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SUSTAINABLE DEVELOPMENT OF WATER RESOURCES, WATER SUPPLY AND ENVIRONMENTAL SANITATION

Provision of Free Sustainable Basic Sanitation: The Durban Experience

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The cholera outbreak in August 2000 focused the government's attention on addressing sanitation in South Africa as a matter of urgency. This led to a policy review, the promulgation of the National Sanitation Policy (2001) and finally to the development of a national strategy to eliminated the sanitation backlog over the next ten years. The cholera outbreak, together with the Millennium Development Goals for water supply and sanitation, have highlighted an urgent need for sustainable service delivery in this country.

In Durban, the eThekwini Municipality (EM) is attempting to ensure an effective barrier against the spread of disease among the newly incorporated, under-serviced rural communities of the Municipality. These challenges are being addressed through an innovative, sustainable approach in the provision of free basic water supply (200 litres/household/day), and a urine diversion toilet, together with health and hygiene education that promotes hygienic behaviour practices. According to the Strategic Framework for Water Services, Water Service Authorities (WSAs) should not only provide the water services necessary for basic health and hygiene. The municipalities are also required to provide services, which support sustainable livelihoods and economic development. This paper reflects the process followed in meeting the above challenges as well as the lessons learned.

Introduction

In South Africa, like other countries with water and sanitation backlogs, the population mostly aspires to in-house, full-pressure water supply and flushing toilets linked to waterborne sewerage and wastewater treatment. The government recognises that the provision of these levels of services to all is neither technologically nor financially feasible, nor necessarily environmentally sustainable. Peri-urban and rural populations particularly are unsuited to the provision of such services, owing to absence of land ownership, housing density, population mobility, and inaccesible terrain.

The Ventilated Improved Pit (VIP) latrine is the minimum and cheapest option of acceptable service. These dry on-site sanitation systems that do not require the expense of water to dispose of urine and faeces. Once the pit is full the top structure can be moved over to another freshly dug pit and the old pit sealed. This is feasible only if there is sufficient space to relocate the pit.

Government policy states that everyone has the right to basic sanitation (affordable, appropriate, effective, socially acceptable and sustainable), as well as free basic water for all. The encouragement of VIP usage, emphasising human dignity, has translated into status, and VIP superstructures have become immovable brick superstructures. This precludes the VIP being moved with any degree of ease, and results in pits having to be evacuated mechanically when full (Brouckaert et al. 2005).

Mechanical desludging equipment is expensive, vulnerable to failure, often cannot access the site and frequently cannot cope with the heavy sludge and solid matter found in the pit. The alternative is manual emptying, where people dig excreta and solid waste out of the pit, using shovel, buckets and other implements. This work can be unpleasant, and poses a number of health risks if not managed carefully. For those pits that can be accessed by tanker the average costs for emptying one pit is in the region of R600 - R1 000. The householders contribution for emptying the pit is R80, while the balance of the cost is subsidised by the municipality (in this case, Durban). Clearly this is not sustainable in the long term.

South Africa runs the risk of an outcome similar to Zimbabwe, where pits provided through sanitation programmes are now full. No mechanism is in place to empty them and new pits are not being built. (M Jonga undated, citied by Austin & Holden 1999). Unless the pit can be emptied economically, investment will be lost. According to a nationwide sustainability audit of sanitation facilities initiated by the Department of Water Affairs (DWAF) and other sector departments, up to 28% of toilets (or serviced households) could fail in the short to medium term, resulting in 0.46 million households (or 1.9 million people) reverting onto the backlog list before 2010 (Matingi and Associates 2005).

The government provides a subsidy for the installation of basic services, including water and sanitation, via the Municipal Infrastructure Grant (MIG). Subsidies for free basic sanitation cover the costs of hygiene promotion and

the capital costs of providing a basic sanitation service to households (DWAF 2003). The current approved subsidy, in the region of R3 000 (including VAT) per household, places an enormous burden on WSAs that have to make up for the shortfall, especially when costs escalate due to increases in materials and labour costs, and where other sustainable toilet options are selected.[1]

eThekwini Municipality (EM), the local authority for the city of Durban, on the eastern seaboard of South Africa within the province of KwaZulu-Natal (KZN), covers an area of approximately 2 297 square kilometres, with a population of just over three million (eThekwini Municipality 2002 census). Following the municipal elections in 2002 the Metro boundaries were extended to include an additional rural 75 000 households (60 000 of which were not served) (EM 2003). The eThekwini Water and Sanitation (EWS) unit, responsible for water and sanitation service delivery, has developed a new approach to delivering water and sanitation services, as part of the Integrated Development Planning (IDP) process. Basic water and sanitation are provided as an integrated package, together with associated educational support to those newly incorporated rural areas, falling outside the waterborne edge[2]. This approach allows for cost effective delivery, a water supply compatible with a sanitation solution, and an education programme addressing operation and maintenance (O&M) of the services, as well as health and hygiene issues (EM 2003).

The municipality adopted a policy based on the principle that the only sustainable on-site household sanitation option was one which the householders could sustain themselves. In support of this policy, the urine diversion toilet option was selected for the following reasons:

- The provision of waterborne sewage infrastructure to newly incorporated rural areas would be costly and impractical due to physical considerations.
- Conventional VIPs would not be sustainable due to the problems of tanker access when emptying, and the cost to the municipality of a subsidised emptying process.
- Each household would be provided with 200 litres of free water daily. This limited free water supply dictates the use of a dry sanitation system..
- The urine diversion (UD) toilet (if correctly used) would allow for safe on-site disposal of human waste, with no need for municipal intervention besides education and training.
- New pits would not need to be periodically excavated, nor new top structures built when the old pit was full.
- The risk of environmental damage would be limited as the waste would be almost broken down before it was exposed to the surrounding soil - in contrast to the conventional VIP which can allow seepage of raw sewage into the surrounding soil and water table.

A synopsis of the integrated approach to the provision of water and sanitation in the EM region is as follows:

Water

200 litres of free potable water is supplied via a 200 litre ground tank, filled daily. Municipal mains are laid along district road reserves. Communal mains are laid along tracks and paths, supplying between 15 and 30 consumers[3].

Sanitation

The urine diversion toilet consists of two chambers, which allow access to the contents from the rear of the chamber, constructed above or slightly below ground level. The pedestal is designed to allow urine to flow to a soakaway, while the faecal matter collects in the chamber in use. A urinal for men also links to the soakaway. Sand or ash is added as covering material over the faeces after each use to promote drying and prevent odour and fly problems. When the chamber is full, the pedestal is moved to the second chamber and the opening to the first chamber is sealed. When the second chamber is full, the contents of the first chamber are emptied and the pedestal switch is again carried out. The householder is instructed how and when to remove the contents, and how and where to dig a hole and bury the contents on site.

Programme Management

The Construction Branch of EWS project manage the process, using local labour for construction. Skills development is central to the success of construction. Institutional and Social Development (ISD) consultants inform the community about the project, confirm demographics, liaise with local structures and provide training, using techniques developed by EWS on the maintenance of toilets, and general health and hygiene practices. A Project Steering Committee (PSC) for each project ensures representation and participation. The PSC acts as a communication channel between the project management team and the community. Local facilitators, selected, managed and trained by the ISD consultants, conduct house-to-house liaison and education.

Planning

Projects are selected and prioritised according to the following criteria:

- Health related index (the highest weighting factor)
- Technical feasibility (does not change the weighting)
- Funding provision (determines when projects occur)
- Availability of resources.

The Health Department established that cholera incidences re-occur every three to five years in areas without access to

[1] The subsidy is currently under review by DWAF. WSAs will be considered for an increased subsidy if they can show that the chosen service type is viable and sustainable; and is neither harmful to the environment nor disadvantageous to other users.

[2] The waterborne edge is a line drawn on a map which demarcates those area where it is neither financially or technically feasible to provide waterborne sanitation, from those areas which already have the service.

[3] A household, consisting of a group of dwelling units or a single house, registered by the EM is regarded as a consumer.

potable water and sanitation. The health related index is the primary criterion in project selection and prioritisation because it indicates the greatest risk to communities.

Implementation

Phase A (Project Initiation):

Phase A comprises project selection; feasibility and initiation; engineering, geological, environmental and social status surveys; intervention planning, budget development, water services project description and approvals. It also consists of PSC and facilitator selection and training, community consultation and education programmes.

Phase B (Delivery)

During Phase B, households complete application forms for water connection (and pay fees) and assistance for toilet provision; households receive education programmes and provide sweat equity. EWS makes the final connection to the water mains after all work for both the toilet and water supply is inspected and complete. A 'Metro number'[4] forms a record of the as-built toilets and water connection per households, and is recorded on the Geographic Information System (GIS).

Community Education

Each household gets five visits, during the pre-construction and delivery stages. They learn about their own responsibility, sweat equity, health and hygiene, and operation and maintenance (O&M). Post implementation education reinforces the messages.

Monitoring and Evaluation

EWS has commissioned the Human Sciences Research Council (HSRC) to conduct an ongoing, independent evaluation of the roll-out. Looking at a sample of 1 160 randomly selected households, the HSRC examines the effectiveness of the education programme, the community acceptance of the water and sanitation systems, as well as maintenance of the systems by householders. In addition, the researchers check the quality and durability of the construction and the hygienic maintenance of the systems through an observational checklist.

Research

In collaboration with University of KwaZulu-Natal (UKZN) various trials and studies are being conducted, looking at risk assessment and potential re-use of UD toilet contents for agriculture.

Training and Capacity Building

Throughout the process education, training and capacity building play an important role, at the following levels:

- Training of ISD consultants (by EWS) on the general objectives of the project.
- Training of community facilitators (by ISD consultants) - with the focus on the employment of women - on project information, together with focused heath and hygiene education and how this should be disseminated at the household level. Each household is visited five times at various stages or milestones.
- Building capacity of PSCs through workshops.

Achievements and Outcomes

Ethekwini's rural water and sanitation programme is still in its infancy, having only been in existence since 2003. Currently 45000 units (June 2006) have been completed at a rate of 1 000 units per month.

EM is unique in South Africa in that it has integrated the water and sanitation service delivery process as a single 'package', with associated training. The outcome will be improved access to services with a lower than normal O&M burden, a reduction in cholera and other waterborne diseases, and general improvement in health.

Lessons Learned

Constant feedback is achieved from the HSRC conducting an ongoing independent evaluation of the roll-out, the effectiveness of the education programme, community acceptance of the water and sanitation systems, as well as householder maintenance of the systems. Evaluation has lead to the detection of problems, including the design of toilets and water tanks, has identified gaps within the education programme, as well as the need for additional interventions. Collaboration with the University assists with the development of sound policies for project sustainability.

The EM experience has yielded the following lessons:

1. Centralise the risk or challenge to a single unit or institution (capital, operating, public health and life cycle costs). This centralisation of sustainable service delivery in the hands of EWS encourages focus on outcomes, rather than outputs, and makes the primary drive sustainability (quality), rather than numbers (quantity). EWS has faced an enormous challenge of driving an education programme around health issue (life-threatening in the case of cholera), and providing a model for other related departments, such as Health.

2. Develop an implementation model which suits the institution. EM has a thorough understanding of the background and make-up of the community that is being targeted, resulting in a model that is cost effective and acceptable to the consumer, and has also cut down costs.

The implementation model also needs to:

- reduce the number of external role players
- reduce the operating burden and
- build the institutional capacity of the municipality to have clear implementation guidelines and rules.

Internal communication mechanisms are in place to facilitate joint development, management, communication and co-operation between departments in the programme.

3. Focus on the household. Establishing relationships with households, rather than dealing with an anonymous

[4] A 'Metro number' is an administrative number allocated to a household which allows the household (and the consumer) to be uniformly referenced and mapped.

'community' improves sustainability of service delivery. Households are 'employed' on various construction tasks, complete an application form and to pay a water connection fee. The evaluation study shows that it would be counterproductive for the municipality to clear the chambers, because there would be less incentives for householders to keep the contents of the UD chambers dry, and to keep them free of rubbish and chemicals.

4. Monitor and evaluate constantly and alter the implementation model. EWS has been able to address issues as they arise. For example:

- The covers of the pits were sealed initially with, resulting in these getting damaged when the householders inspected the contents of the vaults. New fibreglass covers slide in and out easily.
- Warping wooden door problems have been addressed.
- Vent pipes to prevent flies from flying in and out were covered initially only with mesh, which allowed rainwater to enter the tanks. New models have umbrella caps.
- Evaluation of the education programme revealed that while the more immediate requirements of operation and maintenance were understood, householders needed more information on emptying the pits.
- Children mess toilets because pedestals are designed for adults. Some householders discourage children from using toilets at all, preferring to send them to the 'bush'. EWS has developed a prototype adaptor, currently on trial, to assist better child use of toilets.

5. Address the expectations of rural communities. The HSRC social study report reflected on expectations of rural communities. While the level of acceptance of the daily water supply was high, the acceptance of the UD toilet was less so, but improved over time, with improved design features and more information on maintenance.

- Waterbone sanitation was expected by those who live close to developed or formal areas with waterborne sanitation. Their expectations were raised too by the former Minister of Water Affairs when he spoke to them about 'the ladder of service'.
- Deeper rural communities have a greater acceptance of the system, because they do not live in proximity to a more 'developed' area, and consequently do not compare themselves to an 'improved' system.

The consultation and education process has paid off handsomely with compliance in some places. At times the effects of this have been offset by poor workmanship, delays in provision or lengthy service interruptions. It is clear too, that while almost everyone aspired to a full pressure system some day, some areas are simply not prepared to accept a lower level of service, which calls for skillful negotiation on the part of the municipality.

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Acronyms

DWAF	Department of Water Affairs
EM	eThekwini Municipality
EWS	eThekwini Water and Sanitation
GIS	Geographic Information System
HSRC	Human Science Research Council
IDP	Integrated Development Planning
ISD	Institutional and Social Development
KZN	KwaZulu-Natal
MIG	Municipal Infrastructure Grant
O&M	Operation and Maintenance
PSC	Project Steering Committee
UD	Urine Diversion
UKZN	University of KwaZulu-Natal
VIP	Ventilated Improved Pit
WSA	Water Service Authority

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