environmentally, socially and financially sustainable, and technically excellent.

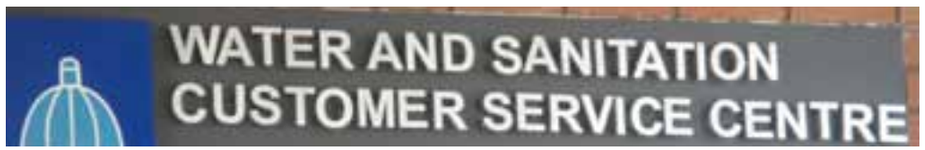
All EWS initiatives take a holistic approach, which means linking water and sanitation services with the type and location of housing, health, job creation, energy and food provision. Water conservation and water demand management are also important aspects.

COMMITMENT TO CUSTOMERS

The EWS Customer Care policy is based on the national ***Batho Pele***[3] principle, which means 'people first', and emphasises the values of 'customer first' and 'getting it right first'. Values include respect, good customer care, service excellence, integrity and professionalism, and mutual trust and understanding.

Each service delivery unit has a Customer Service Charter and Customer Care Standards that are reviewed and updated annually.

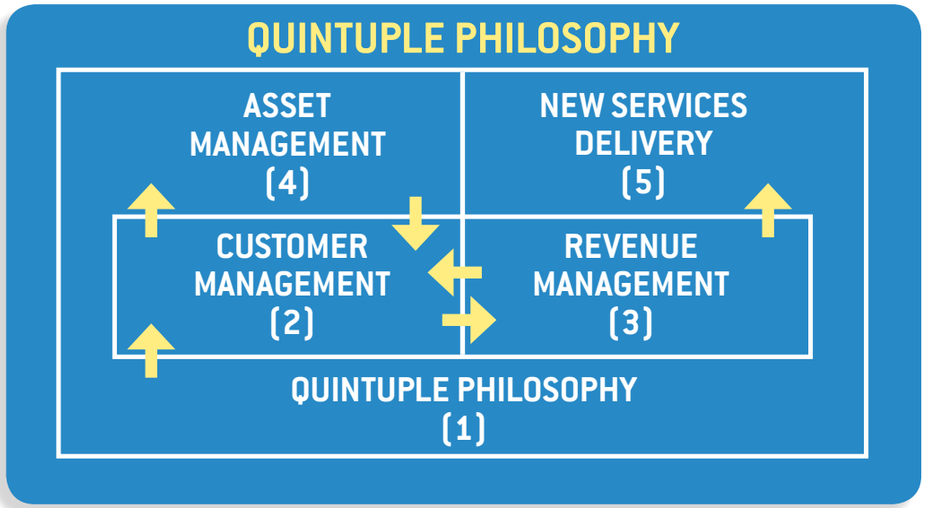
- **Customer Services Charter:** explains the aims of EWS in the delivery of water and sewage disposal services, how EWS may be contacted should the service not be satisfactory and customers' corresponding responsibilities.
- **Service Level Standards:** ensure that the public expectations of service delivery are matched by achievable and measurable performance standards. The document sets out the services offered, the response times/level of service that can be expected and provides contact details of the various offices and the EWS call centre number.



[3] http://www.polity.org.za/polity/govdocs/white

"EWS staff are encouraged to experiment with new technology developed elsewhere and to follow ideas that may not have been tried before. From top to bottom there are management systems to secure productivity together with an ethos of diligence in service that is worthy of a major municipality. The EWS is an example to their colleagues in other municipalities." (Source: letter of reference from a partner organisation)

EWS PHILOSOPHY



MANAGEMENT STYLE

Water and sanitation as a business is seen differently in eThekwini. Neil Macleod bases the management of EWS on the 'Quintuple Philosophy', (shown in the figure below) which links five key management issues:

(1) human resources/skills,
(2) customer management,
(3) revenue management,
(4) asset management, and
(5) new services delivery.

(1) Effective human resource management means ensuring that the municipality has competent key staff and standard operating procedures are in place. It also means retaining institutional memory, as well as ensuring effective training and succession planning (through talent management and staff development). This requires regularly reviewing the municipal structure and building an organisational culture based on integrity and excellence.

(2) and **(3)** EWS has also managed to strike a balance between customer and revenue management. The supply of basic water and sanitation is seen as a right, whereas higher levels of service are priced using market principles. The water price is set at a level that covers debt costs, depreciation, and operating and maintenance costs.

(4) EWS also emphasises maintaining existing assets. Internationally, most water service utilities spend over 90% of their capital budget on asset replacement. An important aspect is to know what assets exist and their condition. EWS uses GIS systems to keep track of assets and monitor 'non-revenue water' (water that is produced and 'lost' before it reaches the customer, through leaks or metering inaccuracies). As a result, EWS has managed to decrease non-revenue water from 42% in 1996 to 29% in 2012.

(5) EWS has delivered water to more than one million people and sanitation to more than 700 000 people through the installation of new infrastructure. Infrastructure solutions are chosen to be affordable and financially, environmentally and socially sustainable. The development of new infrastructure needs to place job creation as an important aspect of service delivery.

Teddy Gounden (Acting Project Executive, EWS) attributes the success of EWS as a unit to the open door policy of management and the employment of driven and motivated staff who are encouraged to be creative and take risks to innovate. Leadership is provided in such a way as to create an enabling environment for staff to explore various initiatives and to take credit for the successful outcomes. The overall management style is a participative and empowering one which leads to the unit working together as a team towards a common goal.

EWS MANAGEMENT STYLE IN BRIEF:[4]

- Effective communication is vital to success in securing funding and getting projects implemented.
- Staff must be empowered to explore innovative solutions to problems
- Communication can make or break any initiative.
- Water and sanitation operation should be seen as business to be run according to normal business principles and the implementation of a strategic approach.
- Innovation is the key to growth and development of the municipality.
- The support of political leadership is critical for success

"The leadership style and strategic and technical ability of the Head of EWS, Neil Macleod, has had a significant impact on water and sanitation service provision in eThekwini Municipality. Macleod has been a pivotal actor in water governance in the city and he is supported by a well capacitated and highly committed team, who support and enact the principles of EWS's water and sanitation services Charter. The high level of technical competence of this team and the leadership style of its Head, has enabled EWS to be an innovative and adaptive Unit that has achieved considerable success in meeting water and sanitation needs and challenges for the poor in a fast growing city. This sets eThekwini's Water & Sanitation Unit apart from other municipalities. As a result of its strong leadership it has been able to shift political will towards innovative and progressive water and sanitation services delivery."
Source: Durban City Report, EU: Chance2Sustain, 30 May 2013

[4] MILE Master Class learning notes: Edition No: 05/2011(www.mile.org.za)

THE NEXUS APPROACH

CHALLENGES AT A GLANCE

- Many consumers lack awareness and education about health and hygiene.
- Many consumers have a poor understanding of how to use water and sanitation systems properly.
- Crowded informal settlements because of increased migration to urban areas.
- Rural communities living outside water-borne edge.
- Crowded informal settlements requiring services.
- Sewer pipe blockages and storm water management.
- Non-payment of bills, illegal connections and vandalism.

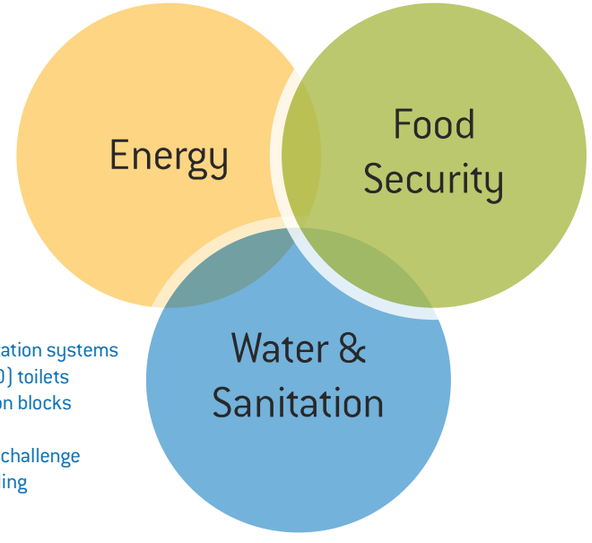
Overcoming these challenges requires a unique approach. EWS has recognised how water, energy, health and food security are interlinked, and so solutions aimed at just one sector are not sustainable. For example, increasing food security or energy supply generally results in higher water consumption.

Therefore, EWS uses the nexus approach when implementing projects to improve food, water and energy supply.

Nexus: 'the connection or series of connections linking two or more things' (Oxford Dictionary).

- DEWATS (decentralised waste water treatment systems)
- Fertiliser from urine (VUNA)
- Rain water harvesting
- Grey water reuse
- LaDePa technology

- Life cycle assessment (LCA) of water and sanitation services
- Methane to electricity
- Mini-hydro power
- Biodiesel from microalgae.



- Prefabricated sanitation systems
- Urine diversion (UD) toilets
- Community ablution blocks
- Free basic water
- Reinvent the toilet challenge
- Water reuse/recycling
- Co-digestion

THE ETHEKWINI DIFFERENCE

Many organisation and municipalities use a similar nexus approach, so what makes EWS different?

A combination of:

1 BUSINESS WITH A HEART
2 COMMUNITY ENGAGEMENT
3 TECHNOLOGY DRIVEN
4 LEARNING FROM AND SHARING EXPERIENCES
5 COLLABORATING WITH OTHERS

BUSINESS WITH A HEART

Like most municipalities in South Africa, one of the biggest challenges facing EWS is ensuring that water bills are paid and illegal connections are eliminated, while meeting the basic human rights of access to clean water and sanitation.

BASIC WATER AND SANITATION SERVICES

In 2000 eThekwini introduced free basic water, at 200 litres per household per day (free basic water supply became national policy in July 2001). In July 2008, this supply was increased to 300 litres per household per day for all customers within 200m of the household, at a flow rate of not less than 10 litres per minute (9kl/month or 37.5 litres per person per day for a family of 8). All residential households received free basic water until July 2012, when only semi pressure households, or full pressure households in properties with a ratable valued of less than R250,000 receive free basic water. All other households are charged on a rising block tariff depending on the volume of water consumed. Households also receive a free basic sanitation service (i.e. no charge for the first 9kl of water used per month). Sanitation systems consist of either a flushing toilet connected to water borne sewerage or septic tank, ventilated improved pit latrines (VIPS), urine diversion toilets (UDT), or community ablution blocks.

Water	First 9kl/month
Energy	First 65 kWh free to poor residents using less than 150 kWh per month
Sanitation	VIP, UDT, or toilet connected to septic tank / water borne sewerage with no discharge fee less than 9kl of water used per month
Waste removal	Collection and disposal of refuse at stepped tariff sliding scale
Health	Access to clinics and voluntary testing and counselling

+	−	LESSONS
• Free basic water became national policy. • Increase in number of people with access to water and sanitation. • Decrease in water borne diseases.	• For large poor families the free basic allowance of 9kl may be insufficient. • Too great an increase in free basic water may not be financially sustainable for the City. • Installation of water tanks and onsite sanitation systems does not necessarily stop the demand for more improved service.	• Consultation with local community members is essential.

DEBT RELIEF

Faced with a chronic arrears problem, in August 2005 the municipality initiated an innovative policy and plan to assist customers with high arrears. The customer's debt would be gradually written off over 20 months, provided that the customer made regular payments of their current account. This is in contrast to the blanket write-off of customer debt that other municipalities implement. The programme encourages improved payment behaviour by customers and ensures a stable revenue stream for the municipality. However, if customers default on their monthly payments, their debt is reinstated.

The qualifying conditions for a water user are:

- Property rates value must be equal to or less than R250,000 (approx. US$25,000).
- The customer must be in arrears for 90 days or more.
- The customer must be willing to sign a contract, which entails a number of conditions related to payment terms and defaulting on the agreement.

Households, which do not qualify for debt relief because their property is valued above R250,000 but are still poor, can be declared eligible for free basic water (9kl/month). The customer must apply to EWS via their local councillor. A social worker will then assess the household and make a recommendation to EWS on a case-by-case basis.

+	–	LESSONS
As of August 2014: • 46 000 customers signed up for debt relief. • R132-million written off in debt. • About R136-million recovered (money which EWS would not otherwise have received). • The use of Customer Service Agents (CSAs) for home visits is successful.	• Internal capacity to repair water leaks as soon as they are reported. • Long-term commitment on the part of the municipality.	• Success is only possible with in-depth planning, strong leadership, buy-in from councillors and community consultation. • CSAs should not work in the area in which they live. • Awareness needs to take place at household level.

COMMUNITY ENGAGEMENT

EWS has recognised the need for a participatory approach in the provision of service delivery with a focus on building trust in order to move from a historical situation of conflict to one of creative and constructive dialogue.

CUSTOMERS SERVICE AGENTS

Trained CSAs make house visits, to give residents information on service levels and standards, and to enable residents to raise concerns relating to service delivery and more sensitive issues such as debt and illegal connections. If citizens believe they are not receiving the promised standard of service, the CSAs record this information and pass it on to the relevant managers, and provide residents with a reference number for follow-up purposes. CSAs are also able to guide the resident to choose the best financial option.

An independent research report found that 76% of residents found that the CSAs were helpful and 87% of residents found eThekwini staff polite and helpful.[5]

+	–	LESSONS
• More open communication between EWS and customers. • Consumers can interact on sensitive issues with no fear of being penalised.	• Obtaining political buy-in and support. • Logistics around transport (long distances between customers). • High turn-over of CSAs (as they gain experience, they find other employment).	• On-going training, follow up and evaluation is essential. • Outsourcing of CSAs has value, as contracts can be performance based. • CSAs should not work in areas where they live. • Material needs to be developed at the correct level of understanding.

"EWS has also been able to develop the well-defended argument that innovative technical methods of service delivery are required in the city to ensure sustainability for environmental, financial and water scarcity reasons, requiring customer acceptance, education and training. The established and responsible customer base must also be retained and reassured that costs and quality of delivery would not be compromised and hence a great deal of effort has been put in to developing platforms through which the state could engage with citizens." Teddy Gounden, Special Projects, EWS (reported on in Durban City Report, EU: Chance2Sustain, 30 May 2013)

[5] Human Science Research Council survey, December 2004

RAISING CITIZENS' VOICE

This public education initiative was introduced by the National Regulator within the Department of Water Affairs (now the Department of Water Affairs and Sanitation), with the aim of empowering citizens to hold local government accountable by training on their rights and responsibilities with respect to water and sanitation services. After training, user platforms serve as monthly meetings between the municipality and the community for ongoing monitoring and problem solving.

EWS, together with the Mvula Trust (a Water Services NGO), redesigned the programme to focus on the development of a solid partnership with communities.[6] Since 2009 EWS has been running this programme, with a core team of people responsible for the training, establishing user platforms and conducting quarterly meetings with the user platforms.

The training programme consists of 10 generic training modules that cover aspects related to peoples' rights, government structure, the water cycle, using water wisely, sanitation and hygiene, pollution prevention, tariffs and billing, regulation and monitoring, and identifying gaps.

In order to address all areas in eThekwini, EWS identified 17 geographic zones, each of which consists of six wards. Each ward is represented by a councillor, committee members and active civil society organisations. Training is carried out by well-trained and experienced municipal officials and over a weekend, and discussions and interaction is encouraged. At the end of the training, certificates are presented and participants are invited to participate in the user platform. One user platform is created per zone, to be used for discussing water and sanitation service issues.

+	−	LESSONS

• Guides EWS service delivery:
  • increased free basic water supply to households
  • addressed the needs of child-headed households
  • reduced the number of illegal connections
  • led to the establishment of the debt relief programme.
• Increases understanding for citizens of how service delivery works.
• Provides greater insight into community needs.
	• Gaining trust of the participants.
	• Finding key people to provide the training.
	• Updating regularly the training material.
	• Managing the conflict between civil society agents and politicians.
		• Need to contextualise the training to reflect local conditions.
		• Training material to be produced in the local language.
		• Ownership by the municipality ensures sustainability.
		• Keeping accurate records of meetings with action items is essential.

[6] Raising Citizens' Voice in the regulation of water services, by Lindy Morrison, Durban Regional Director, The Mvula Trust (no date)

STREET THEATRE

To address the on-going challenges of blocked and damaged sewers due to misuse by communities, EWS embarked on an extensive education and awareness programme, using funding from the Development Bank of Southern Africa. This programme initially targeted informal settlements but was extended to include other areas.

A theatre group, 'Renaissance' staged comical performances at taxi ranks, shopping centres, clinics, hospitals and community meetings.[7] The success of the street theatre led to the theatre troupe being invited to Washington DC to perform at the World Bank Water Supply and Sanitation Forum. The World Bank also provided backing for the development of an educational toolkit that allowed similar programmes to be set up in other cities and countries. EWS has now institutionalised street theatre as part of the education programme, employing four actors and support staff to deliver these programmes.

Competitions are held during the performances, whereby prizes can be won by those who answer sanitation related questions correctly. Prizes are 'on the spot' or through a lucky draw and range in value from soccer balls to washing machines.

+	−	LESSONS
• Reduction in sewer blockages. • Increased awareness of proper use of sanitation systems.	• Obtaining buy-in from community leaders. • Finding talented actors to communicate messages that will lead to positive behavioural changes.	• Awareness raising only successful if accompanied by improved infrastructure.

[7] Models of public service excellence from the eThekwini Municipality in KwaZulu-Natal, Impumelelo (2014); (www.impumelelo.org.

"I consider the achievements of the eThekwini Water & Sanitation Unit to have significance beyond the regional Southern African scale. The eThekwini experience has lessons and can serve as inspiration for water utilities in all developing countries, stimulating these utilities to improve their performance" (Source: letter of reference from a partner organisation)

TECHNOLOGY DRIVEN

One of the strengths of EWS is recognising the need to support the roll-out of water and sanitation programme with in-depth research, data collection and technological support. Some examples of this evidence based approach are demonstrated by the following investigations.

"Good Science makes good policy"

FERTILISER FROM URINE

UDTs separate urine and faecal material by means of a specially designed toilet pedestal (and urinals for men) – the urine is sent to a soak-away, while the faeces are captured in a chamber where they are contained and degrade over time. In conjunction with the Swiss research organisation Eawag and the Pollution Research Group (PRG) from the University of KwaZulu-Natal (UKZN), EWS are investigating the processing of urine from UDTs to produce fertilisers:

- **Technology (reactors)**: Two reactor setups are being tested to recover the nutrients from urine for use as a fertiliser: (i) a struvite reactor and (ii) a combination of nitrification and evaporation. These reactors are installed and operating at Newlands Mashu Research Facility.
- **Social:** The role of health and hygiene education in the acceptance, use and maintenance of UUDTs in rural communities, and the acceptance of using urine as a fertiliser.
- **Logistics:** Developing a logistical system for collecting urine using an institutional approach.

UDTs are currently installed in rural areas, but EWS is investigating ways in which this type of technology can be adapted for use in all households. In order to demonstrate that UDTs are not only for use by poorer communities, EWS has installed a number of UD urinals in its customer care building – this urine is currently being processed into liquid fertiliser in the building's basement. In addition, at the Newlands Mashu Research facility, all visitors' toilets are UDTs of varying designs are being used to determine the optimal construction and operational aspects before roll-out into the city.

+	−	
• The development of a field reactor to produce struvite from urine. • Nitrification reactor operating at EWS. • Agricultural trials using products as fertiliser show promising results.	• Logistics of urine collection. • Damage to urine diversion pipes and containers. • Up-scaling to create small businesses.	• Communication with community, local leaders and councillors essential for buy-in.

"The open approach to experimenting with and piloting new solutions across both technical and social aspects of service delivery has truly made EWS a pioneer in the world of utility-run services." (Source: letter of reference from a partner organisation)

REINVENTING THE TOILET

EWS, together with the PRG at UKZN, has received two grants from the Bill & Melinda Gates Foundation (BMGF) to participate in the Reinvent the Toilet Challenge (RTTC). The end objective is to produce a new-generation, self-sustaining toilet that is able to convert human waste into sterilised fertiliser, potable water, mineral salts and electrical energy. The toilet will integrate several operations to process the different components of the waste stream (faeces, urine, rubbish and wash water) and recover the useful constituents. In Phase 1 of the RTTC, the PRG's work (2012 and 2013) covered aspects including the design of a pedestal capable of splitting the four waste components at source, characterisation of the waste input streams, and processes for treating the faeces and urine.

During the course of Phase 1, a large amount of data on the characteristics of faecal waste generated. The BMGF recognised that the strength of the PRG and EWS lay in providing technical and data support to other grantees and allowed the testing of prototype toilets in Durban. Therefore, during Phase 2 of the RTTC (2013 and 2014), a number of grantees from overseas organisations visited Durban to learn from the experiences of the PRG and EWS in onsite sanitation delivery. The data generated from this project will benefit all researchers in this field in designing new and innovative toilets for use in developing countries.

+	−	LESSONS
• Creation of a large data base of chemical, physical, mechanical and biological properties of faecal sludge from various onsite sanitation systems • Researchers from local and international organisations visiting Durban to make use of facilities, experiences and for prototype testing • Access to onsite sanitation systems and field sites through EWS	• Health and safety aspects continually requiring updating and upgrading • Funding for laboratory equipment (maintenance and repairs)	• Well trained laboratory staff and up-to-date standard operating procedures essential

MINI HYDRO-POWER

EWS is investigating the installation of 2–4 mini turbines fed by the city's Northern Aqueduct water distribution system. The aqueduct supplies water from the large Durban Heights treatment works to the city's northern suburbs. Due to the differences in elevation between Durban Heights and the reservoirs, there is excess pressure at the inlets to the reservoirs, which is currently dissipated by pressure reducing valves. The proposed turbines will use the pressure which forms at the inlets to the reservoirs which is currently dissipated by pressure reducing valves to generate electricity, which will be fed into the municipal low tension grid. The expected output of the turbines ranges from 120kW to 180 kW. This study is still in the feasibility stage.

LEARNING FROM AND SHARING EXPERIENCES

SUSTAINABLE LIVING

In the early 2000s, eThekwini recognised that the living conditions of the rural population needed to improve, but there was insufficient water for agricultural activities and tap water was scarce and too costly.

Rain water harvesting tanks were installed to collect water for irrigation purposes. However, a survey carried out a year later found that 80% of the tanks were not being used for the intended use because of infertile or poor moisture-retention soils, lack of knowledge and/or equipment, and low germination and survival rate of seeds.

The initial failure of this project led to the Parks and Gardens Department developing a dedicated Agricultural Management Unit (AMU) to provide professional on-going support to rural and peri-urban households. eThekwini is the first Municipality to set up an Agricultural Management Unit specifically to promote food gardens for the poor.

Further initiatives included research into the large-scale provision of compost, nutrients and treated wastewater from a range of sanitation streams. The lack of moisture retention in the soils led to EWS becoming interested in using sewage sludges for compost, which then progressed onto research projects related to the declassification of sludges for agriculture, and the development of the latrine dehydration and pasteurisation (LaDePa) technology. Soil fertility aspects lead to an interest in identifying the nutrients from urine and the use of wastewater from decentralised wastewater treatment works (DEWATS) for irrigation purposes.

Rain water tanks were produced locally, thereby creating employment opportunities. Accredited training courses were provided for both the contractors and champions in each area. Recipients were also trained in how to implement organic homestead gardens and provided with start-up tools and materials. Pilot trials have proved successful and further rollout of this programme is planned.

+	–	LESSONS
• Water available for communal gardens at no cost to communities. • Increase quality of life due to food production.	• Buy-in from the community. • Damage to rain water tanks.	• Support to communities is required to sustain the programme. • Continual training required.

THE MUNICIPAL INSTITUTE OF LEARNING - MILE

The eThekwini Municipality realised the need for a peer-based learning intervention to support the emerging and changing needs of South African and sub-Saharan municipalities, which led to the establishment of the Municipal Institute of Learning (MILE[8]), which is hoped will position Durban as a Centre of Learning in South Africa and the African continent. EWS officials conduct annual Master Classes at MILE, at which they share their experiences and expertise, on aspects ranging from providing services to rural and peri-urban areas, to reducing non-revenue water, with other municipalities from within the province and elsewhere in South Africa.

+	–	LESSONS
• Large numbers of people from various municipalities exposed to the experiences and lessons learned through the EWS programmes.	• Finding the time to prepare and present the courses.	• Importance of obtaining an understanding of the participants needs such that information can be focused on the relevant areas.

SUPPORT TO OTHER AFRICAN COUNTRIES

In addition to the sharing of experiences though the MILE programme, EWS offers support to other municipalities within Africa to assist them in establishing similar systems. This ranges from customer care aspects to on-site sanitation technologies. Technology transfer takes place by visits to eThekwini by various delegations, and by EWS staff spending time in other African municipalities to provide training and technical support.

"If you want to go fast, walk alone; if you want to go far, walk together." African Proverb

[8] www.mile.org.za

COLLABORATING WITH OTHERS

EWS believes in the importance of collaborating and partnering with a wide range of organisations, as shown in the table below. Various research projects, as well as initiatives to support municipalities in other African countries, are funded or co-funded through local and international organisations.

Partner organisation	Project/initiative
South African Water Research Commission (WRC)	• Co-digestion of high strength industrial wastes • Decentralised wastewater treatment systems (DEWATS)
Bill & Melinda Gates Foundation (BMGF)	• Reinvent the toilet challenge • Fertiliser from urine (valorisation of urine nutrients in Africa or VUNA) • City Partnership for Urban Sanitation Service Delivery (in conjunction with the UK Department for International Development (DfID))
Norwegian Pollution Control Authority	• Formulation of trade effluent tariffs and permitting requirements
Bremen Overseas Research and Development Agency (BORDA)	• DEWATS for the provision of services to communities living outside of the waterborne edge
The Facility for Infrastructure Development (ORIO)	• Provision of community ablution blocks as a sanitation service in dense informal settlements • AC mains replacement leading to a reduction in non-revenue water
AusAid and World Vision	• Assistance to the City of Bulawayo in network management and customer service
ICLIE – Global Cities Network	• Capacity building in the management of water and sanitation in Ethiopia
World Bank	• Providing assistance and capacity building to officials in Harare, Lusaka, Malawi, Ivory Coast, Pakistan and Bangladesh.
World Bank Water and Sanitation Programme (WSP) in Nairobi	• Development of an educational toolkit for use in developing countries as part of water and sanitation programmes
United Nations Institute for Training and Research (UNITAR)	• Durban appointed as an accredited training hub for building capacity in anglophone sub-Saharan Africa
Development Bank, South Africa	• Providing capacity building and assistance to local municipalities in South Africa
GIZ – German Development Co-operation	• Providing assistance to the City of Harare to establish a customer data base using GIS • Capacity building in Botswana
The Dutch Government	• Centre of Expertise created as a training hub for best practice
Business Partners in Development (BPD)	• PPP investigations (private companies, government and NGO partnerships) in the provision of water and sanitation services
UN Habitat	• Lilongwe Water Board – playing a mentoring role on the Global Water Partnership Alliance

JOINT RESEARCH

As far back as 2003, eThekwini Municipality recognised the need to work with local tertiary organisations to strengthen collaboration on research and development, capacity building and knowledge management. It has signed a Memorandum of Understanding (MOU) with three tertiary educational institutions: the University of KwaZulu-Natal (UKZN), the Durban University of Technology (DUT) and Mangosuthu Technikon. The desired outcomes include a stronger economy, an improvement in the quality of life for all citizens and the development of a higher skills and technology base. [9]

WITH UKZN

Subsequently, Memoranda of Agreement (MOA) have been signed between the municipality and UKZN outlining specific collaborations. One notable MOA is between EWS and the Pollution Research Group (PRG) based in the Engineering Faculty (Chemical Engineering discipline), first signed in February 2006 and again in 2013 (to run until mid-2015). Joint research projects include collecting data on the filling rate of ventilated improved pit latrines (VIPs), optimising the processing of faecal waste, modelling the operation of wastewater treatment works and undertaking customer satisfaction surveys (e.g. using urine diversion toilets or urine based fertiliser).[10]

WITH DUT

The partnership with the Institute for Water and Wastewater Technology at DUT resulted in a 300 000 m^3 demonstration plant, aimed at optimising the technology for biodiesel production using final effluent from a wastewater treatment facility.

WITH OTHER ORGANISATIONS

EWS also makes use of research organisations, such as the Human Science Research Council, to carry out customer satisfaction surveys (on the use of Customer Service Agents (CSAs), the debt relief programme and the roll-out of urine diversion toilets). The results of these surveys are used by EWS to improve service delivery. Internationally, EWS works with research organisations to develop pilot-scale demonstration plants, such as reactors for the processing of urine to fertiliser (Swiss Federal Institute of Aquatic Sciences and Technology, or Eawag), or to install and operate DEWATS (Bremen Overseas Research and Development Organisation, or BORDA).

[9] WIN-SA Fieldnote, December 201, Integrating Science Policy and Practice

[10] For more information on these projects: www.prg.ukzn.ac.za

SKILLS DEVELOPMENT

Through the collaboration with tertiary organisations, a number of staff within EWS are studying towards post graduate degrees in sanitation-related fields. This builds internal capacity and assists in ensuring a progressive and well informed team going forward.

In addition, post-graduate students (of engineering, environmental sciences and health) undertake their research work on real-life challenges and questions posed by EWS, thereby exposing them to the water and sanitation field. As a result of this interaction, 22 Master's students (of which five are EWS staff members) and four doctorate students are working on projects. Of these students, 18 are male and 8 are female.

PRIVATE SECTOR CONTRIBUTION

Collaborating with the private sector helps to ensure high technical standards of service delivery projects and on-going performance, as well as encouraging job creation and small business development. EWS uses tenders for operation and maintenance contracts, and public-private partnerships (PPP) for longer term projects.

Two successful examples are:

- the Durban Water Recycling project, whereby treated effluent from the Southern Wastewater Treatment Works is recycled for industrial use, thereby freeing potable water for use elsewhere; [11]
- the development of the latrine dehydration and pasteurisation pelletiser (LaDePa) for the processing of pit latrine sludge. [12]

EWS also uses external organisations for raising awareness within communities, e.g. performance artists to present street theatre programmes.

[11] The Durban water recycling project – The vision becomes reality: Conference proceedings, Wisa 2012 (www.wisa.co.za); www.durban.gov.za/City_Services/water_sanitation/Services/Pages/durban-recyling.aspx

[12] Towards sustainable pit latrine management through LaDePa: Conference proceedings, WISA, 2012 (www.ewisa.co.za); www.parsep.co.za

"The EWS is a unique world class example that demonstrates how political leadership combined with a visionary program have helped the international development community learn what works and does not work at scale. While leaders at EWS have already been betting on new and risky approaches to test innovation that will ultimately have a long term benefit for the population, most municipalities refrain from exploring ideas out of the box, focusing on business as usual." ***(Source: letter of reference from a partner organisation)***

"The interactions between the Pollution Research Group and the eThekwini Water and Sanitation Unit have grown and matured over the years. But it is not to say that the interaction has become routine and un-imaginative. On the contrary, the water and sanitation sector is beset with 'wicked problems' and the municipality is deeply involved in attempting to solve them. This brings together people and communities with a wide range of needs and skills with academics and professionals from all disciplines. The golden thread is the desire to improve the everyday lived life of ordinary people through the improved delivery of water supply and sanitation services.

It may sound trite, but everyone gains from the interaction; the municipality and its staff, the academics and their students and of course, poor people who are the focus of the investigations. Over the past 3 years over 80 students (is the time correct) have been exposed through research projects to unconventional modes of service delivery and the rigours of undertaking and interpreting research results.

A further outcome of the interaction has been the opportunity to work with leading international researchers and their students who come to Durban to learn about and to contribute to service delivery to the poor.

As a spin-off, the research results will also produce data that will enable middle class and wealthy live more sustainable live" ***Professor Chris Buckley, Head: Pollution Research Group, UKZN***

RECEIVING RECOGNITION

EWS has been recognised for various programmes through local and international awards. Some of these are listed below:

Debt relief programme
- United Nations Public Service Award Africa Winner: Improving the Delivery of Services in 2007
- Impumelelo Star Award in 2006

Participatory approach to engaging with the community
- United Nations Water for Life Best Practices in 2011
- Impumelelo Award in 2005 (Customer Service Agents)
- Dubai International Award for Best Practices in 2003
- Impumelelo Gold Award in 2000 (overall education programme)

Community ablution block
- United Nations Public Service Award Africa Winner: Improving the Delivery of Services in 2013
- Impumelelo Gold Award in 2012
- IWA's Project Innovation Awards: Development in 2011 (The use of Modified Shipping Containers as Community Ablution Blocks for Informal Settlements)

LaDePa pelletiser
- Impumelelo Gold Award in 2012
- IWA's Project Innovation Development Awards in 2011

Rural water and sanitation programme
- Impumelelo Gold Award in 2003.

FACTS AND FIGURES

Administrative name	eThekwini
Geographical name	Durban
Municipal area[13]	2 297 km2
Total population (approx.)[13]	3.6 million
Estimated number of households (2011) [14]	912 400
% formal housing[14]	54%
% informal settlements[14]	34%
% rural housing[14]	12%
% of households receiving free basic services[14]	37%
Water stats	
Volume of water supplied to customers[13]	900 Ml / day
Number of water treatment works[13]	9
Number of water reservoirs[13]	263
Length of water mains[13]	12 000 km
Number of water connections[13]	420 000
% of households with access to free running water[14]	55%
Sanitation stats	
Length of sewerage system[13]	7 000 km
Volume of wastewater treated[13]	500 Ml / day
Number of wastewater treatment works owned[13]	27
Volume of wastewater recycled for industrial use[13]	40 Ml / day
% of households with flushing toilets[14]	48%
% of households with Urine Diversion Toilets[14]	9%
% of households with Ventilated Improved Pit Latrines[14]	4%
% of households with access to Community Ablution Blocks[14]	8%
Backlog for sanitation services[14]	20%
Financial stats	
Total EWS budget[15]	>R6.2 billion
Total sanitation budget[15]	R 700 million
UD Toilet construction[15]	R 30 million
Community Ablution Blocks[15]	R 250 million
VIP emptying programme[15]	R 20 million

[13] Water Services Development Plan (2011), EWS
[14] Latest survey data from EWS (2014)
[15] Personal communication with EWS financial department (2014)

SALGA
South African Local Government Association

WATER RESEARCH COMMISSION

South African CitiesNetwork