REPUBLIC OF SOUTH AFRICA

Water Quality Management Series

Managing the Water Quality Effects of Settlements: -

A SUMMARY OF THE EXPERIENCES IN THE TEST CASES

Department of Water Affairs and Forestry

NOVEMBER 2001

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DOCUMENT INDEX

This document forms part of the Department of Water Affairs and Forestry's National Strategy for Managing the Water Quality Effects of Settlements. It represents one of the outputs of a project that was jointly funded by the Department of Water Affairs and Forestry and the Danish Government via their DANCED program.

The Department of Water Affairs and Forestry reports in this series are: -

Policy Documents

Managing the Water Quality Effects of Settlements.
The National Strategy, Edition 1. Policy Document U 1.1

Managing the Water Quality Effects of Settlements
Considerations for the Sustainable Management of Pollution from Settlements. Policy Document U 1.4

Managing the Water Quality Effects of Settlements
The National Strategy. Edition 2, Policy Document U 1.1

Operational Guidelines

Managing the Water Quality Effects of Settlements.
Options for Interventions Guide. Operational Guideline U 1.2

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An Assessment of the Non-payment Problem
Legal Considerations for Managing Pollution from Settlements
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DIRECTOR: WATER QUALITY MANAGEMENT
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AD Mkize	MN Kulati	K Jezi
H Sikweza	S Potelwa	D Sakatha
T Mzamo	T Horner	

PREFACE

Pollution from densely populated and poorly serviced settlements is perhaps one of South Africa's most *important*, but most *complex* water quality problems.

Important, because pollution in and from these settlements not only affects downstream users, but has its most significant impacts on the communities living in these settlements. Failing sanitation and waste removal systems create appalling living conditions in many settlements, and contribute to serious health problems in these communities. Pollution in and from these settlements is, therefore, not only a water quality issue, but has much wider implications for government's aims to provide a better life for all

Complex, because pollution in settlements is rooted in the socio-economic, political and institutional conditions in the settlement. The use, or misuse, of services together with the way in which the services are maintained by Local Authorities lies at the heart of the pollution problem in many settlements. This is further complicated by the legacy of South Africa's apartheid history. Solutions, therefore, lie in changing the way in which the services are supplied and used.

However, *sustainable* solutions to the problem lie not only in our ability to supply and use waste and sanitation services to best effect, but also in the longer-term capacity of local government to maintain these services. This is likely to be the biggest stumbling block to sustainable management of pollution from settlements. Local government in South Africa clearly has significant capacity problems, and misuse of services, for a variety of reasons, is endemic in many settlements across the country. More importantly, failing waste services contribute to poor living conditions, and hence to the misuse of the services. Non-payment for services also limits the capacity of the Local Authority to effectively maintain the services, which then leads to further failure of the services.

Strategies to manage pollution in settlements must take a broader view of both Local Authority capacity, and the socio-economic and political dynamics of the community in order to arrest this downward spiral. The Department of Water Affairs and Forestry, therefore, initiated a study of the links between pollution, community perceptions and local government capacity, to run in parallel with the Test Cases. A number of reports have been produced to support this study.

It is hoped that these reports provide compelling arguments to address this problem both by ensuring better planned and run services, but also by active intervention and assistance where there are clear and immediate threats to community health and the environment. This report forms part of this process.

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1 INTRODUCTION

1.1 Background

Phase 2 of the project to *Manage the Water Quality Effects of Settlements* had two main components; 1) Testing the approach developed in Phase 1 in nine Test Cases, and 2) A *National Strategic Process* that addresses the financing, servicing and planning of settlements. This report covers the first of these components, and:

- Briefly comments on the main pollution problems in each Test Case.
- Outlines what the Test Case Steering Committees did to address these problems.
- Highlights the results of these interventions, and
- Comments on the Test Case implementation process, and
- Highlights lessons learnt from this process.


TEST CASE PAGE

This report is intended to supplement the Intervention Plans and Final Completion Reports produced by each Test Case Steering Committee (TCSC). The full versions of these reports are available from the Project Office, at the Address below, if required. Where available the Final Completion Reports have been installed on the project CD.

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1.2 The Test Cases Implementation Process

The Test Cases implementation process began in March-April 1999. During these two months nine workshops were held, one in each province, to explain the approach developed in Phase 1 to Local Authorities in the province. This process reached some 135 Local Authorities. These Local Authorities, together with the regional Department of Water Affairs and Forestry office, were then invited to submit settlements to be considered as Test Cases. A total of 36 proposals were received and evaluated by the Dense Settlements project team and Danced, and nine Test Cases (one per province) were selected.


HOW TO PAGE

Each Test Case Steering Committee was then requested to send 2 representatives to a National Workshop on 28-29 June 1999, at which the approach to managing pollution in and from settlements was explained. (The "How To" guides explain these approaches in detail.) This workshop was also used to help the TCSC formulate a Work Plan. These Work Plans were incorporated into Memoranda of Understanding that formalised the arrangements between the Project Team, the TCSC and Danced.

These Work Plans outlined a process whereby the TCSC would engage the community and Local Authority in a structured dialogue to determine the actual causes of pollution, and typically included the following steps:

- Identify the main pollution problems in each waste stream.
- Workshop these to identify the "root causes" of pollution .
- Test this understanding with the community.
- Formulate interventions for each of these root causes.
- Formulate a monitoring plan for each of these interventions.
- Prepare an Intervention Plan that outlines the above process.

The Test Case Steering Committees were given six months to develop a draft Intervention Plan. A further joint Test Cases workshop was held on 15 and 16 March 2000, at which TCSCs could discuss their plans, and could exchange ideas. The TCSCs were given 1 month after this workshop to finalise their Intervention Plans. The final Intervention Plans were forwarded to Danced in May 2000.

These Intervention Plans were used as a basis for implementing actions to address the root causes of pollution in each settlement. The Project Team visited the Test Cases approximately every second month to provide on-site mentoring, and to learn from the implementation process. This also allowed the Project Team to share the experiences between the Test Cases. A further under joint workshop was held between the Test Cases on 3 and 4 April 2001, at which the TCSCs had the opportunity to discuss their progress, and to share ideas. The TCSCs were then given 7 months to complete their work and produce the Final Completion Reports. These reports addressed the following:-

- The main pollution problems in the settlement,
- The causes of these problems identified by the process,
- The interventions selected,
- Problems experienced in the implementation process,
- The impacts of these interventions in terms of improved water quality, improved community health, and improved living conditions in the settlements, and
- What the community and Local Authority are doing to ensure sustainability.

Each Test Case has also been given the opportunity to host a workshop for neighbouring communities and Local Authorities, to showcase their work.

1.3 The aim of this report

The report summarises the information contained in these Final Completion Reports. It collates the various experiences in the Test Cases into a succinct description of what the main problems were, what was done to address these, and the results of these interventions. As such, the report does not provide a complete description of all the interventions in each case, but focuses on the highlights from each Test Case. The reader should refer to the Final Completion Reports themselves for more details.

However, the last section of this report also serves to highlight some of the problems experienced in the implementation process, and the lessons learnt from these problems. These lessons have been built into edition 2 of the National Strategy document, and into the processes that will be used to address new settlements as described in the "How To" guidelines.

2 HIGHLIGHTS FROM THE TEST CASES

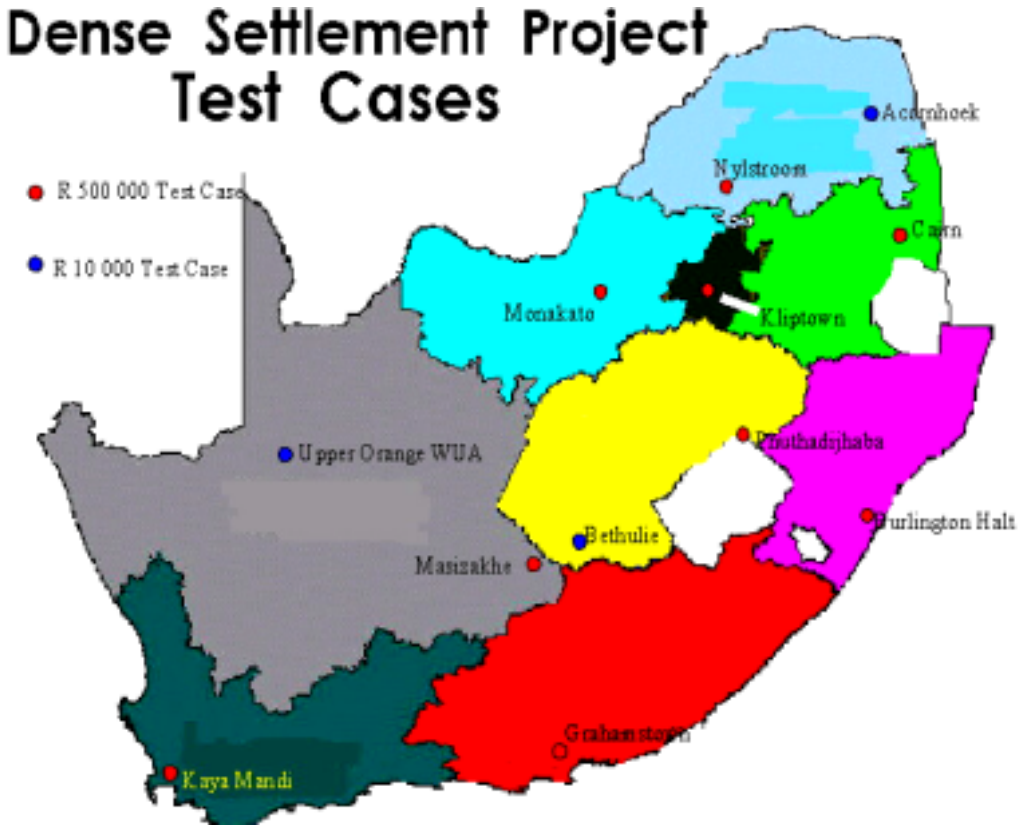
2.1 Introduction

The "Dense Settlements" project has supported two kinds of Test Case. The first nine cases, selected in April 1999, were funded to R 500 000.00 each. This money was to be used to both identify the root causes of pollution, and develop and implement Intervention Plans to address these causes. These nine Test Cases are summarised below.

However, savings to the project placed the Project Team in a position to fund additional cases. It was decided that these Test Cases would get only nominal funding to identify the root causes of their pollution problems, but that they would have to find the funds to address these causes themselves. These Test Cases were given only R 10 000 for this process.

While provision was made to tackle 12 of these cases, only two eventually got off the ground. However, both of these smaller Test Cases were able to secure funding from local sources to implement interventions to address their pollution problems, and both have demonstrated that sustainable solutions can be found even when only limited funds are made available to initiate the process. These two Test Cases are described in the following section.

The map below shows where all 11 test cases are situated.



Note:- The Upper Orange Test Case was accepted by the Team, but they never initiated any work, and never requested any funds.

2.2 Northern Province (Nylstroom/Phagameng Test Case)

2.2.1 Background

Phagameng is the township associated with old "white" town of Nylstroom, which lies some 150 km north of Pretoria. The total population of the town is some 18 500 people, of which 11 500 live in Phagameng. Phagameng lies in a relatively flat area underlain with sandy soils, and is sparsely populated. (The settlement density is about 30-40 houses per hectare). Pollution problems in this settlement are consequently not severe.

The intention of this Test Case was to include the old white area of the town to investigate the issues around cross subsidisation of services from the "white" area for the poorer Phagameng community. However, this process failed as the white community seemed to think that dense settlement pollution was not their problem. This was possibly due to the way they were approached. The work that was done consequently concentrated on the Phagameng portion of the town.

2.2.2 Main pollution problems

As indicated above, while pollution is certainly a problem in Phagameng, it is not a very significant at this point. In general the pollution issues were:-

- Bush toileting for that portion of the community without toilets.
- Blockages for that part of the community with flush toilets.
- Informal solid waste sites dotted around the community.
- A stormwater canal that is clogged with solid waste.
- Sullage water runoff from standpipe areas.

The problem analysis in the Nylstroom Test Case was hampered by the fact that different parts of the settlement had different services. It was consequently recommended that the TCSC select only a few of the main problems to address, but to extend the other problems using other sources of funding.

The main pollution problems the TCSC decided to address were the clogging of the stormwater canal with litter and garden refuse, and the littering of the open areas in Phagameng. These two problems are clearly linked. The clogging of the canal leads pooling of water in the canal. Mosquitoes breed in this water, and the Local Authority would regularly dose the canal with pesticides. Water from this canal feeds into the Nyl River, which is the main inflow into the Nylsvlei Ramsar site. The potential pesticide pollution of the Ramsar site was therefore considered to be one of the most important problems.

The TCSCs analysis of this problem indicated that the community living alongside the canal tended to dump their litter into the canal. This was due to a lack of awareness of the consequences of this, but also that no alternatives where provided and the community did not have a place to dispose of waste in a safe way. It was also recognised that there was no protection of the banks of the canal, and erosion of soil into the canal also contributed to it clogging.

Similarly the open areas in the town were perceived to be dumping grounds, and not places of recreation for the community. While there was generally a good understanding of basic home hygiene practices, most members of the community did not link pollution of the environment to health issues. Some people also linked littering with job creation.

2.2.3 Interventions and monitoring

The interventions in Phagameng focused on cleaning the canal and open areas, providing alternative safe places to dispose of waste, and on awareness building. Moreover, the Local Authority was encouraged to include the routine maintenance and clean up in their programme.

The once off cleaning of the canal was undertaken by community members for the project. However, it was emphasised that this was a once off operation, and that more littering would not create more jobs. Skips were also placed at strategic places along the canal for the community to use. Monitoring of these interventions included regular photographing of the canal to see if it became clogged, and monitoring of the use of the skips by the community. An intensive awareness campaign was held on the dangers of littering, which was supported by the Provincial MEC for the Environment.

The open areas in the town were cleaned up and turned in parks using funding from a separate project "The Clean and Green Campaign", which contributed a further R 1 million to the project. This clean up removed some 2000 bags of waste to the waste disposal site. This included the removal of the litter, the grassing of open areas and planting of trees. Children's playground equipment was also provided, Litterbins were provided – and monitoring of these areas has also included regular photography.

Before and After questionnaires were used to assess changes in the communities perceptions regarding littering, and a clean pollution free environment.

2.2.4 Results and sustainability

Regular photographs of both the canal and open areas has shown that both are remaining remarkably clean even six months to a year after the initial cleanup. While there are still some littering problems, the Local Authority has included a regular once a month cleanup of the canal. The skips placed long the length of the canal are being used, and are regularly emptied by the Local Authority. This waste is placed in a licensed waste disposal site. Because less litter is getting into the canal, the regular cleanup takes less effort, and the costs of this are offset to some extent by the fact that the Local Authority now no longer uses pesticides in the canal.

The awareness campaigns have also had an impact on the community, and the children are keeping the open areas and playgrounds largely free of litter. The litterbins regularly fill up and the Local Authority removes the litter. More importantly, the Local Authority has recognised the value of ongoing awareness campaigns, and has made a budget of R30 000.00 per year available for ongoing awareness campaigns. The Local Authority has also indicated that they are completely integrating the project with their routine functioning, and are considering addressing other settlements in their area. These decisions have been taken up in the Minutes of the Municipal Executive meeting of 16 October 2001.

In this Test Case sustainability will primarily be secured via buy-in from the municipality both in the regular clean up of the canal, but also in their R30 000 per year investment. What is important is that the interventions have made very visible improvements. This not only motivates the community, but indicates to the Local Authority that investments in Phagameng can lead to improved quality of life. In this respect the Local Authority has reported a reduction in the littering problem.

North West Province (Monnakato Test Case)

2.3.1 Background

Monnakato is one of the old "homeland towns" established by the previous Boputhatswana Government. It has no economic base, very few shops and no industries. Most of the community is unemployed, or employed on neighbouring mines or towns. It has a population of some 8000 people on some 1500 stands. However, the settlement is also sparse (about 20-30 dw/ha), and as such pollution is not severe.

Water supply in Monnakato falls directly under a bulk water supplier, Magalies Water, who supply the water and collect the payment, while electricity is supplied directly by Escom. The water services offered range from standpipes to in house water connections. While the whole town has a water borne sewage system connected to a treatment works, less than 20 % of the houses in the older section of the town are connected to this system. The reasons for this are related to the costs of connecting, and the cost of the water after connecting. Most houses therefore have an unimproved pit latrine. However, all the houses in a new housing development have been connected to the sewer system.

Refuse removal and the operation of the dumping site are contracted to service providers outside of the town. A black bag system is used, and bags are removed twice a week and new bags are provided. However, there is very little no payment for these services, in spite of the fact that a billing and collection system is in place. The council can also offer other services such as building rubble or garden refuse removal, but these services are rarely used.

The institutional situation in Monnakato changed significantly during this project. At the start of the project, Monnakato was acting as a Transitional Rural Council in its own right. However, in December 2000, Monnakato became part of the Rustenburg Council. It is important to note that the problem analysis was done before the amalgamation, and that may of the causes of pollution have been addressed by the amalgamation. Nevertheless, it is still felt that the root causes of pollution in Monnakato are common to many towns, and as such the lessons learnt from this Test Case remain valuable

2.3.2 Main pollution problems

The most significant problem identified was a lack of capacity within the old Transitional Rural Council (TRC). This is associated with poor financial status, as well as a lack of technical and organisational skills. The TRC, therefore, did not perform its functions effectively and the services in the town run by outside contractors, who were paid out of the Equitable Share Fund. Unfortunately there was no monitoring of the contractor, and often services were not effectively supplied. The evidence for this comes from the fact that the funds to pay for the contractor would run out halfway through the year. These problems are typical of many of the smaller rural towns in South Africa.

There is also a lack of trust between the community and TRC, which makes it difficult to effectively supply any service. The community is therefore hesitant to pay for services, and payment was below 30% at the start of the project. This was exacerbated by a lack of awareness in the community as to why they should pay for services, and what it costs for these services. Many

community members also did not know what services they should be paying for. In addition while hygiene awareness was good, few people linked pollution to poor health.

The most visible pollution problem arising from these problems was informal dumping of solid waste along the roads. This points to the fact that the solid waste removal system was not functioning well, and was not used to best effect by the community.

Other problems identified are, the rising water table in wet periods, which floods the pitlarines and clogging of the stormwater system by litter. The Sewage Treatment Works is also not fully operational, and most of the sewage from the town flows untreated into the Elands River.

2.3.3 Interventions and monitoring

Much of the pollution problem was associated with the TRCs financial, technical and organisational capacity, as well as their interaction with the community. The primary interventions were therefore to build capacity within the then TRC. This included capacity building programmes for the TRC, for them to better understand how to run services in the town, and to manage the operation and financing of these services. The project also helped establish a 'Help Desk" to promote interaction between the community and TRC, and to promote payment (or part payment for the services).

Workshops to promote TRC/community interaction were also held to help build trust. These interventions were backed up by building awareness in the community of the risks posed by pollution, and the costs of running effective waste management services. Several clean up campaigns were held, and the opportunities for re-cycling were also investigated.

As the interventions were primarily based on building capacity within the Local Authority, and on building the community/local government relationship, monitoring focussed on changed perceptions within the community, and a greater understanding of what is required to run the waste services both within the community and the TRC.

2.3.4 Results and sustainability

It is difficult to directly contribute the changes in the Local Authority in this Test Case as the amalgamation with Rustenburg has in any event created significantly more capacity. However, it is clear that the community has a lot more trust in the authorities, and they have indicated that they would start to pay for services. They are also more aware of what it costs to provide the services, and no longer believe that the Local Authority is wasting their money.

- ?? Payment for services is up from 7% to about 70%
- ?? At the start 21% of the Community believed that it was important to pay Local Rates and Taxes, now this is up at 68%
- ?? At the start only 27% of the Community recognised their role in pollution. Now this is over 70% of the Community.
- ?? At the start 80% of the Community linked pollution to health, now this is over 94%.

Rustenburg has now also indicated that they would like to use the methods developed in some of the other towns they have now taken over as part of the amalgamation of Local Authorities.

2.4 Mpumalanga Province (Cairn Test Case)

2.4.1 Background

The Cairn community is located just outside Nelspruit. The land and community are part of the a Land Reform project being addressed by the Department of Land Affairs, and the settlement is one of the Test Cases for the Danced/DLA project on including environmental concerns in Land Reform. The area of the Test Case is small (some 25 ha), and includes some 50-60 families, housing density is therefore low (1-2 dw/ha). These are mostly retired farm workers, and employment rates are very low.

This was an old farming community and the settlement is some distance from town. As such, while the Nelspruit Municipality is responsible to providing services, the actual provision of services is likely to take some time. The community is therefore going to take on the operation and maintenance of their services for the foreseeable future.

Services in the community at the start of the project were those supplied by the original landowner, and consist of pit latrines, and back yard pits for solid waste. There is no water supply for the community, as the original landowner no longer supplies water. The community therefore fetches water from a small stream nearby. This stream often dries up in winter.

This Test Case was largely run by the TCSC with help from a local consultant.

2.4.2 Main pollution problems

The most important problem identified by the community was the lack of a reliable water supply. However, the water supply issue is being addressed by the Department of Land Affairs project. The most important pollution problem was the bush toileting by the community. This is caused by the fact that the pit latrines were full, toilet seats were broken and many of the toilet structures were collapsing.

The full pits could be explained by the fact that there is no service provider to empty out the pits, and no funds to be able to pay for a private contractor. The original owner of the land had also never emptied the pits. However, this seemed to be exacerbated by the community putting solid waste in the pits, and that the toilets had never been cared for by the community. This was ascribed to both a lack of awareness, and the lack of ownership.

Solid waste disposal is also a problem for the community (hence their disposal in the pit toilets), and at the start of the project the community disposed of household waste in shallow pits dug near the house. Animals and children could still get into these pits, and solid waste has been scattered throughout the community.

Sullage at this point is not a critical issue, as the community does not have a reliable supply of water. But once water is supplied to the community, sullage water may become an issue.

2.4.3 Interventions and monitoring

The primary intervention focussed on stopping the bush toileting problem. To do this the pit latrines had to be emptied. However, attempts to empty the pits failed as solid waste in the pits clogged the equipment used, and a material had hardened and could not be pumped. As a result

new VIPs were installed. However, it was stressed that unless these pits could be maintained and looked after correctly, then these new toilets would eventually degrade to the same state as the old pits. To ensure this awareness campaigns were carried out as to how to look after the pits, and posters of the correct use of the new toilets were placed in each of the new structures. But more importantly, the TCSC stressed that the new pits would have to be emptied out regularly. Calculations showed that this would require a "services" payment of some R15-R17 per month.

The community were therefore requested to pay R20 per month to cover both the eventual emptying of the pits, as well as other minor maintenance that needs to be done. These payments would be made into a community trust fund set up by the land reform project, and when the pits again filled up a contractor could be paid from this fund to empty them. The old toilet structures have now been turned into storerooms for each household.

It was also recognised that sustainable use of the new pits would require a safe alternative site to dispose of solid waste. Two new licensed solid waste sites were therefore also developed on either side of the community. Households would have to carry their waste to these pits. Lastly, a local charity organisation has developed a simple recycling plant for the community. The intention is that when sufficient recyclable material had been collected, a local recycling company will collect the material and pay the community.

In this respect the TCSC also realised the recycling system could also be used to help the poorest households afford the monthly payment for services. People who cannot afford the R20 could collect recyclable material from the community and surrounds in lieu of payment. Each household was provided with recycling bins to help the community with this process.

2.4.4 Results and sustainability

The immediate result of the installation of the new toilets has been the elimination of the bush toileting problem. However, sustainability largely rests on ensuring that the underlying causes of the original problems have been addressed. There is clearly better ownership of the new toilets, which each family having decided where they wanted "their" toilet placed. Most of the new toilets are now locked.

Payment for the new services is perhaps the greatest measure of success. In this respect, payment of the R20 for the maintenance of the toilets and other services increased from the initial no payment to some 30-40% of the households paying within the first few months. The TCSC did further awareness work to try to increase this, and payment increased to some 50-60%. These funds were being regularly deposited into the community trust fund, and the collection of these services is providing employment for one person. Unfortunately, however, payment has subsequently dropped. It is difficult to assess the reason for this, but there indications that the communityfeels that it is not obliged to pay particularly in the light of the "free basic services" initiatives. However overall payment over the last year is still 30 % better than before.

The new solid waste sites are being used and managed. However, the community has not yet collected sufficient recyclable material for them to sell. It is therefore difficult to assess the sustainability of this intervention.

In summary, the interventions agreed by the TCSC and the community would have placed the community in a position to sustainably manage their own waste services. Unfortunately, the community seem unwilling to take sufficient ownership of the services to voluntarily commit funds to ensuring that this will happen. As such in the absence of any enforcement of the payment for services – their interventions are unlikely to be sustainable. This problem my in part be due to the fact that the process was largely driven by the consultants as there was no "champion" in the community.

2.5 Gauteng Province (Kliptown Test Case)

2.5.1 Background

Kliptown is perhaps the most densely populated and was the most polluted of the Test Cases. Kliptown forms part of the greater Soweto area, and the Test Case is centred in Freedom Charter Square (where the ANCs Freedom Charter was signed in 1955). There are some 2700 "houses", mostly informal shacks in the settlement, with a density of over 70 dwellings per hectare. There are, however, plans for a formal housing scheme nearby, and the intention is to "de-densify" Freedom Charter Square by moving some people out.

The TCSC for this Test Case has had considerable support from the project team, and there are also a number of skilled people in the community and on the TCSC, who have provided services to the Test Case at little or no cost.

Water supply in the settlement is from standpipes, which also serve as washing up points. The intensive use of these standpipes means that there is a constant flow of sullage water from these standpipes. Sanitation services are bucket latrines supplied by "Sanitech", who is in turn paid by the council. These toilets are placed in the streets, and were originally intended to serve 6 families. However, currently the toilets serve some 11 families.

Solid waste collection is via a black bag and skip system, which has recently been installed. This system appears to be working, but there is 70 years of accumulated waste that needs to be removed. Stormwater or sullage runoff is also a considerable problem due to the density of the houses. As a consequence there is a constant flow of dirty water between and through the houses.

As the council regards this area as "unserviced" there is no payment system in place, and there is no cost recovery with respect to the solid waste, sanitation system or water supply.

2.5.2 Main pollution problems

The most visible pollution problem was the sullage water. As the houses do not have an in house water supply most of the community does washing at the standpipes. This results in a constant flow of sullage water to the river. Analyses of this water show that it is faecally contaminated, and high in nutrients. The community also often leaves taps running to rinse the clothes, which further exacerbates the problem. People doing the washing at their houses put their dirty washing water into the street. There is no drainage system in place at the standpipes or in the streets, and there are few gardens, which could be irrigated with the water. This also results in significant stormwater problems in wet weather.

The bucket sanitation system is also a considerable cause for concern. As the toilets now serve 11 families, they are often full and bush toileting is common. The toilets are also incorrectly placed and inconvenient to use. There is spillage from overfull buckets during collection, and many buckets and toilets are broken.

The density of the houses also results in a problem with the solid waste system, and the skips often overflow. Littering is also a significant problem near the shopping area. Litter pickers have been employed who have reduce the litter problem in the settlement, and clean up campaigns have been held. However, there is still a considerable accumulation of waste. Be this as it may, most of the community expressed satisfaction with the solid waste collection system, as it had considerably improved conditions in the settlement.

2.5.3 Interventions and monitoring

The interventions proposed for this Test Case focussed on the sullage waste stream. The TCSC constructed sullage drainage points at each of the standpipes, as well as at washing up areas. These were connected to a sewer main running along the edge of the settlement, and the sullage drains down to this main and hence to the main sewage treatment works. The materials for this construction were provided by the project, but community members provided the labour at a nominal cost. Community members were trained to construct the system, and to undertake minor repairs to the system.

Awareness campaigns were also held with the community to educate them on the use and maintenance of the new system, and to discuss options to ensure the system remained operational. The equipment necessary to clear blockages has also been bought.

Monitoring concentrated on upstream and downstream sampling of the river to determine the changes in river water quality. The number of drainage points constructed was also monitored, and the number of blockages that occurred in the system, before and after the awareness campaigns was monitored. The community's perceptions of the settlement, the project and their willingness to pay for the maintenance of the system.

2.5.4 Results and sustainability

Some 175 sullage drainage points have been constructed at communal taps or washing up areas throughout Kliptown. An additional 25 drainage points have been constructed in private yards. These private connections were done at the request of the property owner, who then also paid for the connection to the main drainage system. The most significant impact of this work has been the elimination of the sullage flowing in the streets. This has had a marked improvement on the overall living conditions in the settlement, and has resulted in a significant reduction in the load on the river. At the start of the project some 90% of the bacterial load downstream came from the settlement. This has dropped to only 10%. The reduction in nutrient load has been estimated as being close to that from a medium sized Sewage Treatment Works that is discharging an effluent at the General Standard.

A more significant impact of this has been an improvement in the community's perception of the settlement, with most people being a lot more positive about living in Kliptown. Many of the inhabitants have also reported a reduction in diarrhoea in their children and incidences have dropped from about 25% of households reporting diarrhoea with the last month to less than 10%. Most people have also indicated that odours are reduced and that there are fewer flies. This has had the effect that the community is now willing to contribute money and labour to the maintenance of the system. The system for maintenance they have developed is based on the group of houses that uses a particular drainage point. When a blockage occurs, the people using that drainage point all contribute financially to the unblocking of the drainage point, and the community members who have been trained will be asked to do the cleanup. This has been "tested" in a number of cases, and households have typically been paying some R 1 to R 5 each to clear a blockage.

This has had several spin-offs; firstly it is employing community members on an ongoing basis, secondly the community is effectively paying for a service among themselves, and thirdly as there is a direct link between the actions of the people using the drains – the blocking of the drains and hence to costs – there have been fewer blockages.

2.6 Free State Province (Phuthadijhaba Test Case)

2.6.1 Background

Phuthadijhaba was the capital of the old homeland of Qwa Qwa. It is a large town situated in the foothills of the Drakensberg. As it was impractical to run the Test Case for the whole of the town, two smaller settlements (Mabolela and Bochabela) within the town were selected for the study. There are some 1200 stands in these settlements, 80% of which are informal. Some 30% of the people in the area are employed.

Sanitation systems in Mabolela and Bochabela are primarily unimproved pits. There is no solid waste removal system and the water supply is from standpipes. There is also no stormwater system, and erosion is a significant problem due to the steep slopes in the area. The Phuthadijhaba Transitional Local Council (TLC) also suffers from significant capacity problems, and non-payment is a significant problem. The services in those fully served areas of the town are also not effectively maintained and operated. The TLC has consequently appointed Sedibeng Water as an agent. This bulk water supplier now manages the water supply to the whole TLC area, and manages the Waste Water Treatment Works for the TLC. Sedibeng also provides a septic tank desludging service.

A number of households in the area also use private contractors to desludge their septic tanks. But these tend to be the wealthier households that can afford the R 100 to R 150 fee.

2.6.2 The main pollution problems

The initial problem analysis for this settlement was not based on the structured facilitated approach, and was drawn up by the consultants based on site visits. Much of the problem analysis therefore appeared to be speculative, and not based on actual interaction with the community. The problem analysis was also done with the assumption that a fully flush sanitation system was the only feasible solution.

The problem analysis did however indicate that seepage into the pit latrines causes the faecal material to overflow the pit. The few septic tanks that exist also frequently overflow. A private contractor who empties the pits and tanks for a small fee has been prevented form disposing the effluent directly to the wastewater treatment works, and now disposes the effluent direct to the river. The lack of a solid waste system also means that the community disposes of household waste and litter directly to the rivers and streams.

There was also considerable dissatisfaction with the unimproved pit toilets, with most of the community indicating that they posed a health and safety risk.

2.6.3 Interventions and monitoring

The initial Intervention Plan indicated that if the community were given high levels of services it would make them “proud”, and they would stop polluting. The interventions proposed by the TCSC, therefore, total some R11 million, which is more than we have available (R500 000 per Test Case was made available). Initially the TCSC indicated that they would only accept a full flush sanitation system. It was therefore decided to hold an independent review of the Intervention Plan.

This review indicated that the project should go ahead, but that the TCSC should review its insistence on a full flush sanitation system.

This was done, and after visiting one of the other Test Cases, the TCSC decided that they would install VIP sanitation systems for some 50-60% of the households, but that they would request the TLC to provide the rest. These VIPs would be lined to ensure that water could not infiltrate the pit. However, to ensure that these VIPs where maintained, the TCSC also held awareness campaigns on how to use the toilets, and have also gone into negotiation with Sedibeng Water and the Local Authority to develop mechanisms whereby the community could save up to desludge the pits.

2.6.4 Results and sustainability

Clearly, the problems with the implementation of this Test Case have influenced the time they have had for implementation, and hence the opportunities to monitor the sustainability issues. We can nevertheless report that some 150 VIP latrines where installed and awareness campaigns were held on the most appropriate use of these systems. The TCSC is presently negotiating with the council for them to install a further 150 VIPs – based on the successful management of this project.

More importantly the TCSC have been discussing how to ensure that the funds to desludge the pits would be available. In this respect Sedibeng Water have indicated that they would provide this service for some R95 per pit. While this cost is already highly subsidised, it is unlikely that poor households would either save up these funds or would have these to pay as a once off cost (albeit only once every 2 to 3 years. The project team is therefore highlighting the experiences in Kliptown, Burlington Halt and Kaya Mandi as examples of how to address this problem. However, it is difficult to indicate that the project is sustainable in the absence of a clear plan to provide for community savings to pay for this service. Nevertheless, the TCSC is aware of this problem, and is hopefully better equipped to find a sustainable solution.

Unfortunately, however, it has also come to light that the TCSC are using the Test Case for political gain. This has lost them support from the council.

2.7 Northern Cape Province (Masizakhe Test Case)

2.7.1 Background

Masizakhe is a small settlement situated in the semi-arid upper Karoo region. There are some 290 informal houses and 10 formal houses in the settlement. These house some 1 700 people. A further 20 stands are available for expansion. This settlement used to fall under the Bo Karoo District Council, based in De Aar, which is about 170 km from Masizakhe. With the new Local Authority boundaries, Masizahke now falls within the Umsobomvu District run from the nearby town of Colesberg some 30 km away.

Employment in Masizakhe is at about 40%, but payment for services is close to zero. This TCSC developed the Intervention Plan in house. There was some interaction with the project team, and the DWAF regional office was initially intensively involved in the process.

The sanitation system consists of flush toilets, connected to small septic tank that collects the solids. A small-bore system (100-150mm) takes the liquid away, which is pumped to oxidation dams just outside the settlement. The septic tank should be periodically emptied using a tractor pulled tanker, however, the system was left for some 3 years before regular collection started.

Solid waste is placed in bins that are emptied onto an open back trailer, and taken to a dumpsite some 1 km outside of the settlement. There is no system for garden refuse.

There is no sullage disposal system, and the community has been advised not to dispose of sullage in the toilets as the fats and solids block the system. Most people therefore throw the sullage water into the street. There is a rudimentary stormwater system still under construction, but construction has been stopped due to dissatisfaction with the contractor. A berm has been built above the town to divert stormwater, but this is now acting as a dam and water seeps through this berm into the houses.

A housing scheme has been promised, whereby the community can get secure tenure and formal housing, but this has suffered considerable delays. The community has indicated that they see this housing project as the priority.

2.7.2 The main pollution problems

The most significant pollution threat in Masizakhe comes from the frequent blockages in the sanitation system, and the frequent pump failures. These lead to raw sewage flowing into the streets and into a nearby stream. Blockages tend to occur due to inappropriate anal cleaning material, and due to the small-bore pipes used. More importantly, the system was left for too long before regular emptying of the tanks started. This has meant that solid waste (which should remain in the tank) has got into the small-bore system and has caused blockages. In addition, there was no communication with the Council. As a result pump failures were not reported. This has meant that there had been an almost continuous flow of untreated sewage into a nearby stream. Children play in this stream and the potential for disease was high.

Wind blown solid waste from the back of the tractor drawn trailer is also a problem, and the bins and bag system can not deal with garden refuse. Some “old” waste from before the installation of the solid waste system. The sullage and stormwater problems, while certainly evident do not seem to be a serious pollution threat at this point.

2.7.3 Interventions and monitoring

The interventions planned by the TCSC are primarily based on reducing the number of blockages. As there are not enough funds to replace the small bore system, this will be done by:-

- ? ? Building awareness on how the sanitation system functions, and what causes blockages.
- ? ? To educate the community in the most appropriate use of newspaper for anal cleaning.
- ? ? To increase the size of the septic tank system to allow more time for breakdown.
- ? ? To develop communication links between the community and council so that blockages are reported.

A cage was also constructed around the solid waste trailer to prevent waste from being blown off. A clean up campaign was initiated to address the "old" waste, and the composting of garden waste will be encouraged. Awareness campaigns around the disposal of sullage were conducted.

Lastly, the council repaired the pumps, and the community was educated in the need to report pump failures timeously.

2.7.4 Results and sustainability

The size of the septic tanks was increased by building a new tank between two existing tanks. The existing tanks were then linked to these tanks. These new systems are now functioning, but it is difficult to tell if they would continue to function well.

Nevertheless, the blockages problem has been solved by the intervention. The council has now also undertaken to desuldge the tanks on a more regular basis. In addition, the pumps have been repaired, and are regularly maintained. The result of this has been that there have been no pump failures in this last 18 months, and the number of blockages has been significantly reduced. The immediate effect of these interventions has nevertheless been a reduction in the incidence of diarrhoea. The local Authority has taken note of this and has already indicated that they would pay closer attention to the operation and maintenance of the sanitation system in Masizakhe. It therefore appears as if the root causes of the system failures have been addressed, and there are therefore opportunities for the sustainable improvement of the pollution problems.

Unfortunately the cage that was constructed has not yet been placed on the trailer, and the TCSC is in contact with the council for them to do this.

2.8 KwaZulu-Natal Province (Burlington Halt Test Case)

2.8.1 Background

The Burlington Halt settlement forms part of the Inner West City Council (IWCC) of the Durban Metro. It consists of some 318 formal residential sites and an additional 202 informal houses. The families in the informal dwellings may be relocated to formal houses once these have been constructed. This TCSC spent some R 25 000 in preparing the Intervention Plan, mostly to minute and cater workshops and meetings. Some funds have also been spent on monitoring the community perceptions. There has been some interaction with the project team, and there was significant commitment from the regional DWAF staff member involved in the Test Case.

Burlington Halt has previously been the subject of a project to upgrade the sanitation services. Each household was given the materials to construct a flush toilet system, which was to connect the houses to the sewer mains. However, most the community sold the material and did not connect. A small portion of the community was therefore connected to the system, others use bush toiletting or used rudimentary long drop latrines. Blockages in the system were also common mostly because the flow in the system was low.

The Solid Waste collection system is a black bag system operated by a contractor who lives within the settlement. Some 600-700 bags are delivered once a week, which is sufficient to remove some 4500 kgs of waste. However, many of the informal houses do not get bags delivered. These houses therefore dispose of their waste in informal pits near the river.

Sullage disposal is either in the streets or into the open stormwater drains along the roads. Most of the roads in the settlement are unpaved and, as the settlement is on steep slopes, erosion is a problem.

2.8.2 The main pollution problems

The most significant pollution problems in Burlington Halt stem from the failing sanitation and solid waste collection systems.

As indicated above, only a small portion of the community is connected to the system. As a result of this blockages are common. In addition to this blockages are not reported, and many people do not flush the toilet, as they cannot afford the water (water used to be cut off for non-payment).

For that part of the community not connected to the system, overflowing pits are a major problem which leads to bush toileting or the use of the solid waste system to remove faecal matter. This part of the community has outlined a number of reasons as to why they have not connected to the system:-

- ? ? Building material was sold to bring in money.
- ? ? Not all the material was supplied.
- ? ? They did not know how to connect and could not afford to pay a plumber.
- ? ? They did not have the space to place the toilet, or could not build the top structure.

Problems in the solid waste system include:-

- ? ? Residents do not put their bags out on time.
- ? ? Animals get into the bags placed on the ground.

- Only 1 bag is supplied to each stand, but often there are several families living on the stand.
- The bags are used for other purposes.
- The removal vehicle can not reach all parts of the settlement, and the contractor does not always move the bags to accessible places.

These problems therefore relate primarily to the misuse of the system, and poor communication between the service provider and the community.

2.8.3 Interventions and monitoring

The TCSC and the community decided that their main priority was to address the sewage system. However, they were cautious not to allow the same problems with the selling of the materials to reoccur. They therefore held extensive awareness campaigns to educate the community of the dangers of the pit toilets, and to create a demand for a better system. Residents who then wanted to link to the sewer system had to pay R100 to be connected. Plumping and construction teams from the community were trained by the project, and these teams built new toilets for all those who paid their R100. In addition to this the community has opened a trust account, and all those with new toilets deposit R5 per month into this account. This will be used to maintain the toilets and the connection to the mains. The council has undertaken to maintain the main bulk infrastructure in the settlement.

Problems in the solid waste stream were primarily addressed by awareness campaigns, and by building better communication between the service provider and the community. These targeted means to identify how many bags are needed, how to use these bags, the health risks associated with accumulating solid waste, and how to make the most of the service that is provided. Wheelbarrows were also bought so that the bags could now be delivered to each door, and to carry bags to a central point. Clean up days were also held.

The interventions in this project also sparked off a number of related projects. These were; 1) the improvement of open parks in the settlement, 2) a campaign to increase pride in the community by encouraging gardening, and 3) the construction of a new community hall.

2.8.4 Results and sustainability

In the beginning of this project the solid waste service provider was removing 4.4 tons of waste per month. This has increased to 7.7 tons, without an increase in the number of houses. This shows that more waste is being removed for safe disposal. Similarly, 16% of the houses indicated that before the project they often did not get a black bag delivered, this has dropped to 6%. More importantly, initially some 75% of the community linked pollution to health. This has increased to 95%, which indicates that more community members are likely to commit to improving the pollution problem. As a result of this more people are expressing a pride in the community, and a desire to keep it clean. Most people also thought that the community was cleaner since the interventions.

In spite of expectations, most of the community paid their R100 to be connected to the sewer system, and the TCSC now has a waiting list of people who have paid and who want to be connected. More importantly, people are paying their R5 for maintenance of the system This willingness to pay for a service and to ensure that it is maintained properly represents a significant shift in the community's thinking. This bodes well for the sustainability of the interventions. The community is also now more aware of the roll of the Local Authority in maintaining the system, and now more people are aware of which Department they need to report faults to. (Before the study 65% of the people would report faults to the wrong department – now this is down to 16%).

2.9 Eastern Cape province (Rini Test Case)

2.9.1 Background

Rini, or Grahamstown, is located in the southern portion of the Eastern Cape. The total population of the town is some 85 000 people on 5000 stands. The town is at the headwaters of the Kowie River, which flows to Port Alfred a tourist town on the coast[1].

Sanitation services in the settlement range from bucket systems to waterborne sewers. Solid waste is collected by a black bag system, which is supplemented by large skips or hoppers to carry the garden and other refuse. The stormwater system and roads range from tar roads with underground stormater drainage, through to unpaved roads without any formal system of runoff collection. Payment for these services (throughout the town) is at 45%, this means that payment in Rini is likely to be less than 20%.

The headwaters of the Kowie River, which runs through the settlement, have been channelised to avoid pooling and stagnation of the polluted runoff. These canals now run constantly with sullage and sewage water. There is a significant solid waste problem in the town, with wind blown litter visible throughout the region. Most of the rivers and stormwater systems are clogged with solid waste.

2.9.2 The main pollution problems

The Rini TCSC has identified the following main pollution problems in the settlement:-

- ? ? The pit latrines fill up and overflow in wet weather. This overflow gets into nearby watercourses. It was not clear as to why this happens, and may be due to a clay layer some 50cm below the surface, and hence subsurface inflow to the pits, or due to surface runoff into the pits.
- ? ? Blockages in the fully reticulated part of the town are not reported or cleared timeously. There is also a lack of funds to effectively maintain this service, hence its frequent failure.
- ? ? There is a lack of knowledge on how the solid waste system is to be used, and the purpose of the skips. Bags may therefore be put out too late, are not collected and either put next to the skips, or on the roadside. Animals get into these bags and spread the litter. Some skips may also be poorly placed.
- ? ? The sullage problem arises primarily due to the fact that some 60% of the settlement has a yard tap connection, but no sullage drainage point. Dirty water is thrown into the street, and as many of the roads are tarred, the water runs off to the Kowie River. As a result of this there is a constant dry weather flow of sullage water into the river.

2.9.3 The Interventions and monitoring

The TCSC proposed the following interventions:-

1) Two or three pits will be opened and studied to determine the reason why they flood. This will be supplemented by a study of when this flooding seems to occur, i.e. during rains, or for a few days afterwards. One the origin of the problem has been identified, solutions will be proposed. Once a suitable solution has been identified, some 10-15 pits will be upgraded to the new design criteria. Monitoring will then show whether these test VIPs flood less frequently. The council will then upgrade all the existing pits to this new design using other funding sources.

[1] The original intention was to include Port Alfred in the Test Case, however, this was dropped due to a lack of capacity in the DWAF regional office.

> The issue of the pit latrines filling up is particularly important in the wider project context. Geotechnical conditions, such as clay layers, are often used to motivate for higher levels of services. An investigation into the problem in Grahamstown, and the solutions to this therefore makes a contribution to the project at a national level.

2) A trainee anthropologist from Denmark assisted the project team to identify the root causes of non-payment in Rini, and to identify innovative options to address this problem. The LA has agreed to implement these recommendations.

3) The problems in the solid waste stream was addressed by awareness building programmes around the use of the collection of the bags system, and the skip system. This addressed both, "Why it is important to use the system properly", and "How do you use the system effectively".

4) An awareness campaign also focused on the most appropriate disposal of sullage water i.e. on gardens. This will also address the "Why" and "How" components outlined above.

2.9.4 Results and sustainability

Unfortunately the Rini TCSC was somewhat slow in the implementation of these plans. As a result of this, while the interventions have been carried out there has been too little time to notice any sustainable improvement in the pollution problems in Rini. We can therefore only report that additional solid waste skips have been bought, and have been painted with awareness material that highlights the most appropriate use of the skips.

The problems with the VIP latrines have been identified, but as yet the council has not carried the findings over to the test VIPs. However, there have been informal discussions with the council, and they have indicated that they would consider continuing with the work. The TCSC have also been invited to present their results to neighbouring communities with the aim of initiating similar studies.

The TCSC has also been encouraged to continue with the monitoring process so that they can demonstrate their successes. This will be used to provide additional motivation to the council to continue with the work. As such it is too early to indicate that the interventions have been sustainable. However, it is clear that there is a better understanding within the TCSC members and the council of the causes of pollution and how to address these. This is likely to result in some improvement both in the management and provision of services, as well as in the way they are being used. Perhaps most significantly the Local Authroity has now indicated that proper use of the solid waste system would save them the costs of 1 vehicle, 2 drivers and 8 workers per month. This would therefore free up these workers for other jobs. This indicates that they are aware of the potential value of this project.

2.10 Western Cape Province (Kaya Mandi Test Case)

2.10.1 Background

The Kaya Mandi Test Case is situated in Stellenbosch near Cape Town. It lies in a mountainous area, and the settlement is on a steep slope above the Plankenburg River. The settlement lies in the winter rainfall area of South Africa, which is characterised by hot dry summers, and cold wet winters. The Plankenburg River is severely polluted, *with E coli* counts of over 12.9 million organisms per 100 ml (The guideline for contact recreation is 120 organisms per 100ml), and elevated ammonia and other nutrients concentrations. This severe pollution has already lead to some vineyards further downstream having to be abandoned. Diarrhoea is also endemic in the settlement, and is one of the most commonly reported diseases within the settlement.

Estimates of the population of Kaya Mandi range from some 10 000 people, to some 22 000 people. This range is due to an under count in the national Census (which appears to be typical of many towns), as well as the rapid influx of people. The practical upshot of the under estimate of the population is that the services are also under designed. This settlement has densities of over 60 dwellings per hectare, and is also one of the more polluted Test Cases.

Kaya Mandi has both formal and informal housing, with the majority of the population in informal housing. The services in this area are communal toilet blocks, which back onto a washing up area. (called Bus Toilets). A number of standpipes are also dotted around the settlement. The Solid Waste system is a black bag system that is collected door to door. This was supplemented by skips placed at street corners. This system is also clearly not functioning well and litter and household refuse is a significant problem in the settlement.

2.10.2 The main pollution problems

The main pollution problems in Kaya Mandi appear to stem from two issues, the misuse and failing Bus Toilet system, and the misuse of and failing bag and skip system.

Most of the Bus Toilets are in a very poor condition, with “rodding eyes” and pipes missing, broken drains and washbasins, and frequent blockages that go unreported. It was also indicated that there were too few of these toilets, and it was too far to walk for many people, who then use the solid waste system or bush toileting as an alternative. Solid waste is also frequently put into the toilets resulting in blockages. As a result of this there is a constant flow of feacally polluted sullage and sewage water from each Bus Toilet block.

Problems identified in the solid waste system include;

- the poor location of the skips,
- one bag per week was considered insufficient for most families,
- the skips become over full and the litter surrounding the skip is not removed,
- children can’t reach the skips, and
- there seems to be a lack of community pride and awareness of the dangers of solid waste pollution .

The result of these problems is that solid waste slowly accumulates in the settlement, resulting in an even more entrenched lack of community pride. There is also a significant lack of trust between

the community and council, which results in the vandalism of the Bus Toilets, and a "don't care" attitude by the council.

2.10.3 Interventions and monitoring

The TCSC has proposed the following interventions:-

- The Local Authority has agreed to construct a few more Bus Toilets for the community, and will site these in consultation with the community. This will be funded from other sources. However, this is dependent on space becoming available.
- The existing Bus Toilets will be cleaned and all the pipes and rodding eyes replaced. A signboard will be placed in each Bus Toilet indicating which houses it serves, who looks after the block, and where to report problems like blockages.
- Each toilet block will have a person assigned to check on the toilets on a daily basis, and will fill in a form indicating the problems on a weekly basis. These will be placed on file at the "help desk".
- The "help desk" will be established in the settlement where people could report problems, and where the files on each Bus Toilet block will be kept. The Local Authority will visit this office to collect the forms, and will attend to the problems.
- An awareness campaign will focus on the need to maintain the Bus Toilets in a clean state, and to report problems, but also to stop vandalising the system.
- An awareness campaign will also focus on the appropriate use of the flush toilet system.

These interventions will primarily be monitored by via the Bus Toilet reporting system. This will focus on whether the forms are filled in, whether the problems identified are repaired. The number of blockages will also be recorded, and the flow of polluted water to the river will be estimated, to assess any reductions in flow. A before and after survey will also be conducted within the community to assess their perceptions regarding the Bus Toilet system and its appropriate use.

The TCSC also has close links with the University Medical Faculty, and will be using some of the resources offered by these links to monitor changes in community health, and changes in the quality of the Plankenbrug River.

2.10.4 Results and sustainability

The implementation of the Intervention Plan in Kaya Mandi has met with mixed success. A number of community members were trained as plumbers. This group cleaned up the Bus Toilets and replaced all the missing and broken plumbing material replaced. An awareness campaign was carried out regarding basic hygiene awareness, and the causes of sewer blockages. Unfortunately, many of the problems rapidly re-emerged after the cleanup.

The TCSC have suggested a number of reasons for this;

- It will take time for the awareness campaigns to have an effect.
- Improvement in vandalism of a communal system like the bus toilets will always be limited as there is little ownership of the system.
- There is a criminal intent to some of the vandalism (for example where plumbing equipment is stolen for resale). This is difficult to address with awareness campaigns.

As a result of this the TCSC has decided to try to better police the system. Community committees for each toilet block will look after the toilets and would place a "guard" at each toilet block. This person would not only police the use of the system, but would also keep the block clean, and would report problems to the help desk. However, more importantly the community members using that block would contribute to paying that person. The person looking after the block may also rotate

through the community, providing every family with an opportunity to get some income. The council has indicated that should this system prove to be effective, they would consider supplementing the person's salary. This would have the advantage of building a better community – council relationship, and of bringing money into the settlement. This may in fact save the council money as they would no longer have to continually repair the toilets.

Unfortunately, the Kaya Mandi TCSC has also only just started these interventions. This has left little time to revisit their problem analysis or to monitor the success of their interventions. In this respect it is difficult to indicate that the system of guards paid jointly by the community and council is working. Nevertheless, there are clear indications that the community now better understands the causes of their pollution problems, and are better equipped to address these causes. In this respect, the TCSC have provided the following data.-

- Prior to the interventions 40% of the community knew where to report problems with the Bus toilets. Now this has risen to 96%.
- Some 97% of the households had kept the awareness material to be able to refer to it later.
- Co-operation between the council and community has improved significantly. The community is reporting problems to the help desk and these are being attended to.
- The council may take on the Project Manager appointed for this project as a permanent employee. The salary for this person will be offset against the savings in continual repairs of the toilet system

Moreover, the council has a better understanding of the problems facing the community, and this should lead to better communication. The results of this improved communication is already evident in the fact that the council have provided office space for the establishment of the help desk, and have contributed some equipment to the team of plumbers.

3 THE SMALLER TEST CASES

3.1 Introduction

Two Test Cases were funded to R 10 000 each[2]. The intention of this was to provide seed funding to start the problem analysis, but then to ask these Test Cases to find separate funds to continue the work and to implement interventions to address the causes of pollution in their settlements. This section briefly describes the results in these two Test Cases.

3.2 Bethulie

The small town of Bethulie is located in the southern Free State province. The main pollution problem in this town was that all the sewers in the town were blocked. As a result very little effluent reached the oxidation pond system, and raw sewage was flowing in all the streets. This not only had severe pollution implications but also had a significant impact on community health. The result of this was that the relationship between the community and Local Authority was very poor.

The main causes of the blockages were that the community were flushing solid waste, and were also disposing of solid waste directly into the sewers via the manholes. However, the Local Authority also did not have a routine inspection programme, and they did not respond to minor blockages. The result of this was that the system became progressively more blocked, and reached a point where the simple cleaning equipment they had at their disposal were no longer able to clean the system. In addition to this the sewerage pump stations had also become inoperable due to solid waste clogging the pumps.

A number of workshops were held with both the community and Local Authority in an attempt to get to the root causes of the problems. These workshops built a better understanding of the causes of the problems, but also lead to an improved relationship between the community and the Local Authority. Some of the R 10 000 was also used for awareness building within the community – based on the experiences gained from the problem analysis.

The Local Authority had in the interim applied for a R 2 million grant to replace the sewerage pumps, and to re-align some of the sewer lines. In addition to this they have got R 600 000 emergency funding from the Provincial Government to clean the sewer system. The result of this was that the immediate problem of the blockages has been addressed.

But the Local Authority has also now started a routine inspection process, and they respond to blockages before they become too severe for them to deal with. More importantly, the community is now more aware of the causes of the problem, and are working with the Local Authority to minimise the problems in the future.

3.3 Acornhoek

Acornhoek is a small town in the eastern part of the Northern Province near the Kruger National Park. Acornhoek falls under the Bushbuck Ridge Local Authority, which has significant capacity problems. Acornhoek itself serves as the commercial and shopping area

[2] A further three Test Cases did express interest, but they never initiated work and never requested any funding

for the surrounding rural areas. There are no large industries or wealthier sectors in the town, and as such the council is unlikely to be able to raise much revenue locally.

The main commercial area of Acornhoek suffered from significant solid waste problems. There was no formal collection of solid waste, and litter generated from the hawkers and shops was dumbed along the roadside. Some of the larger shopping centres operated their own private refuse removal systems, and refuse was dumped in informal dumping grounds. The nearest licensed disposal site was in Hoedspruit some 50km away.

The interventions decided on by the TCSC were to undertake an awareness campaign on the health and environmental risks posed by littering. At the same time the opportunities for cost recovery were explored with the shopkeepers and hawkers, and agreements were reached on how the various storeowners could pay for an ongoing service. The Bushbuck Ridge Local Authority authorised the use of R 600 000 of their Equitable Share Fund to develop a licensed solid waste site in Acornhoek. (This site is currently being developed). Industries in Phalborwa (some 100km away) donated drums for solid waste, and these were placed throughout the commercial area.

The remainder of the project funds were then used to pay a private contractor to provide a collection service and to remove the solid waste to the disposal site. (Initially the Hoedspruit site was used.) This system operated under project funding for 2 months. During this time it was hoped that the costs would start being covered by the shopkeepers and hawkers. Unfortunately, the Local Authority felt that they should be involved in the collection of these services payments, but did not have the capacity to do this. As a result the collect of waste has stopped. The TCSC has now been encouraged to restart the process – but to operate it as a private-public-partnership until such time as the Local Authority is ready to take over the service.

4 SOME LESSONS LEARNT

Overall the Test Cases have provided mixed successes. In some of the cases, notably Kliptown, Nylstroom, and Burlington Halt, there are very good opportunities for sustainability through improved cost recovery, clear improvements in the quality of life, and improved awareness in both the community and service providers. Most importantly in each of these cases the Local Authority has committed itself to continuing with the work, or the community is clearly able to manage the services themselves.

To a lesser extent, the Kaya Mandi, Monnakato, Bethulie, Acornhoek, and Masizakhe have provided opportunities for sustainable improvements in the pollution problems. In these cases there are opportunities for cost recovery and/or improved involvement from the service providers or Local Authority – but as yet there is no firm indication that the interventions are likely to be sustainable. Nevertheless, at least in Monnakato improved cost recovery is likely to realise sustainable improvement. Similarly, In Kaya Mandi, buy-in from the council should make the interventions sustainable.

In the others, Rini, Cairn and Phuthadijhaba, the opportunities for sustainable improvements seem lower. In these cases the TCSC did not really get to grips with the root causes of the problems, or started their interventions too late to show real results. A lack of basic project management skills in these TCSCs also limited the efficacy of their implementation. It is also important to realise that intransigence by the community, and the unwillingness to accept ownership and hence responsibility for services payment was important in Rini and Cairn.

However, in spite of the mixed successes, the implementation process in each Test Case provided some valuable lessons with respect to how the structured facilitated process may be improved. These lessons have been built into edition 2 of the National Strategy document, and have influenced the recommendations made for the roll out of the approaches in other settlements. These lessons are highlighted here.

1. Generally, the process of getting to the root causes of the pollution problems works well. While not all of the Test Cases found their root causes in the first round – most found that the process was ongoing and when they re-visited their problems (sometimes after the initial interventions) they had a better understanding of the root causes. (see the Cairn, Kaya Mandi and Rini Test Cases.)
2. The method seems to bring the officials and community closer together as they both have the opportunity to express their concerns. This builds a better understanding of their respective problems and challenges. This in itself seemed to lead to improved co-operation without the need for specific intervention. (see the Monnakato and Kaya Mandi Test Cases.)
3. The linking of the Problem Tree with the interventions and the monitoring requirements (see the Problem Analysis Guide) guides the community and the Local Authority (service provider) into developing a viable plan to address the pollution problems.
4. By encouraging the community and Local Authority to find the physical, social and institutional causes, the method helps find the underlying causes of pollution. This also means that the community and the service provider recognise that they both contribute to the problems, and that no one side is solely to blame.
5. The structured-facilitated process worked best when it was almost confrontational in nature. Where the service provider or Local Authority or community were confronted with their contribution to the problem, they were forced to defend their position, which in turn promoted participation. This also helped to get to the root causes of problems, and helped build a common understanding of the problems faced by each group.

6. This also highlighted that is critical to get both service providers and communities at the same meeting. In this respect, the younger community members were usually the most keen to actively participate, but were less likely to accept that they contribute to the problem, preferring to blame it all on the service provider. Older members of the community, and especially women, were much more ready to accept the community's role in the problem. This means it is important to involve the older people and women, and to make sure they participate.
7. Most Test Cases did not make the best use of their monitoring data. Most TCSCs reported improvements in payment, reduced diarrhoea, and improved awareness but few could provide real quantitative data in this respect (with the notable exception of the Burlington Halt, Kliptown, Kaya Mandi, and Monnakato Test cases.
8. On-site mentoring seemed to been important to keep the TCSC on track, but also to provide "good ideas" to overcome some problems. The project team including the DWAF staff and some of the people involved in the Test Cases should therefore continue some mentoring role in post project implementation.
9. One of the most important issues coming out of the whole Test Case process was the expectations of the community are generally very high. In some cases the process was seen simply as a means of demonstrating that higher levels of services were necessary. Some TCSC and community members also treated the process as a job creation exercise. This places some doubt over whether the process would still be effective if no funding were provided.
10. Some of the Test Cases took some time to start implementing their intervention plans (mostly due to administrative complications). In these cases their interventions, when they were eventually done, were often unfocussed and sometimes missed their original intention. This seemed to be due to the fact that the TCSC had "forgotten" what the actual problems were. As such, it is recommended that the problem identification process and the implementation of interventions occur soon after one another.
11. In this respect, it is important that the funding for implementation is clearly identified from the outset. This will avoid long delays while trying to identify potential sources of funding only once the Intervention Plans have been drawn up.
12. Ultimately, the sustainability of any interventions to address pollution problems will rest on finding the funds for ongoing operation and maintenance. Given the extent of the non-payment problem in South Africa, this is likely to be the biggest hurdle to sustainable management of pollution from settlements. In this respect, the Test Cases have shown that community operated services and payment schemes were most successful. Good examples are the Kliptown, Cairn, Acornhoek, and Kaya Mandi Test Cases. In these cases the community pays directly for their "service", and in fact provides this service themselves. There is therefore a more direct link between payment and the provision of the service.

5 CONCLUSIONS

In general the implementation of the Test Cases has been successful, and valuable lessons were learnt from all the cases. In each case, while the process was not always implemented as designed, it did make the TCSC, community and Local Authority think beyond the immediately obvious causes of pollution. This also had the effect of helping both the service provider (or Local Authority), and the community to recognise their contribution to the pollution problem. In many cases, this reaped benefits in changing the way the service is provided, and in the way the community uses the service – even where this was not the specific intention of an intervention. In at least five of the Test Cases settlements, there have been visible reductions in the pollution problem and this has lead to improved community health. In the others, the potential for improved management of the waste services has certainly been created by the interventions.

All the TCSCs have also expressed enthusiasm for the approach, and many have started using it in their other activities. In all cases the structured-facilitated process has identified pollution causes and interventions that were not evident at the start of the process, albeit with some assistance from the project team. In some, for example the Kaya Mandi, Burlington Halt, and Kliptown. Test Cases, this has lead to some very simple but innovative community based initiatives to address the problem. In most of the Test Cases the community will be involved in the ongtoing implementation of the Interventions, which will help ensure sustainability.

However, there are some problems. In almost every case, non-payment was the major underlying cause of pollution problems. This was usually put down to poverty, but the volume and type of waste generated in many cases indicates that there is some money in the community. But few communities recognised this, and it is not expected that this problem will be effectively and widely addressed without a more co-ordinated national approach. In this respect, the recent initiatives around “free basic services” may exacerbate the ownership and responsibility problems underlying non-payment, and will make it difficult to manage pollution in some areas.

Lastly, the Test Cases implementation process has indicated that on-site mentoring is critical to the process.

An independent evaluation of the Intervention Plans by the National Sanitation Co-ordination Office is attached in Appendix A.

APPENDIX A

A Strategy to Manage the Water Quality Effects of Settlements

Implementation of the strategy: a review of the nine test cases

by the National Sanitation Co-ordination Office

Introduction

Further to a request from the Dense Settlements Project Team, the National Sanitation Co-ordination Office (NaSCO) has agreed to review the Intervention Plans drafted by the Test Case Steering Committees (TCSC) in each province, for each of the nine test cases selected.

As a member of the Dense Settlements Project Steering Committee (PSC), NaSCO is familiar with the progress of the project and was represented at the Mabula Game Lodge workshop in July 1999. Familiarity with the individual test cases is however limited to a brief presentation of each and a review of the test case files which were freely available to members of the PSC. In addition a visit was made to one of the test case sites: Cairn in Mpumalanga; this provided an opportunity to observe and discuss some of the difficulties faced at a community level, in preparation and implementation of the intervention plan.

Approach to the review of the Test Case Implementation Plans

On receipt of all of the plans, each was reviewed in turn and assessed according to the following criteria:

1. General understanding of the strategy approach;
2. Test case steering committee support
3. Clarity of problem tree analysis
4. Interventions proposed
5. Budget

Whilst comments have been supplied, no particular conclusions have been drawn about the process as these comments are provided to complement those of the main project team.

1. Phagameng, Greater Nylstroom (Northern Province)

1.1. The report demonstrates a good understanding of and well facilitated approach to the test case, and indicates a high level of commitment by the TCSC. It is not always clear however whether it is trying to address the problems of a wider area than just the formal and informal areas of Phagameng.

1.2. A reasonable level of understanding of the issues relating to service provision and responsibilities within the community is indicated, although the need for community awareness campaigns was widely recognised.

1.3. The problem tree analysis highlights an even balance of social and institutional issues although gives only one problem based on physical factors which impacts on pollution of the area. The problems identified are not clearly related to pollution of the water course by solid and liquid wastes which are washed or percolate into it, thereby missing some of the wider implications of overflowing toilets, burst pipes and uncontrolled stormwater and lack of treatment capacity.

1.4. Whilst the responsibility for implementation and monitoring of the plan is clearly allocated to the TCSC and the TLC members, there is an urgent need for the proposed performance monitoring plans to be developed and acceptance of the roles of particular members to be demonstrated.

1.5. A budget of R160,000 has been indicated, with an encouragingly significant proportion being proposed for community awareness campaigns. Additional activities have not been costed, but those indicated include others which could realistically be included in the test case budget.

2. Masizakhe (Northern Cape)

2.1. The report demonstrates a well-facilitated approach to the strategy, with reasonable understanding by the community of what it is trying to achieve. Community support for the initiative appears to be limited by other concerns which community members feel are of greater relevance to themselves, as well as by the fact that there will be no major implementation occurring as part of the project.

2.2. Support for the TCSC is reported as having been consistent and through them an endorsement of the process by the community.

2.3. The problem tree analysis is clear in identifying many of the issues, although in the case of the sewage waste stream puts the onus very much on institutional interventions whilst there is a more balanced highlighting of institutional, physical and social problems for the other waste streams.

2.4. There is a mixture of attainable interventions, such as the education and awareness programmes, and those which require significant financial and institutional input. It is apparent that the community is looking to the Council to improve existing infrastructure and feels that their problems will be solved when the new local authority boundaries are drawn. Training of locals for maintenance of pumps and vehicles has been well identified as an intervention, although careful consideration of who this must be is important in order to retain the skills within the community.

2.5. No budget details have been provided.

3. Kayamandi (Western Cape)

3.1. A reasonable understanding of the approach to the strategy is demonstrated, although the report dwells details rather than taking a general overview in some circumstances. The focus on the pollution issues is very strong, possibly to the detriment of community needs which may have attributed to lack of community interest further into the programme.

3.2. There appears to be a strong TCSC which had strong community support in the beginning, although it is reported that community support was lost over time (reasons being given as the unrealistic time constraints imposed by the DANCED project programme).

3.3. The problem tree approach has not fully clarified the underlying reasons for problems experience but has rather listed a whole range of discrete issues with no ‘root’ causes.

3.4. Without ‘root’ causes having been clearly identified, the task of identifying suitable interventions has possibly been harder. Interventions around education and awareness have

however been clearly identified as has the need for a structured approach to monitoring and evaluation. Fairly major infrastructural interventions have been proposed, supported by local government in certain instances, which can build on services which are already in existence. Macro level issues such as the capacity of treatment works and future levels of service which may impact on the volumes of wastewater being generated have not been addressed, thereby preventing any interventions being developed now which target future needs.

3.5. The budget indicates significant support for education and awareness raising, but is otherwise rather vague and does not appear to have allocated funds to the minor physical interventions proposed although these are important.

4. Kliptown (Gauteng)

4.1. A good understanding of the strategy is demonstrated, as well as good levels of understanding of the issues to be a addressed within and by the community.

4.2. The TCSC appears to have been enthusiastic and well supported by the community, although it was difficult to assess the local authority or other institutional support for it. By using a committee that was already established appears to have assisted the process, particularly in using well-established links between community and local authority parties.

4.3. The problem tree approach is fairly clear with strong recognition of the lack of awareness and ability to pay as a major contribution to pollution from all the waste streams, as well as little active participation from the community in addressing the problems.

4.4. The interventions are clearly related to the water quality problems and provide clear guidelines around monitoring and evaluation. The whole process is well defined in terms of community roles and status.

4.5. No budget has been provided

5. Cairn (Mpumalanga)

5.1. It was difficult to ascertain the level of understanding of the strategy from this report, although with Land Tenure/Transfer processes already established within the community it appeared that the capacity for initially engaging with the strategy was already in place. Community understanding of the links between the waste streams and pollution of their watercourse did not appear particularly high, but understanding that management of the waste streams was necessary to improve their health status was indicated.

5.2. The TCSC appeared active at a community level, although it was difficult to ascertain the level of local government support. The New Trust Association already in place in the community facilitated the process and buy-in from its members, although possibly resulted in interventions going ahead even before the wider strategy and intervention plan had been fully developed.

5.3. The problem tree approach very clearly indicates the relationships between ‘root’ causes and effects on the pollution of their surrounding environment although does not cover wider issues which combine with those identified, nor ultimately relate the problems to pollution of the water source.

5.4. The intervention plan includes a number of realistic activities which the community can be actively involved in and highlights the need for education and awareness programmes around all the waste streams. The existence of the New Trust Association implies that there is existing dialogue with local government which should positively impact on future activities within the community.

5.5. A clear budget, closely related to the activities listed in the intervention plan, was provided, utilising the full R500,000 available as part of the DANCED project.

6. Monakato (North West Province)

6.1. This intervention plan is brief and no clear evidence is given that the strategy was well understood.

6.2. No mention of a TCSC was given

6.3. Whilst the problem trees were fairly clear in outlining the related issues, they did not appear to be 'site specific', i.e. not closely related to the actual community problems.

6.4. The intervention plan consists of a list of typical interventions without any consideration of who is to implement and monitor the various activities. Again the interventions do not appear specific to the test case problems.

6.5. No budget is provided.

7. Burlington Halt (KwaZulu Natal)

7.1. The understanding of the aims of the strategy are reasonable, with a fairly clear focus on pollution of the water source. As with the Kayamandi test case, the water pollution focus appears to slightly overshadow community needs.

7.2. The TCSC appears well represented and active in supporting the project. Support from the community was difficult to gauge.

7.3. By incorporating a large number of issues into the problem trees, some confusion has resulted particularly in the sewage waste tree. There is no stormwater problem tree included. Useful cause and effect relationships have been highlighted however.

7.4. The intervention plan is very general in its proposals, with no allocation of responsibility although indicates that this ultimately lies with the local authority. Education and awareness programmes are proposed although specific reference to the need to address cost-recovery is not included. Cost recovery will however be crucial if existing high level of service are to be maintained; awareness of alternative levels of service must at a minimum be considered and related closely to the water supply available.

7.5. No budget is provided.

8. Rini-Grahamstown (Eastern Cape)

8.1. The intervention plan is too brief to properly assess, providing little background information on the test case communities. As a result it is difficult to determine the level of understanding of the strategy and how it relates to the water quality problems.

8.2. The TCSC appears to have struggled to maintain support, although has been pro-active in seeking new ways to address this issue. Changes in its approach have probably delayed progress of the project.

8.3. The problem trees lack explanation and therefore it is difficult to comment on their relevance or accuracy. They identify a large number of social issues indicating that a significant education and awareness intervention would be proposed.

8.4. No interventions have been included.

8.5. No budget has been included.

9. Phuthaditjhaba (Free State)

9.1. Whilst a fairly reasonable level of understanding of the strategy is stated, the actual analysis and implementation strategy developed indicates that the level of understanding is limited. Whether the manner of engaging the community or due to activities within the community itself is at fault, a realistic approach to the strategy has not been realised.

9.2. The TSCS appears well established although how close it was to the community was not apparent. The lack of information on how it engaged with the community members makes it difficult to assess the level of support.

9.3. The problem trees are somewhat convoluted although do address a large number of issues. These issues although raised, do not however highlight the causes which can be addressed through some initial simple interventions.

9.4. The intervention plan is completely unrealistic in that it focuses solely on physical interventions without any reference to awareness raising and education. The cost implications of such interventions have not been dealt with, nor the communities willingness to pay for services indicated.

9.5. No budget for the DANCED funds is supplied, although capital costs have been given relating to the provision of new infrastructure.

Jane Crowder

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