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LESSON SERIES
August 2013

SANITATION UPGRADING PROGRAMMES

Lessons from the Bucket Eradication Programme

WATER RESEARCH COMMISSION

ACKNOWLEDGEMENTS

This lesson is compiled from the Water Research Commission **Report No. 2016/1/12: Evaluation of Sanitation Upgrading Programmes: The Case of the Bucket Eradication Programme.** The report was compiled by **NP Mjoli of Hlathi Development Services.**

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Yazeed Kamaldien (www.yazkam.com)

ACRONYMS

IAPS	-	Integrated Algal Pond System
DWAF	-	Department of Water Affairs
WRC	-	Water Research Commission
BEP	-	Bucket Eradication Programme
O&M	-	Operation and Maintenance
H&HE	-	Health &Hygiene Education
GDS	-	Green Drop Scores
BOD	-	Biological Oxygen Demand
WWTW	-	Wastewater Treatment Works
NDHS	-	National Department of Human Settlements

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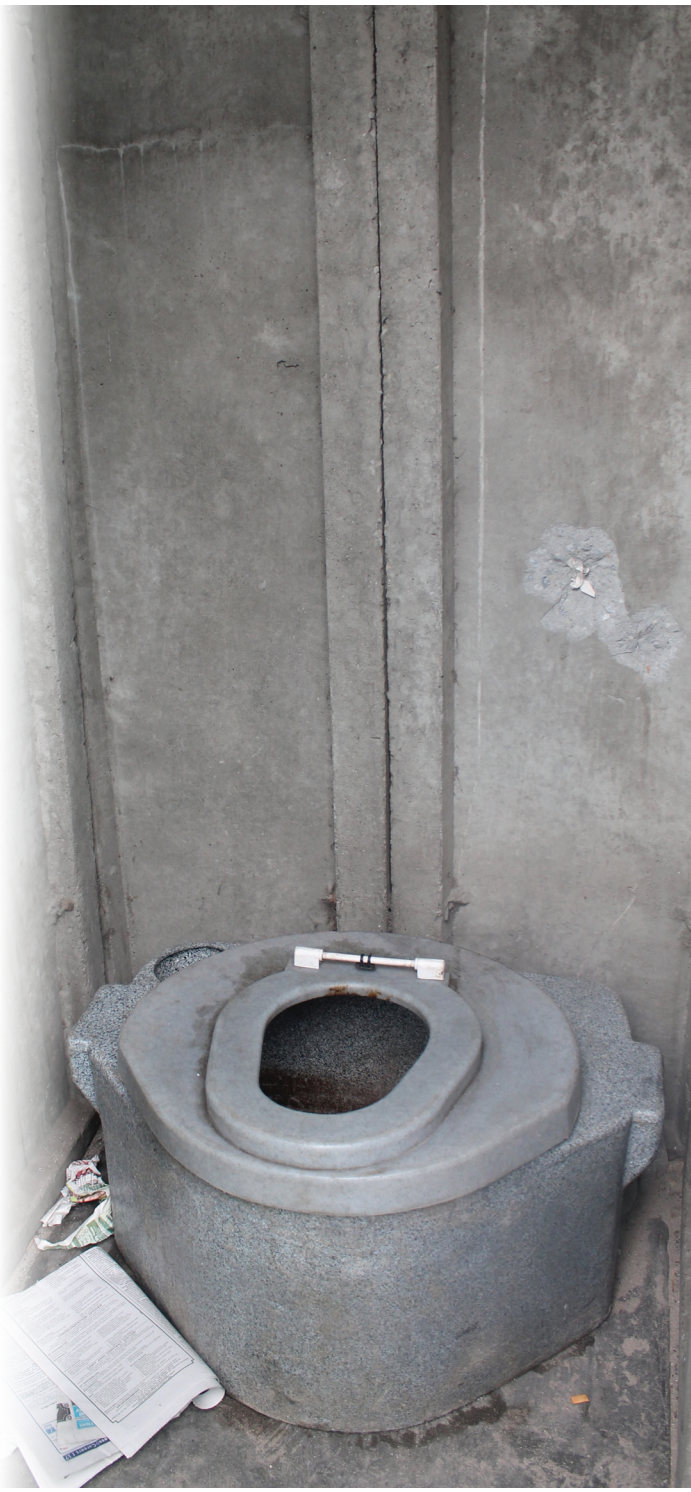
1 BACKGROUND

The bucket sanitation system is considered to be one of the worst sanitation systems because of its violation of human dignity for the users and those responsible for collection and disposal of the human waste from bucket toilets. Additionally, it is considered to be unhygienic and expensive to maintain.

The South African national government took a decision to accelerate the eradication of the bucket sanitation system. Former President Mbeki in his state of the nation address of February 2006 set a target for the eradication of all pre-1994 buckets from the formal townships by December 2007.

In February 2005, the bucket sanitation backlog in formal townships in South Africa was estimated at 252 254 buckets (DWAF, 2006). Former President Mbeki in his state of the nation address of February 2006 set a target for the eradication of all pre-1994 sanitation buckets from the formal townships by December 2007. According to the Department of Water Affairs' close out verification report of the bucket eradication programme (DWAF, 2009) between February 2005 and December 2007, the national government allocated a total of R1.8 billion for the eradication of all pre-1994 buckets from formal townships.

For the majority of South African municipalities, eradication of the bucket system entailed replacing it with the conventional waterborne sanitation system. This presented a challenge for municipalities servicing areas without bulk sewers and inadequate wastewater treatment capacity and in some cases the available water supply could not support the new waterborne sanitation systems. The bucket sanitation system was considered to be unhygienic and expensive to maintain and it violated the human dignity for the users and those responsible for collection and disposal of the human waste from bucket toilets.



Definition of the bucket sanitation system

A bucket sanitation system is defined as a toilet with a bucket or other removable receptacle placed directly under the toilet seat for the purpose of collecting urine and faeces (DWAF, 2007).

2 THE WRC STUDY ON THE BUCKET ERADICATION PROGRAMME

A Water Research Commission (WRC) study concluded in 2012 was initiated to assess what worked and what did not work in the Bucket Eradication Programme (BEP), to evaluate the programme's extent of compliance with sanitation policy principles, and to assess the impact of the BEP on the quality of life for the beneficiary communities. There was a need to document lessons learned from the accelerated bucket eradication programme so that these lessons could inform the planning of future sanitation upgrading programmes for households that were still using the bucket sanitation system.

This lesson document presents lessons, recommendations and conclusions from the study.

A WRC study, concluded in 2012, was initiated to assess what worked and what did not work in the Bucket Eradication Programme (BEP), to evaluate the programme's extent of compliance with sanitation policy principles, and to assess the impact of the BEP on the quality of life for the beneficiary communities. There was a need to document lessons learned from the accelerated bucket eradication programme so that these lessons could inform the planning of future sanitation upgrading programmes for households that were still using the bucket sanitation system.

The study had the following objectives:

- To evaluate the integration of sanitation policy principles in the implementation of the bucket eradication programme.
- To assess the integration of water conservation and water demand management strategies in the implementation of waterborne sanitation systems and consideration of water availability, wastewater treatment plant capacity and compliance with groundwater protocol.
- To evaluate the planning for O&M of sanitation facilities within the context of free basic sanitation services, household affordability and environmental sustainability.
- To assess household perceptions of the impact of the bucket eradication programme on the improvement in the quality of their lives.
- To evaluate the level of technical advice provided to municipalities by consulting engineers to assist them to implement technically and financially sustainable sanitation systems.
- To document best practice and highlight problem areas.
- To make recommendations for scaling-up good practice and initiatives necessary to rectify the identified problem areas.

The study used five case study municipalities to conduct an in-depth evaluation of the bucket eradication programme, namely: Mangaung (FS), Tokologo (FS), Sol Plaatje (NC), City of Matlosana (NW), and Makana (EC).

The municipalities were selected based on the following criteria:

- Provinces that had the highest number of qualifying buckets during the accelerated phase of the bucket eradication programme, starting from February 2006 – July 2009;

- Innovation – municipalities that used innovative approaches to eradicate the buckets, such as the use of close-circuit system to provide waterborne sanitation systems under conditions of scarce water resources;
- Municipalities with huge bucket sanitation backlogs;
- Municipalities replacing the bucket sanitation with waterborne under difficult socio-economic conditions such as negative economic growth and high unemployment levels;
- Municipalities with both economic and technical constraints (limited water availability and lack of funds to ensure financial sustainability of waterborne sanitation services).

Municipality	DM, Province	Population	No. of Households	Bucket backlog in 2006	Selection criteria	Defining characteristics
Mangaung	Motheo, FS	752 906	202762	16 370	Municipality with the highest no of buckets in FS	Mangaung was experiencing rapid urbanization; improvement in income of its population
Tokologo	Lejweleputswa, FS	21323	7477	1446	Innovation -Piloting close circuit wastewater treatment and recycling sanitation system	Poor municipality with a decreasing population, high dependency on grants
Sol Plaatje	Frances Baard - NC	243 018	52120	8221	Municipality replacing the buckets under difficult socio-economic conditions	Sol Plaatje was experiencing high unemployment (38.8%) and limited prospects for economic growth
City of Matlosana	Dr Kenneth Kaunda , NW	401 122	119274	14 400	Municipality with highest no. of buckets in the NW	High average income per household because of high employment in mining and supporting industries
Makana	Cacadu, EC	70 059	18864	2805 (1303 pre-1994)	Municipality with difficult socio-economic conditions	High unemployment rates (34.3%) and only 32.1% of the population is employed, 51% of HHs depend on government grants

Description of case study municipalities

3 KEY FINDINGS OF THE STUDY

Survey questionnaires for deployed engineers and beneficiary municipalities were used to assess the role played by the deployed engineers in the implementation of the BEP. Focus group discussions were held with representatives of the beneficiary communities in the five municipalities to assess their perceptions of the impact of the BEP on the quality of their lives and workshops were used to solicit inputs from the relevant sanitation stakeholders. The study made use of secondary data to get a thorough understanding of sanitation service delivery in the selected case study municipalities and surveyed municipalities.

The scope of the study included the evaluation of the BEP and the broader aspects of sanitation service delivery in selected provinces that had the bulk of bucket sanitation backlog in February 2005. The study has focused on buckets which were eradicated between February 2005 and July 2009.

The following are the key findings from the WRC study:

i. Extent of BEP Compliance With Sanitation Policy Principles

Ensuring access to basic sanitation services as a right

All case study municipalities complied with the sanitation policy principle of ensuring access to basic sanitation service as a right, and provided a 100% sanitation subsidy to registered indigents. However, they did not make any provision for meeting the special sanitation needs of physically disabled, frail and other vulnerable groups. A one-size-fits-all toilet was constructed for each household.

Integration of H&HE and user education into the BEP

Health &Hygiene Education and user education were neglected by four case study municipalities, who claimed that these components were not included in the BEP budget. The lack of user education contributed to the problem of regular blockage of household toilets due to the use of inappropriate materials for anal cleansing and disposal of foreign materials into the toilets.

Community participation

Only one out of five case study municipalities engaged the beneficiary households in the selection of the sanitation technology option. One of the case study municipalities learned a costly lesson when it replaced buckets with VIP toilets without consulting the beneficiary community. These toilets were rejected and vandalized by the angry beneficiary community which demanded waterborne sanitation facilities.

Financial sustainability

The decision to replace buckets with the waterborne sanitation system was not based on a thorough assessment of affordability of this higher level of service for municipalities and the beneficiary households. All the case study municipalities were concerned about the long-term financial sustainability of the waterborne sanitation system because the beneficiaries of the BEP were not paying for sanitation services except in one case study municipality where households who were not registered as indigent were paying for sanitation services. All five municipalities were facing a problem of increasing O&M costs for sewerage services because of high incidence of blocked drains and sewers which were caused by the use of inappropriate anal cleansing materials and disposal of foreign materials into the toilets.

Environmental sustainability

Only one case study municipality conducted a thorough assessment of water availability, capacity of water supply infrastructure and wastewater treatment capacity before taking a decision to replace buckets with waterborne sanitation system. Four case study municipalities received low average municipal Green Drop Scores (GDS) in the range of 0% to 52% and only one municipality received a score of 76% in the 2011 Green Drop assessment (DWA, 2011). The wastewater quality compliance ranged from 0% to 83% GDS for the five case study municipalities. The poor performance was attributed to the lack of technical skills, poor O&M and in some cases the wastewater treatment plants had already exceeded the design capacity. One of the case study municipalities was discharging non-compliant effluent from two of its plants because the wastewater treatment processes were compromised by high biological oxygen demand (BOD) wastewater from the abattoir and chicken industry which was discharged into municipal sewers without pre-treatment.

Figure 1: Wastewater with blood flowing into the screens in Klerksdorp WWTWs

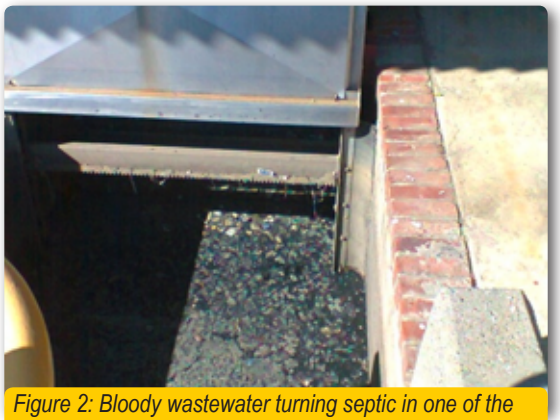


Figure 2: Bloody wastewater turning septic in one of the inlet screens due to blockage caused by "thick" clots of blood in the wastewater

Figure 3: Feathers collected in one of the corners of the activated sludge reactors in Hartbeesfontein

Figure 4: Secondary clarifier

Figure 5: Fat, blood and feathers collected in one of the corners of chlorine contact tank

Integration of water conservation and water demand measures

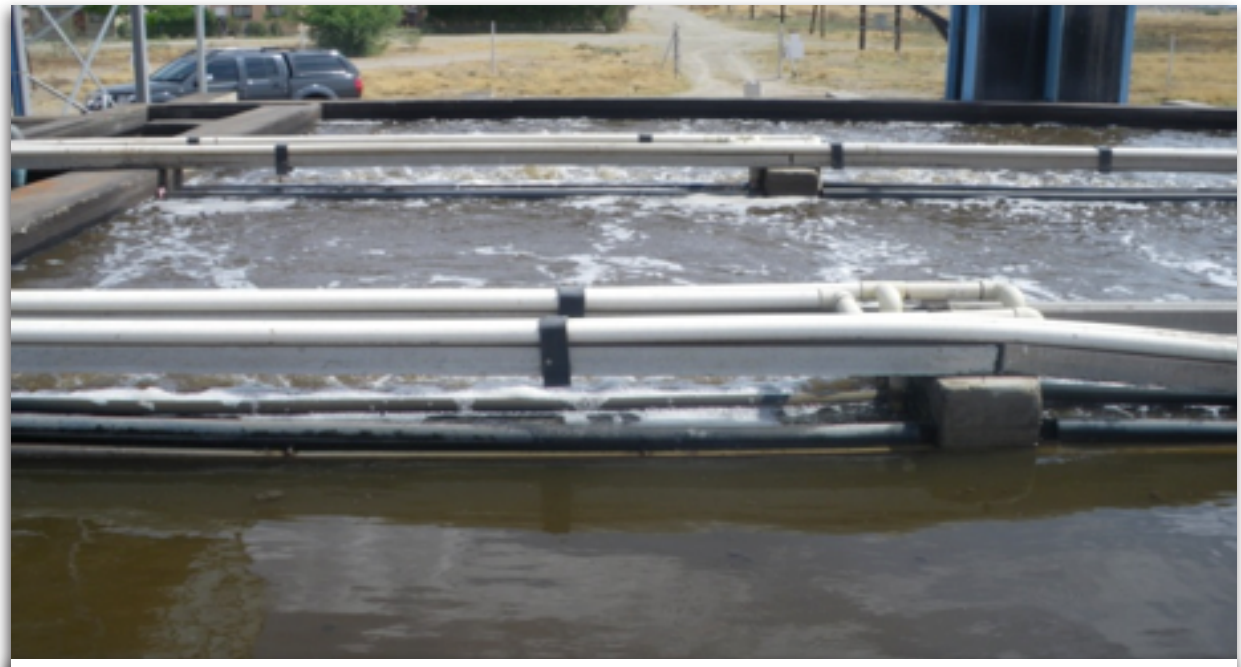
Four case studies municipalities did not include water saving measures during the installation of waterborne sanitation systems. Only one case study municipality installed six litre cisterns in household toilets to save water.

ii. Perceptions of the Impact of the BEP By Beneficiary Households

The representatives of beneficiary communities who participated in focus group discussions in all five case study municipalities were satisfied with the waterborne sanitation facilities which were convenient and safe for use by children. They believed that the quality of their lives had improved and their human dignity was restored because they were no longer subjected to the dehumanizing buckets. The representatives of beneficiary communities from the four case study municipalities believed that the health of their children and the entire community had improved as a result of the replacement of buckets with the waterborne sanitation facilities. The flies that used to breed in uncollected buckets were no longer a problem. The representatives of the beneficiary community from one case study municipality reported no improvement in the health of children and the rest of the community because 500 households were still using buckets which served as breeding ground for the disease spreading flies.

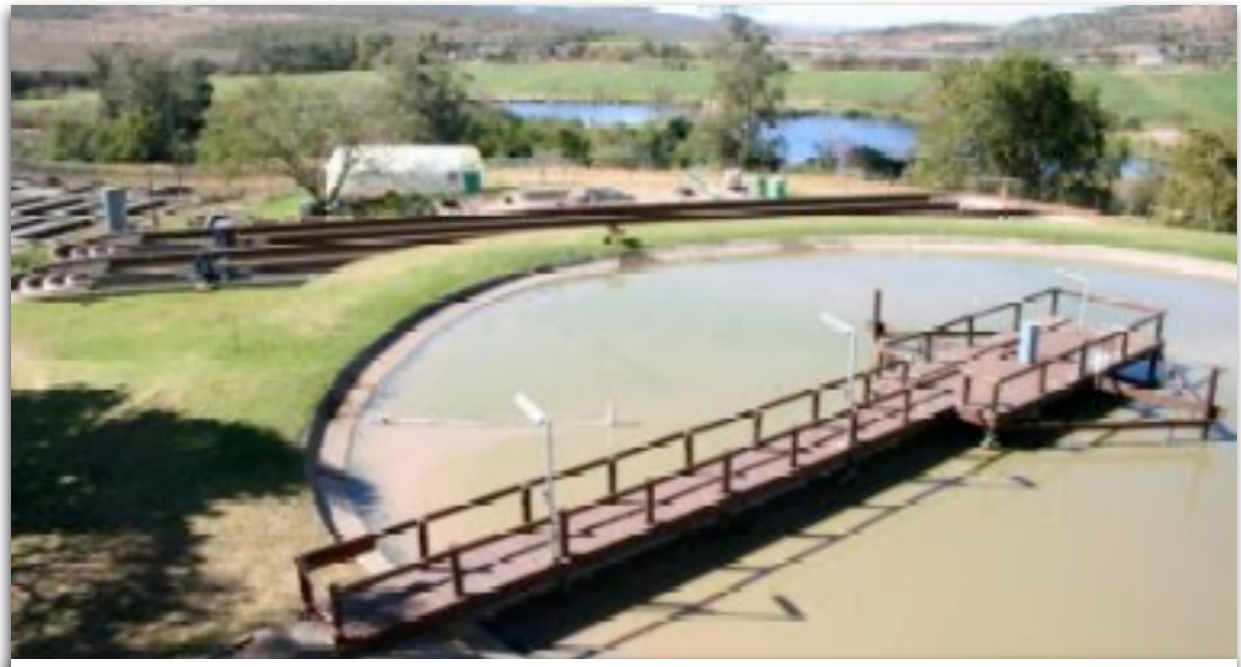
iii. Use of Innovative Sanitation Technologies

Tokologo Municipality was piloting the close circuit wastewater treatment and recycling sanitation system. Although there were problems of reliability with this system, the users were happy to have waterborne sanitation facilities. However, more research was required to resolve the technical problems associated with the technology such as the expected increase in salinity and its potential impact on the biological wastewater treatment processes.



Tokologo *– Close circuit wastewater treatment tank divide into three compartments of equal volume*

Makana Municipality in partnership with Rhodes University successfully piloted the integrated algal pond system (IAPS) technology for the treatment of municipal sewage. They demonstrated that this low cost and robust wastewater treatment technology could produce effluents that were compliant with effluent discharge quality standards and it also produced algae which could be used in crop production.



Makana IAPS *- Pilot plant in Belmont Valley wastewater treatment works*

Storage tank with treated wastewater for distribution to the connected houses

iv. The role of deployed engineers in the implementation of the BEP

The deployed engineers made a significant contribution to the acceleration of the eradication of the pre-1994 buckets from formal townships, but they played a limited role in influencing the municipalities in the choice of the sanitation technology options because a political decision was already taken to replace buckets with the waterborne sanitation system. They mentored junior technical officials to operate and maintain the new wastewater treatment works. A few engineers trained the plant operators on the requirements of the Blue Drop and Green Drop assessment programmes. It was not always possible to transfer technical skills in all municipalities because there were cases where there were no technically qualified municipal officials who could be trained to operate and maintain the new or upgraded wastewater treatment works.

v. Review of the financial performance of seven selected municipalities

A review of the financial performance of seven selected municipalities was conducted over a period of three years (2008-2010) which followed the eradication of the majority of buckets. The aim of the review was to identify trends in annual revenue, expenditure, bad debts, water and sewerage debtors which could impact on financial viability of these municipalities. The review highlighted the following:

- All selected municipalities experienced problems with revenue collection due to high unemployment levels, poor credit control and debt collection;
- Increasing dependency on equitable share, in 2 out of 7 municipalities the equitable share accounted for more than 40% of the total annual revenue in 2010;
- Low levels of expenditure on repairs and maintenance – All seven municipalities were spending less than 7% of their revenue on repairs and maintenance and five out of seven municipalities showed a reduction in expenditure for this component over the three years reviewed;
- Increase in water and sewerage debtors – Five out seven reviewed municipalities showed an increase in water debtors and sanitation debtors over the review period. Only one municipality showed a decrease in water and sanitation debtors during the three year period reviewed.
- Five out of seven reviewed municipalities were implementing stringent measures to improve revenue collection, credit control and debt recovery.

vi. Problems associated with the sustainability of the accelerated BEP

The following aspects of the BEP compromised sustainability:

Political aspects

- The political targets and supply-driven approach to the implementation of the BEP overlooked the definition of sanitation as a service that goes beyond the provision of a toilet.
- Due to the political driven targets, the implementation of the BEP was not preceded by proper strategic sanitation planning.
- The key performance indicator for the BEP was the number of buckets replaced, there was no focus on the quality of toilets constructed, water availability and capacity of wastewater treatment works (WWTWs), affordability and availability of technical capacity to operate and maintain the new sewerage networks and wastewater water treatment plants.
- Due to the top-down nature of the BEP, there was no emphasis on Health &Hygiene Education (H&HE), user education and community involvement in the planning of the BEP at the local level. Limited emphasis was placed on appropriate sanitation technologies, socio-economic factors and environmental factors.

Institutional aspects

- The Municipal Technical Directors were forced to succumb to political pressure to replace buckets with waterborne sanitation systems under difficult technical, environmental and socio-economic conditions.
- Despite the government's huge investments in the eradication of bucket sanitation because this technology was considered to be unhygienic and a violation of human dignity, the case study municipalities were continuing to perpetuate the use of buckets in informal settlements without sanitation facilities.
- Weak national and provincial regulation and oversight of municipalities led to poor compliance with sanitation policy principles and other national norms and standards.

- The transfer of sanitation responsibility from the Department of Water Affairs (DWA) to National Department of Human Settlements (NDHS) created confusion on the institutional responsibility for sanitation regulation.
- During the implementation of the BEP, the government appointed private companies to control the procurement of contractors and engineering firms were commissioned to build wastewater treatment plants. But once construction was completed no further resources were allocated to ensure that these new or upgraded wastewater treatment works were operated and maintained properly.

Financial aspects

- Government failed to couple investments in infrastructure with matching investment in technical capacity for operation and maintenance of the sanitation infrastructure to ensure sustainable sanitation service delivery.
- All the municipalities reviewed as part of the study were struggling with huge debts because of non-payment for municipal services by businesses, government institutions and households. Payment of municipal service charges by these consumer groups could improve the long-term financial viability of municipalities.

Social aspects

- The current interpretation of the concept of human rights has led to the perception that human rights meant that basic water supply and sanitation should be free. The national government needed to clearly define its boundaries of responsibility. Similar criteria for qualifying for the RDP housing subsidy should be applied to the bucket replacement programme to reduce the financial burden for government.
- The BEP consultants and contractors did not always have the necessary social focus, and they did not consider H&HE and user education as components of sanitation infrastructure projects.

4 CHALLENGES & LESSONS LEARNED FROM BEP

Challenges

The following challenges were identified by municipal officials from the five case study municipalities:

- ***Securing adequate funds for the bucket eradication programme***
  The national bucket eradication fund was limited to pre-1994 buckets in formal townships, therefore, municipalities with limited revenue struggled to eradicate all post-1994 buckets.

- ***Affordability of waterborne sanitation services for the poor***
  The smaller and poor municipalities were concerned about financial sustainability of waterborne sanitation services because the majority of the BEP beneficiaries were indigent and even those households who could afford to pay were not paying for sanitation services.

- ***Use of inappropriate anal cleansing materials by poor households***
  Three case study municipalities were faced with a problem of regular blockages of drains because poor households could not afford toilet paper and they were also disposing foreign materials into the toilets. This increased O&M costs sanitation in these municipalities.

- ***Lack of funds to upgrade and build new wastewater treatment works***
  Some municipalities with limited funds were struggling to secure funds for upgrading or building new WWTWs to accommodate the additional connections. This affected the quality of the wastewater discharged from these overloaded WWTWs.

- ***Critical shortage of technical skills***
  Most case study municipalities did not have adequate technical skills for operation and maintenance of wastewater treatment plants.

Lessons

i. Sanitation service delivery was a complex process that could not be reduced to a toilet.
The BEP focused on toilet construction and neglected the sustainability aspects such as community involvement, affordability, hygiene education, user education and proper O&M of wastewater treatment works.

ii. Failure to invest in water efficient sanitation technologies could put pressure on local waterresources
The neglect of the integration of water conservation and water demand management measures into the BEP could put pressure on local water supply and increase the cost of providing water services to poor households who depended on subsidized water services.

iii. Partnerships between local universities and municipalities can contribute solutions to sanitation challenges
The successful piloting of the Integrated Algal Pond System (IAPS) for treating municipal sewage by Rhodes University and Makana Municipality demonstrated the important role that could be played by partnerships between local universities and municipalities in finding solutions to local sanitation problems.

iv. Municipalities were implementing stringent measures to improve revenue collection

Several municipalities reviewed as part of this study were implementing stringent measures to improve revenue and debt collection, such as deduction of municipal service charge arrears of municipal officials and councillors from their monthly salaries.

v. It is crucial for municipalities to take ownership of sanitation infrastructure projects

Municipalities must take leadership and ownership of their sanitation infrastructure projects instead of handing over control to the consulting engineers because they remain legally responsible for O&M and sustainable sanitation service delivery long after the engineers had finished construction of infrastructure and left.

vi. Repair and replacement of malfunctioning components of the wastewater treatment works should not be subjected to rigid municipal procurement procedures

Municipal management must treat the requests for the repair or replacement of components of wastewater treatment plants as urgent and not subject them to the standard government procurement procedures because the delays could compromise the wastewater treatment processes and the quality of effluents discharged.

5 RECOMMENDATIONS & CONCLUSIONS

The following key recommendations and conclusions are based on the outcomes of the BEP evaluation in the case study municipalities:

Recommendations:

i. Weak sanitation governance must be addressed and the water sector regulator must implement appropriate penalties and incentives to enforce compliance with effluent discharge standards.

ii. DWA as the water sector regulator should implement a competency criteria for technical directors and plant operators in all municipalities. This could be modelled on the National Treasury competency criteria for finance staff in municipalities.

iii. Sanitation sector leadership and coordination must be improved.

iv. Resources should be allocated to reverse the identified problems which were threatening the sustainability of sanitation services.

v. Engagement of the private sector to operate and maintain wastewater treatment works that posed a high environmental risk should be considered.

vi. Community involvement, H&HE and user education must be placed at the centre of sanitation service delivery to ensure community ownership.

vii. Stringent measures adopted by several reviewed municipalities to improve revenue and debt collection should be replicated in municipalities facing similar challenges.

viii. Low cost robust wastewater treatment technologies such as the Integrated Algal Pond

a. System (IAPS) piloted by Makana Municipality and Rhodes University should be considered for scaling-up in rural municipalities with limited financial and technical capacity to operate conventional wastewater treatment works.

ix. Incentives must be provided to encourage municipalities to implement innovative sanitation technologies that are affordable and acceptable to the beneficiary communities.

x. Flexible procurement procedures are required to accelerate the repair or replacement of crucial components of WWTWs to avoid compromising the wastewater treatment processes.

Conclusions

What worked?

i. The bucket eradication programme was characterized by good project management, effective coordination and cooperation of sector departments and it enjoyed buy-in from all the political levels and the three spheres of government.

ii. The deployed engineers played a significant role in helping municipalities without technical capacity to eradicate the majority of pre-1994 buckets by July 2009.

iii. The beneficiary households were satisfied with the waterborne sanitation facilities, they believed that their health had improved and their human dignity was restored because they were no longer subjected to the dehumanizing buckets.

What did not work?

i. The BEP case study municipalities failed to comply with most of the sanitation policy principles.

ii. The supply driven approach adopted in the implementation of the BEP failed to plan for sustainable sanitation service delivery because it focused on toilet construction. This led to poor performance of wastewater treatment works which were assessed as part of the study because no resources were allocated to the proper operation and maintenance of new or upgraded WWTWs.

iii. The BEP put limited emphasis on Hygiene awareness, community involvement and user education.

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