

**EFFECTIVE COST RECOVERY IN A CHANGING
INSTITUTIONAL AND POLICY ENVIRONMENT:
MUNICIPAL DEMARCATION,
THE "FREE BASIC WATER" POLICY, AND
FINANCIALLY SUSTAINABLE SERVICE DELIVERY**

L. Marah • M O'Donovan • R Martin • D Boberg

WRC Report No. 1384/1/04



Water Research Commission



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**Report to the
WATER RESEARCH COMMISSION**

by

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EXECUTIVE SUMMARY

1. Objectives

Following the work undertaken by Sigodi Marah Martin "Identifying Examples of Successful Cost Recovery Approaches in Low Income Urban and Peri-urban Areas"¹, which included a national survey to set the case studies against a statistically sound universe, it was decided to apply similar methodology to the newly formed local authorities, and establish an analytic framework appropriate to the situation.

The overall objective of the study has been to make an assessment of the level of cost recovery as far as local government is concerned, and identify which measures are the most effective in increasing the rate of collection. This report highlights the substantive implications of the findings for municipal officials and national policy makers seeking to overcome obstacles to successful cost recovery. An assessment is also made of the impact of the free basic water policy, and the issue of unaccounted-for water.

2. Literature survey

The report extracts relevant findings from the literature on the subject of cost recovery – which is comparatively limited as far as South Africa is concerned. It reviews the question of the importance of social capital in cost recovery, and the effect of previous cost recovery regimes, levels of payment and service levels on the responses to new projects and proposals. An important factor in cost recovery is the appropriateness of the levels of service provision to the affordability, and the standard of maintenance provided.

The literature shows how management and customer care are also important influences in creating the environment within which cost recovery will be more likely to succeed. This includes good communications with the customers, the involvement of the consumers in project design, and providing good customer care facilities.

¹ WRC Project K5/1131 *Identifying examples of successful cost recovery approaches in low income urban and peri-urban areas*, Johannesburg, 2003.

Tariffs and affordability are also important factors. Definition of affordability is clearly an important factor, and there is considerable elasticity of demand within certain parameters. Billing and metering systems are also considered.

The legal framework, and sanctions for non-payment are a major factor in cost recovery. The literature provides case studies of methods used.

3. Previous survey

Chapter three describes Sigodi Marah Martin's previous study, undertaken in 2000, which was, in many senses, the starting point for the current work. This included five aspects. First, consultations with the stakeholders, including the Department of Provincial and Local Government (DPLG), Department of Water Affairs and Forestry (DWAF) and the South African Local Government Association (SALGA) and secondly a literature review. Thirdly, a national survey was conducted to collect quantitative data on the cost recovery situation nationwide. Fourthly, case studies were undertaken of four successful local municipalities, and finally the findings were synthesised and recommendations made.

4. Methodology

The data was collected by means of a detailed survey of fifty randomly selected municipalities, supplemented by a simpler postal survey of all municipalities. Based on multiple imputation techniques, key missing variables in the postal survey were inferred from in-depth interviews. The project also featured capacity building of the PDIs working on data collection and analysis.

Difficulties were experienced in obtaining responses to the questionnaire, and some responses contained gaps. Responses to the national survey were limited by two factors: some of the municipalities are not Water Services Providers, and therefore had no data; the second has been the difficulties presented by the re-demarcation process which has caused data collection and harmonisation difficulties for many municipalities. The demarcation process has also made presentation of historical data difficult. To address the issue of missing data and non-responses a method of multiple imputation was used to augment the survey.

The response rate was approximately the same as in the former study. The use of a stratified random sample for the detailed survey ensured that it was representative of national trends and the range of experiences endured by municipalities.

5. Findings

Chapter five presents the analysis and findings of the study. It starts by examining the concepts of debt ratios and repayment rates as indicators of cost recovery performance. Debt ratio is the ratio of current debt to total debt. If payments are made on time, then the ratio will be one. It was found that, even though the free basic water policy removes a substantial proportion of households from the debtors list, the average ratio from the municipalities studied was about 0.5 – not a good situation. One municipality received only 3 percent of the amount they billed in a quarter. The use of the repayment rate (proportion of households who pay on time) gave very similar results.

The work proceeds to examine the probable impact of adopting better practices. These may be summarised as follows:

- Impact of Masakhane programmes, strong penalties and progressive tariffs

The study calculates the impact of adopting improved practices by first constructing a scenario in which a municipality has no Masakhane programme, no penalties for non-payment, and a fixed tariff structure (i.e. one in which the rate charged does not increase with increased consumption). It shows that if such a municipality were to adopt these policies and practices there would be an eighty percent chance of improving cost recovery by between 1 and 40 percent. It may be of interest to record that few municipalities currently have adopted all three measures.

- Masakhane and progressive tariffs

If municipalities move from a total absence of Masakhane campaigns and progressive tariff structures to full implementation of these two measures, an average increase in payment rates of about 11 percent may be obtained.

- Strong penalties

Strong penalties are defined as the suspension of services if a household is more than three months in arrears. If municipalities were to move from no penalties to strong penalties, the cost recovery rate would improve by nine percent on average. In 80 percent of instances the improvement would be between – 9 and 30 percent.

- Strong penalties, the abolition of flat rate billing and progressive tariffs

This approach will increase the payment rate by approximately 23 percent. Most (80 percent of the increases) will be between 17 and 30 percent – indicating that there is a negligible chance that changes will result in reduced payment rates. Current payment rates (based on the simulated model) are only 57 percent – indicating that increases of this magnitude are entirely plausible.

- Simulating the debt ratio

The effect of administrative changes on *payment rates* of typical municipalities may be compared with the effect on the *debt ratio*. Unfortunately the clear trends indicated with respect to payment rates are not manifest in the debt ratio models. The free basic water policy contributes to this effect. If we take the change from no penalties to strong penalties, the improvement in debt ratio will be only 4 percent, and in 80 percent of instances the debt ratio will change by between –18 and 16 percent, and the average effect is almost exactly zero.

In conclusion the study has shown that the reconfiguration of the municipalities, coupled with the implementation of the free basic water policy has had a marked influence on how recovery of costs can be enhanced. On the one hand initiatives geared towards the lower end of the market are increasingly overshadowed by the impact of the free basic water policy. On the other hand, the implementation of punitive sanctions against non-indigent consumers who fail to pay a progressive, volume-related tariff, takes on increasing importance. However, it must be noted that just as punitive sanctions become increasingly necessary, they also become more expensive to implement. Water services providers are no longer able to cut the flow of water to defaulters – the policy would suggest that they have to ensure that the free basic allowance remains available to all.

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CHAPTER 1: INTRODUCTION

1.1 Background

South Africa has a history of inequitable distribution of water services, skewed by racially discriminatory policies and severe socio-economic inequality. For example, the 1996 census found that four out of ten South African households lacked piped water, and that more than 95 percent of those without piped water were "African".² The advent of democracy not only gave all South Africans the right to participate freely in public affairs, but it also constitutionally entrenched rights to basic social and economic services.³ The policy expression of the government's general commitment to basic service delivery was the Reconstruction and Development Programme (RDP), which (among other things) aimed to provide all South Africans with "a clean, safe water supply of 20 to 30 litres per capita per day within 200 metres."⁴ At the same time, the RDP document recognised that implementation would be subject to financial constraints, noting that the programme would "redirect government spending, rather than increasing it as a proportion of GDP."⁵ The subsequent publication of the Growth, Employment, and Redistribution (GEAR) macro-economic strategy — stressing the importance of aggressive fiscal deficit reduction for the country's medium-term growth prospects — highlighted the financial constraints. A crucial challenge for the government was to reconcile competing pressures, to extend basic services to all South Africans and to ensure their financial sustainability.

The White Paper published in 1994 by the Department of Water Affairs and Forestry (DWAF) paid careful attention to the cost of expanding basic water services. Drawing in part on conventional thinking in international development organisations, this approach sought to

²Statistics South Africa, *Census in Brief* (Pretoria: Statistics South Africa, 1998), 76. The service figures are for piped water available "in dwelling" and "on site or in yard." Classifications by population group (African, coloured, Indian/Asian, white, and unspecified/other) are used to track the legacy of past racial discrimination.

³Republic of South Africa, "Constitution of the Republic of South Africa, 1996," Act 108 of 1996, (Cape Town: Government Printer, 1996), section 27.

⁴*The Reconstruction and Development Programme: A Policy Framework* (Pretoria: 1994), section 2.6.6.

⁵*The RDP*, section 6.6.3.

recover recurrent (operation and maintenance) costs of basic services through user charges.⁶ Resources at DWAF's disposal could thus be devoted to the capital costs of expanding basic service infrastructure. Some allowance was made for the very poor through the approval of subsidised "lifeline tariffs" to make basic services affordable. In urban areas responsibility for servicing the indigent was assigned to local government, which was to fund such services from the Department of Finance's "equitable share" grants (based on the number of residents below the poverty line) or by increasing charges on other consumers cross-subsidising the poor. The white paper emphatically stated that DWAF's financial responsibility did not extend beyond grants to cover capital costs of basic services: *"The basic policy of Government is that services should be self-financing at a local and regional level."*⁷ By insulating itself from obligations related to operation and maintenance costs, the Department sought to devote the limited financial resources at its disposal to capital development.

Difficulties in securing user payments soon emerged as a major threat to the continued expansion of basic water services. In 1998, DWAF admitted that "many of the Department's RDP water projects are proving unsustainable as cost recovery is not taking place."⁸ There was no shortage of possible explanations for low payment rates. Consumers of basic services were poor. Similar services had previously been provided free in many areas. Given South Africa's political history, the legitimacy of municipal governments was weak, and a "culture of non-payment", which had taken root in the struggle against apartheid, had become entrenched. The weakness of municipal institutions made the administration of billing and payment systems problematic. Within the existing policy framework, the failure of cost recovery left the government with an unpalatable choice — either allow existing services to collapse, or divert a portion of the capital budget to propping up existing services. The first option involved a clear step backward regarding the goal of extending basic services to all South Africans. Yet the second, by draining the funds available for further capital

⁶DWAF, "Water Supply and Sanitation Policy White Paper" (Cape Town: Government Printer, 1994). For a critique of cost recovery through user charges, see M. A. Schur, "The Need to Pay for Services in the Rural Water Sector," *South African Journal of Economics* 62, no. 4 (Dec. 1994): 419-31.

⁷DWAF, "White Paper, 1994," 18, emphasis in the original.

⁸DWAF, Water Services Chief Directorate, "Twelve Successful Cost Recovery Case Studies for Water Services in South Africa" (Pretoria: DWAF, 1998), executive summary.

development, could be construed as a form of exploitation in which, in DWAF's words, "a small portion of the population enjoys free services whilst the majority has no services."⁹

The following research report attempts to address and shed light on the problem of cost recovery in South Africa within the context of newly demarcated municipal boundaries the adoption of a free basic water policy and the implementation of the Municipal Structures and Municipal Systems Acts.

1.2 Research Objectives

Effective cost recovery is crucial to the financially sustainable provision of water services. The institutional and policy changes referred to above have profoundly altered the environment in which cost recovery must take place. The main changes included the re-demarcation of municipal borders, a policy of providing free basic water¹⁰ was adopted local and metropolitan municipalities became directly responsible for implementing the policy while maintaining services levels. These changes substantially modify the prevailing paradigm of cost recovery. Moreover as very few municipalities enjoy the luxury of a viable status quo, a thorough going review of municipal cost recovery practices and expectations is inevitable.

The research highlights the links between municipal restructuring, and the challenge of financially sustainable service provision. It provides information and insights that assist the development of cost recovery strategies during a period of institutional and policy change, furthermore it points to potential cost recovery practices. The research builds upon existing studies, in particular, WRC project K5/1131¹⁰ – in using systematic data collection and analysis to estimate determinants of cost recovery in a dynamic environment. Although sophisticated modelling techniques are applied, it aims to present practical implications for national and municipal decision making in an accessible and non-technical way.

⁹DWAF, "White Paper, 1994," 21.

¹⁰ *Identifying examples of successful cost recovery approaches in low income urban and peri-urban areas*. Johannesburg, 2003.

The objectives of the study were to:

- To audit (countrywide) successful cost recovery for water services provision. A prime difference of this audit vis-à-vis the previous WRC study is the adoption of the new municipal demarcations as a frame of reference. Over and above the spatial changes the audit also identifies the on-going changes in policies prompted by the introduction of the free basic water policy.
- To establish the institutional, social, economic, and political contributions to successful water service provision and identify how these contributions have adapted to policy changes.
- Formulate indicators of which suggest improved cost recovery for the water service sector. These indicators build on the previous project in terms of a) the changes in policy and framework while b) incorporating the impact of uncertainty in administrative and other interventions.

1.3 Research Methodology

The main objective of the survey was to collect quantitative data on the cost-recovery situation countrywide — including behavioural and financial indicators of cost-recovery outcomes, social and institutional profiles, infrastructural characteristics, and billing and payment policies and practices. The information builds on the previous WRC K5/1131 study conducted by SMM, while expanding the investigation into municipal accounts and the “landed” cost of water. The main research instruments were interviews conducted on an individual basis with senior officials in fifty municipalities. In addition to these face-to-face interviews (which were used to capture data regarding policy and administrative behaviour) all other municipalities were invited to respond to a brief postal survey covering key questions. The face-to-face interviews were in greater depth and cover a wider range of aspects. By carefully selecting the municipalities to cover a full range of experience these interviews were used to impute, where necessary, missing data regarding national trends.

The research methodology for the survey component of the project can be summarised in five steps:

- From a review of existing international and South African research, formulate an analytical framework identifying major hypothesised determinants of successful cost recovery. Insights from the WRC study K5/1131 are instrumental in identifying promising strategies.
- Use a national survey and other social data sources (for example, the 1996 census) to collect indicators measuring cost-recovery outcomes and the hypothesised determinants of successful cost recovery for a sample of South African municipalities. Using the StatsSA Labour Force Survey, 2001 (LFS) a representative cross-section (in terms of cost recovery) of municipalities was identified. A random selection of municipalities was then drawn from the resulting typology. The fifty randomly selected municipalities were subject to in-depth interviews. As indicated above all other municipalities were asked to participate in a shortened, simpler postal survey.
- Using multiple imputation techniques key missing variables in the postal survey were inferred from the in-depth interviews.
- Using appropriate statistical techniques to conduct descriptive and "causal" analyses of the dataset compiled.
- Once the impact of the changes in municipal demarcation and policies on administrative and other cost-recovery related practices are identified the substantive implications for municipal officials and national policymakers seeking to overcome obstacles to successful cost recovery are identified.

1.4 Project Data Collection and Analysis Systems

To reach the above objectives a two phased approach was adopted. The first phase was –a "Baseline" analysis of cost recovery in the newly demarcated municipalities:

- a. The first stage was a compilation of a countrywide dataset on municipal social, economic, service and institutional profiles. A Geographic Information Systems (GIS) were used to integrate social, infrastructural and institutional data from official sources by spatially referencing demographic, economic and financial data within new municipal boundaries.

- b. This was followed by a simulation of cost recovery outcomes for different municipal profiles. This phase included the use of a multivariate statistical model to illustrate the effects of various determinants of cost recovery. A similar model was used in the WRC research project K5/1131.

The second phase was a two-tiered survey of cost recovery determinants and outcomes for newly demarcated municipalities

- a. Tier 1: A postal survey on approaches to cost recovery for water services was targetted on all the newly demarcated municipalities. This involved a postal survey administered to all municipalities. Characteristics of the realised sample (responding municipalities) were then compared with the target population (all municipalities).
- b. Tier 2: A survey of a stratified random sample of newly demarcated municipalities with more detailed questions about cost recovery for water services. The sample was stratified to ensure coverage and national representivity of municipal types. The questionnaire was administered face-to-face by trained fieldworkers.
- c. Multivariate statistical analysis of "two-tiered" data.

1.5 Project Outputs

The key outputs of the research are a concept paper, a review of the existing literature and analysis of the surveys.

Concept Paper: This paper was an initial exploration of cost recovery concepts. It is reproduced in Appendix A for reference.

Literature Survey

The available English literature was reviewed as a precursor to defining the research instruments. The review is presented in chapter 2.

Research Report: This report which is largely technical in nature examines cost recovery practices in the new institutional and policy environment. Derived from the *national survey of municipal cost recovery*, this report shows how a range of social, political, and economic factors affects cost recovery. These findings assist municipalities, service providers and national policymakers in dealing with obstacles to the financially sustainable expansion of access to basic water service.

CHAPTER 2: LITERATURE SURVEY

2.1 Introduction

This chapter presents a synthesis of the available literature regarding cost recovery. The primary objective of the review was to identify key factors which affect cost recovery, and in so doing, to provide directions to aspects which will lead to successful cost recovery while pointing to those variables which should be covered in the survey component.

2.2 Background Factors

Much of the literature which describes the background under which costs recovery initiatives take place relate to specific projects. These projects, furthermore, seem to be inordinately concentrated in rural areas. Despite this they are highly informative of how the context affects cost recovery.

2.2.1 *Social Capital*

The term "social capital" is used to characterise the presence in a community a sense of interdependence, and thus its ability to collectively solve problems. A community which is in on-going conflict, or has no mechanisms for the members to work together is said to have no social capital.

It is not therefore surprising that, in at least one DWAF report¹¹, most of the communities referred to have higher than average social capital. However, it would be fair to neither the communities nor the project managers, to assume that social capital just exists. There are many examples of it being developed, and the work of the Mvula Trust in generating community support and trust through the project process emerges from several of the cited case studies (e.g. Gundani, Motlhabe Ntswana-Le-Metsing, Ngqele)¹².

¹¹ Department of Water Affairs and Forestry, Water Services Chief Directorate. "Twelve Successful Cost Recovery Case Studies for Water Services in South Africa." Pretoria: Water Services Chief Directorate, 1998.

¹² Department of Water Affairs and Forestry. "Understanding the Cost Recovery Challenge: A Study of Ten Rural Communities." DWAF, 1998.

Political divisions can be very destructive, and can be used to give distorted messages. In the DWAF report ¹³ a group from the village of George Moshesh which claimed to represent the ANC party tried to undermine cost recovery efforts by saying that it was government's responsibility to pay for water.

An important component of social capital is respect for the leadership. A good example is provided by Norokie, ¹⁴ where the leadership of a water scheme was undertaken and consisted of two elderly people, one woman and one man. While they were in charge everything worked well. However, at the time this scheme consisted of only a single borehole. The village was designated to become part of a large water distribution project, with 19 standpipes in the village. During its implementation the project followed the conventional system of establishing a water committee, and was not badly implemented. However, it has nevertheless disrupted the existing leadership structure. Women feel excluded from the committee (where an ability to speak English is considered to be a qualification for membership), and there are doubts about the fairness of the proposed system of flat-rate payments. The committee is also dominated by the youth, many members of which, the community consider to be less trustworthy with money than the previous leaders.

In Kopela, another of the communities studied in the same report¹⁵, payment for consumption fell to a dismal 2% of households. . The reasons given included resentment that free-riders were getting water, suspicions about how the money was being used, poor communications with the water committee, and, to quote a committee member, "bad attitudes". Leaders were alleged to spread bad feelings and discourage payment at "meeting (sic) at night when even the chief does not know". The report concludes that "a whole host of underlying tensions and power struggles form the context for this difficult situation. These tensions have lead to the gradual breakdown of co-ordination between the four communities linked by the project. Operation of the system has been reduced to a level of ad hocery that threatens the supply of water on a day-to-day basis and ultimately for the future".

¹³ Op cit.

¹⁴ Department of Water Affairs and Forestry. "Understanding the Cost Recovery Challenge: A Study of Ten Rural Communities." DWAF, 1998.

¹⁵ Op cit

2.2.2 *Previous Cost Recovery Regime*

The nature of the cost recovery regime and the efficacy with which it was enforced had a profound effect on the way in which changes were accepted. For example, when water charges are included with other charges - like tribal levies or municipal rates cost recovery may be subordinated to other dynamics. If water charges were included in tribal levies the water element of costs become incidental to the right to occupy the land. Obviously this influence peoples likelihood of paying and their ability to "free ride".¹⁶

Many projects inherited cost recovery regimes that were very weakly enforced or dysfunctional.¹⁷ The Norokie project, referred to above, experienced problems due to the fact that no cost recovery system had been introduced for at least a year after water had been supplied. While the community had given its consent for the project and had undertaken to pay, the length of the delay in introducing payments correlated with increased grumblings about the prospects of paying in the future.

Indeed, this situation is encountered quite regularly. In the DWAF report¹⁸ it is reported that in the Stormberg and Mbaxa areas no payments are being made for the water. No information had been given with regard to how much should be paid or where it should be paid.

However, the existence of a weak or inefficient system does not preclude a strong reversal in payment practices is not fatal to good results. DWAF report¹⁹ refers to a marked change from a situation in Gundani where there was no cost recovery system (diesel for the pump was paid for by DWAF), to one where cost recovery reached 85%. A similar turn-around was

¹⁶ Department of Water Affairs and Forestry. "Understanding the Cost Recovery Challenge: A Study of Ten Rural Communities." DWAF, 1998.

¹⁷ Op cit

¹⁸ Department of Water Affairs and Forestry. "Local Cost Recovery Practices and Attitudes in Proposed Amatola Water Board Area." DWAF, Pretoria, 1998.

¹⁹ Department of Water Affairs and Forestry, Water Services Chief Directorate. "Twelve Successful Cost Recovery Case Studies for Water Services in South Africa." Pretoria: Water Services Chief Directorate, 1998.

reported in Douglas, where, from being R1.8 million in the red, Douglas became financially secure with about 85% cost recovery.

2.2.3 Previous Levels of Payment

Customs regarding payments and expectations of service levels developed over time. These changes affect behaviour and expectations fundamentally as, for example, consumers cease budgeting for water payments. It is thus expected that, where the level of payment for a scheme is very poor, changing behaviour become doubly hard. Nevertheless despite such entrenchment of behaviour and expectations radical change can still be affected. Choma²⁰, cites Middleburg (which is discussed in more detail below) as an example of poor payment levels, (defaults were 76%) turning around dramatically. Now almost all consumers pay for their water services.

Another example is in Klerksdorp where the residents established a reputation for their aggressive boycotts of service charges. This tradition reduced payments levels to 11%. However, as a result of improved service, customer education, and strict enforcement, the situation was turned around to one where cost recovery reached 94%.²¹

2.2.4 Previous Standard of Service

An important consideration in cost recovery is the degree to which people are satisfied with the standard of service of the water system in place. A common scenario in rural areas, for example, is one in which a new scheme which benefits most residents is introduced. Although those who did not benefit from the scheme were quite satisfied with their existing service levels the improvement of services to the others undermines their incentive not to pay

²⁰ Choma, Sidney. "Case study of Middleburg." *Paper Presented to the South African Institute of Civil Engineers Conference on Best Practice in Cost Recovery.* October 1999.

²¹ Department of Water Affairs and Forestry, Water Services Chief Directorate. "Twelve Successful Cost Recovery Case Studies for Water Services in South Africa." Pretoria: Water Services Chief Directorate, 1998.

for water services. The DWAF report²² makes this point in respect of the village Goara (Northern Province), where almost half the households continued to use the previously installed borehole and/or river.

The report describes a similar situation in Kameelboom (Northern Province). A third of households (55 out of the total of 159) were not paying, had never paid, and were not required to pay (they were not listed in the community treasurer's books) for water. Some of these were people with their own boreholes.

The report further refers to Modderspruit (North West) where the old and the upgraded systems operated side by side. While the new system had excellent pressure it did not always work because of vandalism and/or pre-paid technology. Although the old system required arduous hand-pumping it was still widely used by those unable to pay for their consumption. The older system thus operated as a useful safety net for the poor and for when the new system failed.

2.3 Infrastructure

2.3.1 Standards of Services

Ethekweni has set a good example of linking standards of service to the affordability of the customer²³. The lowest standard is the provision, via flow restricters, of no more than 6kl per month to household stands. This is a cheap, and reliable system which nevertheless saves householders the effort of carrying water, without incurring the expense of internal water fittings.

²² Department of Water Affairs and Forestry. "Understanding the Cost Recovery Challenge: A Study of Ten Rural Communities." DWAF, 1998.

²³ Department of Water Affairs and Forestry, Water Services Chief Directorate. "Twelve Successful Cost Recovery Case Studies for Water Services in South Africa." Pretoria: Water Services Chief Directorate, 1998.

A higher level of supply is the provision of in-house tanks. These tanks give a higher level of supply albeit at low pressure. From a reticulation point of view costs are still low as it provides a source of water these households can draw on in peak consumption periods.

The motivation for yard taps is high in many communities and they have obvious attractions from the point of view of cost recovery. In Mogogelo²⁴ community members are saving up to upgrade to yard connections. However despite their enthusiasm for the service they refuse to pay for communal standpipes.

An interesting example of community standard-setting occurred in Ganyesa²⁵. The water supply system, developed in 1996, took its water from two boreholes which were linked to two large reservoirs. However, during a promotional visit to introduce the "enviro-loo", the presenter mentioned groundwater contamination by pit latrines as reason to support his product. Since then, borehole water is no longer perceived as clean and healthy.

In examining the question of cost-effective water provision in rural areas, the Appropriate Technology Group²⁶ stated in 1991:

Appropriate technologies which have been successful in other rural areas need to be tested and evaluated, and where necessary modified for local conditions. The following technologies are among those which should be followed up:

- *Rainwater harvesting and storage*
- *Small dams*
- *Disinfection methods for small water supplies*
- *Desalination for remote areas*
- *Water dispensers for distribution terminals*
- *Water storage tanks; and*
- *Village level operation and maintenance hand pumps*

²⁴ Department of Water Affairs and Forestry. "Understanding the Cost Recovery Challenge: A Study of Ten Rural Communities." DWAF, 1998.

²⁵ Op cit.

The privatisation of many of the functions related to water supply in rural areas should be promoted. In particular the support framework for entrepreneurs to participate in the construction and implementation of the schemes.

2.3.2 Maintenance and Vandalism

The DWAF report²⁷ states, as one of its conclusions,

People are only going to pay if they feel that they are getting value for their money. It is no coincidence that every project studied had really good service, with supply very seldom interrupted, of good quality.

While some vandalism is, for example, nothing more than adolescents play in other cases it is a sign of protest. Pre-paid systems tend to attract more vandalism due to their failure to supply water when the means are lacking.

In Modderspruit²⁸, a new water system was based on pre-paid standpipes operated by tokens. Use of pre-paid technology was prompted by bad cost recovery rates. At the beginning of the project vandalism was a serious problem partly because the system was operated by a private company. However at the time of the survey vandalism was not a serious issue. The reasons for the vandalism included anger on the part of the sections of the community that did not want to be included in the new system, unhappiness with the level of service (yard taps were preferred to shared standpipes) and retaliation by owners of the private boreholes who did not want their income undermined.

In Mogogelo, cited in the same report, the maintenance system appeared to be extremely cumbersome. Community water operators checked the system daily and reported faults to the water offices. Although repairs were reportedly needed on a regular basis, especially to

²⁶ Appropriate Technology Group, Water Care Programme. "Guidelines on the Technology for and Management of Rural Water Supply and Sanitation Projects." CSIR, Pretoria, 1991.

²⁷ Department of Water Affairs and Forestry, Water Services Chief Directorate. "Twelve Successful Cost Recovery Case Studies for Water Services in South Africa." Pretoria: Water Services Chief Directorate, 1998.

²⁸ Department of Water Affairs and Forestry. "Understanding the Cost Recovery Challenge: A Study of Ten Rural Communities." DWAF, 1998.

taps, valves and wheel valves, their reports were then collected every two weeks or so by the water board. . The situation was aggravated by the theft of taps.

2.3.3 Metering

Simes Lings and Tshivase²⁹ make the point that pre-paid water meters require a relatively high capital investment and technological sophistication. They warned that there could be resistance from the public, and that communal points could be subject to vandalism. All these predictions have come true, but the accounts of successful projects is growing and portrays a more satisfactory picture.

Several different types of prepayment are possible. An intermediate solution is the use of tokens –objects that can be bought from shops or the water authority. The tokens entitle the user to predetermined certain amount of water.

The DWAF report³⁰, describes a system used at Goara where the communal water supply was activated by a token. To gain access to the service residents contribute R5 each month to an operator who buys tokens from the water supplier. One token a week was needed to activate the flow of water. The operator activated the flow to the standpipes three times a week. Between these times the taps were kept locked by caretakers who lived next door to each standpipe. The community reported a high degree of satisfaction with the system.

At Modderspruit (cited in the same report) there were several complaints about the pre-paid technology. "The meters do not work properly. . .so that the water does not stop, or it does not count the water you have taken"; "People misuse the system and manage to twist the card so that they get water free", "Once I had to pay R10.50 to a vendor just to do my washing

²⁹ Simes, CE, Lings, RJ, and Tshivase, T. "Prepayment Water Metering for South Africa." Water Research Commission Report KV 56-94. Pretoria: Water Research Commission, 1993.

³⁰ Department of Water Affairs and Forestry. "Understanding the Cost Recovery Challenge: A Study of Ten Rural Communities." DWAF, 1998.

because the standpipe didn't give water". During the fieldwork the entire pre-paid system was out of order.

2.4 Management/Customer Care

2.4.1 Communications

Communications between the authorities and consumers is an important variable. Bad communications can quickly result in conflict and retaliatory boycotts. Good communication contributes to a responsive public that trusts the authority, understanding their needs in terms of payments, and supports it by encouraging all members of the community to do their duty. Nlatleng Trollip and Jordaan³¹ point to the inadequacy of public meetings as a communication tool, and the lack of credibility of the mass media. They add that even existing community structures are limited. This limitation is often due to political agendas and a lack of experience in communicating both upwards and downwards. They emphasise the need to employ "community service assistants" whose job is to act as communicators with the public at large, and with community structures such as Ward Development Committees. This parallels the experience of Martin³² where specially trained teams of community development workers acted as communicators to 27 000 households. They obtained popular co-operation in situations with huge potential for conflict (like removing houses to make way for roads etc).

Smit illustrates the magnitude of the gap between water authorities and their customers, and emphasises the importance of properly handled customer care.

³¹ Nlatleng, Nene, Trollip, Dirk and Jordaan, Naas. "Communication as an Integral Part of Cost Recovery." *Paper Presented to the South African Institute of Civil Engineers Conference on Best Practice in Cost Recovery*, October 1999.

³² Martin, Richard. "Institutional Involvement in Squatter Settlements." *Architectural Design*, April 1976.

In the DWAF report³³ "Local cost recovery practices and attitudes in proposed Amatola Water Board area" the point is made that improved communications and management practices are required if cost recovery is to be improved. The authors state:

The practical recommendations for improving cost recovery concern the needs for institutional investors in water supply to:

Develop clear relationships between the presently responsible parties and consumer interests regarding all the aspects of improving cost recovery identified above. It is important that institutional relationships and structures in water scheme areas are linked to the development of systems for operation and maintenance where possible and appropriate. In addition these relationships can be extended to other areas of the operation of a scheme such as rehabilitation, the management of payment points, sanctions, billing and planning.

The Appropriate Technology Group³⁴ in their "Guidelines of the cost effectiveness of rural water supply and sanitation projects" state:

There is a need for more attention to be paid to the education and training aspects of these schemes. Regional centres, or preferably regional training teams who can move from district to district, need to be established to provide the training and follow-up support needed. Education needs to focus on sanitation and domestic health and hygiene, as well as creating an awareness of ways of achieving development successfully.

2.4.2 Consumer Involvement

As part of the conclusions in the DWAF report³⁵ "12 successful cost recovery case studies" states:

Projects should be demand driven. It is vital that the community, or as close to grass roots level as possible, are made to feel part of the decision-making process. Without this the sense of ownership will be lost.

³³ Department of Water Affairs and Forestry, "Local Cost Recovery Practices and Attitudes in Proposed Amatola Water Board Area." DWAF, Pretoria, 1998.

³⁴ Appropriate Technology Group, Water Care Programme, "Guidelines on the Technology for and Management of Rural Water Supply and Sanitation Projects." CSIR, Pretoria, 1991.

³⁵ Department of Water Affairs and Forestry, Water Services Chief Directorate, "Twelve Successful Cost Recovery Case Studies for Water Services in South Africa." Pretoria: Water Services Chief Directorate, 1998.

Rall³⁶ summarises a demand-responsive project as follows:

- *The community initiates and makes informed choices about service options, based on their willingness to pay for the service, and acceptance of responsibilities for subsequent operations and maintenance.*
- *The community contributes to investment costs relative to level of service and has significant control over how funds are managed.*
- *There is an adequate flow of information to the community, as well as procedures for facilitating collective action decisions within the community (social intermediation).*
- *Communities can choose how goods and services are delivered and how water and sanitation services are managed.*
- *Government has a facilitative role, sets clear national policies and strategies and creates an enabling environment (including the legal framework) for participating groups.*
- *The community (or representative body thereof) owns and is responsible for sustaining its facilities.*
- *Community capacity is appropriately strengthened.*
- *Innovation is promoted and the need for flexibility is recognised.*

2.4.3 Customer Care

Muller³⁷ states that "customer care" is now legislated under Chapter 9 of the Municipal Systems Act, 2000. She says a clear distinction needs to be made between the customer care and management on one hand, and debt collection on the other. She proposes that debt collection be sub-contracted so that the Council will be able to play the role of the "good guy" while the debt collectors will play the role of the "bad guy".

³⁶ Rall, Martin. "The Demand Responsive Approach to Community Water Supply and Sanitation as Interpreted and Applied by the Mvula Trust." Mvula Trust Strategic and Planning Committee document. Johannesburg: Mvula Trust, 1999.

³⁷ Muller, Louise. "Municipal Credit Control Procedures and Case Studies." Paper Given to the 5th Annual Conference of the South African Revenue Protection Association, 2001.

Muller also points to the importance of easily accessible pay points, and the need to provide alternative arrangements for those who cannot pay during normal business hours, such as through supermarkets. For example, in the small town of Douglas, payments could be made at the point pensioners use to receive their pensions. This practice will save pensioners in particular much time and trouble.³⁸

In Klerksdorp considerable efforts were put into customer care and information. These included providing proper facilities for complaints and queries which were operated by trained personnel on a 24 hour basis; provision of a council bus that visited townships to explain the need to pay for water and respond to concerns about services. The service provided accessible pay points and was used to report intimidation to the police.

In Durban³⁹, community members were trained as plumbers and community liaison officers. This provides the double benefit of making service providers easily accessible while creating the impression that the Council supports the community. The plumbers went from house to house to check for leaks and register customers. In the process they also record pertinent information like family size and consumption levels.

2.4.4 Personal Data

Choma⁴⁰ has demonstrated that policy must be informed by good data, and uses Middleburg as an example. Adequate data indicates that the authority knows enough about customer's circumstances and can thus respond to their situation effectively. For example when consumers claim they cannot pay as a result of poverty the authority must have independent evidence as whether or not the claim is sufficiently true.

³⁸ Department of Water Affairs and Forestry, Water Services Chief Directorate. "Twelve Successful Cost Recovery Case Studies for Water Services in South Africa." Pretoria: Water Services Chief Directorate, 1998.

³⁹ Department of Water Affairs and Forestry, Water Services Chief Directorate. "Twelve Successful Cost Recovery Case Studies for Water Services in South Africa." Pretoria: Water Services Chief Directorate, 1998.

⁴⁰ Choma, Sidney. "Case study of Middleburg." Paper Presented to the South African Institute of Civil Engineers Conference on Best Practice in Cost Recovery." October 1999.

In rural schemes it is common for data to be collected by a door-to-door census. These exercises give customers the chance to furnish accurate information⁴¹ and to ask questions about developments. In the DWAF report⁴² Douglas is used to show how to identify consumers carefully and accurately. Part of effective discrimination included drawing a distinction between tenants and owners.

2.4.5 Tariffs and Affordability

The debate about whether water should be treated as a market commodity, social service or an inalienable right has featured prominently in South Africa.

Debates about the ability to pay have to be tempered by consumers willingness to pay and the ability of service providers to end free riding. An argument often made about affordability is that while people often find money to pay private water vendors⁴³, when water is supplied, by authorities, through taps this willingness to pay attitude changes. This demonstrates that water demand is elastic.

Another aspect of demand is that surveys often fail to differentiate between the responses of men and women. Men typically underestimate the effective demand for water, as they do not have to collect it: women are more likely to pay for the convenience of labour and time saving service.⁴⁴ Despite the opportunity costs of foregoing a more accessible facility the price of water has a major impact on demand. The DWAF report "Implementing prepayment water metering systems" reiterates the point that a few Rand can make a big difference to the poor living in rural areas. For example a scheme that was estimated to cost R12 per month was rejected, as the residents said they could only afford R7 per month.

⁴¹ Op cit.

⁴² Department of Water Affairs and Forestry, Water Services Chief Directorate. "Twelve Successful Cost Recovery Case Studies for Water Services in South Africa." Pretoria: Water Services Chief Directorate, 1998.

⁴³ Department of Water Affairs and Forestry. "Implementing Prepayment Water Metering Systems." DWAF, Pretoria, 1997.

⁴⁴ Op cit.

To take a more objective approach, Veck and Bill⁴⁵ undertook a contingent evaluation of the water services in Alberton and Thokoza in Gauteng. The study showed that the water demand was highly elastic as the poor cannot afford to pay more as the price increases, and increases in the price of water encourages upper income groups to reduce water consumption in the short term. The effect is therefore for the lower income group, because of their limited disposable income, to decrease their use of water as the price of water increases. "Contingent Valuation" approach has been used with success in Perth, Australia.

The DWAF report⁴⁶ "Implementing prepayment water metering systems" states:

Affordability is a very imperfect measure of what people will pay for water. Income and poverty indicators are reported here primarily to demonstrate the importance of:

- *keeping the price . . . as low as practical*
- *engineers, sociologists and development practitioners not fuelling communities' demands and expectations for water in excess of basic needs provision. . .*
- *acknowledging the spread of incomes even within rural communities, so that households with higher incomes which are willing to pay the full cost of a higher level of service will have their demands satisfied.*

Hazelton and Kondlo⁴⁷ make the following point:

Sliding scale tariffs may be a useful means of generating some additional funds for cross-subsidising poor communities. This would be particularly true where water costs are low because the infrastructure was installed long ago and the sliding scale tariff is also being used to introduce more uniform tariffs in a district. However even for affluent households higher water prices will curb consumption. . . Since elasticity itself is not constant but dependant on the initial price level, the demand at which the price increase is applied and

⁴⁵ Veck, GA and Bill, MR. "Estimation of the Residential Price Elasticity of Demand for Water by Means of a Contingent Valuation Approach." *Water Research Commission Report 790/1/00*, Pretoria, 2001.

⁴⁶ Department of Water Affairs and Forestry. "Implementing Prepayment Water Metering Systems." DWAF, Pretoria, 1997.

⁴⁷ Hazelton, Derek and Kondlo, Simphiwe. "Cost Recovery for Water Schemes to Developing Urban Communities: A Comparison of Different Approaches in the Umgeni Water Planning Area." *Water Research Commission Report 521/1/98*. Pretoria: Water Research Commission, 1998.

the relative affluence of the customers . . . Therefore sliding tariff scales should be seen primarily as a demand regulator and not as a provider of additional revenue.

Rall⁴⁸ describes the market driven approach as follows:

- *Sustainability of services can only be ensured if consumers pay the full economic cost. This is because, firstly, consumers respond only to economic incentives and disincentives. Treating services as a commodity to be supplied in accordance with the rules of the "market" is the best way to achieve efficiency and cost-effectiveness.*
- *Subsidies to the poor are not good because governments can't afford them.*
- *Basic social services, including water and sanitation, are not fundamental human rights like individual liberty and freedom of expression. They are conditional on the ability to pay. Policy objectives should therefore not be based on providing a particular level of service, even if it is considered to be the basic minimum required for health and human dignity, but on what consumers can afford to pay.*

He counters these points by indicating that although government has many limitations, properly targeted and implemented subsidies are an essential part of a sound policy in a country such as South Africa.

Clearly, if charges are not clearly related to consumption levels, usage can be quite high. In typical rural schemes where inconvenience acts as a rationing device usage is limited by the distance people must carry water. In urban areas such constraints may not apply so effectively as hosepipes and similar devices are used. the authors of the DWAF report⁴⁹ "Local cost recovery practices and attitudes in proposed Amatola Water Board area" report that in Kuntselamanzi township consumption from standpipes was between 150 and 200 litres/per capita/day. In rural areas consumption levels may be one tenth this level. Moreover

⁴⁸ Rall, Martin. "The Demand Responsive Approach to Community Water Supply and Sanitation as Interpreted and Applied by the Mvula Trust," Mvula Trust Strategic and Planning Committee document. Johannesburg: Mvula Trust, 1999.

⁴⁹ Department of Water Affairs and Forestry. "Local Cost Recovery Practices and Attitudes in Proposed Amatola Water Board Area." DWAF, Pretoria, 1998.

string inequities exist where inconvenience rations supplies. Households living next to a communal standpipe will be likely to use more water than those living far away.

Where flat rate systems are implemented large family are more likely to use more water than smaller ones. Small families are thus less inclined to pay diligently. Such inequities are a factor in poor payment levels as indicated with respect to Kameelboom. By contrast, the case of Modderspruit which uses a pre-paid system which is preferred by many as "big families pay for what they use" although other aspects of the scheme are unsatisfactory due to reliability problems.⁵⁰

To some extent the issues regarding rights and cost recovery have been addressed in the government's free basic services policy. However, there remain difficulties in funding the policy particularly in the rural areas where there are not insufficient large consumers to cross-subsidise the poor, uncertainties regarding the powers and functions of different arms of local government and poor administrative structures.

The first documented study of the implementation of a progressive subsidy was in Durban where the first 6 kl of water have been effectively provided free⁵¹. The success of the Durban efforts is partly attributed to good customer care and maintenance standards. Choma⁵² makes a similar point in relation to Middleburg: a policy that recognises the fact that poor people cannot pay, or can pay very little, will get community support for cost recovery efforts.

⁵⁰ Department of Water Affairs and Forestry, Water Services Chief Directorate. "Twelve Successful Cost Recovery Case Studies for Water Services in South Africa." Pretoria: Water Services Chief Directorate, 1998.

⁵¹ Macleod, Neil. "Case study of Durban Corporation." Paper Presented to the South African Institute of Civil Engineers Conference on Best Practice in Cost Recovery, October 1999.

⁵² Choma, Sidney. "Case study of Middleburg." Paper Presented to the South African Institute of Civil Engineers Conference on Best Practice in Cost Recovery." October 1999.

A common sentiment is that people will willingly pay more if the standard of service is increased. In the DWAF report⁵³ "Local cost recovery practices and attitudes in proposed Amatola Water Board area", the authors cite the case of Tyu-Tyu where people say they would be quite happy to pay the cost of 200 litres/day, which would be R18, 24 per month.

2.4.6 Billing and Metering

A recurrent theme is the problem of flat rate charges – particularly when flat rates are combined with communal standpipes. In a study of the Umgeni Water methods of cost recovery, Hazelton and Kondlo⁵⁴, citing Hlapo 1996, state:

Soon it became apparent that the flat rate was unpopular and that it was regarded as unfair by some customers because those further away pay the same rate as customers living close to the unit who, as well as not having to carry the water as far, generally use more water. At the same time it was also difficult for Umgeni Water to know whether the money collected was sufficient for the water used as these standpipes were not metered. Vandalisation of such standpipes was quite common.

In response to this difficulty, Umgeni Water introduced metered shared standpipes. These are registered in the name of individuals who control them. These individuals are responsible for the taps. The standpipe owner can either sell water at a profit or implement a flat rate by dividing the bill equally amongst the households that get the water from that standpipe. The authors state that

When water is sold at a profit each household pays according to its water usage and generally this appears to work well. . . . When households agree to share equally problems often arise if the bill is larger than expected as households with fewer dependants start complaining that they are cross subsidising those with larger families. . .

⁵³ Department of Water Affairs and Forestry. "Local Cost Recovery Practices and Attitudes in Proposed Amatola Water Board Area." DWAF, Pretoria, 1998.

⁵⁴ Hazelton, Derek and Kondlo, Simphiwe. "Cost Recovery for Water Schemes to Developing Urban Communities: A Comparison of Different Approaches in the Umgeni Water Planning Area." *Water Research Commission Report 521/1/98*. Pretoria: Water Research Commission, 1998.

However . . . some Umgeni Water officials believe that outstanding debts from those standpipes are high and that Umgeni Water is having difficulty in cutting off the supplies since in most cases customers claim that they have paid for the water. There are also occasional instances of a customer insisting on being given water without paying. If standpipe owners are not paying their debts there must also be some questions with respect to the service they are giving. . . In the meantime Umgeni Water is encouraging Water Committees to be more careful in identifying prospective shared standpipe owners.

Hunter⁵⁵ describes the problems faced by Johannesburg in terms of billing. These included difficulties in getting access to the meters, faulty or damaged meters, and poor productivity among the meter readers. In addition, records were very poor in terms of accuracy of addresses, ID numbers etc.

There can be no question that integrating a municipal bill provides a useful tool in enforcement of cost recovery. Integration means that all municipal accounts are included in the same bill, e.g. water, electricity, and assessment rates. With this system, when the account is not paid, the easiest response is to cut off the electricity.

Tuck⁵⁶ outlines the relatively difficult task of cost recovery where water is billed separately, an aspect that has contributed to the increasing use of prepayment meters. While there are successful examples of prepayment meters, the technology is comparatively sophisticated and often unreliable. On the other hand, water, being a comparatively low cost commodity, does not lend itself to theft, as does electricity.

Muller points to the importance of the deposit as a guarantee against default. This must be linked to a clear policy on indigents, which is fairly and efficiently applied.

⁵⁵ Hunter, Roland. "Institutional Capacity." Paper Presented to the South African Institute of Civil Engineers Conference on Best Practice in Cost Recovery, October 1999.

⁵⁶ Tuck, Graeme. "Comparison Between Prepayment Electricity and Water Consumers." *Paper Given to the 5th Annual Conference of the South African Revenue Protection Association*, 2001.

It remains important not to suggest that successful practices can necessarily be replicated elsewhere. For example Durban uses community members to deliver bills,⁵⁷ but Johannesburg has found this practice to be unreliable.⁵⁸ Johannesburg has instead adopted incentives like prizes to regular payers.

For some authorities it would appear that the cost of collection outweighs the need for cost recovery. For example in Mogogelo,⁵⁹ Magalies Water asked the households in the community to register themselves with the water office. Non-registered households were ignored. Thus of the 5000 households, 100 had registered, Only a third of those were paying.

In Ganyesa (as cited in the same study) residents were supposed to pay R4, 00 per month, but were encouraged to make payments on an annual basis as part of the tribal levy. Payment was running at about 25%, but due to the low cost of running the scheme an 80% payment rate would result in a substantial surplus.

2.4.7 Staffing

Efficient cost recovery requires a well organised team, and weaknesses in management and administration have been prime contributors to low levels of payment. The most obvious cause has been inadequate records (see under billing above). Hunter⁶⁰ describes the management problems facing the Johannesburg Metropolitan Council. These included 13% of the properties not being billed, a lack of capacity in the indigency unit, delays in cutting off supplies in the even of non-payment etc, problems of delivering bills etc.

⁵⁷ Department of Water Affairs and Forestry, Water Services Chief Directorate. "Twelve Successful Cost Recovery Case Studies for Water Services in South Africa." Pretoria: Water Services Chief Directorate, 1998.

⁵⁸ Hunter, Roland. "Institutional Capacity." Paper Presented to the South African Institute of Civil Engineers Conference on Best Practice in Cost Recovery, October 1999.

⁵⁹ Department of Water Affairs and Forestry. "Understanding the Cost Recovery Challenge: A Study of Ten Rural Communities." DWAF, 1998.

⁶⁰ Hunter, Roland. "Institutional Capacity." Paper Presented to the South African Institute of Civil Engineers Conference on Best Practice in Cost Recovery, October 1999.

The solutions adopted by Johannesburg have included improved staff training, incentives for staff in terms of productivity, tougher penalties for non-performance, privatising/ring fencing utilities, and introducing a businesslike approach to management.

2.5 Sanctions and Legislative Framework

2.5.1 Legislation

Fowler⁶¹ points to the need under the new legislation (especially the Municipal Finance Management Bill) for Councils to take responsibility for cost recovery. He indicates that the days when Councillors could decide, for political expediency, to waive debts, are over.

Muller⁶² points to the requirements of the Municipal Systems Act, 2000, and also to the need for legally binding by-laws regarding debt collection and credit control. Indeed the DWAF report⁶³ makes the point that under s106 2f of the Local Government Transition Act Second Amendment 1996, Councillors were personally liable for losses incurred by failure to collect debt. In Douglas this fact persuaded Councillors to pursue an aggressive cost recovery policy, with remarkable results.

2.5.2 Social

The DWAF report⁶⁴ states, as one of its conclusions with respect to payment practices that *In small rural communities peer pressure and social embarrassment seem to be most effective.*

⁶¹ Fowler, Trevor. "Keynote Address." Presented to the South African Institute of Civil Engineers Conference on Best Practice in Cost Recovery, October 1999.

⁶² Muller, Louise. "Municipal Credit Control Procedures and Case Studies." Paper Given to the 5th Annual Conference of the South African Revenue Protection Association, 2001.

⁶³ Department of Water Affairs and Forestry, Water Services Chief Directorate. "Twelve Successful Cost Recovery Case Studies for Water Services in South Africa." Pretoria: Water Services Chief Directorate, 1998.

⁶⁴ Department of Water Affairs and Forestry, Water Services Chief Directorate. "Twelve Successful Cost Recovery Case Studies for Water Services in South Africa." Pretoria: Water Services Chief Directorate, 1998.

However, the question of social pressure can work both ways. In Kameelboom, pressure on the water committee from consumers had resulted in about half the community being excused from paying as a result of their "economic pressures".⁶⁵

2.5.3 Water Restriction/Cut Off

Muller says that illegal connections must not be tolerated in any circumstances. A similar view was taken by the tribal authorities of the Motlabe Ntswana-Le-Metsing area who fine anyone making illegal connections R300 – a lot of money in a poor rural area⁶⁶.

In Bisho, an important factor in their successful record was the prompt and harsh response to unauthorised connections (which in this context meant by-passing the meter). Penalties included being charged for re-connection. In Klerksdorp⁶⁷, the first offence for unauthorised connections resulted in a fine of R300, while the second was R2 000 or six months in prison. In Durban (same report) defaulters received a letter asking why they should not be disconnected. If they gave an acceptable explanation their service was replaced by a standpipe. They still had to pay their arrears and for the standpipe water, and had to sign an agreement accepting this. Should they then still not pay, their standpipe was disconnected.

⁶⁵ Department of Water Affairs and Forestry, "Understanding the Cost Recovery Challenge: A Study of Ten Rural Communities." DWAF, 1998.

⁶⁶ Op cit.

⁶⁷ Department of Water Affairs and Forestry, Water Services Chief Directorate. "Twelve Successful Cost Recovery Case Studies for Water Services in South Africa." Pretoria: Water Services Chief Directorate, 1998.

As part of its conclusions the study states:

Once the need to pay has been communicated, an acceptable, affordable tariff has been negotiated and the promised service has been delivered, then the agreed punitive measures must be implemented. In general the harsher the measures the better the cost recovery. No amount of adversity must be allowed to sway officials. In this regard the support of Councillors/local authorities is essential. It was interesting to note that there seemed to be about a 3-month acclimatisation period is required, for people to become accustomed to the inevitability of having to pay. The slightest weakness on the part of the service provider in this period will however, spell disaster.

In a rural setting the available measures are more limited. In Kameelboom⁶⁵, the leadership had been induced to allow the water to run out before community members could be forced to pay regularly. This was the leaderships only means of putting social (and other) pressure on the non-payers which, at one point, included 92% of the community.

2.6 Conclusions

The DWAF report⁶⁶ summarises the pre-conditions for effective cost recovery as follows:

- *The service must be reliable*
- *The water quality must be acceptable*
- *The level of service must be appropriate*
- *An appropriate revenue collecting and accounting system must be in place*
- *Unaccounted-for water must be controlled*
- *There must be customer acceptance of the cost recovery options used and of the revenue collecting authority*

⁶⁵ Department of Water Affairs and Forestry, "Understanding the Cost Recovery Challenge: A Study of Ten Rural Communities." DWAF, 1998.

⁶⁶ Department of Water Affairs and Forestry, "Implementing Prepayment Water Metering Systems." DWAF, Pretoria, 1997.

- *Assuming the other pre-conditions are in place, customers must know that water will be disconnected if bills are not paid.*

It adds further:

What happens when cost recovery is not implemented:

- *The rich and influential receive more by way of subsidy than the poor*
- *It leads to people being treated as the objects of aid rather than partners in development*
- *As more schemes are commissioned the Government's budget becomes consumed in operating existing schemes. Thus little or no money is left for the development of new schemes for those who have nothing.*
- *Communities are misled into believing that water provision is cheap.*

These provide an apt summary of the themes running through the literature which we have examined in this chapter.

CHAPTER 3: STUDY METHODOLOGY

3.1 Introduction

The previous WRC project (K5/1131) showed that service providers could make substantial improvements in the recovery of costs. That study indicated that improved cost recovery depended, at least in part, on the upgrading service levels and implementing or changing credit control policies. Interventions proposed included upgrading service levels to metered connections and the implementation of penalties for non-payment. However, it was thought that the findings of that study might not be generalisable to contemporary municipal structures for a number of reasons. These reasons included:

1. The data on which the study was based was derived from a survey conducted prior to the re-demarcation of municipalities. Municipal demarcation reduced the number of local authorities from 830 to 284⁷⁰. The political and economic imperative underpinning the re-demarcation was, in part, to group better serviced areas with less affluent areas – particularly rural areas. As a rule poorer areas have lower service levels, a greater proportion of residents unable to pay for services and higher service provision costs. The re-demarcation of municipalities thus muddled the water in terms of the “average” experience of municipalities. Moreover municipalities now encompassed a much wider range of challenges in terms of service levels, economic challenges and consumer cultures.

With respect to consumer culture it was anticipated that the re-demarcation would have a positive impact on cost recovery. The new legislation increasingly linked service providers to consumers through Ward Committees and similar structures. These structures, and other measures, were expected to solicit community involvement and hopefully undermine the ethos of non-payment. It was expected that the new municipal

⁷⁰There is some overlap between District and Local Municipalities. Occasionally the provision of water services has been devolved “upwards” from poorly equipped Local Municipalities (category B) to the District Municipalities (category C). In the rural areas DWAF remains the water services provider in most cases. This confusion has resulted in the vagueness as to how many relevant municipal water service providers there are.

structures were to be widely perceived as "legitimate" and less vulnerable to the "culture of non-payment" - thereby improving payment rates.

It was also expected that the strong administrative capacity with which the "white" towns were associated could be brought to bear on improving service delivery, billing procedures and, by implication, cost recovery.

2. The first study also coincided with the initiation of the free basic water policy. At the time municipalities were only beginning to come to terms with that policy and its implications for service delivery and budget management. The policy, as will be seen, had a marked impact on how cost recovery was to be understood.

For the above reasons, this study aimed at re-examining cost recovery under the new municipal regime. These reasons were further bolstered by other changes in the political environment at local levels. For example, because the Masakhane campaign appeared to have disappointing results, the period in question also coincided with a reduction in emphasis on exhortation as a means of stimulating cost recovery.

3.2 Sample stratification

Given the success of the previous study and the need to maintain comparability, its methodology was closely followed. One improvement was the use of face-to-face interviews with senior municipal officers in 50 municipalities. These respondents were selected from a stratified sample of municipalities selected in a way that ensured representation of divergent service and payment levels.

If fifty municipalities were drawn at random from the 284 it is possible that key experiences would not be adequately represented. For example, there are only six metropolitan areas and there was a strong chance that none would be selected in 50 random draws from the 284. This could result in the loss of insight from experiences that affected a significant section of the population. The only way of guaranteeing that both metropolitan municipalities (high income high service levels) and poorly serviced, impoverished municipalities were selected was to

stratify the sample on the basis of service levels and income. Sample stratification was used to ensure that a random sample drawn from the population adequately represented the topics of interest. For the purposes of this survey it was necessary to stratify the sample on payment rates while considering the extent to which payment is required/demanded (i.e. the billing rate) as well as the ability to pay (as measured by average household income).

The stratification was based on achieving an appropriate mix of payment levels and billing levels in conjunction with the ability to pay (as measured by average income). The data required for the stratification of the municipalities were derived from a combination of census data and Statistics South Africa's Labour Force Survey (LFS) of 2001. The LFS survey – which is only adequately representative at provincial level – indicated service levels for water and other domestic amenities. It, unlike the census, also indicated whether or not households paid for the water they used. The LFS was nevertheless poorly representative of municipalities and thus the 1996 census was used to categorise municipalities in terms of income levels etc.

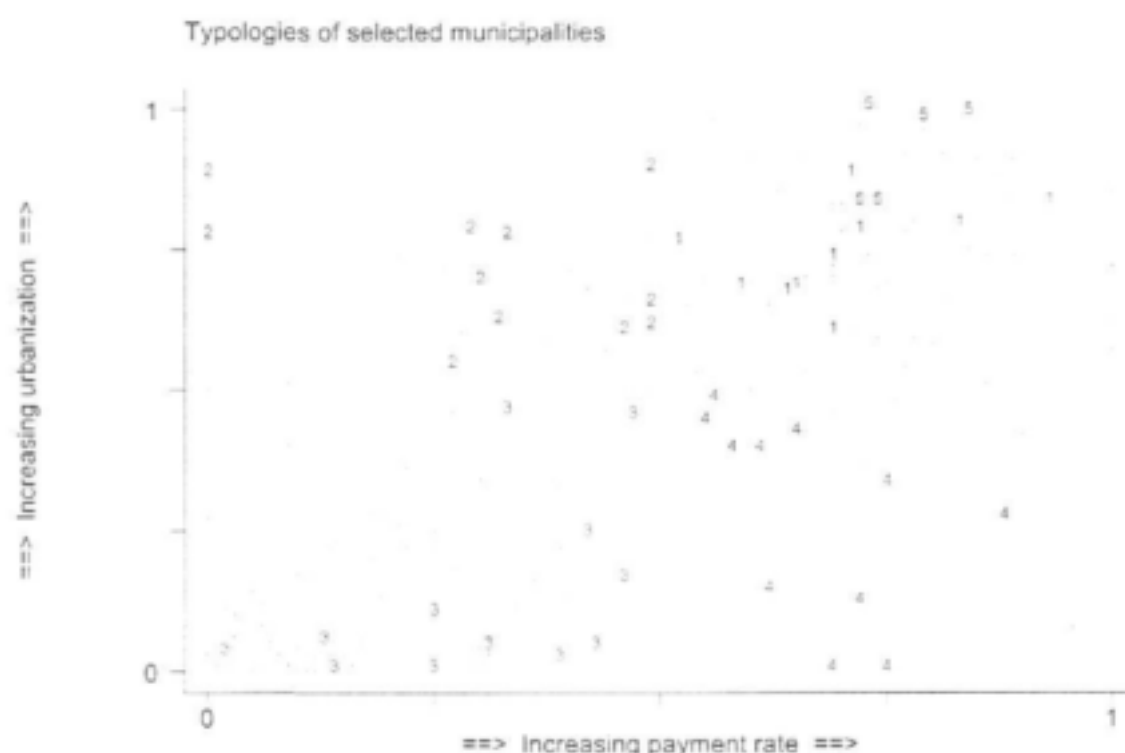
It was initially anticipated that four strata of roughly equal numbers would be sufficient to ensure that the full range of experiences was covered. However it was decided that a fifth stratum for the metropolitan municipalities was required and all metropolitan municipalities would be included in the 50 face-to-face interviews. As the level of urbanisation correlates to service levels, income and billing rates it a useful way of illustrating the effect of the stratification. The graphics below illustrates how each of the five strata corresponded to payment rates and the degree of urbanisation in that municipality.

In the graphic below every municipality is represented by its relative position with respect to urbanisation level and payment rates. Highly urbanised regions with high payment rates are located in the top right hand corner. Conversely, predominantly rural areas with low payment rates are located in the bottom left hand corner. The object of developing the typologies was to ensure a representation of the diversity of experiences in terms of urbanisation level, payment rates and other criteria. The typology was developed by categorising every municipality according to their similarity to other municipalities with respect to water service related issues. Thereafter a random selection of municipalities was drawn from each stratum.

Except for the metropolitan municipalities an equal number of municipalities were drawn from each stratum.

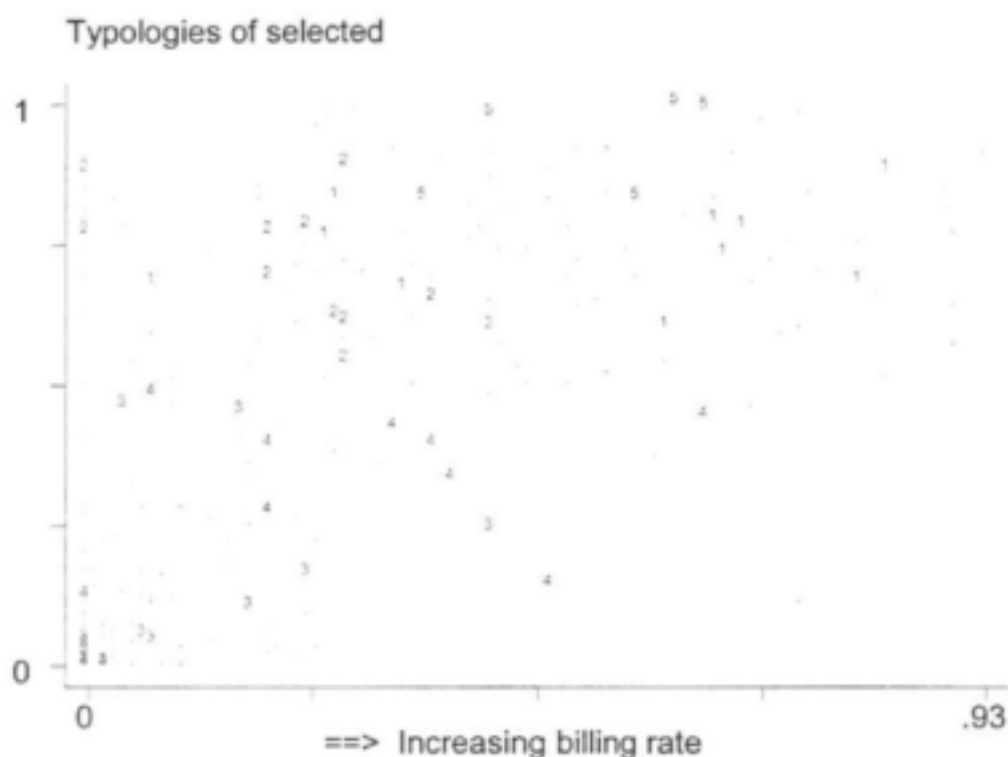
If the municipality was selected for inclusion in the sample it is represented by a number between "1" and "5". These numbers represent its eventual typological classification. All municipalities that were not selected for the sample are indicated by a ".". The graphic shows how the municipalities both 1) span the full spectrum of experience and 2) cluster in five relatively homogenous groups. The clustering is illustrated by how each of the five groups is concentrated in patches. Appendix F carries details of the realised sample.

Graph 3.1: Typologies of selected municipalities: payment and urbanisation rates



The effect of the classification of the municipalities is represented below in a slightly different way. Here the graph displays the selected sample when set against the urbanisation and billing rates. Although the sampled municipalities cluster differently it is evident that the sample still spans the full range of experiences. Furthermore the clustering of the types into localised groups is still evident.

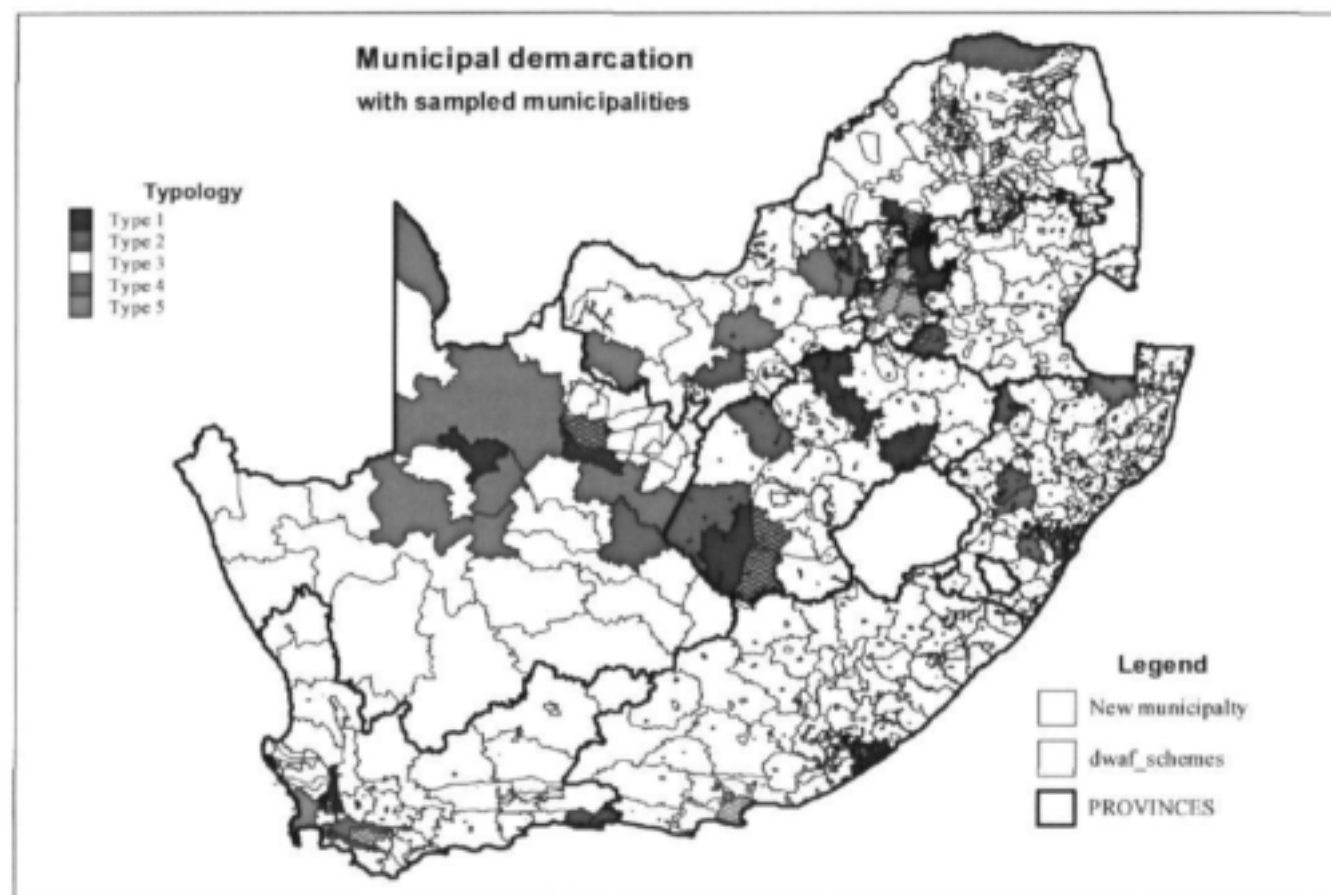
Graph 3.2: Typologies of Selected Municipalities: billing and urbanisation rates



A postal survey was conducted among all other municipalities, i.e. all those not targeted for the face-to-face interviews. These respondents were asked to complete a somewhat shorter questionnaire. The way in which non-responsiveness was dealt with and how integration of the postal and face-to-face interviews was achieved is dealt with in the next section.

The resulting stratification is illustrated in Figure 3.1 overleaf.

Figure 3.1: Map of Stratified Sample



3.3 Non-responses and the Use of Multiple Imputation

Although non-responsiveness is generally anticipated to be a problem in postal surveys more problems than usual were anticipated in this study. The dramatic changes in municipality composition and priorities had not yet been matched by increasing administrative capacity. The survey would call on the same administrators to spend some time formulating their responses. The re-demarcation exercise had ensured the amalgamation of diverse local authorities under a common umbrella. Coming as it did on the heels of a new environment with respect to the provision of free basic water services, the increasing use of prepaid meters and constitutional limitations on the suspension of essential services, the re-demarcation presented a particular challenge to those responsible for providing services. Many municipalities were ill equipped to deal with these challenges and often lacked the ability or inclination to respond to yet another survey. Reluctance to participate in the survey was possibly aggravated by questions that called for reasonably detailed extracts from municipal accounts. Nevertheless, adequately detailed responses were received from 99 municipal water service providers. Half the responses (49) were from the face-to-face interviews and the balance (50) were from the 234 municipalities and district councils asked to complete the reduced postal questionnaire. Approximately one third of all municipalities (and the residents thereof) were thus represented in the study.

The response rate was approximately the same as that achieved in the previous study. The use of a stratified random sample among the face-to-face interviews ensured that the survey was representative of national trends and of the range of experiences endured by municipalities. The participation rate was not by any means inadequate for a survey of this type and the results can be taken as representative. However a greater problem was presented by respondents' inability to answer key questions. Respondents seem to have experienced most difficulties with questions regarding municipal accounts in earlier years. For example only one in ten municipalities were able to estimate the "accumulated depreciation" of water service infrastructure. This is perhaps unsurprising, as doing so would require a reconciliation of infrastructure assets held by all the constituent parts of the now amalgamated municipality.

To address the issue of missing data and non-responses, a method of multiple imputation was once again used to augment the survey. The method allows for estimates of those parts of the questionnaire that were missing to be made while preserving the known level of uncertainty. The method ensures that no information is “conjured from nothing” while minimising the impact of non-responses. Multiple imputation was particularly useful when a fair representation of responses to questions not asked in the postal survey are required. The imputations ensured that an effective sample size of 99 responses was maintained⁷¹.

Multiple imputation is a statistical technique for “filling in” missing values in a dataset — essentially by using what is known to infer what is unknown. Although multiple imputation is still rare in applied social research, in virtually all circumstances it is statistically superior to the other methods that are used. These include dropping variables (columns in a data table) from the analysis if they have several missing values, dropping observations (rows in the data table) if they have any missing values, or filling in missing values with guesses or estimates and then treating them the same as known data. The first two options generally introduce greater statistical bias or inefficiency or both. The third assumes an unwarranted degree of certainty about true values where data are missing. Multiple imputation uses a formal statistical model to “fill in” missing values, but it fills in different values in the same position in a set of otherwise identical datasets. The distribution of these imputed values represents the degree of uncertainty about the true value. If other information in the imputation is a good predictor of the variable with the missing value, the imputed values will be very similar from dataset to dataset. If the variable with the missing value is not closely associated with the others in the model, a wide range of values will be imputed — representing the uncertainty of the imputation process. Once the imputed datasets have been created, an identical analytical model is estimated separately using each one, and the results are combined in a way that accounts for variation within and across datasets.

Extract from WRC Project No.: K5/1131

The following section deals with the main findings of the study while drawing, where appropriate on the original study for comparisons.

⁷¹ Conducting a greater number of face-to-face interviews remains the preferred option in increasing sample reliability as larger sample size reduces the range of uncertainty (or sample error). However, the returns on increasing sample size diminish dramatically as cost escalate, leaving the combination of face-to-face interviews with a postal survey and using multiple imputation as an efficient and reliable way of enhancing sample size.

CHAPTER 4: ANALYSIS AND FINDINGS

4.1 Measuring Cost Recovery

In general "cost recovery" refers to the recouping of costs incurred as the result of providing a service – in this context the provision of potable water to residential households. With respect to many utilities (and with respect to water provision in particular) estimating the level of success in cost recovery is compounded by the fact that the actual cost of the service is generally unknown. Despite this it can probably be assumed that there is a general and significant under-recovery of cost incurred in the provision of household water services.

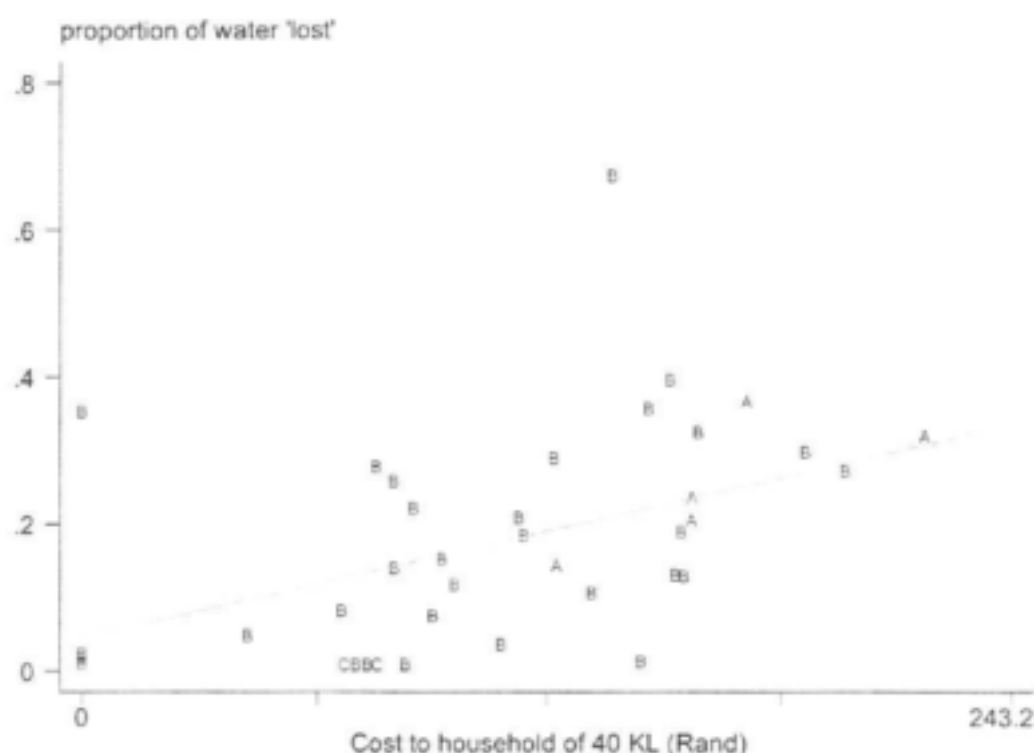
Recent estimates⁷² by the authors indicate that when the most conservative estimates of capital costs are used the level of under-recovery is approximately 20 percent across the country – nationally revenue from water sales is twenty percent less than expenditure on distributing that service. This, coincidentally, also means that 80 percent of municipalities do not currently provide a sustainable water distribution service. Nevertheless "cost recovery" can be conceptualised in more general terms - the extent to which payment is received for services which have been billed for - or for which payment has otherwise been demanded. Central to this conceptualisation is the notion that the failure of beneficiaries to pay for amenities and services, which they receive but were not billed for, does not constitute a failure in cost recovery. Municipalities tend to treat such instances as water losses, which are dealt with as if they are leakages. The level of water losses can be extraordinarily high – in one municipality it is set at two thirds of water purchased (66.4 percent). On average 18 percent of water was lost by the respondents. This suggests that water losses are of the same magnitude as the increase in revenue required to make the water distribution services sustainable. However respondents are unable to indicate whether or not losses are due to their failure to bill consumers, illegal connections or leakages. Statistically speaking the proportion of water lost in distribution is not related to any of the expected physical factors like the size of the distribution infrastructure (as measured by the length of water mains). It would be

⁷² Marah, Lansana, Michael O' Donovan, Richard Martin and David Boberg. "The Costs of Water from Raw Water Through to User Charges." Sigodi Marah Martin, Johannesburg, 2003.

tempting to assume that the more massive the infrastructure is, the more likely losses would increase through unreported/ undetected leaks etc. This however does not appear to be borne out by the responses. Neither are there any significant relationships between expenditure on *per capita* variable costs and losses, on maintenance staff per consumer or per kilometre of mains. Had water losses been predominantly the result of leakages resulting from the poor maintenance of infrastructure a correlation between variable costs (and maintenance costs in particular) and the rate of water loss would be expected. However no such correlation was evident. This suggests that losses may not predominantly be the result of inadequate capital maintenance and the resulting leakages.

By contrast the one factor that is positively (and is statistically significant) correlated with the loss rate is the price of water. In certain consumption categories a higher price of water is correlated to higher rates of water "loss". The relationship is illustrated by the correlation between the charge to households for 40 Kl of water and the rate of water loss. The relationship is presented graphically below. In the graphic the location of every sampled municipality with regard to unaccounted water and the cost of 40Kl of water is indicated. The municipalities are represented by either "A", "B" or "C". These symbols correspond to the Demarcation Boards' classification of municipalities as metropolitan ("A"), standard ("B"), or cross-border ("C").

Graph 4.1: Relationship between Proportion of Water Loss and Cost to Household



The symbols indicated in the graph show the demarcation board classification of municipalities.

The graph clearly indicates the range of tariffs charged for 40 Kl of water. In a small number of municipalities this volume of water was effectively free while it was substantially higher in category A (metropolitan) municipalities. Somewhat disingenuously, these municipalities attribute their higher water charges to the costs incurred by large infrastructure investment like the Lesotho Highlands water scheme and to the servicing of debts.

This relationship illustrated above suggests that a substantial component of water loss is the result of cost avoidance by consumers and/or a systematic failure by municipalities to bill households and extract payment. Physical leakages, correspondingly, need to be accorded a diminished role in explaining water losses. Furthermore the relationship between losses and price does not hold when the cost of 10 Kl of water is considered. The absence of a clear correlation between the 10Kl price and the rate of water loss indicates that indigent households may find it easier to reduce consumption to below the free basic limit than to

avoid the costs arising from higher consumption levels. This indicates that water losses centre on consumption patterns not of the indigent households but of middle level consumers using water far in excess of the minimum free allocation.

As respondents were unable to distinguish between losses due to leakages, illegal connections and administrative failure the analysis that follows centres on the narrower definition of cost recovery – the recovery of expenses which have been billed for. This implies that the “losses” are covered by other users or by the state.

4.2 Ways of Measuring Cost Recovery

There are many ways of measuring cost recovery rates (for which payment is expected) but those adopted here correspond to those used in the previous study. The main two measures are the debt ratio and the payment rate.

4.2.1 The Debt Ratio

The “debt ratio” is the ratio of current debt to the debt that has been accumulated as a result of prior non-payment or late payment. The ratio is obtained by simply dividing current debt by the total debt. “Current debt” is that amount of money that is due and should be paid before the next billing cycle. If all bills are paid timeously (and this has consistently been the case) the ratio of current debt to accumulated debt will be near or equal to “1”. If any part of the debt is rolled over into the next month the ratio drops proportionally.

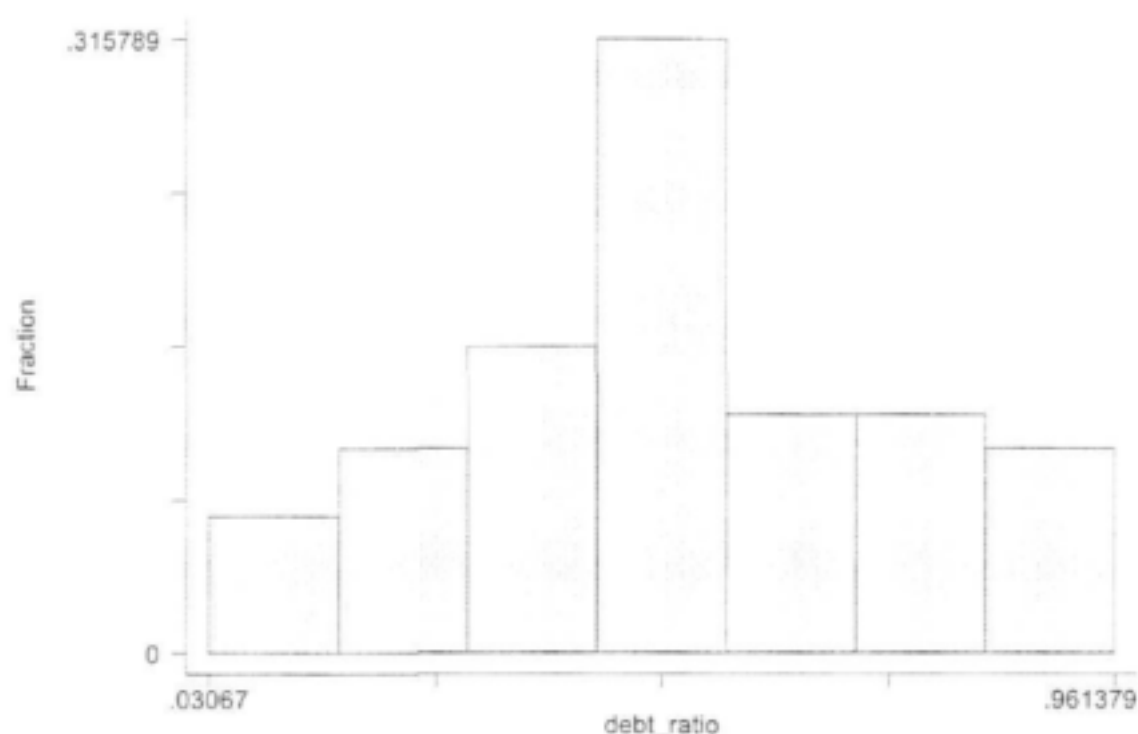
A debt ratio of (or close to) “one” is thus desirable as it signifies that the service provider is receiving payment and is receiving it timeously. A debt ratio of less than one suggests that proportions of current debt is being rolled over into the next billing cycle or is not being paid at all. However even this figure has been affected by the re-demarcation of municipalities. The longer a municipality or service provider has been operating, the more likely it is to have accumulated past debts. Typically, unless the debts are recovered or written off as unrecoverable, monies owed to municipalities will accumulate on the books for many years. Given this, it is easy to see that the ratio of current to accumulated debt is as much a function of non-payment as it is of the length of time for which the accounts have been kept. However the restructuring of municipalities led to many of them rationalising their accounts by, *inter alia*, writing off old debts. As it is not known which municipalities had done this it was

necessary to adopt a more appropriate measure of the debt ratio. The responses received from the municipalities indicated that the ratio of current debt (i.e. the monies due in the current billing cycle) to the total debt accumulated over the preceding three months (including the current month) would serve as the most justifiable measure of "debt ratio". The difference in definitions means that this study is not necessarily comparable to its predecessor particularly in so far as the debt ratio is concerned. The advantage is that any movements in the ratio reflect current trends and not those of that inherited from the earlier administrative system

A more pertinent difference between the two studies concerns the impact of the free basic (FBW) water policy. The free basic water policy ensured that low income households consuming less than the free allocation would not be billed for their consumption and would thus also no longer contribute to debt accumulation. Previously it was widely assumed that low-income households are more likely not to pay their service bills than their more affluent counterparts. If this is the case the immediate impact of free basic water was to improve the debt ratio, as a large number of defaulters would no longer be billed. The debt ratio would thus automatically improve as a result of the free basic water policy without there being any fundamental changes in consumers' behaviour or service providers' cost-recovery practices. In the first study no distinction was made between accounting practices before and after the implementation of the free basic water policy, in this study the implementation of some free basic water policy can be assumed.

The average debt ratio among respondents was 0.5 – i.e. the debt ratio most likely to be observed was one in which current debt was half the total due for the quarter. However, once again there was great variation in the figures. One municipality received only 3 percent of the amount they billed in the quarter – a situation made possible by a subsequent dramatic reduction in the billing rate.

Graph 4.2: Debt Ratio



4.2.2 Repayment Rate

Another measure of cost recovery is the proportion of households who can be expected to pay their water bills timeously. This measure was not derived from municipal accounts but was supplied directly in response to the question *"what is your best estimate of the percentage of individual consumers (that is excluding business and public-sector consumers) who are likely to pay their accounts on time (i.e. submit payment before they receive the next bill)?"*

Although the payment rate and the debt ratio are both attempts to measure the cost recovery rate there are important (and substantial) differences between the two. Statistically the relationship between the two is insignificant. The reasons for the differences are only partly the result of unreliable data. A favourable debt ratio may be accompanied by an unfavourable cost payment rate if, for example, low consumption households are less likely to pay their water bill than high consumption households and/or businesses.

In order to identify the main determinants of the “debt ratio” and “repayment rate” these two variables were independently regressed against a number of factors. The statistically insignificant factors were sequentially removed as dependent variables in a step wide fashion. The “factors” used in the regression are shown in the table below.

Table 4.1: Factors Used in Regression Analysis

VARIABLE NAME	DESCRIPTION	OBJECTIVE/IMPACT
lbill10kl	The log of the rate charged for 10Kl of water this measures price sensitivity	For price sensitivity
Poor	Proportion of population in lowest 2 income quintiles	Impact of general poverty
tLprivcon	the proportion of households with their own water connection	Impact of communal versus private amenities
tLflatrate	Proportion of household paying a flat rate	reflects non volumetric tariffs
penstrong	The use of strong penalties for non-payment – services suspended in under three months	Impact of penalty
penweak	The use of milder penalties for non-payment – services suspended only after three months	
pennone	No suspension of services	Impact of failure to use penalties
tLwhite	Proportion of white households who are not poor	Affordability issues (see note)
tLcol_ind	Proportion of “coloured” and Indian households who are not poor	Affordability issues
tLafrican	Proportion of African households who are not poor	Affordability issues
Logn	The log of the total number of water consumers	Impact of scale
Progtariff	The use of progressive tariffs	Impact of escalating unit costs
Masakhane	The existence of a Masakhane-like programme	Impact of education and motivation programmes
ur_rate	The urbanisation rate	Impact of population concentration
logn_cen	The log of the total number of households in area	Impact of municipality size

The variables are described (with details as to how they were transformed) in Appendix A. Four variables proved to be statistically significant in determining the debt ratio. They are:

- `spenstrong` highly punitive measures for non-payment
- `tLafrican` proportion of African households who are not poor
- `logn` the number of water consumers
- `ur_rate` the urbanisation rate

Collectively these variables account for one quarter of the total variance in the debt ratio. Up to three quarters of the variance thus has to be accounted for by all other factors, measured and unmeasured.

Besides the economic and cultural differences between population groups in South Africa citizens also have differing traditions with respect to political action such as rent and service boycotts. Like income and culture these traditions largely correspond to racial groups. It was important to consider this dimension of consumer behaviour while coupling it to income disparities and the ability to pay. The most pertinent measure capturing both "political heritage" and income was the proportion of each racial group not living in poverty. After the income profile (with racial shares) was derived from the 1996 census an income/race classification of each municipality's population could be derived. People living in households with an income corresponding to that of the poorest 40% of the population were treated as "poor". The results show that the debt ratio is significantly reduced as the proportion of "affluent" Africans in the area increases. This is indicated by the importance of the variable "tLafrican" which, of the four significant variables, has the strongest positive effect on the debt ratio. This variable is a measure of the proportion of the African population not in poverty.

The importance of this variable suggests that affordability remains an issue with regard to water cost recovery. However the proportion of the municipalities' population living in poverty was not itself a significant determinant – partly because the poor are increasingly covered by free basic water and do not contribute to the debt ratio calculation.

Having a relatively large “affluent” African population proved to be the most positive determinant of a healthy debt ratio. The next most positive determinant was “strong” penalties for non-payment. A “strong” penalty corresponded to restricting or suspending services within two months of payment not being made for services. The adoption (and use) of such a policy could improve the debt ratio by about ten percent.

A more surprising impact on the debt ratio was the impact of increasing urbanisation rates - higher rates of urbanisation corresponded to poorer debt ratios. Rural residents who were billed for services were more diligent in paying than their urban counterparts. This also reflected the relatively low reliance on free basic water in urban areas.

There was also a positive relationship between the debt ratio and the number of consumers in the municipality. As the number of consumers increased the debt ratio improved – perhaps in tandem with increasing administrative capacity on the part of the service provider. However a distinction needs to be drawn between the number of consumers and the number of households in each municipality. Although the two numbers corresponded closely in many areas they diverged markedly in those municipalities where significant proportions of the population were not provided with water services. This divergence was great enough to ensure there was a **positive** correlation between the number of consumers and the debt ratio and a **negative** correlation between the total population and the debt ratio. This is more easily understood if it is acknowledged that, with the general exception of metropolitan areas, the more populous a municipality is, the less likely it is that individuals will receive water services.

Much of the above is may be irrelevant in terms of municipalities’ ability to improve their own situation. The only variable over which municipalities may have any control are the penalties for non-payment. Municipalities cannot improve debt ratios by changing the number of residents, the income/race composition of that population or the proportion of residents that are urbanised. Of the listed factors the only one they can manipulate are the penalties they impose for non-payment.

4.2.3 Payment Rates

While municipal accounting officers are usually able to show how debts have aged - and are able to disaggregate the source of the debt (e.g. water, electricity or rates account) they are rarely able to distinguish what proportion of the debt is incurred by households and what incurred by business, industry etc. Thus while the debt ratio can be taken as an objective measure of efficacy of the municipalities' policies and procedures in overcoming consumers resistance to paying their bills, the scenario is muddled by the business component. If, as can be assumed, economic enterprises are more diligent in paying for services any analysis of the "debt ratio" may tend reflect the influence of business rather than better credit control practices.

Businesses are probably more diligent about paying for services because water service providers are less constrained by laws, policies and the constitution when it comes to suspending their services. This greater vulnerability on the part of business is often accompanied by the high costs incurred (in terms of production and clients) when services are even momentarily suspended. As is shown below this aspect, coupled to the removal of the indigent from the billing system, takes the edge off the use of the debt ratio as a measure of cost recovery.

An alternative measure is the proportion of households who are likely to pay their water bills on time. This measure overcomes the problem cited above and can focus attention firmly on domestic consumers. It is, however, unable to allow for any distinction based on consumption levels. Each consumer is treated equally regardless of how much water they consume and thus on the individual impact they have on a municipality's water account. Obviously those who are not called on to pay for what they consume are, again, removed from consideration. We refer to the proportion of households who are likely to pay their water bill timeously as the "payment rate". As indicated above, because this measure is conceptually related to the "debt ratio", it can reveal markedly different things about cost recovery.

The survey reveals three statistically significant determinants of the payment rate - each of which is under the control of the municipalities to some degree. These determinants are:

- the proportion of households paying a flat rate for their water

- the absence of penalties for non-payment, and
- the use of progressive tariffs

The first two determinants are negatively correlated to payment rates. The greater the proportion of households paying a fixed rate for water, the lower the payment rate. This relationship is somewhat surprising as fixed rate consumers have little incentive to conserve water anyway. The absence of disincentives for excessive consumption has arguably been translated into a greater reluctance to pay for anything at all.

The absence of penalties for non-payment has an independent (and additional) effect on payment rates. By not penalising defaulters by suspending their services (water or other services) the likelihood of consumers paying and paying timeously is reduced. This concurs with the findings of the original study.

The third determinant is the presence of a progressive tariff. A progressive tariff is one in which the unit cost of water increases as the total volume consumed by the consumer increases. The adoption of such a tariff has a positive effect on payment rates. This phenomenon (which was also identified in the initial study) is usually understood in terms of the legitimacy of cost recovery. Regressive pricing is seen as punishing or taking advantage of the poor and seemingly invites resistance. Historically such resistance has contributed to the culture of non-payment. A progressive price structure seemingly undermines that resistance and the associated culture of non-payment. Among those affected by the increasing volumetric charges, a progressive tariff seemingly acts to limit consumption rather than to induce non-payment.

Municipalities can improve their payment rates by establishing progressive tariff structures, reducing the use of fixed tariffs and instituting penalties for non-payment. Unfortunately the last two determinants are increasingly inaccessible as they require the installation (and reading) of meters or the installation of flow restricting mechanisms. The effect of the free basic water policy has been to increase the cost to municipalities of imposing penalties on non-payers. Now services cannot simply be terminated – any disconnection has to be accompanied by the implementation of alternative mechanisms or adoption of practices that

ensure that the offending household still gets the prescribed minimum service (under the FBS this is usually 6 Kl a month). Installing flow restrictors, using prepaid meters or other devices – each of which is inevitably more costly than just disconnecting the defaulter, can accomplish this.

4.2.4 Probable Impact of Adopting Better Practices

The impact of any practice being adopted is never certain. Both the information used to develop the model and the environments in which municipalities operate ensure that outcomes are, to some degree, uncertain. By illustrating this uncertainty (with typifies all representative samples) a better indication of the likely range of outcomes is given. Unfortunately this uncertainty is rarely emphasised in reports, as analysts concentrate on mean or average impacts. This suggests to readers that outcomes are more certain than they really are. Practitioners on the other need to understand that there are no guarantees as a result of changes in practices there are only more and less likely outcomes.

As in the initial study we deal with this uncertainty by presenting probabilistic outcomes – these show what range of outcomes is most likely. These ranges are presented as 80 percent probabilities – i.e. such outcomes are “ensured” 8 out of ten times. As before these results are presented graphically with summaries of key variables.

The impact of implementing changes is obtained by estimating two scenarios. The first reflects the “before” situation and the second the “after” situation. The difference between the two is the improvement (or deterioration) in outcomes. These values are simulated a large number of times to obtain a probability distribution showing the range of outcomes. The probability distribution clearly indicates what outcome is most likely and how much deviation from that outcome can be expected.

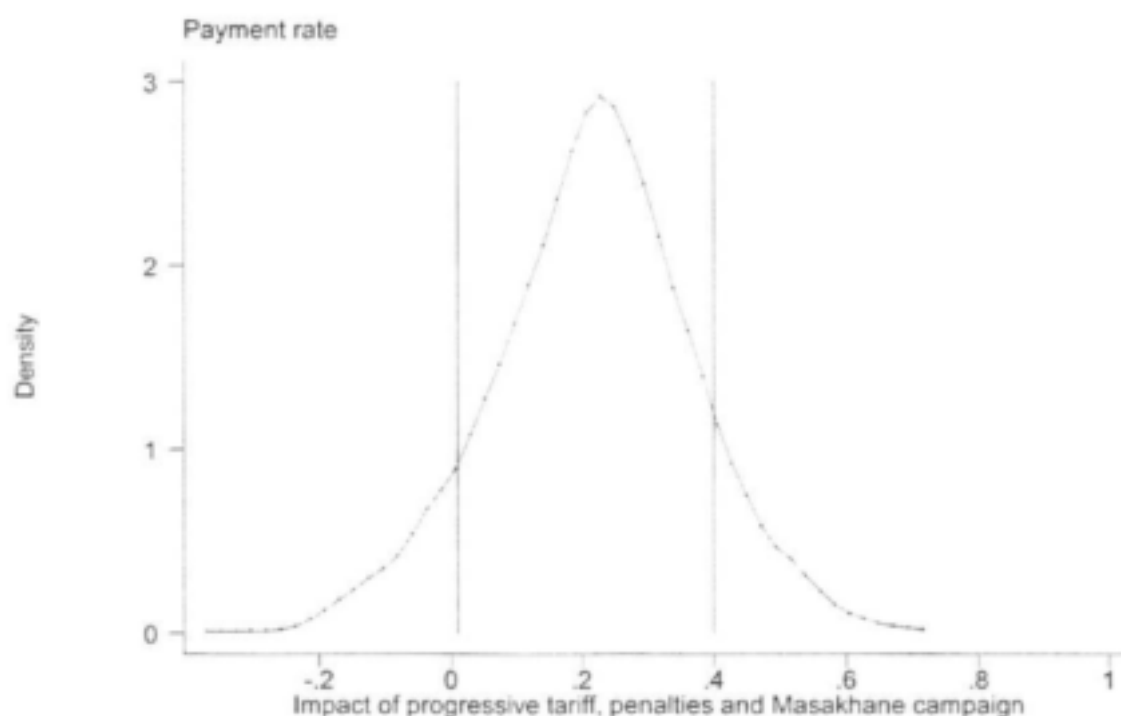
4.2.5 Masakhane Programmes, Strong Penalties and Progressive Tariffs

To understand the Graph 3 below consider a number of municipalities identical in respect of population size, the number of water consumers, the unit price of water, the number of private connections, racial/ income profiles and urbanisation levels. Assume further that none have a progressive tariff structure, none have an active Masakhane-type campaign and none have penalties for non-payment. The diagram portrays the range of outcomes that are likely

to result from the simultaneous introduction of a Masakhane type programme, strongly punitive penalties for non-payment and a progressive tariff structure.

A typical municipality moving between the two situations sketched above is 80⁷³ percent certain of improving payment rates between 1 and 40 percent. On average an improvement in payment rates of 21 percent will be realised. The effect can thus be pronounced, however the starting conditions that include no punitive tariffs, no Masakhane-type campaign and regressive or neutral tariff structure must be borne in mind. Very few existing (newly demarcated) municipalities bear all these features making the hypothetical municipality somewhat unusual. Most municipalities do have progressive tariffs, many have some kind of Masakhane campaign and almost two thirds currently impose penalties for non-payment. Consequently such dramatic increases in payment rates are unlikely to be achieved.

Graph 4.3: Impact of Progressive Tariff, Penalties and Masakhane Campaign



⁷³ The vertical lines on the density plots represent the lower and upper 80percent confidence intervals of the estimates.

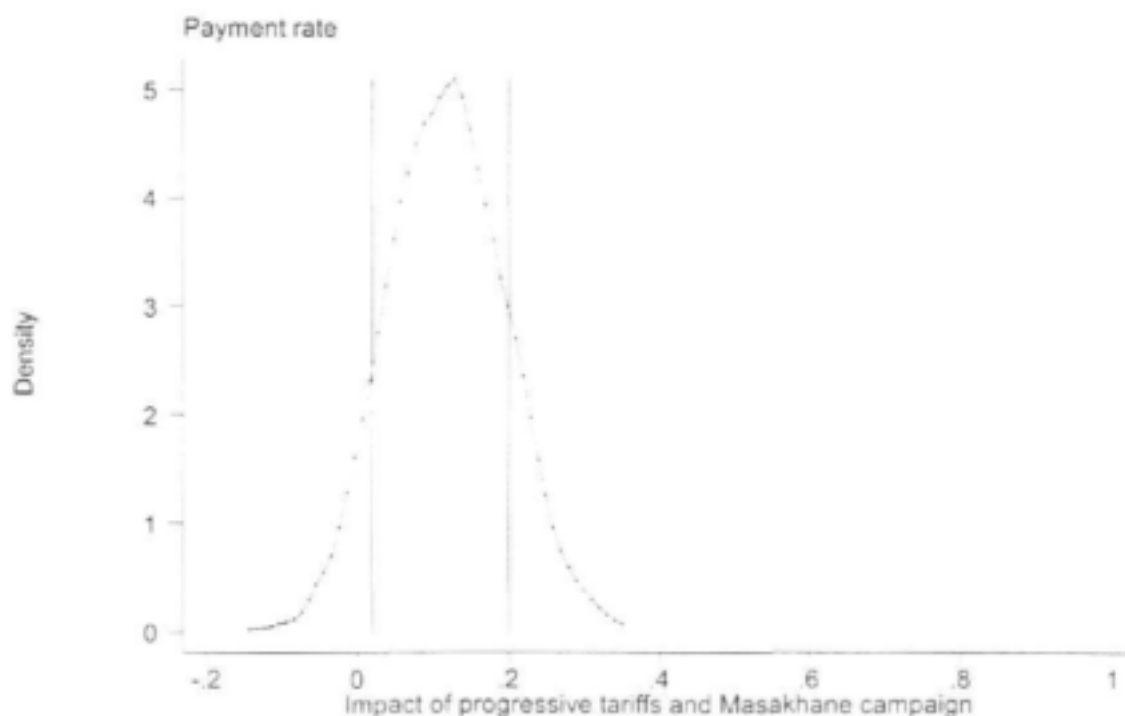
Average impact	21 %
lower limit of 80% confidence interval	1 %
upper limit of 80% confidence interval	40 %

However we are also able to see what happens when municipalities which are typical with respect to prevalence of Masakhane campaigns, penalties and progressive tariffs, and then selectively adopt these measures, as shown in the scenarios in Graph 5.4.

4.2.6 *Masakhane and Progressive Tariffs*

If municipalities move from a total absence of Masakhane campaigns and progressive tariff structures to full implementation an average increase in payment rates of about 11 percent may be obtained. However, as before, many municipalities already have these measures in place. If only those municipalities without these features were to implement them then the average payment rate would increase by a reduced 4 percent. Municipalities can be assured that the increase will be between -3 percent and 11 percent in 80 percent of cases. There is thus a small chance that the introduction of the measure will reduce payment rates.

Graph 4.4: Impact of Progressive Tariffs and Masakhane Campaign

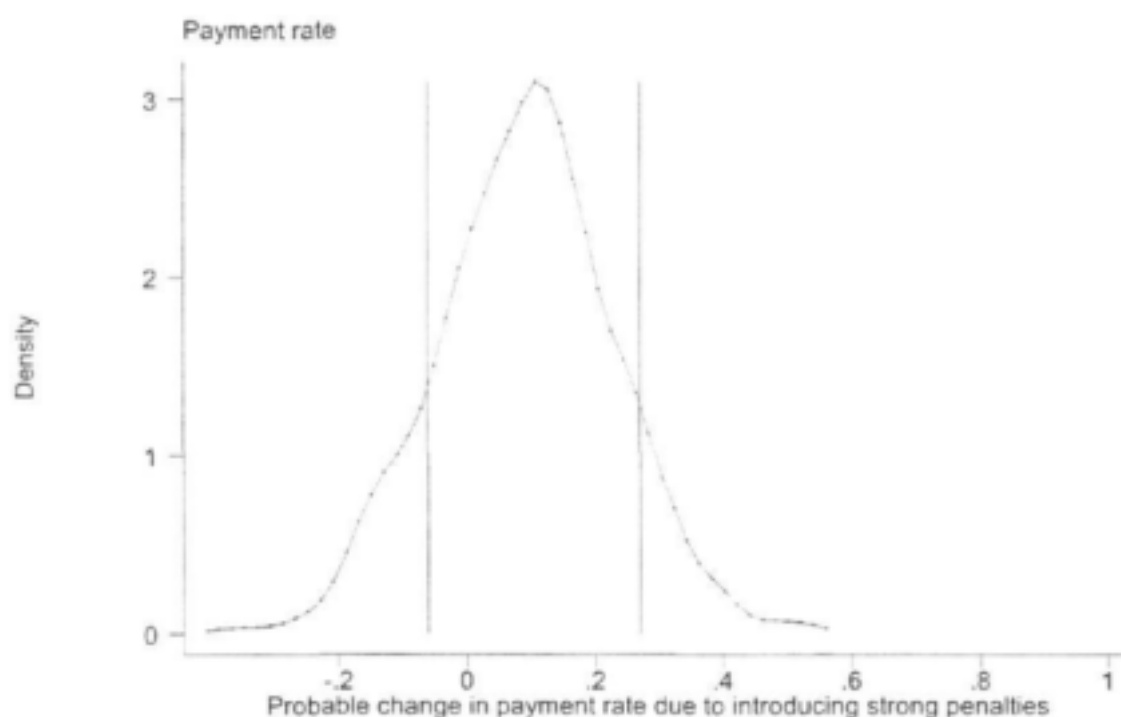


Average impact	11 %
lower limit of 80% confidence interval	3 %
upper limit of 80% confidence interval	20 %

4.2.7 Strong Penalties

Here we examine the impact of otherwise typical municipalities imposing strong penalties for non-payment – and implementing no other changes. Recall that a strong penalty involves the suspension of services for consumers being three months in arrears. If municipalities were to move from an absence of penalties for non-payment to strong penalties the cost recovery rate would improve by 9 percent on average. In 80 percent of instances the improvement would be between -9 and 30 percent. Again there is a relatively small probability that the measure will result in reduced cost recovery rates.

Graph 4.5: Probable Change in Payment Rate due to Introducing Strong Penalties

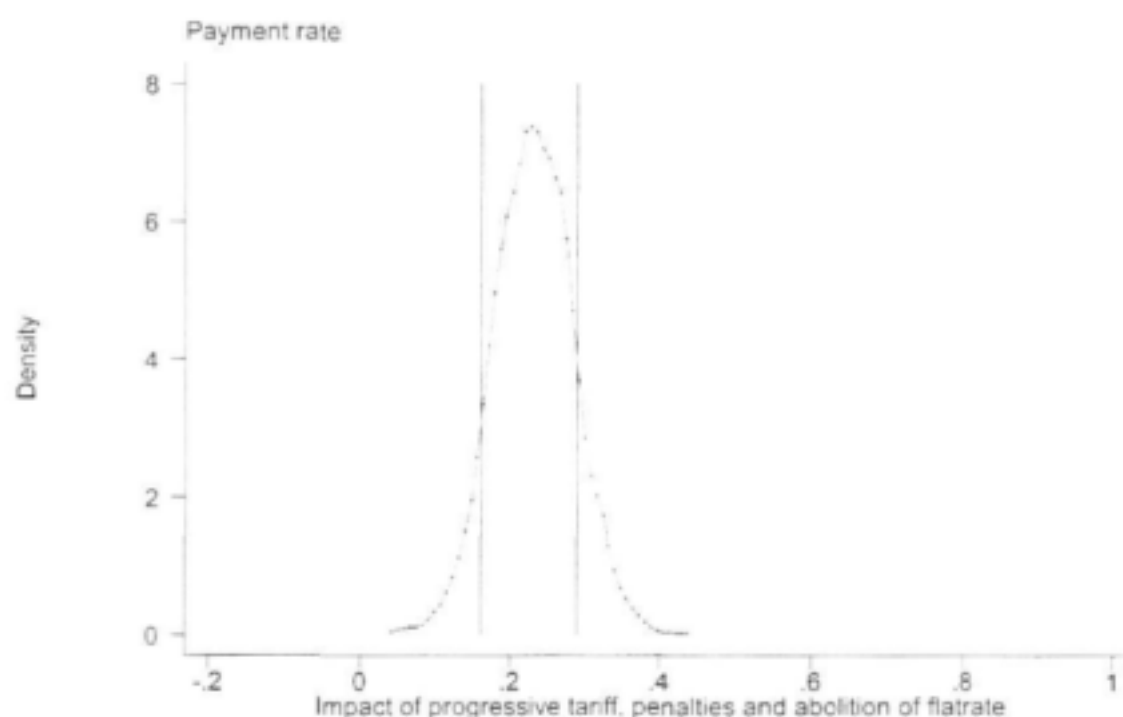


Average impact	9 %
lower limit of 80% confidence interval	-9 %
upper limit of 80% confidence interval	27 %

4.2.8 Penalties, the Abolition of Flat Rate Billing, and Progressive Tariffs

We conclude this section by examining the impact of the variables identified as significant in the first section. These variables are the implementation of penalties, the abolition of flat rate billing, and the implementation of progressive tariffs. The municipalities are assumed to be typical in every other respect. They are then assumed to universally implement strong penalties and progressive tariffs and, simultaneously, to abolish flat rate billing.

Graph 4.6: Impact of Progressive Tariffs, Penalties and Abolition of Flat Rate



Average impact	23 %
lower limit of 80% confidence interval	17 %
upper limit of 80% confidence interval	30 %

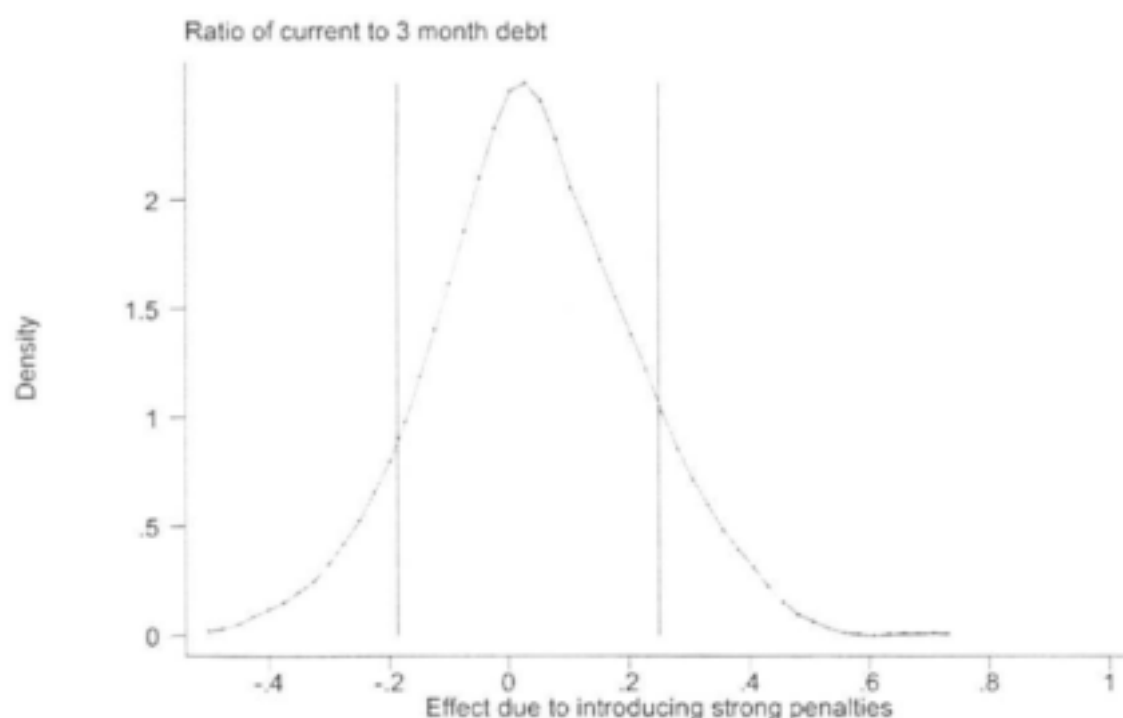
The simultaneous implementation of these measures is likely to increase payment rates by approximately 23 percent. Most (80 percent) of the increases will be between 17 and 30 percent – indicating that there is a negligible chance that the changes will result in reduced payment rates. Current payment rates (based on the simulated model) are only 57 percent – indicating that increases of this magnitude are entirely plausible.

4.2.9 *Simulating the Debt Ratio*

In the preceding section the effect of administrative changes on payment rates of typical municipalities were modelled. As shown earlier this is only one measure of cost recovery – the debt ratio being an important alternative. Unfortunately the clear trends indicated with respect to payment rates are not manifest in the debt ratio models. Even in the initial study the effect of changes on debt ratio were consistently more “vague” than the impact on payment rates. The definitional changes adopted in this study, coupled to the impact of free basic water further aggravate this situation.

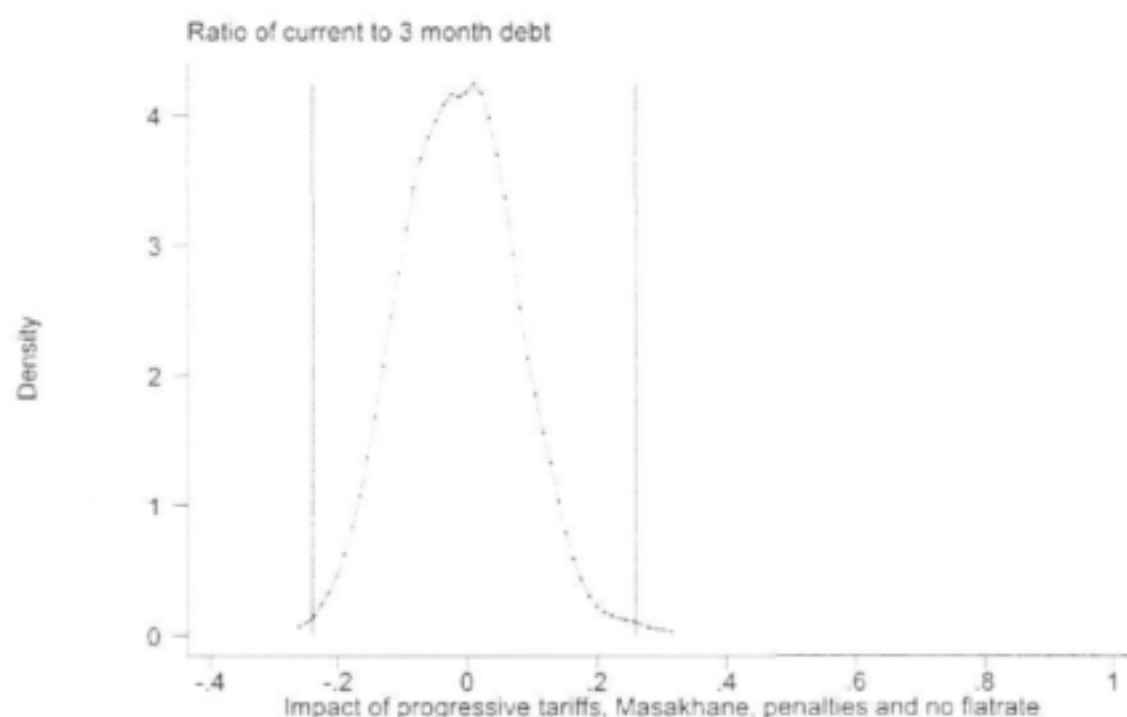
The situation is illustrated by examining the impact of moving from an absence of penalties for non-payment to strong penalties, in municipalities that are otherwise entirely “typical”. The average improvement in the debt ratio will be only 4 percent. In 80 percent of the instances the change will lie in a very wide range of between -17 and 26 percent. In other words there will be a mildly positive effect but there is some chance that the impact will be negative.

Graph 4.7: Effect due to Introduction of Strong Penalties



The likelihood there will be a negative effect is belied by the fact that payment rates are almost certain to improve as a result of the adoption of penalties, thereby improving cost recovery however it is measured. This is illustrated further by examining the effect on the debt ratio of municipalities typical in every respect universally implementing progressive tariffs, Masakhane campaigns, strong penalties and abolishing flat rate billing. In 80 percent of instances the debt ratio will change by between -18 and 16 percent – the average effect is almost exactly zero. We however know from the above that payment rates will increase by about 23 percent when these policies are implemented.

Graph 4.8: Impact of Progressive Tariffs, Masakhane Campaign, Penalties and no Flat Rate



Given the changes to municipal accounting the use of the debt ratio as a measure of cost recovery is not highly informative. What the simulations do indicate is that the impact of measures designed to improve payment rates are likely to be neutral with respect to the debt ratio – they are as likely to improve as they are to aggravate the existing ratio.

4.3 Concluding Remarks

Despite the fact that the study has been impaired by the vagueness with which municipalities treat water losses it has shown that significant gains can be made in cost recovery despite the implementation of the free basic water policy.

Circumstantial evidence suggests that much (if not most) of the water lost in distribution is attributable not to leakages but inadequate or ineffective billing procedures by water service providers. Should these losses be eliminated the water distribution sector could eliminate much of the current shortfall between income and expenditure that bedevils sustainable water provision. Identifying the source of the losses is beyond the scope of this study. This should probably be identified as an important research initiative that can contribute to a sustainable water distribution service.

Even when ignoring the impact of water loss/wastage substantial improvements in payments can be made by the implementation of progressive tariffs, sanctions against non-payers and the abolition of fixed rate tariffs. Implementing these measures where they are not currently instituted would increase payment rates by about 23 percent. Consumer education through Masakhane-type programmes is likely to have a positive but far smaller effect.

Approximately one-third of municipalities indicate that they currently have Masakhane type programmes in place. However many of these programmes are made marginal by the free basic water policy. Moreover, many Masakhane-type campaigns were geared to reach the very market made irrelevant in terms of cost recovery by the free basic water policy. A similar fate befell community participation programmes. Although one-third of responding municipalities indicated that they had community involvement programmes associated with the provision of water services these were invariably fairly superficial. In all but one instance "community involvement" involved education initiatives, the use of municipal representatives or elected officials to encourage payment or the adoption of instruments to facilitate repayment of arrears. In the one exception "community involvement" involved the training of local workers during capital development projects. While such interventions may facilitate political legitimacy the data suggests improved repayment rates would require that community involvement initiatives or Masakhane programmes be focused on a relatively

affluent section of the market. Thus the benefits are likely to be realised from those households who, for example, consume 40 Kl a month rather than those that consume 6 or 10Kl.

This is also the section of the market that benefits from the use of fixed tariffs. The study shows that far from simply failing to limit unnecessary consumption of water, the fixed tariff is also associated with lower payment rates.

The survey reveals that the reconfiguration of the municipalities coupled with the implementation of free basic water has had a marked influence on how the recovery of costs of water distribution services can be enhanced. On the one hand initiatives geared towards the lower end of the market are increasingly overshadowed by the impact of the free basic water policy. On the other hand the implementation of punitive sanctions against non-indigent consumers who fail to pay a progressive, volume-related, tariff takes on increasing importance. However it must be noted that just as punitive sanctions become increasingly necessary they also become more expensive to implement. Water suppliers are no longer able to cut the flow of water to defaulters – they have to ensure that the free basic allowance remains available to all.

The study indicates that there are limits as to how much cost recovery can be improved by increasing the per litre charge to consumers. It was shown above that an increasing the charges in this way results in a greater proportion of water being “lost” in distribution. This suggests that shifting the burden of under-recovery of costs onto those who already pay, by increasing prices, will, to some extent at least, result in greater losses in distribution. The focus for effective cost recovery should thus shift to ensuring that all consumers who use more than the free basic provision are billed for what they consume and that they are then either made to pay for that water or to restrict their consumption to the amount provided free.

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APPENDIX A: TECHNICAL DETAILS OF STATISTICAL ESTIMATES

A.1 Introduction

The method used in this study attempted, as far as possible, to reflect that used in the successful initial study. This was to ensure, *inter alia*, consistency between the studies. Given that the methods and transformations used in the two studies were made to coincide the explanation that accompanied the first study is repeated here with necessary adaptations.

The statistical analysis was conducted as a two-stage process. The first involved multiple imputation of missing values in the original dataset, which was based on national survey and census data. Multiple imputation generated a set of five “completed” datasets from the “incomplete” original dataset. The second stage of the analysis was to estimate the operationalised model of cost recovery using each of the five “completed” datasets and combining the results statistically. Under virtually all conditions, multiple imputation is superior to more common approaches to missing data — which involve dropping observations, dropping variables, or inserting single “guesstimates” in place of missing values.⁷⁴ The first (multiple imputation) stage of the analysis required at least all variables to be used in the second (model estimation) stage, and a few additional variables were added to improve the quality of the imputations. Specialised software was used to generate the multiply-imputed datasets and again to combine the results of model estimates from each of them.⁷⁵ Stata (a commercial statistical software package) was used to estimate the operationalised model for each of the imputed datasets.

⁷⁴For an extended discussion, see Gary King, James Honaker, Anne Joseph, and Kenneth Scheve, “Analyzing Incomplete Political Science Data: An Alternative Algorithm for Multiple Imputation,” unpublished paper, Harvard University, 2000.

⁷⁵The multiply-imputed dataset were created using James Honaker, Anne Joseph, Gary King, Kenneth Scheve, and Naunihal Singh, *Amelia: A Program for Missing Data*, Windows version 1.05 (Cambridge: Harvard University, 1999). The combination of the multiple-imputation results was done using “MI” procedures written by Kenneth Scheve to run within the commercial Stata statistical software package.

The remainder of this appendix presents technical details of the analysis. The first section describes the variables used the multivariate statistical analysis. The second section gives details of the multiple imputation stage. The third section presents the details of the model estimation stage.

A.2 Variables Used in the Multivariate Analysis

Table B1 contains all of the variables used in the multivariate analysis. All of the variables listed were used in the multiple imputation stage, while only those above the dotted line were used in the model estimation stage. The source of most variables is the national survey, with the exception of a few items calculated from census data — the demographic profile variables (*white*, *col/ind*, *african*, and *poor*), a variable to distinguish urban, rural and mixed area types (*areacat*), and a variable to measure the number of likely water consumers, based on reported service types. The two dependent variables were the payment rate for household consumers (*payrate*) and debt ratio for water services (*waterdebt*). Three variables — *penstrong*, *penweak*, and *pennone* — are indicator variables capturing the use of service restrictions to penalise non-payment. (*Pennone* does not appear in the model estimates, as it is treated as the excluded base category.) Four variables — *white*, *col/ind*, *african*, and *poor* — are compositional variables to capture the municipal income and racial profiles. (*Poor* does not appear in the model estimates because it is treated as the excluded base category.) The descriptions of the other variables above the dotted line are straightforward, and the rationale for their inclusion in the operationalised model is discussed in the main text of the report. The variables below the dotted line were included only to improve the quality of the multiple imputations. *Totaldebt* is closely related to *waterdebt* and was available for many more municipalities in the sample. *Logn_cen* was closely related to the survey-based *logn*, and therefore helped inform imputations for the number of household consumers in municipalities. *Province* and *areacat* add some geographical information to the multiple imputations.

Table A1: Description of Variables Used in Multivariate Statistical Analysis

Variable	Description	Source
Payrate	Payment rate for household consumers	National survey
waterdebt	Debt ratio for water services	National survey
Privcon	Proportion of households with private connections	National survey
Flatrate	Proportion of household consumers paying flat rate	National survey
penstrong	Service restriction to penalise non-payment, 90 days or less overdue	National survey
Penweak	Service restriction to penalise non-payment, more than 90 days overdue	National survey
Pennone	Service restriction not used to penalise non-payment	National survey
White	Proportion likely household consumers, white and not poor	1996 census
col/ind	Proportion likely household consumers, coloured/Indian/unspecified and not poor	1996 census
African	Proportion likely household consumers, African and not poor	1996 census
Poor	Proportion of likely household consumers, poor (all race categories)	1996 census
Logn	Natural logarithm of number of household consumers	National survey
Supmkt	Dummy variable to indicate availability of payment facilities at supermarkets	National survey
Progtariff	Dummy variable to indicate a substantially progressive tariff	National survey
masakhane	Dummy variable to indicate an active Masakhane campaign	National survey
Totaldebt	Debt ratio on consolidated household accounts	National survey
Province	Categorical variable to indicate province	-
Areacat	Categorical variable to indicate predominantly urban, predominantly rural, and mixed area types	1996 census
logn_cen	Natural logarithm of number of likely water consumers, based on service types	1996 census

Note: 'National survey' refers to the national survey of municipal cost recovery conducted for this study; '1996 census' refers to the South African census conducted in 1996. Variables below the dotted line were used only in the multiple-imputation model.

A.3 Description of the Multiple-imputation Stage

The multiple-imputation stage assumes that variables follow a joint multivariate normal distribution. To approximate this assumption, it was necessary to transform some of the variables to make their distributions more nearly symmetric and unbounded. The transformations used are summarised in table B2. Several of the variables — including both dependent variables — are proportions bounded by definition to values between zero and one. These variables included *payrate*, *waterdebt*, *privcon*, and *flatrate*. A logistic transformation was used to improve the fit of the distributional assumptions:

$$lt(x) = \ln\left(\frac{x}{1-x}\right)$$

Another group of variables are compositional proportions (*white*, *col/ind*, *african*, *poor*), and a related log-ratio transformation was used. This transformation requires the arbitrary selection of one variable as the “base,” and *poor* (x_b) was used for this purpose. The transformation for the remaining proportions (x_i , $\{x_w$ (*white*), x_c (*col/ind*), x_a (*african*) $\}$) is:

$$lt(x) = \log \frac{x}{x_b}$$

The two variables for number of consumers (*logn* and *logn_cen*) were already subject to a standard logarithmic transformation and did not require any further alterations. The remaining variables were dummy variables (*supmkt*, *progtariff*, and *masakhane*) and categorical variables (*penstrong/weak/none*, *province*, and *areacat*). There is no benefit to transforming the values of such variables.

Table A2: Non-linear Transformations in the Multiple-imputation Model

Variable	Transformation
payrate	Logistic
waterdebt	Logistic
privcon	Logistic
Flatrate	Logistic
pen: strong/weak/none	Entered as ordinal variable
White	Log ratio (base category: poor)
col/ind	Log ratio (base category: poor)
African	Log ratio (base category: poor)
Logn	No additional transformation
supmkt	None
progtariff	None
masakhane	None
province	Entered as a categorical variable
areacat	Entered as a categorical variable
logn_cen	No additional transformation

Note: Multiple-imputation model was run using James Honaker and others' "Amelia: A Program for Missing Data," Windows version 1.05. Cambridge: Harvard University, 1999.

Table A3: Alphabetical List of Municipalities in the Realised Sample

DMB code	Municipality name	Province	Type
Cape Town	Cape Town	WC	A
CBLC1	Kgalagadi	NC/NW	CBLC
CBLC2	Bronkhorstspuit	GT/MP	CBLC
CBLC7	Phokwane	NC/NW	CBLC
CBLC8	Merafong	GT/NW	CBLC
DC02	Boland DM	WC	DMA
DC05	Central Karoo	WC	DMA
DC07	Karoo	NC	DMA
DC08	Riemvasmaak	NC	DMA
DC09	Frances Baard	NC	DMA
DC24	Umzinyathi	EC	DMA
Durban	Durban	KZ	A
EC101	Camdeboo	EC	B
EC125	Buffalo City	EC	B
EC132	Tsolwana	EC	B
EC132	Tsolwana	EC	B
EC134	Lukhanji	EC	B
EC142	Senqu	EC	B
EC152	Tabankulu	EC	B
EC155	Nyandeni	EC	B
Ekhuruleni	Ekhuruleni	GT	A
FS161	Koffiefontein	FS	B
FS162	Kopanong	FS	B
FS183	Tsewlopete	FS	B
FS192	Dihlabeng	FS	B
FS201	Kroonstad	FS	B
FS203		FS	B
FS204	Metsomaholo	FS	B

GT02B1	Nokeng Tsa Taemane	GT	B
GT411	Mogale City	GT	B
GT422	Meyerton	GT	B
Johannesburg	Johannesburg	GT	A
KZ214	Uhjziwabantu	KZ	B
KZ216	Hibiscus coast	KZ	B
KZ222	Umgeni	KZ	B
KZ223	Moorriver	KZ	B
KZ227	Richmond	KZ	B
KZ232	Emnamblini	KZ	B
KZ234	Estcourt	KZ	B
KZ236	Imbabazane	KZ	B
KZ241	Endumeni	KZ	B
KZ245	Umvoti	KZ	B
KZ252	Newcastle	KZ	B
KZ253	Utrecht	KZ	B
KZ262	Pongola	KZ	B
KZ263	Abaqulusi	KZ	B
KZ266	Ulundi	KZ	B
KZ284	Umlazi	KZ	B
KZ285	Mthonjaneni	KZ	B
KZ294	Maphumulo	KZ	B
KZ5A1	Ingwe	KZ	B
KZ5A5	Ixopo	KZ	B
KZ5a3	Ilembe	KZ	B
KZ5a4	Kokstad	KZ	B
MP302	Mkhondo	MP	B
MP306	Dipsaleng	MP	B
MP312	Emalahleni	MP	B
MP315	Thembisile	MP	B
MP321	Thaba Chweu	MP	B

MP324	Nkomazi	MP	B
NC01b1	Gamagara	NC	B
NC061	Richtersveld	NC	B
NC066	Karoo Hoogland	NC	B
NC067	Khai ma	NC	B
NC073	Emthanjeni	NC	B
NC074	Kareeberg	NC	B
NC075	Renosterberg	NC	B
NC078	Siyancuma	NC	B
NC083	Khara Hais	NC	B
NC084	Grobbershoop	NC	B
NCDMA08	Un-named	NC	DMA
NP332	Letaba	NP	B
NP341	Musina	NP	B
NP352	Aganang	NP	B
NP362	Lephalale	NP	B
NP366	BelaBela	NP	B
NW1A1	Moashaweng	NW	B
NW1a1	Moshaweng	NW	B
NW373	Mdibeng		
NW373	Rustenburg	NW	B
NW374	Kgetlengrivier	NW	B
NW383	Mafikeng	NW	B
NW385	Zeerust	NW	B
NW393	Schweizer Reneke	NW	B
NW394	Greater Taung	NW	B
NW404	Maquassi Hills	NW	B
Port Elizabeth	Port Elizabeth	EC	A
Tshwane	Tshwane	GT	A
WC015	Swartland	WC	B
WC022	Witzenberg	WC	B

WC023	Paarl	WC	B
WC024	Stellenbosch	WC	B
WC026	Breede River	WC	B
WC031	Theewaterskloof	WC	B
WC032	Overstrand	WC	B
WC042	Langeberg	WC	B
WC043	Mosselbay	WC	B
WC044	George	WC	B
WC047	Plettenberg Bay	WC	B

APPENDIX B: DEFINING COST RECOVERY, A CONCEPT PAPER

B.1 Introduction

There are many layers and many issues within the subject of cost recovery. This paper is an attempt to outline briefly the area within which all discussions concerning cost recovery take place. It includes matters of costs, tariffs, incomes, equity, sustainability, administration, maintenance, responsibility and efficiency.

At the outset it is necessary to determine *what* costs have to be recovered, an issue which includes tariffs, the measurement of the amount consumed and affordability. Thereafter we examine in more detail the question *how* the money is recovered.

B.1.1 What is Cost?

The problem of determining what costs should be recovered is a complex one, and one with many different dimensions. In the formulation of tariffs, from a basic one like buying diesel to operate a borehole pump, to the tariffs of a large urban area, which include the pooling of a multiplicity of costs, including capital, loan repayments, maintenance, bad debts and many other overheads, there are two important considerations.

The first is: are the costs objectively verifiable? The importance of this is that objectively verifiable costs are much easier to understand and therefore people are much more willing to pay them.

Secondly, are costs calculated on a sustainable basis? The question then becomes what tariff should be used to fund sustainable development? Should it cover only the historic costs of the development, or should it also be making provision for future development?

Some of these issues are covered in more depth in the appendix, which offers a number of scenarios to illustrate the difficulties of constructing tariffs which meet these criteria, and also unpacks the components of what is broadly known as cost.

Another pressing problem in South Africa is that of payments by the public. It would be an over-simplification to say that, no matter what the tariff, there are problems of collection, but there can be little doubt that although the amount to be collected is a factor, there are many other variables. Moreover, whereas the quantum is, in certain senses, fixed, the other variables are not. This paper therefore concentrates on the many other issues in cost recovery.

B.2 Demand

The demand side of cost recovery also has many facets.

B.2.1 Water Usage

At its most basic level, demand for water – which we here use as the example for study – is a basic human need. The RDP treats it as such and predicates a level of service of standpipes within 200 metres as satisfying that need. The typical consumption figure for standpipe usage is 25 litres per capita per day.

Taking the self-contained borehole as an example – as described in the scenarios in the appendix as an example of the most simple system – there is a direct connection between the amount of water used and the cost (namely the diesel oil used in pumping the water). In such circumstances the demand is based on the dual constraints of work (carrying the water between standpipe and home) and price.

Water piped directly to the house removes one of these constraints. If the water is charged at a fixed rate, the second constraint is also removed, and thus there is no theoretical limit to the demand.

In cost recovery it is clear that charging on the basis of volume consumed will have a substantial impact on demand. Demand is further influenced by price, which is, in turn, determined by the tariff.

There are many approaches to tariffs. The traditional approach was to use a basic fixed rate, no matter the amount consumed, or else to charge at a lower unit rate as consumption increases. This was based on the actual cost of installation and similar factors, loading overheads in the "front" portion of the tariff (i.e. that part which all consumers pay), and charging only the cost of water supplied in respect of additional consumption. Today, as discussed below, tariffs which penalise higher levels of consumption by higher unit costs are more common. These have the advantage of reducing unit rates for small consumers, and therefore for the poor.

An example of such a tariff structure:

- First 10 kilolitres per month R1,00 per kilolitre
- 10 - 40 kilolitres per month R3,00 per kilolitre
- 40 - 100 kilolitres per month R4,00 per kilolitre
- over 100 kilolitres per month R5,00 per kilolitre
- to which are added overheads to cover:
- Payment to cover the cost of reading the meter
- Payment to cover amortisation of the meter and connection
- Payment to cover overheads for billing, collection, bad debt etc.

B.2.2 Affordability and Incomes

To what extent are affordability and incomes the major determinants of water consumption? The richer households consume 250 litres per capita per day or more: for purposes like gardening, swimming pools, bathing, laundry, dishwashing and sanitation. At this level, although pricing can have an impact on consumption – as discussed below – lifestyle is the largest determinant of consumption.

In a sense, the same applies at the bottom of the market. The poor have to carry water, and this limits consumption in terms of the volume of water used.

But although there is such a strong correlation between incomes and consumption, is price an important factor in determining consumption, and if so, how much? Part of the mantra in

South Africa is that the poor cannot afford to pay, but if they could, would they budget their water in accordance with their means?

The answer is probably yes. Experiences with pre-paid meters for electricity confirm that many households which professed to be unable to pay, actually do so with pre-paid meters; moreover, they quickly learn how much they can afford and limit their consumption accordingly. Their frugality in this respect has surprised Eskom, and changed, we are told, some of their predictions in terms of energy supply. It is almost certain that the same will apply with water. An anecdotal account relating to the Isle of Wight in Britain is instructive here. The island's water supply was approaching the stage at which it was inadequate in dry years, and water rationing was becoming a regular feature. It was decided to construct a pipeline under the sea to bring water from the mainland, at enormous cost. This was done. At about the same time, the Water Board decided to introduce a new tariff, one which set the initial tariff low, but sharply escalated the price for higher consumption users. Consumption reduced so dramatically that within a year the island had once more become self sufficient, and the pipeline became redundant.

The same system can work anywhere, and there is little doubt that price does affect water consumption, and therefore, incomes.

B.2.3 Cross Subsidy

Most authorities state that they do not cross subsidise. Indeed, the charging of different tariffs for different parts of the town has been declared unlawful. However, there are three ways to make different charges.

1. Residents within one part of the jurisdiction pay a flat rate, while those in another part pay for water consumed. Typically, flat rate payers pay for less than those who pay by the amount consumed.

2. Residents who do not pay for water, and are not penalised for failing to pay – a situation common in many parts of the country – are effectively being subsidised by those who do pay.
3. The last is to use tariffs to cross subsidise. As described above, a tariff structure which charges large users at a higher rate than low users, makes it possible for the poor to have water charged at a lower rate.

B.3 Barriers to Debt Collection

B.3.1 Perceptions of Value and Cost

In introducing the matter of supply, and sketching scenarios in that connection, we referred to the concept of objectively verifiable cost. This is important because many people have a perception that they should not be paying for water, and resent some of the overheads that form an essential part of the cost. The vagueness of many typical tariff calculations makes it difficult for an authority to justify a specific figure. The weakness of their position has been illustrated by negotiations that take place in respect of water tariffs with communities in connection with Masakhane and similar campaigns. Such negotiations usually aim to agree on a figure that the residents will accept as fair, which also represents a meaningful commitment by the community to making payments.

B.3.2 Equality and Fairness

Perceptions of inequality and unfairness are also a cause of non-payment, and a successful cost recovery system must deal with the problem of both real and imagined inequity. It is a fundamental difficulty in communal and flat rate schemes that, because there can be no distinction between the extravagant consumer and the frugal one, inequities inevitably result. The gap is comparatively modest in schemes where water must be hand carried from standpipes, but with household connections using the flat rate system the gaps can be substantial. If people feel that the rate they are paying is an average, then the frugal consumer must resent the extravagant one. This can lead to resistance to payment.

This is an important incentive to develop a consumption-based system. In some countries, the charges made in communal schemes are based on a volume basis – e.g. people pay per bucket used. The water is sold by a community member, either on behalf of the community or his or her own behalf. This system is especially useful in that it penalises non-payers, but it requires very strong social organisation to be effective. Examples include situations where the community employs a person to collect the tariff – which is a nominal charge per bucket – or a person does so as a business, and takes personal responsibility for collecting the charges, as well as paying the council. It is not inconceivable to have the fixed rate based on the number of users in the household, though we have not come across any examples of this in practice.

By way of a footnote at this juncture, there are several examples of successful cost recovery in the situation of standpipe supply, where the community appoints people to collect the charges on a monthly basis and ensure that only people who have paid are allowed to use the water. However, this poses several challenges in terms of the strength of social organisation, and the homogeneity of the community. Where it works it at least addresses the question of limited supply to payers only, if not the question of the distinction between extravagant and frugal users.

B.3.3 Administration

There are many ways in which administration can make a positive as well as negative impact on cost recovery.

Cost recovery is affected by three fundamental factors in the administrative sense. There are incentives, penalties, and convenience.

Convenience is a concept that has come late to public administration. The essential point is whether workers can pay their bills when offices which receive the cash are open only during their own working hours. The situation was often worsened by long queues, and cash offices, like banks, opening for only a portion of the working day. Where all adults in a household are working – and this is a particularly acute problem with single parents – payment of bills can

become a major obstacle, to the extent that willingness to pay is severely compromised by the hindrances in the way. For the better off this is solved by the use of cheques, direct debits and credit cards; but for the disadvantaged other arrangements are essential, such as opening cashier's offices over the week-ends and accepting payments through retail outlets.

B.3.4 Incentives

A basic incentive to encourage payment is the issuing of bills. The cost of doing so should be weighed against the benefits in the case of flat rate payments, but even there we would argue that the information contained in a bill is important, especially when a consumer gets into arrears. In that the bill shows the cumulative amount of arrears, stipulates interest and other costs, it can act as a reminder of the extent of the debt, and one would hope, create an incentive to pay.

The approach propagated by the Masakhane campaign was to use the incentive of development to a community which pays its bills. Unfortunately the connection is seen as a tenuous one, and many communities responded by turning the tables: their argument was that unless the standard of services, especially those such as refuse removal and roads, was improved the residents had no incentive to pay. This is not to say that such incentives cannot work: there are examples in which communities which pay have benefited from investment, and demonstrably have received rewards for their efforts. If this message can be communicated effectively to other communities and if the relevant authority is committed to making the investment, this approach has great importance.

There are also financial incentives. One system is to use a reduced rate for people who pay before a certain date, after which the full rate becomes payable. This can act as a simple and effective encouragement to pay promptly and pays for itself by reducing overheads incurred in dealing with defaulters.

Another method is to use a lottery or prizes. Under such a system (used by Durban Metro, among others) all those who are up to date in their payments are eligible for a monthly cash

or other prize. Widespread publicity enhances the interest and stimulates people who may be in arrears to a limited degree to catch up and so have an opportunity to win.

B.3.5 Penalties

The most important penalty is the disconnection of the water supply. Local Authorities which are also electricity suppliers usually include water and electricity on the same bill. Thus if the person is in arrears, it is the electricity which can be turned off. Some LAs do so on a Friday, so as to create the maximum inconvenience, so sending the strongest message to consumers to keep their payments up to date.

Where the LA is not the electricity provider, the problem is more difficult. Rather than cutting off water altogether (which can give rise to health problems unless there is an alternative source of supply) it is common for the LA to install a flow limiter in the pipe, instead of cutting off the water altogether. This means that the water supply is not totally cut off, but an extremely slow trickle of water is still available. This is very frustrating to the consumer.

When all other measures fail, the drastic scenario for dealing with defaulters is to use the courts to recover the debt by the sale of the house and/or contents. The process runs roughly as follows.

1. A bill is sent to the debtors.
2. If the account is not paid, the fact is recorded in the bill the following month.
3. After a certain period, say 90 days, the person is sent a letter of demand. The letter states that if payment is not received within a certain period, legal action will be taken against the debtor.
4. If no payment is received, the matter is turned over to attorneys.
5. Attorneys prepare a summons which is then issued by the court, and served by the Sheriff.
6. After the summons has been served, the debtor has only five days within which to enter an Appearance to Defend the action.

7. If no defence is entered, as is usually the case, the attorneys will lodge an application for a default judgement.
8. When judgement is granted, the Council (as creditor) issues a warrant of execution against the property, which is served by the Sheriff on the debtor.
9. The attorneys place advertisements regarding the time and place of the Sale in Execution, and describing the property, in local newspapers and the Government Gazette.
10. The property is then sold. Usually the only buyer is the Local Authority, or a bank if it had a bond on the property.

The debtor can halt the process at any time by paying the money due, though it should be noted that the amount due will include an increasing percentage of legal costs as the process develops.

There are other penalties.

In the rural areas these can include nothing worse than ostracism of those who do not pay. Traditional leaders can also indicate that they will no longer assist people who have not paid for their water.

In the urban areas, local authorities can also insist that they will not assist people whose accounts are in arrears.

B.3.6 Illegal Connections

A problem that reduces the effectiveness of many campaigns is the flouting of the law by making illegal connections and by-passing or breaking water meters. (In the case of standpipe supplies, the incentive to make illegal connections is substantial as it raises the quality of service. This is a common problem in the rural areas, but is not central to the argument here.) An essential part of enforcement is disconnecting and preventing illegal connections. Many local authorities fine householders who make illegal connections. In addition they must also pay a connection fee to obtain a legal service, plus a deposit. These

act as powerful disincentives to illegal connections, but are only as effective as the system that identifies and enforces them.

An important point in this connection is that municipalities cannot take such actions unless a legal framework exists for them to do so. This requires the formulation and proclamation of by-laws for the purpose, a field in which most municipalities lack the expertise.

B.3.7 Prepayment Meters

The use of pre-paid meters has already revolutionised the cost recovery of electricity. It has two major advantages. There are no overheads in terms of collection, court action etc; and the system is transparent for the consumer who quickly learns how much electricity costs, and how to budget for its use. Also, in some circumstances, where the cards can be bought from local retailers or similar outlets, payment becomes significantly more convenient. Pre-paid meters have also been devised for water, and it remains to be seen whether they will be sufficiently reliable. But they may offer a major breakthrough in the field of cost recovery, although they are expensive.

DISADVANTAGES Introducing pre-paid meters as a substitute for ordinary meters will undoubtedly create antagonism from consumers, unless they have genuinely consented to the idea. To obtain such consent will require careful and very effective community consultation. However, where consumers consent to their use as a trade-off whereby they obtain a higher standard of service (such as converting from standpipe supply to individual water supplies) such meters can be accepted more readily. Consumers are likely to be even more willing to accept them if the system can be shown to be cheaper than conventional ones.

B.3.8 Historical Social and Political Obstacles

While the above factors are the most important ones, it is essential to be aware of other factors which enter into any cost recovery programme.

The first and most obvious is that the majority, due to their rural origins, perceive as free, to be taken from the shared well or the river. The common view is that it is a natural product, provided by God, and that it is not fair to charge for something that costs the sellers nothing. Experience has shown that, with time and information, these perceptions can be changed: consumers can change their attitude when they realise that pipes, treatment and other components of water supply systems do cost money.

The second, and more difficult, heritage is the homeland system. Different homelands had different policies but the effect has been broadly the same. The legacy is that (a) flat rates are charged, (b) these rates are no more than a token of the cost, (c) there is no effective collection system, (d) either there are no penalties for defaulters, or penalties are not enforced.

Lastly, an important consideration, especially in the urban areas, is the legacy of the rent boycotts. By using the ability to withhold rent, service charges or bond payments, township residents demonstrated the power of their money. While this had a clear political motive, it also had distinct economic advantages for the boycotters and people quickly stopped budgeting for payments. When the time came for citizens to display greater responsibility under the new government, they did not do so. They perceived that local government was comparatively powerless if people refused to pay, and even today this perception remains in many cases. The Masakhane campaign succeeded in changing attitudes but not to the extent that the majority started to pay their dues. Negotiations with communities usually centred on whether people should pay for services when standards of delivery were low. The second point was the quantum of payment. The levels at which payments should be made to achieve full cost recovery were so much higher than people were used to that compromises were sought. As a result, negotiations resulted in conditional agreements, often entered into in good faith by leaders. But the residents did not always accept the agreement and payments were not made.

Overcoming this history is a very slow and difficult process that plays an important part in the cost recovery equation.

B.3.9 Communication and Community Involvement

The issues described above are at once complex and simple, simple in that paying for water can be understood quite easily; but complex in that the quantum includes the many factors discussed above.

Experience has shown that an understanding of the concepts by the consumers is an essential pre-condition to any successful cost recovery programme. The process used will vary depending on the level of education and sophistication of the consumers, but the end result is the same. Once this stage has been reached there is another very important step: consumers must accept the tariff as reasonable.

In the type of simple rural schemes described above, the communities are quite capable of setting their own tariffs, and frequently set them at a higher level than the minimum.

In the urban areas, however, it is much harder. Frequently the tariff is used as a political weapon, and communities feel that they have not "won" unless they have forced the Council to reduce the tariff substantially. It is submitted there that negotiations on this basis are fruitless: they make the Council the supplicant and give the community power to hold it to ransom for any minor problem. Too many cases to mention have shown that such negotiated tariffs do not achieve genuine acceptance.

B.4 Conclusions

The paper above has tried to describe the many dimensions of the issue of cost recovery. All the aspects mentioned above contribute either to the success or failure of cost recovery.

To date the experience has been very mixed and many schemes which looked promising have failed. Others have succeeded in spite of facing tremendous difficulties.

Identifying the key components of success will be difficult, but we have every hope that the study proposed will contribute to a better understanding of these matters.

B.5 Addendum: Unpacking Costs, Alternative Scenarios

There is a large range of "costs" that can be included in the concept of cost recovery. It will be useful to start with the supply part of the equation when examining the elements of cost recovery.

To begin with there are costs that cover the cost of a good consumed. In the case of water, which is our concern here, this could be based on an estimate of nothing more than maintenance costs. For example, in a rural situation, it may cover the cost of the diesel oil required by the pump to extract water from a borehole. This is a simple concept for people to understand: if they do not pay for the diesel, the pump will not work and they will have no water. Thus, for them, the specific cost to be paid by the household will be the purchase price of diesel divided by the number of households using it. If more water is used, the diesel will have to be bought more frequently and thus the household water bill will rise, and vice versa. Sometimes the funds will be raised as and when required. Therefore there will be no regular payment but rather a house-to-house levy when required.

If the pump breaks down, a mechanic must be paid to repair it. His charge will probably be based on an estimate of the number of hours he will work during the year divided into the income he would hope to earn, to which he will add a transport cost, and the overhead costs of running his service. These could include the cost of his office staff, office rent, taxes, interest on bank loans and so on. However, as far as the community is concerned the invoice the mechanic submits is the cost, although the mechanic knows that there is a big difference between the charges he makes and his marginal costs. However, as far as the community is concerned, paying of his account is payment for visible goods and services, which to the members of the community are objectively verifiable.

Still using the borehole example, the cost of drilling the borehole is also included. A community based project might start with a house to house collection and/or undertake fund-raising, and thus pay the cost up front. Again, these costs are objectively verifiable as far as the community is concerned.

The issue changes immediately when overheads are added into the cost, for instance, the cost of collection. If a community member is paid an allowance to collect the funds from house to house, this will be perceived, once more, as objectively verifiable – assuming that the allowance has been agreed in a transparent way with community participation.

However, the situation changes immediately if a so-called “cost of collection” is added by an outside party. This will typically be more than the salary of the person: it will include overheads similar to those the mechanic includes in his rates: allowances for leave, public holidays, pensions, office space, administration and supervision, record keeping, transport and more.

Furthermore, if the cost is amortised over a period of many years, the situation immediately becomes harder to communicate, even though, to a banker, the cost of the transaction is unarguable in that interest and capital repayment are paid following clearly defined practice. Clearly parallels can be drawn with other bank loans, especially mortgage bonds, though even the principles by which these are calculated are very difficult to communicate.

If, to continue with the example of the single borehole, if the original borehole is inadequate for the whole community, and an additional borehole is required, those who are to benefit from the new borehole would be asked to pay for the installation. But if the cost of the new borehole is double the cost of the first one, is it fair that the people who receive the water should have to pay so much more, when the goods and service they are receiving are identical to that provided by the first one? Would it not be fairer to pool the costs so that each member of the community has paid the same amount for the service? But if so, we may imagine the outrage that the beneficiaries of the first borehole might express.

In due course reticulation is installed. If the work is done by a contractor, the cost is objectively verifiable in terms of a lump sum which covers the contractor’s labour, materials, overheads and profit.

It is very unlikely that the community can pay for the reticulation, and therefore ways must be found for borrowing for it. The normal system is that central or local government funds

the project and recovers the debt over a period of many years. Using this logic, if debt is to be recovered over a period of fifteen years, the charge should be reduced at the end of the period. However, as soon as our charges are based on projected costs over a period of several years, it is apparent that other matters have a major influence.

The first is the question of maintenance, and charges for it. Charges are now based on provision for future in terms of funding maintenance costs, whether undertaken by the water provider or by a contractor. These charges must be based on an expected amount of work and materials and the cost of managing that service.

Secondly there are other overheads to be factored into collection, such as the cost of collection – this includes the staff at pay points, the cost of the facilities they use and all the overheads associated with employment such as pensions, supervision costs etc.

Thirdly, provision must be made for the cost of cash handling, banking and accounting.

Lastly, provision has to be made for bad debt.

The complexity of this situation makes it impossible for the charges to be objectively verifiable, and there is fruitful ground for debate about how much should legitimately be charged for any of them components of the charge.

The situation is further complicated by the question whether tariffs should be standardised. When an existing scheme is expanded, inflation will typically make the costs of the second stage more expensive. Objectively verifiable costs, as described above, would dictate that the recipients of the stage 2 development would pay more. Under this logic, the costs to be recovered from each project would be different.

While this might be practicable in isolated rural communities, in urban areas it creates many difficulties, especially in terms of equity. The same level of service would be charged for at different rates, which could lead to absurd results such as neighbours, for historical reasons, paying totally different amounts even though the service is the same. However, before

remarking that this is totally absurd, it must be noted that the practice in the housing industry is based exactly on that principle. For example, a house that is built in phase one of a project will be sold at the price prevailing at the time: a house built, for example, a year later will be sold at a different price even though the product is identical.

It has become standard practice, therefore, to charge a uniform tariff for all consumers. This further distinguishes the cost from the charge. A consumer living in a well established neighbourhood which has had no money spent on it recently will be indirectly paying for developments elsewhere in the area as annual tariff increases are introduced.

These scenarios illustrate the large number of factors that enter into the issue of establishing tariffs, the difficulty of justifying charges based on service levels, and the need, at one level, for the consumer to trust the authority making the charges.

APPENDIX C: REALISED SAMPLE OF MUNICIPALITIES

The typologies are defined in terms of the complex interaction of factors postulated as representing the range of municipalities' experiences in terms of cost recovery. All the factors included in the classification process are listed below. The typologies were derived by firstly, defining metropolitan municipalities as a class of their own (category "5"). The remaining municipalities were grouped into four equally sized relatively homogenous groups using a Kohonen artificial neural network. The four groups were arbitrarily numbered "1" through "4" giving, with the metropolitan areas, the five typologies on which the sample was based. The variables included in the neural network for the classification were:

- Province
- Population size
- Average population density
- Average income
- Proportion of households receiving piped water
- Payment rate
- Billing rate

The required data was derived from either the 1996 census or the 2001 Labour Force Survey conducted by Statistics South Africa. Once every municipality (excluding the metropolitan areas) was classified a random selection of each group was drawn to reveal the sample indicated below.

Typology "1"

1. Re A Ipela Municipality
2. Kopanong Municipality
3. Moqhaka Municipality
4. Nokeng Tsa Taemane Local Municipality
5. Buffalo City Municipality
6. Dihlabeng Municipality
7. Kungwini Local Municipality
8. Drakenstein Municipality
9. Bela-Bela Municipality
10. Gariep Municipality

Typology “2”

1. Letsemeng Municipality
2. Musina Municipality
3. Schweizer-Reneke Local Municipality
4. Tswelopele Municipality
5. Umtshezi Municipality
6. Knysna Municipality
7. Oranje-Karoo Municipality
8. Mogale City Local Municipality
9. Plettenberg Bay Municipality
10. Newcastle Municipality
11. Dipaleseng Municipality

Typology “3”

1. Aganang Municipality
2. EC132 Local Municipality
3. Thembisile Municipality
4. Mbombela Municipality
5. Ulundi Municipality
6. Greater Letaba Municipality
7. Moretele Local Municipality
8. Mkhondo Municipality
9. Blouberg Municipality
10. Greater Taung Local Municipality
11. Lephalale Municipality

Typology “4”

1. Uphongolo Municipality
2. NW374 Local Municipality
3. Mpofana Municipality
4. KZ227 Municipality
5. Rustenburg Local Municipality
6. Segonyana Local Municipality
7. Siyancuma Municipality
8. I Poort Municipality
9. Tswaing Local Municipality
10. Theewaterskloof Municipality

Typology "5" - Metropolitan areas

1. City of Johannesburg Metropolitan Municipality
2. Nelson Mandela Metropolitan Municipality
3. City of Tshwane Metropolitan Municipality
4. City of Cape Town
5. Ekurhuleni Metropolitan Municipality
6. Durban Metropolitan Unicity Municipality

APPENDIX D: INTERVIEW QUESTIONNAIRE

GENERAL INFORMATION

1. Name of primary respondent
2. Position in municipality
3. Telephone number
4. Municipality name
5. Main population centres serviced by municipality
.....
.....
.....
.....
.....
.....

(a map of each municipality has been generated. The respondent will merely have to highlight the relevant areas.)

6. Which of the following functions does the municipality perform on any significant scale? (please tick).

- | | |
|-----------------------|------------------------------|
| Water extraction | ☐ Yes |
| Water purification | ☐ Yes |
| Water storage | ☐ Yes |
| Water quality testing | ☐ Yes |

7. From which bulk supplier does the municipality buy its water from?

(Municipalities that purchase bulk water from a water board probably do not extract, purify or store water themselves).

MUNICIPAL CONSUMERS

8. Number of domestic customers (= metered+unmetered+free service)
9. Number of metered domestic customers
10. Number of unmetered or fixed rate domestic customers
11. Number of Free service customers
12. Number of non-domestic water customers (industrial firms etc.).....
13. How much potable water is the municipality currently able to distribute?
..... (please indicate unit e.g. ML and time frame)
14. Total length of mains piping kilometers

15. Over the last year has the municipality been unable to provide all the potable water required by residents?

Please tick the appropriate box:

☐ Yes

☐ No

16. IF YES: Please describe the frequency and circumstances.

17. On how many occasions in the last year have water services to any area been disrupted for more than 24 hours. (If emergency distribution measures had to be put in place this would constitute a disruption)

Please estimate.

MUNICIPAL ACCOUNTS FOR 2001/2

The following section requires extracts of information from the municipal account system for the financial year ending in 2002. The categories below coincide with the IMFO guidelines for municipal accounts. The required information should also reflect the new municipality demarcation. If this is not the case please indicate the administrative unit to which the figures refer.

Reporting year (if not 2001/2)

18. ANNUAL WATER PURCHASES and SALES (Section 8 of MFO handbook, Appendix F)

FINANCIAL YEAR ENDING

Item	1999*	2000*	2001*	2002
Volume of water bought and purified KL	-	-	-	-
Volume sold KL	-	-	-	-
Volume lost in distribution KL	-	-	-	-
Value of water bought R million				
Value of water sold R million				

* Estimates may have to be based on sales, purchases and losses under earlier demarcation.

19. **VALUE of PROPERTY, PLANT and EQUIPMENT** for year ending 30 June 2002 (Section 8 of MFO handbook Appendix B)

	Cost			Accumulated Depreciation		
	Additions	Disposals	Closing balance	Additions	Disposals	Closing balance
Infrastructure						
Sewerage mains and purification	R	R	R	R	R	R
Water mains and purification	R	R	R	R	R	R
Water reservoirs	R	R	R	R	R	R
Water meters	R	R	R	R	R	R
Water mains	R	R	R	R	R	R
Leased assets for water mains and purification	R	R	R	R	R	R
Other water related infrastructure	R	R	R	R	R	R

20. **VALUE OF TRADING ASSETS.**

SEGMENTAL ANALYSIS as at 30 June 2002 (Section 8 of MFO handbook Appendix C)

Value of assets	Balance at 30 June 2001	Expenditure 2002	Disposals 2002	Balance at 30 June 2002
Electricity	R	R	R	R
Sewerage	R	R	R	R
Water	R	R	R	R

21. **SEGMENTAL INCOME STATEMENT** for year ended 30 June 2002 (Section 8 of MFO handbook Appendix E)

Trading services	Actual income 2002	Actual Expenditure 2002
Electricity	R	R
Sewerage	R	R
Water	R	R

TECHNICAL SERVICES:

The information required here relates only to the provision of water services. This is classified as a "technical service" provided by the municipalities.

22. GENERAL INCOME: WATER

Sale of water	R.....
Reconnection fees	R.....
New connections	R.....
Grant: free basic services	R.....

23. GENERAL EXPENSES: WATER

Purchase Of Water	R.....
Water Administration	
Wages	R.....
General Expenses	R.....
Water Distribution	
Wages	R.....
General Expenses	R.....
Repairs Maintenance And Renewals	R.....
Interest	R.....
Redemption	R.....
Reserve Fund	R.....

24. Estimated full time equivalent of the number of people employed in **administration** of water accounts

25. Estimated full time equivalent of the number of people employed in **operation and maintenance** of water distribution network

26. CONSUMER DEBTORS

Service debtors: Total Rand value

Rates	R.....
Electricity	R.....
Water	R.....
Sewerage	R.....

27. DEBTORS OUTSTANDING (for water sales) AGING OF DEBTS

Consumer debtors for **water services** are usually broken into age categories reflecting how long the amounts are overdue. Please indicate how these water arrears have matured.

Longer than 90 days	R.....
61 to 90 days	R.....
31 to 60 days	R.....
up to 30 Days	R.....
TOTAL debts outstanding	R.....

28. If possible please provide the breakdown of arrears by the type of water service rendered.

Type	Total amount in arrears		
	90 days +	60-90 days	30-60 days
Domestic Metered			
Domestic Unmetered (flat rate)			
Industrial			
Commercial			

Some municipalities combine the water and electricity accounts and are unable to identify which component is in arrears. They may be unable to answer the two preceding questions. In this case a combined figure for electricity and water accounts must be provided.

29. DOES YOUR MUNICIPALITY ISSUE **CONSOLIDATED CONSUMER ACCOUNTS** THAT INCLUDE BOTH ELECTRICITY AND WATER (and possibly other services and rates)?

Please tick the appropriate box:

☐ Yes

☐ No

30. PLEASE BREAK DOWN TOTAL CONSUMER ACCOUNTS RECEIVABLE (including water, electricity, rates, sewerage, and other services) BETWEEN **CURRENT AND ARREARS DEBTORS**. (MFO handbook note 11)

Please enter the approximate Rand value of **TOTAL CONSUMER ACCOUNTS RECEIVABLE** on the lines below (estimate if necessary)

:

CURRENT DEBTORS (30 DAYS AND LESS)

R _____

ARREARS DEBTORS (BETWEEN 30 AND 60 DAYS)

R _____

ARREARS DEBTORS (60 DAYS AND LONGER)

R _____

31. DOES YOUR MUNICIPALITY HAVE **FORMALLY APPROVED CREDIT CONTROL POLICY AND PROCEDURES**?

Please tick the appropriate box:

☐ Yes

☐ No

32. WHAT IS YOUR BEST ESTIMATE OF THE PERCENTAGE OF INDIVIDUAL CONSUMERS (that is, excluding business and public-sector consumers) WHO CAN BE **EXPECTED PAY THEIR ACCOUNTS ON TIME** i.e. submit payment before they receive the next bill?

Please give your best estimate: _____ % of individual consumers

33. WHAT IS YOUR BEST ESTIMATE OF THE PERCENTAGE OF HOUSEHOLD WATER CONSUMERS (that is, excluding business and public-sector consumers) WHO ARE CHARGED A **FLAT RATE** FOR WATER?

Please give your best estimate: _____ % of individual consumers

34. WHAT IS YOUR BEST ESTIMATE OF THE PERCENTAGE OF HOUSEHOLD WATER CONSUMERS (that is, excluding business and public-sector consumers) WHO RECEIVE **PIPED WATER INSIDE THEIR HOMES**?

35. WHAT PERCENTAGE OF HOUSEHOLD CONNECTIONS CURRENTLY HAVE **VOLUME CONTROL OR FLOW RESTRICTING DEVICES ATTACHED**?

Please give your best estimate: _____ % of individual consumers.

36. WHAT PERCENTAGE OF HOUSEHOLD CONNECTIONS CURRENTLY HAVE **PRE-PAID METERS ATTACHED**?

Please give your best estimate: _____ % of individual consumers.

CHARGES FOR WATER

The next questions ask about the tariffs and charges for water.

37. WHAT WOULD THE TOTAL MONTHLY WATER BILL BE FOR A TYPICAL HOUSEHOLD CONSUMING **10 KILOLITRES PER MONTH** IN YOUR MUNICIPALITY (excluding once-off installation charges)?

Please enter the figure on the line below (estimate if necessary):

R_____ per month.

38. WHAT WOULD THE TOTAL MONTHLY WATER BILL BE FOR A TYPICAL HOUSEHOLD CONSUMING **40 KILOLITRES PER MONTH** IN YOUR MUNICIPALITY (excluding once-off installation charges)?

Please enter the figure on the line below (estimate if necessary):

R_____ per month.

39. HOW MUCH ARE **INDIGENT (VERY POOR) CONSUMERS** CHARGED FOR WATER IN YOUR MUNICIPALITY?

Please tick the most appropriate box:

- ☐ The same rates as otherwise comparable, non-indigent consumers.
☐ A subsidized or flat rate lower than the rate paid by non-indigent consumers.
☐ Nothing (no charge).

40. WHAT WOULD THE TOTAL MONTHLY BILL BE FOR AN INDUSTRY CONSUMING **1000 KILOLITRES PER MONTH** IN YOUR MUNICIPALITY (excluding once-off installation charges)?

Please enter the figure on the line below (estimate if necessary):

R_____ per month.

The next few questions focus on **PENALTIES FOR NONPAYMENT AND INCENTIVES FOR PAYMENT** in your municipality.

41. ARE CONSUMERS WHO DO NOT PAY FOR WATER PENALIZED BY **DISCONTINUING** (OR **RESTRICTING**) WATER SERVICE?

Please tick the appropriate box: ☐ Yes
☐ No

42. ARE CONSUMERS WHO DO NOT PAY FOR WATER ALSO PENALIZED BY THE **DISCONTINUATION OF OTHER SERVICES**, LIKE ELECTRICITY?

Please tick the appropriate box: ☐ Yes
☐ No

43. IF CONSUMERS WHO DO NOT PAY THEIR WATER BILLS ARE PENALIZED BY DISCONTINUING OR RESTRICTING ANY OF THEIR SERVICES, **HOW FAR ARE THEY TYPICALLY IN ARREARS** BEFORE THIS PENALTY IS USED?

Please tick the appropriate box:

☐ Between 30 and 60 days in arrears.
☐ Between 60 and 90 days in arrears.
☐ Between 90 and 120 days in arrears.
☐ More than 120 days in arrears.

44. DOES YOUR MUNICIPALITY HAVE AN ACTIVE **MASAKHANE CAMPAIGN** OR OTHER INITIATIVE THAT LINKS PAYMENT RATES TO IMPROVEMENTS IN MUNICIPAL SERVICES?

Please tick the appropriate box: ☐ Yes
☐ No

45. HOW OFTEN ARE WATER **METERS** TYPICALLY READ IN YOUR MUNICIPALITY?

Please tick the appropriate box: ☐ Monthly.
☐ Every 2 to 3 months.
☐ Irregularly.
☐ Never.

46. Is there any **PAYMENT FACILITY** (other than by post or the Internet) by which consumers can pay their water accounts outside of municipal office hours?

Please tick the appropriate box: ☐ Yes
☐ No

IF YES: PLEASE LIST THEM BELOW.

Identify the two most recent investments in WATER INFRASTRUCTURE THAT HAVE BEEN COMPLETED by the municipality (including rehabilitation of existing infrastructure). Identify only investments that have taken place in the last five years. Please provide brief information for each project on the following pages.

INVESTMENT NUMBER 1

47. Original objective of investment: verbal description. Describe and quantify the intended beneficiaries. These can be expressed in terms of the additional number of connections, increase in water pressure etc.

.....

.....

.....

.....

Describe in quantifiable terms the intended beneficiaries. These can be expressed in terms of the number of consumers, mean water pressure etc.

48. Date construction started

49. Date completed

50. Total cost of scheme R.....

51. Sources of funding for project and amounts received

Own capital.....	R.....
Private loans.....	R.....
Government grant.....	R.....
Government loan.....	R.....
DBSA loan	R.....
All other	R.....

52. Were the intended benefits of the project fully realised?

Please tick the appropriate box: ☐ Yes
☐ No

53. If NO please describe the way in which the project did not realise objectives.

.....

.....

.....

.....

(COST OVERRUNS, TERRAIN, GROUND CONDITIONS, LOCATION ETC.)

INVESTMENT NUMBER 2

54. Original objective of investment: verbal description. Describe and quantify the intended beneficiaries.
These can be expressed in terms of the additional number of connections, increase in water pressure etc.

.....

.....

.....

.....

Describe in quantifiable terms the intended beneficiaries. These can be expressed in terms of the number of consumers, mean water pressure etc.

55. Date construction started

56. Date completed

57. Total cost of scheme R.....

58. Sources of funding for project and amounts received

Own capital.....	R.....
Private loans.....	R.....
Government grant.....	R.....
Government loan.....	R.....
DBSA loan	R.....
All other	R.....

59. Were the intended benefits of the project fully realised?

Please tick the appropriate box:

☐ Yes

☐ No

60. If NO please describe the way in which the project did not realise objectives.

.....

.....

.....

.....

.....

(COST OVERRUNS, TERRAIN, GROUND CONDITIONS, LOCATION ETC.)

APPENDIX E: POSTAL QUESTIONNAIRE

GENERAL INFORMATION

1. Municipality name
2. Name of respondent
3. Post held in municipality
4. Telephone number

5. Which of the following functions does the municipality perform on a significant scale? (please tick).

- | | | |
|-----------------------|------------------------------|-----------------------------|
| Water extraction | ☐ Yes | ☐ No |
| Water purification | ☐ Yes | ☐ No |
| Water storage | ☐ Yes | ☐ No |
| Water quality testing | ☐ Yes | ☐ No |

MUNICIPAL CONSUMERS

The questions below assess the number of customers serviced. As far as domestic consumers are concerned a household is a single customer.

6. How many domestic water consumers (households) are billed on the basis of meter readings
7. Number of households billed on the basis of a fixed rate.....
8. Number of households using free basic service only.....
9. Number of households using pre-paid meters.....
10. Number of non-domestic water customers (industrial, farm etc.).....

11. HOW MUCH POTABLE WATER IS THE MUNICIPALITY CURRENTLY ABLE TO DISTRIBUTE? (please indicate unit e.g. ML and time frame)

12. WHAT PERCENTAGE OF ALL THE WATER SOLD IS CONSUMED BY NON-DOMESTIC CUSTOMERS?.....%

13. AT ANY TIME OVER THE LAST YEAR HAS THE MUNICIPALITY BEEN UNABLE TO MEET THE DEMAND FOR POTABLE WATER FROM THE CURRENT CONSUMERS? (excludes occasional service failures)

Please tick the appropriate box: ☐ Yes ☐ No

14. ON HOW MANY OCCASIONS IN THE LAST YEAR HAVE WATER SERVICES TO ANY AREA BEEN DISRUPTED FOR MORE THAN 24 HOURS. (If emergency distribution measures had to be put in place this constitutes a "disruption")

Please estimate the number of incidences.....

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Municipality Name:

Post:

Telephone:

Extract:

Purify:

Store:

Test:

Metered:

Fixed:

Free:

Prepay:

Domestic:

Potable:

Non-domestic:

Yes:

Disrupt:

Times:

POLICIES REGARDING PAYMENT

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The next few questions focus on **PENALTIES FOR NONPAYMENT AND INCENTIVES FOR PAYMENT** in your municipality.

15. WHAT IS YOUR BEST ESTIMATE OF THE PERCENTAGE OF INDIVIDUAL CONSUMERS (that is, excluding business and public-sector consumers) WHO ARE LIKELY TO **PAY THEIR ACCOUNTS ON TIME** i.e. submit payment before they receive the next bill?

Please give your best estimate: _____ % of individual consumers

pay-on-time

16. WHAT IS YOUR BEST ESTIMATE OF THE PERCENTAGE OF HOUSEHOLD WATER CONSUMERS (that is, excluding business and public-sector consumers) WHO RECEIVE **PIPED WATER INSIDE THEIR HOMES**?

Please give your best estimate: _____ % of individual consumers

in-house

17. DOES YOUR MUNICIPALITY HAVE FORMALLY APPROVED **CREDIT CONTROL POLICY AND PROCEDURES**?

Please tick the appropriate box: ☐ Yes ☐ No

credit ☐

18. ARE CONSUMERS WHO DO NOT PAY FOR WATER PENALIZED BY **DISCONTINUING** (OR RESTRICTING) THEIR WATER SERVICE?

Please tick the appropriate box: ☐ Yes ☐ No

shut-off ☐

19. ARE CONSUMERS WHO DO NOT PAY FOR WATER PENALIZED BY THE **DISCONTINUATION OF OTHER SERVICES**, LIKE ELECTRICITY?

Please tick the appropriate box: ☐ Yes ☐ No

discontinue ☐

20. IF CONSUMERS WHO DO NOT PAY THEIR WATER BILLS ARE PENALIZED BY DISCONTINUING OR RESTRICTING ANY OF THEIR SERVICES, **HOW FAR ARE THEY TYPICALLY IN ARREARS** BEFORE THIS PENALTY IS USED?

Please tick the appropriate box:

- ☐ Between 30 and 60 days in arrears.
☐ Between 60 and 90 days in arrears.
☐ Between 90 and 120 days in arrears.
☐ More than 120 days in arrears.

in-arrears ☐

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21. DOES YOUR MUNICIPALITY HAVE AN ACTIVE **MASAKHANE** CAMPAIGN OR SIMILAR INITIATIVE THAT LINKS PAYMENT RATES TO IMPROVEMENTS IN MUNICIPAL SERVICES?

Please tick the appropriate box: ☐ Yes ☐ No

Masakhane ☐

22. DOES YOUR MUNICIPALITY HAVE ACTIVE CAMPAIGNS (OTHER THAN MASAKHANE-TYPE INITIATIVES) TO GET **COMMUNITY INVOLVEMENT** IN THE DELIVERY OF OR PAYMENT FOR MUNICIPAL SERVICES?

Please tick the appropriate box: ☐ Yes ☐ No

Communitvol ☐

IF YES: PLEASE DESCRIBE THEM BRIEFLY.

catcomm ☐

23. IS THERE ANY **PAYMENT FACILITY** (OTHER THAN THE POST, INTERNET, OR BANK TRANSFERS) WITH WHICH CONSUMERS CAN PAY THEIR WATER ACCOUNTS OUTSIDE OF OFFICE HOURS?

Please tick the appropriate box: ☐ Yes ☐ No

afterhour ☐

MUNICIPAL ACCOUNTS

The following section requires extracts of information from the municipal account system for the financial year ending in 2002. These figures are routinely calculated by the Finance Officers and should be available. The categories below coincide with the IMFO guidelines for municipal accounts and relevant references in the IMFO handbook are cited for clarity.

24. Reporting year (if not 2001/2) _____

year

25. **ANNUAL WATER PURCHASES and SALES** (MFO handbook Sect. 8, Appendix F pg.31)

Item	2002
Volume of water purchased KL	
Volume of water extracted KL	
Volume sold KL	
Volume lost in distribution KL	
Value of water bought R million	
Value of water sold R million	
Value of raw water sold R million	

bolbough	
voextract	
Volsold	
Voicost	
Valbought	
Valsold	
valraw	

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Trading services	Actual income 2001/2	Actual Expenditure 2001/2
Water	R	R

10000

● 2017 年 12 月 27 日

27. **CAPITAL ACCOUNT:** VALUE of PROPERTY, PLANT and EQUIPMENT for year ending 30 June 2002. (*MFO handbook* Sect. 8, Appendix B pg.27)

	Cost			Accumulated Depreciation		
Infrastructure	Additions	Disposals	Closing balance	Additions	Disposals	Closing balance
Water mains & d purification	R	R	R	R	R	R
Water reservoirs	R	R	R	R	R	R
Water meters	R	R	R	R	R	R
Water mains	R	R	R	R	R	R
Leased assets for water mains and purification	R	R	R	R	R	R
Other water related infrastructure (includes extraction facilities)	R	R	R	R	R	R

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William A. Anderson

newCbeanc

Figure 1. A schematic diagram of the experimental setup.

merCebanc

THE F.A.C.C. BOARD

mainContentArea

mansA@alano

lease@calix

Keywords: social support; coping strategies; self-efficacy

oitrCbalenc

Other Actuals and

[illegible]

Purchase Of Water R_____

All other costs of extraction and purification R.....

COUNTRY

● 中国书画函授大学肇庆分校

29. HOW MANY PEOPLE ARE EMPLOYED IN THE ADMINISTRATION OF WATER ACCOUNTS? (give full time equivalent)

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adminstaff

--	--	--	--	--	--	--

30. HOW MANY PEOPLE ARE EMPLOYED IN THE OPERATION AND MAINTENANCE OF THE WATER DISTRIBUTION NETWORK (give full time equivalent)

O&Mstaff

--	--	--	--	--	--	--

DEBTORS OUTSTANDING and AGING OF DEBTS

31. DOES YOUR MUNICIPALITY ISSUE CONSOLIDATED CONSUMER ACCOUNTS THAT INCLUDE BOTH ELECTRICITY AND WATER (and possibly other services and rates)?

Please tick the appropriate box: ☐ Yes ☐ No

consolacc

--

32. If YES to 31 - What is the breakdown, by age, of the consolidated consumer debts for water services.

33. If NO to 31 - What is the breakdown, by age, of the consumer debts for water services.

Longer than 90 days R

61 to 90 days R

31 to 60 days R

up to 30 Days R

TOTAL debts outstanding R

L190day

--	--	--	--	--	--	--

61to90

--	--	--	--	--	--	--

31to60

--	--	--	--	--	--	--

Curent

--	--	--	--	--	--	--

total

--	--	--	--	--	--	--

Thank you for your participation
It is greatly appreciated

Other related WRC reports available:

The level of communication between communities and engineers in the provision of engineering services

P Pybus; G Schoeman; T Hart

Fundamental and central to the reconstruction and development programme (RDP), is the empowerment of beneficiaries of basic services in the development process, enabling them to make informed choices. It appears that, although a great many consulting engineers working in the field of community water supply and sanitation are paying attention to the principles of community participation, the community's level of empowerment is not as high as it ought to be. In fact, most of the training appears to be directed towards the implementation stages of the project and not to the ability to conceptualise and understand what the choices are.

The purpose of this research was to test the hypothesis above and to establish how engineering information, for example, concerning the level of service, can best be given so that the community leaders can make a decision based on sound knowledge of the technicalities of the situation.

In an analysis of the major factors that negatively affect communication between consultants (specifically engineering) and communities, it was found that the majority of factors stemmed from a lack of integrated and comprehensive project planning. A number of good reasons may be identified for this, one of which has been the traditional emphasis that this project phase is largely executed "at risk". There is a fairly natural tendency by consulting firms to minimise such "at risk" expenditure. However, the result of this is that vital questions are not asked and essential communication exercises (such as participative research and awareness creation) are not effected. The findings of this study show that:

- One of the most serious problems identified during the study relates to the fact that affordability and the willingness to pay for services are not given sufficient attention. The degree to which communities have been able to exercise informed choice about service levels and costs is related directly to their willingness to pay for services.
- A typical and common finding in all the projects is that training (the process of transferring specific functional skills and knowledge to bring a person to an agreed standard of proficiency) is seen as being synonymous with capacity-building. While extensive training had taken place, commensurate capacity-building activities related to the mobilisation of communities and the creation of community-wide awareness had not been addressed.
- The engineers tended to view the projects in mechanistic terms and neglected the human context of establishing the needs of the community first and then translating these into real terms.

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