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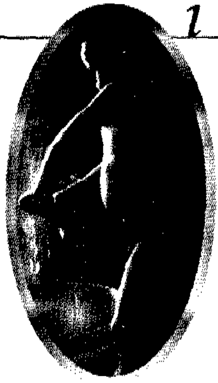
Help manual for rural water credit

# Mvula

# *index*



- *Social development dimensions*
- *Technical options*
- *Finance model*

# *Help Manual for Rural Water Credit*

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**by**

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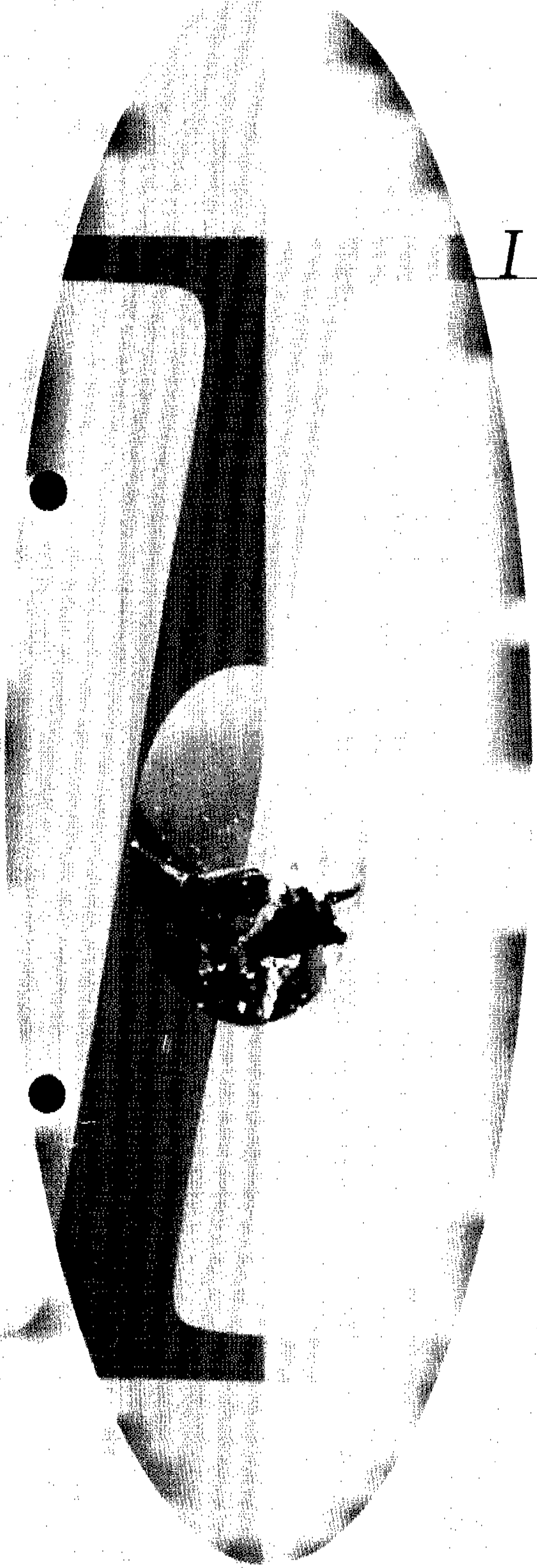
# Index



# Introduction

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*The mission of Mvula Trust
is to improve the health and
welfare of poor and disadvantaged
South Africans in rural and peri-urban
communities by increasing access to
safe and sustainable water and
sanitation services*

α

## *Background and Context*

The manual is the culmination of work done by employees of and consulting companies and individuals associated with the Mvula Trust in Johannesburg, South Africa.

The Mvula Trust is a South African NGO focusing on the provision of basic water services in five of the country's poorest provinces as well as subject-specific research concerned with the alleviation of infrastructural disparities.

Mvula Trust's mission is to improve the health and welfare of poor and disadvantaged South Africans in rural and peri-urban communities by increasing access to safe and sustainable water and sanitation services. It is an independent organisation and operates within the strategic policy framework of the government and in close co-operation and partnership with other development agencies. The Trust promotes efficient partnerships between public, private and non-governmental bodies in service improvement, with the following key functions:

- to facilitate and finance a portfolio of community water supply and sanitation projects;
- to support water and sanitation policy development affecting service access for the poor;
- to build capacity for local-level agencies;
- to promote innovative approaches to sector development;
- to disseminate information relating to the sector and to learn lessons from practical application; and to facilitate loan finance for higher levels of service.

The advent of the new political dispensation in South Africa in 1994, came with a renewed sense of urgency to address the massive backlogs in service infrastructure for previously disadvantaged South Africans. For most rural South Africans, clean water supplies are a prior ity as good access to these means other benefits such as improved health and other economic benefit spin-offs.

The delivery of basic water supplies through the Reconstruction and Development Programme (RDP) and its associated Department of Water Affairs' Community Water Supply and Sanitation Programme (CWSS) has resulted in thousands of rural households gaining access to standpipe water supplies over the last few years.

While the success of the programme has been measured through the number of communal standpipes installed, the issue of sustainability has not been adequately addressed, nor has cost recovery occurred to a significant extent. These problems have resulted in new thinking emerging in the water sector which is beginning to be addressed through a shift in government policies.

The RDP guidelines stipulate that every citizen is entitled to a basic supply defined as 25 litres per person per day, accessible at a walking distance of no more than 200 meters from the dwelling. In general, this has been a useful guideline for purposes of directing the huge water supply infrastructure roll-out programme that followed. However, experience since the onset of the RDP in 1994 has improved understanding of the problem and how best to address it in order to ensure schemes with a better chance to be sustainable. This has meant a need to change approaches accordingly. Some of the issues which exemplify the new approach include the following four principles:

1. Water supply planners and design engineers now realise that rural people cannot be regarded as being homogenous and having similar aspirations. Whilst 25l/person/day may be the guideline World Health Organisation requirement, there will always be other members of the community who will aspire for progressively more, and in a lot of cases can afford to pay for it. These people will prefer yard connections (on-site services) which will result in higher water consumption. Schemes should, therefore, be designed and built to cope with this additional supply burden.
2. A demand for on-site water provision brings to those who desire it, an obligation to pay for their portion of the infrastructure that falls outside of the scope of government obligation (the South African Bill of Rights stipulates that access to water is a basic human right). Considering the economic capacity of most rural house-

holds, on-side water provision will mean accessing loans or credit for their infrastructural upgrading. This requires a number of different levels or types of financing, namely risk-sharing or wholesale finance to supply guarantee money to retail lenders (in formal financial institutions), to grant loans to community members or committees not eligible for commercial loans, traditional savings schemes (ROCSAs, Credit Unions, etc.) whereby communities enter into collective savings schemes, borrow against these savings by using it as collateral or guarantee.

3. There is a need to consider and avail suitable technical options for the structured upgrade of older water schemes which were built to supply 25l/person/day. This should take cognisance of the fact that even in these areas there are people with higher aspirations who may legally or illegally continue to make private connections in order to get supply volumes that they may require. If this is not addressed early enough, it may jeopardise the supply integrity of the entire scheme resulting in other areas without water during times of peak demand such as the early morning and the late afternoons.

4. Operations and maintenance (O&M) considerations need to come out in the fore as there is now a greater need than ever before to ensure that sufficient capacity exists locally to operate and maintain water schemes. The local communities also need to be adequately trained on the need for O&M training as well as the costs associated with these activities. Cost recovery has, therefore, become an integral consideration for design engineers and water supply planners who in evaluating options for either upgrading existing schemes or implementing new schemes now have to provide for yard connections and higher levels of services.

The above context encouraged the Mvula Trust to start investigating ways of meeting the demand for higher levels of water provision services through a loan finance initiative as the calls for higher levels of service from various communities were becoming increasingly evident. In some areas, people rejected the RDP standard communal standpipes in favour of waiting for household connections; and in others unauthorised connections were being made, without consideration being given to the capacity of the resource or the sustainability of the system.

Since it was clear that funding upgraded (on-site) water services was not part of government planning, and the private sector was not getting involved because of high repayment risk associated with the rural poor, an innovative approach needed to be investigated to meet the growing demand for upgraded water service.

The Loan Finance Facilitation Programme was launched by the Trust in 1997 and the programme hinges on the following two complementary objectives:

- To provide policy-makers with a range of innovative financial, technical and institutional options that could be used in the implementation of higher service level projects across the country, and
- To assist communities directly in accessing loan finance for provision of services at better-than-basic levels.

## Acknowledgements

The Social Survey questionnaire was adapted from work done by Michael Goldblatt (University of the Witwatersrand); the survey descriptions were adapted by Sue Elsey (University of the Witwatersrand), the Financial Models were developed by Bee Thompson of the Palmer Development Group in South Africa; the cover design separator sheets and graphics were designed by Joanne Matuszak from the Technikon Witwatersrand, and Lylle Hebbes, Johannesburg, and the technical options information was supplied by Cecil Chibi, a consultant engineer with Mvula Trust. We are grateful to these organisations and individuals for their input.

Funding for the research, compilation and production of the *Help Manual for Rural Water Credit* was obtained from the European Union/NGO Fund.

The *Help Manual for Rural Water Credit* was researched, compiled and written by Minnie Venter-Hildebrand, Programme Manager at the Mvula Trust.

## *The Components to this Help Manual*

The manual consists of four components, all independently applicable but taken as a collective, all dependent on one-another. The components are:

1. Contingent Valuation Methodology Survey
2. Technical Options
3. Financial Models
4. Programme and spreadsheet disk

The first two components, namely the Social Survey and Technical Options feed into the Financial Models, which in turn is dependent on the computer programme supplied with the manual.

This manual is intended as a guideline and help for planners and informal financial institutions exploring the possibilities of providing credit to poor, rural households wanting to purchase the secondary infrastructure for on-site (higher levels) water services.

It aims to assist informal finance institutions to minimise their administrative costs in assessing the viability of the prospective loans and their credit risk by using the financial model in Chapter 3 to calculate the potential annual deficit or profit, taking into account the willingness and capacity of their potential client or clients, to pay.

Planners will find the manual useful in the setting of water tariffs, using the defaults provided or inputting their own costings and in estimating the capacity of households to afford on-site services, thus planning for adequate infrastructural provision.

The computer programme for the Financial Model supplied as part of the manual gives two different calculation options regarding the information derived from the Social Surveys. The defaults used as a calculation option were reached through surveying 1,200 rural households in the four poorest of South Africa's nine provinces. The model makes provision for the defaults to be substituted.

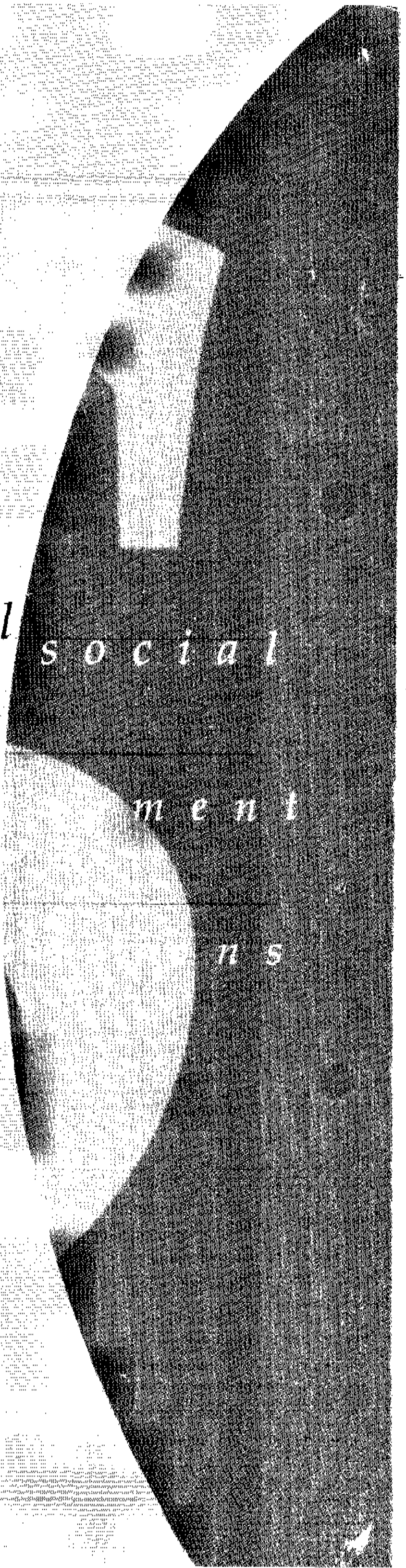
As the Social Surveys are expensive to conduct, and in the light of diminishing grant funding for research, areas or countries already in possession of data should utilise their own information. The objective of including the Social Surveys in the *Help Manual for Rural Water Credit* is to assist organisations and institutions in areas where the information does not exist and where research capacity (financial and human) is low.

The spreadsheets supplied in both the Social Survey and the Financial Model chapters should serve as examples only and the templates contained in the computer disk should be utilised for the analysis.

The chapter on Technical Options gives a rather broad overview of on-site (higher levels) water services. It is by no means meant as a blue-print for application globally, but reflects the options and costs currently under scrutiny by South African organisations and government departments concerned with these issues. It also assumes that the flat-rate system currently used by some communities may not be a fair or ideal cost recovery system. Under prevailing South African conditions, it is, however, broadly applied to suit indigenous circumstances, which include a lack of a more sophisticated revenue collection infrastructure capacity.

The *Help Manual for Rural Water Credit* is deliberately produced as an easy-to-use, loose-leaf booklet so that out-of-date or country-specific information can be substituted for more current data if and when it becomes available. As the programme progresses, other financial options as well as a training component, will be added. It is recommended that recipients of the volume without **the savings-investment model and the training component,** contact the Mvula Trust for the updated editions.

# *social development dimensions*



# *Methodology of Local Level Demand Analysis*

This Section describes a method for estimating the effective demand for household connections (on-site water services). The method is used to develop a market analysis that contributes to a greater understanding of the willingness and ability of poor rural residents to pay for improved water services. This micro-level understanding provides an opportunity for informal financial institutions to assess the market for their loan products, that may arise out of a demand for higher services in the water sector.

The methodological approach falls within the broad category of contingent valuation (CV) surveys, with the core of the research being a household CV survey which aims to elicit information from respondents on what they would be willing to pay for the hypothetical situation of improved water services to their households. CV studies have been used successfully in a number of developing countries to ascertain consumer demand for improved water services and therefore to assist in the planning of water delivery systems.

The rationale of the contingent valuation approach is to estimate consumer demand for improved services that is being increasingly used to estimate the benefits of goods that do not have an easily identifiable market prices, such as environmental improvements and other public goods. A CV estimation differs from surveys which assess opinion or attitudes in that it measures the contingent valuation of respondents (such if "this" happens, what would you be willing to pay?).

The method of conducting a CV survey is to use a bidding procedure to arrive at a value of willingness to pay (WTP) within a confined range. Respondents are generally asked whether they would be prepared to "purchase" a particular level of services at a range of prices. These bids are often asked in a sequence converging from the two extremes being tested.

**Example:** A respondent would be asked whether s/he would want to connect to a piped household water supply if the monthly water was (in the order of questions asked) R100, R10, R90, R20, R80, R30, R70, R40, R60, R50, per 25 litres provided. The responses would fall within a R10 range because a respondent may wish to connect at R30 but would not wish to connect at R40. Thus s/he may want to connect at any point between these two values, although s/he is not offered these prices (e.g. R37). Thus the bid is actually for between R30 and R40 (but not including R40).

## Critiques and defences of CV studies

Three methodological critiques can be levelled at CV when it is applied to hypothetical markets for utility services. All are based on concerns that respondents may not answer willingness-to-pay questions accurately and thus not reveal their 'true' willingness to pay. The possibilities are that:

- respondents believe that they can influence a policy decision by not answering the interview question truthfully – a strategic bias;
- the question format may itself influence the bid, and that respondents may give answers to please the interviewer and interpret the initial price suggested as a clue to the correct bid – starting-point bias;
- individuals may not understand the description of the goods or service being hypothetically offered or may simply not take the hypothetical question seriously at all – hypothetical bias.

## How to minimise biases

**Strategic bias** can be minimised by phrasing questions in such a way as to clearly indicate that responses will not affect the decision-making process or by dividing respondents into two groups who are set a different question. The groups can be compared to evaluate whether strategic bias has significantly altered responses. It can also be minimised by giving respondents no advance warning of the survey to avoid the change of strategically considered answers.

**Starting-point bias** can be similarly tested for, by using both a high and low starting bid approach and testing for bias based on the starting point.

**Hypothetical bias** can be reduced and assessed by using well trained enumerators familiar with the community and by pre-testing the questionnaire for clarity.

The reliability of the bids can be tested as follows:

- considering how many respondents refused to answer the survey questions or gave wildly unrealistic answers;
- comparing bids with payments for already existing services, such as electricity; and
- assessing whether bids are influenced by households' socio-economic characteristics in a way that is in accordance with economic theory

# Questionnaire structure

The household interviews are conducted on the basis of a formal interview procedure by means of a questionnaire divided into four parts. The first two parts deal with basic socio-economic aspects of the household.

**Section 1**: deals with demographic data; these include a description of the respondent's accommodation, the household's size and structure, employment status, and education levels of the household.

**Section 2:** deals with household wealth, income and expenditure. Households will be asked direct questions concerning the levels of household income and expenditure. Given the frequent problems associated with attempts to collect reliable data on household income, an additional procedure will be used to gather this information. The objective in doing this is to develop a suitable proxy for household income and wealth.

**Section 3:** deals with general services and the respondent's attitudes towards them. Questions will be asked as to which new service is needed most – from a list including housing, electricity, water, sanitation, schools, clinics and roads and which service is the next most important.

**Section 4:** specifically examines household water use practices. This includes questions to ascertain where households currently obtain their water, how far away it is, how much water households use and how much is paid by users for water. This section also consists of highly structured questions aimed at establishing what households are willing to pay for improved water supplies.

The focus of the interview in this final section is on the estimation of the household's WTP for water. This will be done using two methods: the 'bidding game' in which respondents are asked what they would be willing to pay, in specified increments, for a specified amount of water supplied through a metered household connection. The second method is a simplified bidding process plus an open bid aimed at ascertaining the total monthly amounts that households would be willing to spend on an improved water supply.

## Section 1: Demographics

| | | |
|---|---|---|
| 1 | **How many people are permanently resident in the household?** | Adults:<br>Children (<18): |

| | | |
|---|---|---|
| 2 | **How many members of the household live and work away from home for most of the year?** | Migrant workers: |

| | | |
|---|---|---|
| 3 | **How old are you?** | Age: |

**4 What is the highest level of education you and your spouse have achieved?**

| Level of Education | Respondent | Spouse |
|---|---|---|
| None | 1 | 1 |
| Up to Std 2 | 2 | 2 |
| Std 3 - Std 5 | 3 | 3 |
| Std 6 - Std 8 | 4 | 4 |
| Std 9 - Std 10 | 5 | 5 |
| Post secondary school | 6 | 6 |

| | | | |
|---|---|---|---|
| 5 | **What is the gender of the respondent?** | Male | Female |

**6** **What is your and your spouse's current employment status?**

| Employment status | Respon-dent | Spouse |
|---|---|---|
| Formally employed (e.g. regular salary; Tax registered) | 1 | 1 |
| Unemployed looking for work | 2 | 2 |
| Stay at home by choice | 3 | 3 |
| Retired with pension fund | 4 | 4 |
| Retired without pension fund | 5 | 5 |
| Too ill to work- no disability grant | 6 | 6 |
| Too ill to work- has disability grant | 7 | 7 |
| Informally or self-employed | 8 | 8 |
| Studying full-time | 9 | 9 |

| | |
|---|---|
| **7** **For how many years have you worked in your current job?** | Years: |

**8** **What type of work do you do in your current job?** (Please tick ✓)

| | Respon-dent | Spouse |
|---|---|---|
| Teacher | 1 | 1 |
| Police | 2 | 2 |
| Clerical / sales | 3 | 3 |
| Transport (taxi, bus driver) | 4 | 4 |

| | | |
|---|---|---|
| Tribal Authority | 5 | 5 |
| Shop owner | 6 | 6 |
| Production / mining | 7 | 7 |
| Builder | 8 | 8 |
| Other (please specify) | 9 | 9 |

| | | |
|---|---|---|
| 9 **Do you intend to live in this community permanently?** | Yes = 1 | No = 2 |

**IF YES no question 9 (respondent intends leaving):**

| 10 **Where do you intend moving to?** (Please tick ✓) | |
|---|---|
| Nearby town or township | 1 |
| Large city (e.g. Durban, Johannesburg, etc.) | 2 |
| Another rural village | 3 |
| Other | 4 |

## Section 2: Wealth, Income & Expenditure

| | |
|---|---|
| 1 **How many separate dwellings are there in the household?** | Dwelling |

| | |
|---|---|
| 2 **How many rooms in the MAIN living quarters?** | Rooms |

| 3 | **Does the main living quarters have the following:** (yes=1, no=2) | | |
|---|---|---|---|
| | A metal or tile roof? | Yes = 1 | No = 2 |
| | Cement blocks or bricks? | Yes = 1 | No = 2 |

| 4 | **Does anyone in your household have any of the following:** | Yes = 1 | No = 2 |
|---|---|---|---|
| | Radio | | |
| | Watch | | |
| | Bicycle | | |
| | Torch | | |
| | Kitchen cabinet | | |
| | Sofa / Lounge Suite | | |
| | Gas / Wood or Coal stove | | |
| | Hi-fi | | |
| | Generator | | |
| | Fridge / freezer | | |
| | Television | | |
| | Vehicle (car or bakkie) | | |

| 5 | **How many EARNERS are there in this household?** | |
|---|---|---|

| 6 | What MONTHLY income does your household receive? | | | | |
|---|---|---|---|---|---|
| | **Income Source** | **Respon-dent** | **Spouse** | **Other** | **Total** |
| | Salary (take home) | | | | |
| | Income from informal or self employment | | | | |
| | Pensions | | | | |
| | Disability grants | | | | |
| | Remittances from family members | | | | |
| | Other (specify) | | | | |

| 7 | How much did your household spend on the following items last month? | |
|---|---|---|
| | Bus, taxi fares | |
| | Food (excluding paraffin) | |
| | Paraffin, gas, coal and wood | |
| | Medicine, hospital, herbalist fees | |
| | Church contribution | |
| | Alcohol, tobacco and cigarettes | |
| | Rent or loan repayment | |
| | Water tariff | |
| | Hire purchase instalments for furniture | |
| | Hire purchase instalments for appliances (TV, fridge, etc.) | |
| | Hire purchase instalments for vehicles; petrol, diesel | |
| | Insurance Policies | |
| | School fees | |
| | Stokvel and / or burial society contributions | |
| | Savings in a Building Society or Bank Account | |
| | TOTAL | |

| 8 | **Which ONE of the following services do you need the MOST?** | |
|---|---|---|
| | Yard Tap | 1 |
| | Toilet | 2 |
| | Schools | 3 |
| | Housing | 4 |
| | Clinic | 5 |
| | Electricity | 6 |
| | Telephone | 7 |
| | Street lights | 8 |
| | Roads | 9 |
| | Other (specify) | 10 |

| 9 | **Which ONE of the following services is the NEXT MOST important to you?** | |
|---|---|---|
| | Yard Tap | 1 |
| | Toilet | 2 |
| | Schools | 3 |
| | Housing | 4 |
| | Clinic | 5 |
| | Electricity | 6 |
| | Telephone | 7 |
| | Street lights | 8 |
| | Roads | 9 |
| | Other (specify) | 10 |

| | | | |
|---|---|---|---|
| 10 | **Are you willing to pay for services such as water, electricity, etc.?** | Yes = 1 | No = 2 |

## Section 3: Water Use

1

| **How much water does your household now use in a day?** | | | |
|---|---|---|---|
| Capacity (in litres) of the containers used to carry water | Number of containers used in a NORMAL day | Total amount of water used in a NORMAL day: | Weekly total (add up) |
| 1. | 2. | 3. | 4. |

| | | |
|---|---|---|
| 2 | **How much water did your household use in a normal day BEFORE the water project?** | |

| | | |
|---|---|---|
| 3 | **WHERE are your household's clothes washed?** (River, tapstand, or house?) | |

| | | |
|---|---|---|
| 4 | **How OFTEN is clothes washing done in a month?** | |

| | | |
|---|---|---|
| 5 | **How much water is used each time for clothes washing?** | |

| | | | |
|---|---|---|---|
| 6 | **Have you been paying water TARIFF?** | Yes=1 | No=2 |

| | | |
|---|---|---|
| 7 | **How much have you paid for water in the last 6 months?** | |
| 8 | **How many TRIPS are made per day to fetch water?** | |
| 9 | **How LONG does each trip take?** | |
| 10 | **How long do you have to WAIT at the tapstand?** | |

## Section 4: Yard Connections

The (PUT IN PROJECT AGENT NAME) Mvula Trust has provided communal tapstands in [PUT IN PROJECT NAME] which are operated by the Water Committee based on monthly household water tariffs. If a household is willing and able to pay, there is now the possibility of obtaining yard connections.

| | | | |
|---|---|---|---|
| 1 | **Are you interested in obtaining a yard connection?** | Yes = 1 | No = 2 |

The cost of a yard connection fee will depend on how many households want to be connected. Would you want to be connected if the minimum deposit cost:

| | | | |
|---|---|---|---|
| 2 | **R300 for deposit?** | Yes = 1 | No = 2 |

If YES, then go to question #3. If NO, then go to Question # 4.

| | | | |
|---|---|---|---|
| 3 | **R400 for deposit?** | Yes = 1 | No = 2 |

Go to Question #5.

| | | | |
|---|---|---|---|
| 4 | **R250 for deposit?** | Yes = 1 | No = 2 |
| | **R200 for deposit?** | Yes = 1 | No = 2 |
| | **R150 for deposit?** | Yes = 1 | No = 2 |
| | **R100 for deposit?** | Yes = 1 | No = 2 |
| | **R50 for deposit?** | Yes = 1 | No = 2 |

The total cost of a yard connection fee will depend on how many households want to be connected. Would you want to be connected if the total connection fee cost:

| | | | |
|---|---|---|---|
| 5 | **R1000 for connection fee?** | Yes = 1 | No = 2 |

If YES, then go to question #6. If NO, then go to Question #7.

| | | | |
|---|---|---|---|
| 6 | **R1100 for connection fee?** | Yes = 1 | No = 2 |

Go to Question #8.

| | | | |
|---|---|---|---|
| 7 | **R900 for connection fee?** | Yes = 1 | No = 2 |
| | **R850 for connection fee?** | Yes = 1 | No = 2 |
| | **R800 for connection fee?** | Yes = 1 | No = 2 |
| | **R750 for connection fee?** | Yes = 1 | No = 2 |
| | **R700 for connection fee?** | Yes = 1 | No = 2 |

| 8 | **If the yard connection fee is between R800 - R1000, would you prefer to pay up front or pay in instalments?** (Please tick ✓) | |
|---|---|---|
| | Not interested in yard connection | |
| | Pay up front | |
| | Monthly instalments | |

| 9 | **If you would prefer to make instalment payments on a loan for your connection fee, how much would you prefer your monthly instalment to be?** (Please tick ✓) | |
|---|---|---|
| | R200 per month | |
| | R150 per month | |
| | R100 per month | |
| | R75 per month | |
| | R50 per month | |
| | R25 per month | |

If you could purchase a yard connection with water being metered and paid for according to how much you use, then would you want to be connected if water cost:

| 10 | **R0.40 per 25 litres?** | Yes = 1 | No = 2 |
|---|---|---|---|

If YES, then GO TO Question #11. If NO, then GO TO Question # 13.

| 11 | **R0.80 per 25 litres?** | Yes = 1 | No = 2 |
|---|---|---|---|

If YES, then GO TO Question #14. If NO, then GO TO Question # 12.

| 12 | **R0.60 per 25 litres?** | Yes = 1 | No = 2 |
|---|---|---|---|

Go to Question #14.

| | | | |
|---|---|---|---|
| 13 | **R0.30 per 25 litres?** | Yes = 1 | No = 2 |
| | **R0.20 per 25 litres?** | Yes = 1 | No = 2 |
| | **R0.10 per 25 litres?** | Yes = 1 | No = 2 |
| | **R0.05 per 25 litres?** | Yes = 1 | No = 2 |
| | **R0.03 per 25 litres?** | Yes = 1 | No = 2 |

| | | |
|---|---|---|
| 14 | **Are you willing to pay for a yard connection AND pay more money each month for the water in order to have a tap in your yard OR would you prefer to collect water from a communal standpipe?** | |
| | Yes | 1 |
| | No | 2 |
| | Don't know | 3 |

| | | |
|---|---|---|
| 15 | **What is the maximum you could pay each month to have a water tap in your yard?** | |

## *Data Capturing Methodology*

Once the data has been collected through the questionnaires, the information needs to be disaggregated into a format whereby an analysis can be made and conclusions drawn.

Templates have been constructed to assist in this process and examples can be seen at the end of this information handbook. The templates allow for a simple input and output process. Comparative data can be systematically taken from the questionnaires and captured into the templates provided in the correct order. The inputs required are simplistic and allow consistency in the data capturing process and therefore provide comparable data for the analysis process.

The following section provides a step by step guide on how to extract the data from the completed questionnaires in a consistent manner in order to assess, firstly, the basic socio-economic aspects of the households involved (Sections 1 and 2 of the questionnaires) and secondly, to consider the households' willingness and capacity to pay for water.(Sections 3 & 4)

The templates have been formatted to deal with the responses in the following order and according to the prominent sections of questions:

The **Main** template provides a description of the layout of the templates and the labelled regions of the input tables. 10 templates have been formulated, 5 for the input process and 5 for the corresponding output analysis.

The templates have been labelled as follows, clearly relating to specific sections of the questionnaire:

| **Inputs** | | **Outputs** | |
|---|---|---|---|
| 1.Demographics | (Sec.1.Q. 1-10) | 1A. | Demographics Out |
| 2.Appliances | (Sec.2.Q. 1-4) | 2A. | Appliances Out |
| 3.IncExp | (Sec.2.Q. 5-10) | 3A. | IncExp Out |
| 4.WaterUse | (Sec. 3.Q. 1-10) | 4A. | WaterUse Out |
| 5.Yard | (Sec.4.Q. 1-15) | 5A. | Yard Out |

The top horizontal row in the templates relates to the questions asked in each section. The first two columns refer to the respondent number and the area in which the questionnaire was carried out, respectively. Once these have been filled in on the first template they remain the same for the consecutive templates and can not be altered as the cells become locked.

It is a good idea to manually number all the completed questionnaires before capturing data. This ensures the extracted data from each questionnaire remains in the correct order for each template. This is vital to ensure the data for each section, corresponds to the same questionnaire and allows true comparisons and clearer analysis and explanations of responses for individual questionnaires.

A key consideration for completing the templates is to ensure a consistency in inputs at all times. It is hoped the following points will assist in attaining a consistency. *However, the analyst must be constantly aware of anomalies in the responses given and make notes of where and possibly why these occur to improve the quality of the analysis.*

## General Considerations for inputting data

Once the questionnaires have been manually numbered, it is possible to then input them in order into the first template. Column A refers to the respondent number, while columns B and C refer to the questionnaire number and the area respectively. These will remain locked for the subsequent templates and therefore must be captured correctly.

Rows 1 and 2 relate to the question number and a brief description of the question posed. Again these rows have been locked and can not be altered. Several columns in the templates are also locked with calculations hidden within them which operate as the data is captured. (For example Column D in the Demographics template.)

The input requirements for the templates are very straightforward and self-explanatory. Simply fill in the correct amounts in the respective columns according to the responses given. It is important to frequently double check that the response relates to the correct column by referring to both rows 1 and 2.

Where a response has been circled or ticked simply fill in the correct number as indicated. (For example for question 4 of section 1, if the respondent has received no education but their spouse was educated to Std 10, the completed respective columns (J and K) would read 1 and 5.)

As a matter of consistency throughout the completion of the templates, the following inputs are required:

| | |
|---|---|
| YES | 1 |
| NO | 2 |
| Male | 1 |
| Female | 2 |

Where the respondent does not know the answer | N/K |

## Template 1: Demographics

Where there is no spouse (Qs. J & M)

or the question does not require an answer (Q. Q) | |

Where there are no migrants

or no years worked in respondent's present job - | 0 |

Throughout the data capturing process it is valuable for the analyst to consider any anomalies that occur in the responses provided. This section of the questionnaire allows for this in several areas. For example, questions 6,7 and 8 allow for a level of cross-checking to ensure the respondent provides the full truth of their employment. (This can also be verified later on in the data capturing process when considering the respondent's source(s) of income. (Section 2, questions 5 and 6.) It is worth highlighting any discrepancies whilst completing the templates to assist the subsequent analysis and to verify the value of the response in terms of maintaining a true and relevant picture for the overall investigation. Issues over truthful responses here may cast doubt over the subsequent responses in the second part of the questionnaire referring to the willingness and capacity to pay for water.

## Template 2: Appliances

**Question 3:**

| | |
|---|---|
| If the main living quarters has a metal or tile roof (i.e. Yes) - | 1 |
| If the main living quarters does not have a metal or tile roof (i.e. No) | 2 |
| If the main living quarters are non-mud walls (i.e. cement/ bricks) | 1 |
| If the main living quarters are mud walls (i.e. not cement/ bricks) - | 2 |
| If the respondent does possess one of the stated appliances | 1 |
| If the respondent does not have one of the stated appliances | 2 |
| (No answer given - assume no - (2)) | 2 |

## Template 3: Income Expenditure

When completing columns E - J ensure the ***totals*** provided in question 6, section 2 are captured. That is; the total salary; informal income; pensions; disability grants; remittances and "other" sources of income from the respondent, spouse and other income providers are added up. It may be wise to double check the totals already provided. Column K will automatically provide the total income for each household.

Again, it is important to refer back to the responses provided in template 1, in terms of the employment identified by the respondent for themselves and their spouse. It may be apparent that informal incomes are not noted in the first part of the questionnaire.

In completing columns L - Z ensure to insert the correct amount provided. Also be aware of the fact that often the responses may be given in terms of totals for the whole year, although the question requires a monthly figure. As such the analyst should calculate the monthly figure from the response provided. This is frequently the case with column X, referring to expenditure on school fees. The interviewer should indicate on relevant questionnaires, the figure provided as a yearly total, otherwise discretion is required in inputting the results to ensure the output is not severely skewed.

## Template 4: Water Use

In completing columns C - F, in answering question 1 (section 3), some cross checking of calculations may be required to ensure the correct figure is captured in the template.

### Column 1.1

| | |
|---|---|
| State the capacity of the container(s) used to carry water | e.g. 25 |
| If two capacities are noted (i.e. different sized containers are used state both values | e.g.120/25 |

### Column 1.2

| | |
|---|---|
| State the number of containers used in a normal day e.g. 6 Where two capacities have been noted, state the number used for each container size in the same respective order as column 1.1 | e.g. 1/ 5 |

### Column 1.3

| | |
|---|---|
| Total the amount of water carried in all the containers used in | e.g. 245 |

one day to state the total amount of water used during a normal day.

**Column 1.4**

Calculate the daily total by 7, to identify the average weekly amount of water used. e.g. 1715

For the subsequent questions in this template, complete the columns according to the responses given in each completed questionnaire.

Note question 4, column I, refers to the frequency of clothes washing in one month, so responses may require interpretation according to the following:

| | |
|---|---|
| Washed every day | DAILY |
| Washed Weekly/ 4 times a month | WEEKLY |
| Washed twice a week/ 8 times a month - | 2WEEKLY |
| Washed 3 times a week/ 12 times a month - | 3WEEKLY |

To complete columns M and N, (questions 9 and 10, section 3) referring to the length of trips and time generally waited at communal taps etc., ensure to include the relevant measurements for each section of data,

Length of each trip to fetch water? e.g. 2km / 20m

Length of time at the tapstand? e.g. 10mins / 3hrs

## Template 5: Yard Connections

This section is slightly more complicated in terms of inputs for the template. Although the responses on the completed questions are largely either yes (1) or no (2), a certain level of interpretation has to take place to enable the template to be more valuable in terms of its outputs.

Only columns D and J (questions 1 and 14) require the analyst to input either 1 or 2 into the template. The remaining cells in the template require a figure to be inserted in response to the relevant questions, except column G (question 8) where the following response are required:

| | |
|---|---|
| If the respondent is **not interested** in a yard connection | 1 |
| If the respondent would like to pay the yard connection fee **Upfront** | 2 |
| If the respondent would like to pay the yard connection fee in **Instalments** | 3 |

If the respondent is not interested in obtaining a yard tap (question 1, section 4) then the majority of the questions will not be answered, therefore a gap should be left in the relevant cells.

In terms of identifying the maximum the respondent would pay for ***a deposit for a yard connection*** (column E, questions 2 - 4), fill in the response where the ***maximum*** deposit was noted.

The same is required for the groups of questions on ***the total connection fee cost*** (column F, questions 5 - 7) and the ***cost of metered water per 25 litres*** (column I, questions 10 - 13). It is important to include the maximum willingness to pay to indicate the maximum range at which the respondents find acceptable.

# Analysis: Contingent Valuation Methodology

## Introduction

To analyse the data, the templates provided must be considered in order and cross-analysed with each other. It is important to ensure the output templates have correctly completed the quantitative data analysis within the tables. If the output templates appear incomplete or have not produced interpretable data check the inputs are correct with reference to the previous section.

Once the quantitative data has been captured correctly, the first stage of the analysis is to identify the sample size taken in relation to the community size under investigation. That is to identify the percentage of the community surveyed.

Secondly, it is important to highlight any pertinent issues relating to how/ where the survey was undertaken. For example, was it necessary to hold a community meeting to inform people of the aims of the survey and to alleviate fears or mistrusts of the interviewers or the outcomes of the survey. Such information can be received from the social researchers themselves in the form of qualitative data.

The output templates should be taken and analysed in order and according to the questions they relate to. However, clearly the responses require cross-checking for accuracy in responses provided and also for purposes of cross-analysis for comparative considerations over certain issues and factors. The following points could be used as an indication of what the output templates indicate and where cross-checking/ analysis could take place in order to consider the direct and indirect implications on capacity and willingness to pay for water. This needs to be done after each section has been completed.

Throughout the analysis process the analyst should keep in mind the points noted during the data capturing procedure. For example, where contradictions occurred and anomalies in either whole or part data sets received from each are under investigation.

## Template 1A: Demographics Out (Sec 1: Demographics)

**Table 1.1 (Q.1) - Average number of people permanently resident in the household.**

Identify the differences between adults and children, as well as the overall average. This has implications on the amount of water expected to be consumed. Comparable with data on Template 4.

*Cross Check: 4.1/ 4.2*

**Table 1.2 (Q.2) - Average number of migrants in the household.**

Implications again relate to amount of water expected to be consumed in the household.

*Cross Check: 3.1/ 4.2*

Also relates to expected income sources and therefore capacity to pay.

*Cross Check: 1.6/ 3.3/ 3.4*

**Table 1.3 (Q.3) - Average Age of Respondent.**

This indicates the ability of the respondent to work and therefore access to either formal or informal income or access to a monthly pension.

*Cross Check: 1.6*

**Table: 1.4 (Q.4) - Level of education of the respondent and spouse.**

Indicates potential employment type and therefore employment security which indicates the source and security of income which in turn highlights the capacity to pay for water, either in monthly instalments or one payment.

*Cross Check: 1.6/ 1.8/ 3.3/ 3.4/ 5.2/ 5.3/ 5.5 5.6*

**Table: 1.5 (Q.5) - Gender of respondent.**

This may influence the response provided i.t.o. the respondents knowledge of spouse's education/employment/income level.

*Cross Check: 1.4/ 1.6/ 1.8/ 1.9/ 3.2/ 3.3/ 3.4/ 3.5*

- May influence the knowledge of time budgets/ distances to water sources etc. and also knowledge of daily/ weekly water budgets.

*Cross Check: 4.1/ 4.2/ 4.3/ 4.4*

**Table: 1.6 (Q.6) - Employment Status of respondent and spouse.**

It is important to get all the information correctly here - therefore compare with stated income sources in Template 3, often unwillingness to declare informal income sources. Also check with number of people in the house (adults and children) to discover who supplies household income. (Possibly gendered roles)

*Cross Check: 1.3/ 1.4/ 1.5/ 1.8*

**Table: 1.7 (Q.7) - Number of years in current job.**

- This indicates the job security of the respondent and therefore ability to pay for water in the future. However, consider the age of the respondent and possibly relate this to the education level obtained. Consider the range of years in employment as well, not just the average - it maybe skewed by certain respondents.

*Cross Check: 1.3/ 1.4*

**Table: 1.8 (Q.8) - Type of work carried out by the respondent.**

Need to be clear on the type of work undertaken to indicate the job security and to correlate the income sources and future capacity to pay for water. It is very important to consider the contents of the 'other' category -- considered in the data capturing process as the analyst needs to know what other employment is undertaken. Very often respondents who are informally employed do not recognise the formal categories of work types and include themselves in the other category even though they maybe informal shop owners or informal builders. Clarification of the outputs is required in the analysis process.

*Cross Check: 1.8/ 3.2*

**Table: 1.9 (Q. 9/10) - Staying in the Community.**

**(Table: 1.10) People moving out of the Community.**

This indicates the stability of the respondent in terms of their future commitments to repaying water installations and making monthly instalments. Consider the age of the respondents as well in conjunction with this as often it may be assumed the elderly are less likely to migrate.

*Cross Check: 1.3*

## Template 2A: Appliances Out (Section 2: Wealth, Income and Expenditure)

**Table: 2.1 (Q.1) - Number of separate dwellings.**

This indicates the size and capacity of the house and therefore the potential for a larger number of people requiring more water in the future and the water construction serving a certain group of people.

*Cross Check: 1.1/ 1.2*

**Table: 2.2 (Q.2) - The size of the main living quarters.**

Again this indicates the potential for the household size to increase in the future and also indicates a suitable water system for the household, if they agree to the payment requirements.

**Table: 2.3 (Q.3) - The structure of the roof/ walls of the dwelling.**

This indicates the capacity of the dwelling to support and incorporate certain water systems if they were to be constructed on the site. It also indicates the availability of finance in the past for upgrading on the property which may indicate the level of surplus income available for certain water systems/ appliances.

**Table:2.4 (Q.4) - Appliances in the household.**

This indicates the wealth expenditure on certain consumable items as well as necessities within the household in the past and also indicates the availability of funds in the past. Can be correlated with the monthly expenditure analysis per household.

*Cross Check: 3.5*

## Template 3A: Income Expenditure Out (Section 2: Wealth, Income and Expenditure)

**Table: 3.1 (Q.5) - Number of earners in the household.**

The average figure must be greater than 1 for a stable household to survive. Can also correlate outputs here with previous considerations of employment for the respondent and their spouse.

*Cross Check: 1.6*

**Table: 3.2 (Q.6) - Income according to category and Rand.**

This indicates the level of formal salary and informal income into the household and into what income category in terms of Rand it on average falls into. This table also allows consideration of pensions and disability grants (often these should be fixed around a specific figure as these are government fixed). The accuracy of the results can be correlated with earlier discussions on the respondents and spouse's employment and income sources.

*Cross Check: 1.6/ 1.8*

**Table: 3.3 (Q.6) - Monthly income combined.**

This represents in specific categories (according to Rand per month) where the majority respondents fall. It is important to recognise the norm for the majority but at the same time it is important to consider the distribution between the highest and lowest income levels. The community will rarely be homogenous, and it is important to consider broader capacity to pay for water/ installments etc.

*Cross Check: 5.2/ 5.3/ 5.5/ 5.6*

**Table: 3.4 (Q.6) - Average income split into categories.**

This indicates the amounts, on average, earned each month from a variety of sources. This can help indicate the total income for households which identify specific sources of income each month -- though again the range of responses must be considered.

**Table: 3.5 (Q.7) - Household Expenditure.**

This can correlate the appliances in the household and therefore the expected monthly expenditure on basic requirements and consumables. Can also correlate information received regarding payment for water elsewhere in the survey. It must also be noted to take care in the figures supplies to this part of the questionnaire. For example, ensure the monthly payments into savings schemes is supplied rather than the total amount already in the savings account. Also, ensure a monthly figure is provided for school fees and not the annual figure.

*Cross Check: 2.4/ 4.3/ 4.4*

**Table: 3.6 (Q.8/9) - Services needed: 1st and 2nd priorities.**

This assists in the independent identification of the need for on-site water service (a yard tap, etc.). Can correlate with the response given in terms of the 'interest' in obtaining a yard connection.

*Cross Check: 5.1*

**Table: 3.7 (Q.10) - Willingness to pay for services.**

This also requires an independent response to a yes/no question regarding the willingness to pay for water. Can be correlated with subsequent questions on the 'extent' of the willingness to pay.

*Cross Check: 5.1/ 5.2/ 5.3/ 5.5/ 5.6*

## Template 4A: Water Use Out (Section 3: Water Use)

**Table 4.1 (Q.1.3) - Total amount of water used in a normal day.**

**Table 4.2 (Q.1.4) - Total amount of water used in a normal week.**

As well as considering the average figure in answer to this question it is also relevant to consider the range to responses and to correlate this range with the range if household sizes - this therefore indicates the range of demand for water connections and also have implications on the cost of the water etc., in terms of engineering purposes. Must also consider the gender of the respondent in order to identify the level of trust the response can have in terms of the level of accurate knowledge the respondent may have.

*Cross Check: 1.5*

**Table 4.3 (Q.6) - Water Tariffs been paid?**

Can be correlated according to the gender of the respondent and other responses along similar lines, such as monthly household expenditure.

*Cross Check: 1.5/ 3.5*

**Table 4.4 (Q.7) - How much has been paid in the last 6 months.**

If this is relevant, the responses can indicate the respondents past willingness to pay and also their capacity to pay in previous months.

*Cross Check: 3.5*

## Template 5A: Yard Out (Section 4: Yard Connections)

**Table: 5.1 (Q.1) - Interested in obtaining a yard connection.**

Correlates with previous questions on acceptance level of a yard connection. Plus it indicates the percentage of the overall respondents who answered the subsequent section on the extent of this willingness to pay.

*Cross Check: 3.7*

**Table: 5.2 (Q.2/4) - The percentage of respondents willing to pay a certain amount for a yard connection fee.**

The response here can be related to the average income per month, plus the stability of the respondents employment (in terms of formal employment). Again it is very important to consider the distribution of responses, that is the minimum and maximum respondents are willing to pay and relate this to the distribution of income categories in the sample taken.

*Cross Check: 1.6/ 3.3*

**Table: 5.3 (Q. 5/7) - The percentage of respondents prepared to pay a specific amount for the total connection cost.**

It is important to relate the average figure (and the minimum and maximum figures) to the average income per month (and to the distribution of income per month within the sample).

*Cross Check: 3.2/ 3.3*

**Table: 5.4 (Q. 8) - Preferred payment method if connection fee is between R800 and R1000**

This relates to the previous table on the amount prepared to pay for the total connection cost. But it is important to recognise the willingness to pay either upfront or in instalments, as the response maybe socially/ culturally constructed and therefore culturally dependent.

**Table: 5.5 (Q.9) - Percentage of respondents willing to pay specific amounts in instalments for loan for connection fee.**

This is a vital part of the questionnaire in discovering the willingness in comparison to the capacity of the respondents to pay for water. According to international research, there is a general willingness to spend 5% of households monthly income on water. Therefore, there is a need to calculate 5% of the average income earned for the majority. Then calculate the 5% of income for the lowest income earners. The resulting figures must them be correlated with the willingness to pay certain amounts within this table of responses. In other words, the analyst must compare the willingness to pay monthly installments with the capacity to pay.

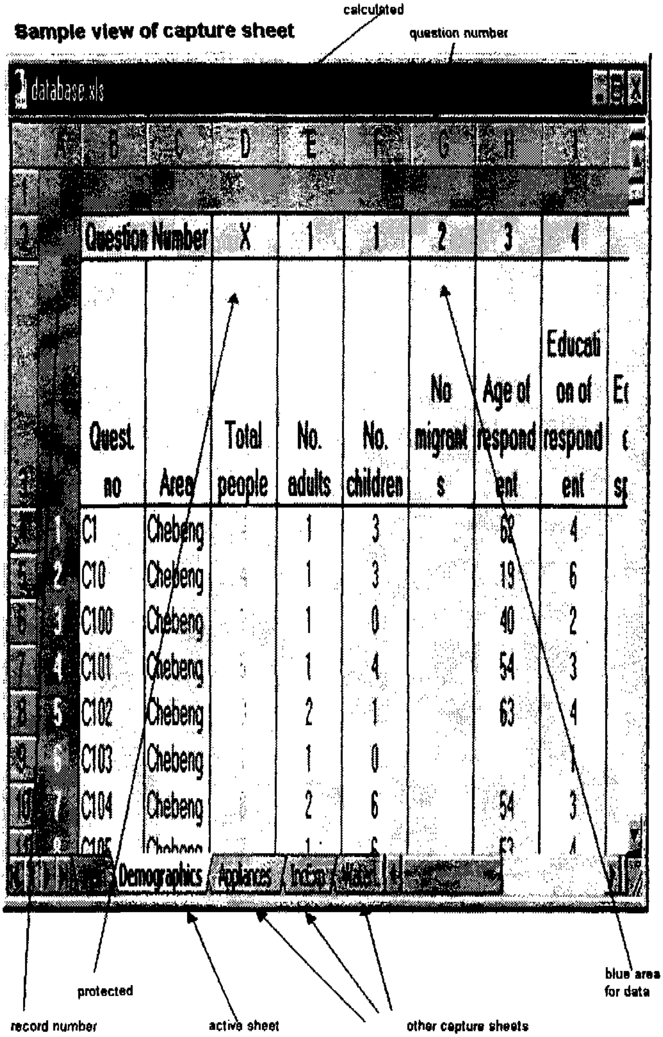
*Cross Check: 3.3*

**Table: 5.6 (Q.10/13) - The number of respondents prepared to pay for metered water.**

It is important to consider the distribution of responses as well as the average figure respondents are prepared to pay for. Compare the willingness to pay a specific amount per litre with the number of litres consumed within different household sizes.

*Cross Check: 1.1/ 1.2/ 4.1/ 4.2*

**Sample view of capture sheet**



## Template 1: Demographics

| | Question Number | | X | 1 | 1 | 2 | 3 | 4 | 4 |
|---|---|---|---|---|---|---|---|---|---|
| | Quest. no | Area | Total people | No. adults | No. children | No migrants | Age of respondent | Education of respondent | Education of spouse |
| 1 | 0 | 0 | | | | | | | |
| 2 | 0 | 0 | | | | | | | |
| 3 | 0 | 0 | | | | | | | |
| 4 | 0 | 0 | | | | | | | |
| 5 | 0 | 0 | | | | | | | |
| 6 | 0 | 0 | | | | | | | |
| 7 | 0 | 0 | | | | | | | |
| 8 | 0 | 0 | | | | | | | |

## Template 2: Appliances

| | Question Number | | 1 | 2 | 3 | 3 | 4 | 4 | 4 |
|---|---|---|---|---|---|---|---|---|---|
| | Questionnaire no | Area | No of separate dwellings | Rooms in main house | Metal roof | Non-mud walls | Radion | Watch | Bicycle |
| 1 | 0 | 0 | | | | | | | |
| 2 | 0 | 0 | | | | | | | |
| 3 | 0 | 0 | | | | | | | |
| 4 | 0 | 0 | | | | | | | |
| 5 | 0 | 0 | | | | | | | |
| 6 | 0 | 0 | | | | | | | |
| 7 | 0 | 0 | | | | | | | |
| 8 | 0 | 0 | | | | | | | |

## Template 3: Income and Expenditure

| Question Number | | 5 | 5 | 6 | 6 | 6 | 6 | 6 |
|---|---|---|---|---|---|---|---|---|
| Questionnaire no | Area | No earners | Salary | Informal income | Pension | Disability | Remittances | Other |
| 1 | | | | | | | | |
| 2 | | | | | | | | |
| 3 | | | | | | | | |
| 4 | | | | | | | | |
| 5 | | | | | | | | |
| 6 | | | | | | | | |
| 7 | | | | | | | | |
| 8 | | | | | | | | |

## Template 4: Water Use

| | Question Number | | 1.1 | 1.2 | 1.3 | 1.4 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|
| | Question naire no. | Area | Water contain-er capacity | No contain-ers per day | Water used on a normal day | Weekly total | Use prior to project | Where wash clothes | How often was clothes |
| 1 | 0 | 0 | | | | | | | |
| 2 | 0 | 0 | | | | | | | |
| 3 | 0 | 0 | | | | | | | |
| 4 | 0 | 0 | | | | | | | |
| 5 | 0 | 0 | | | | | | | |
| 6 | 0 | 0 | | | | | | | |
| 7 | 0 | 0 | | | | | | | |
| 8 | 0 | 0 | | | | | | | |

## Template 5: Yard Connections

| | Question Number | | 1 | 2-4 | 5-7 | 8 | 9 | 10-13 | 14 |
|---|---|---|---|---|---|---|---|---|---|
| | Questionnaire no | Area | Want Yard connection | Deposit | Total fee | Upfront or install-ments | Monthly installment | Final water cost/25 litres | Willing to pay for yard connection |
| 1 | 0 | 0 | | | | | | | |
| 2 | 0 | 0 | | | | | | | |
| 3 | 0 | 0 | | | | | | | |
| 4 | 0 | 0 | | | | | | | |
| 5 | 0 | 0 | | | | | | | |
| 6 | 0 | 0 | | | | | | | |
| 7 | 0 | 0 | | | | | | | |
| 8 | 0 | 0 | | | | | | | |

## Output templates -- Examples

The following templates are examples from an existing rural project (Chweni, Mpumalanga Province, South Africa)

**Template 1A: Demographics Out Section 1: Demographics)**

Table: 1.1

| | | | |
|---|---|---|---|
| 1 | **Average people permanently resident in household** | Adults | 2.96 |
| | | Children | 3.85 |
| | | **Total** | **6.81** |

| **Sample size** |
|---|
| 105 |

Table: 1.2

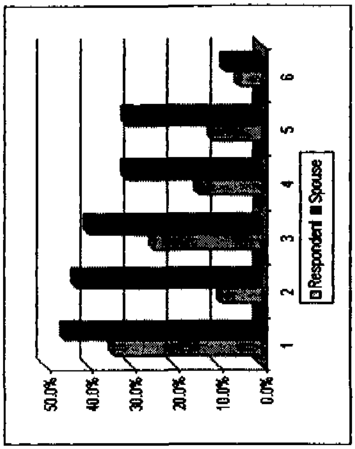
| | | |
|---|---|---|
| 2 | **Average houshold members who are migrant workers** | 0.58 |

Table: 1.3

| | | |
|---|---|---|
| 3 | **Average age of respondent** | 48.90 |

Table: 1.4

| 4 **Highest level of education** | Number | | Percentage | |
|---|---|---|---|---|
| | Respondent | Spouse | Respondent | Spouse |
| 1 None | 33 | 16 | **34.4%** | **45.7%** |
| 2 Upt Std 2 | 9 | 15 | 9.4% | 42.9% |
| 3 Std 3 - Std 5 | 24 | 14 | 25.0% | 40.0% |
| 4 Std 6 - Std 8 | 14 | 11 | 14.6% | 31.4% |
| 5 Std 9 - Std 10 | 11 | 11 | 11.5% | 31.4% |
| 6 Post matric | 5 | 3 | 5.2% | 8.6% |
| Other values | 0 | 0 | | |
| No values | 9 | 35 | | |
| Values | 96 | 70 | | |
| **Total** | 105 | 105 | | |



# Template 2A: Appliances Out (Section 2: Household Wealth, Income and Expenditure)

## Dwelling and Appliances

Table:2.1

| | | |
|---|---|---|
| 1 | **Average number of separate dwellings** | 1.74 |

| Sample Size |
|---|
| 105 |

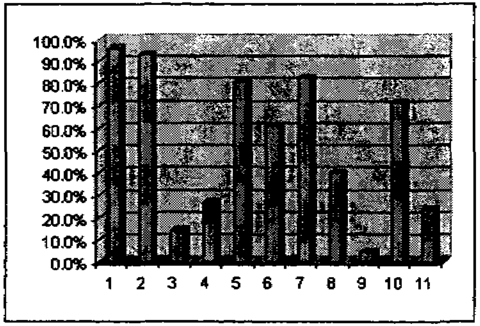
Table:2.2

| | | |
|---|---|---|
| 2 | **Average number of rooms in main living quarters** | 4.97 |

Table:2.3

| 3 | **Structure of main living quarters** | | **Number** | **%** |
|---|---|---|---|---|
| | Metal or tile roof | Yes | 103 | 98.1% |
| | | No | 2 | 1.9% |
| | Cement blocks or bricks | Yes | 105 | 100.0% |
| | | No | 0 | 0.0% |

| 4 | **Appliances in household** | **Number** | **%** |
|---|---|---|---|
| 1 | Radio | 101 | 96.2% |
| 2 | Watch | 98 | 93.3% |
| 3 | Bicycle | 15 | 14.3% |
| 4 | Torch | 28 | 26.7% |
| 5 | Kitchen cabinet | 85 | 81.0% |
| 6 | Sofa / Lounge Suite | 64 | 61.0% |
| 7 | Gas, wood or coal stove | 87 | 82.9% |
| 8 | Hi-fi | 42 | 40.0% |
| 9 | Generator | 5 | 4.8% |
| 10 | TV | 75 | 71.4% |
| 11 | Vehicle | 25 | 23.8% |



# Template 3A: Income Expenditure Out (Section 2: Household Wealth, Income and Expenditure)

Table 3.1

5

| | |
|---|---|
| **Average number of earners in household** | 1.56 |

Table 3.1.1

| Sample Size |
|---|
| 105 |

Table 3.2

6

**Monthly income by category - distribution**

| Income (Rand) | Salary | | Informal or self employment | | Pensions | | Disability grants | | Remittances from family members | | Other | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| 500 | 1 | 1.0% | 9 | 8.6% | 18 | 17.1% | 2 | 1.9% | 1 | 1.0% | 1 | 1.0% |
| 800 | 5 | 4.8% | 15 | 14.3% | 0 | 0.0% | 0 | 0.0% | 1 | 1.0% | 0 | 0.0% |
| 1000 | 6 | 5.7% | 10 | 9.5% | 9 | 8.6% | 0 | 0.0% | 1 | 1.0% | 1 | 1.0% |
| 1200 | 2 | 1.9% | 3 | 2.9% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| 1500 | 9 | 8.6% | 7 | 6.7% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| 2500 | 21 | **20.0%** | 6 | 5.7% | 2 | 1.9% | 0 | 0.0% | 0 | 0.0% | 1 | 1.0% |
| 3500 | 4 | 3.8% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| 3500+ | 5 | 4.8% | 1 | 1.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| **Sample** | 53 | | 51 | | 29 | | 2 | | 3 | | 3 | |

**Template 5A: Yard Connections Out (Section 4: Yard Connections)**

Table 5.1.1

| Sample Size |
|---|
| 105 |

Table: 5.1

| | | | | |
|---|---|---|---|---|
| 1 | **Interested in obtaining a yard connection** | Yes | 100 | 100.0% |
| | | No | 0 | 0.0% |

Table: 5.2

2-4 **Yard connection fee deposit (R) % o respondents prepared to pay:**

| Deposit - Rand | Number | % |
|---|---|---|
| 0 | 0 | 0.0% |
| 50 | 3 | 14.3% |
| 100 | 4 | 19.0% |
| 150 | 8 | 38.1% |
| 200 | 2 | 9.5% |
| 250 | 1 | 4.8% |
| 300 | 1 | 4.8% |
| 400 | 2 | 9.5% |
| Values >400 | 0 | |
| Sample | 21 | |

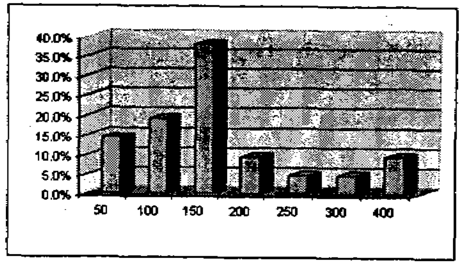
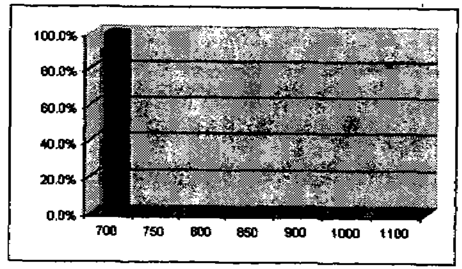



Table: 5.3

5-7 **Total connection cost (R) % of respondents prepared to pay**

| | Number | % |
|---|---|---|
| 0 | 0 | 0.0% |
| 700 | 21 | 100.0% |
| 750 | 0 | 0.0% |
| 800 | 0 | 0.0% |
| 850 | 0 | 0.0% |
| 900 | 0 | 0.0% |
| 1000 | 0 | 0.0% |
| 1100 | 0 | 0.0% |
| Values >1100 | 0 | |
| Sample | 21 | |



# technical options

## *Technical Options*

Four generic groups of promising approaches can be considered in order to provide on-site (higher levels) water of services whilst ensuring that cost recovery is simultaneously addressed:

1. Yard connections with pre-paid meters. These could be complemented by communal pre-paid meters for that section of the population, which cannot afford private connections.
2. Yard connections with conventional metering and billing systems.
3. Yard connections leading to individual storage tanks with an equity valve or trickle feed inlet as well as an accompanying billing system.
4. Yard connections leading to individual storage tanks with the supply controlled from a manifold supplying a cluster of other homesteads. The manifold typically houses a series of valves for each tank as well as a metering system. A billing system is also required.

In evaluating all of the above, it is worth noting that current South African Department of Water Affairs and Forestry policy together with the Water Services Act No 108 of 1997, state that government will provide grant subsidies only to cater for shared infrastructure as well as communal standpoints (RDP standards discussed at the onset of this manual). Additional infrastructure costs to provide yard connections and higher levels of service have to be borne by the home-owner either through cash payments or structured loans collectively organised by the community from financial institutions where normal credit application procedures are utilised.

### 1. Pre-Paid Meters

Pre-paid meter technology now provides commercially available choices such as small meters, which can be installed in each homestead as a direct replacement to conventional meters. Communal pre-paid meters would then be installed for the section of the population which could not afford private connections. A computer based database management system is then generally used to help manage the cost recovery operation. The computer is typically equipped with a token re-charge port to provide new credit depending on amounts tendered.

### 2. Conventional Metering

Conventional yard connections with a metering and billing system will continue to be an option for certain communities. Their applicability will depend on the level of economic and institutional development of the community concerned. A fair amount of institutional infrastructure is also needed to make this option to be viable such as meter readers, a data capture and management system, an invoicing and billing system, etc.

### 3. Equity Valve or Trickle Feed

Trickle feed systems are based on yard connections which lead to small individual tanks in every homestead. The tanks are placed in an elevated position either on a dedicated stand or on the roof of a house. Homesteaders can be given a choice on the tank size, e.g., 200l or 500l depending on the need. A flat monthly rate is frequently charged depending on the tank size. Water into the tank is governed by an orifice valve which lets in water at a trickle flow rate (hence the name). The system, therefore, assists in "flattening" out peak demand on the supply system as water trickles in over a 24 hour period. This system is flexible as bigger tanks can progressively be installed with a wider orifice valve as water demand grows.

## 4. Manually Filled Individual Storage Tanks

Similarly to the trickle feed concept above, yard connections can be provided with individual storage tanks of various sizes for every homestead. Clusters of tanks/homesteads in this instance are supplied from a single manifold which is controlled by a single water vendor. In this case, individual pipes are fed via a valve, which is opened and closed by the vendor/operator depending on the payment status of the consumer household. A float switch is used to close off water to prevent it from overflowing. Like the trickle feed system, this system is also flexible and is promoted as useful in creating job opportunities.

## Advantages & disadvantages

**Pre-Paid Meters**

| Advantages | Disadvantages |
|---|---|
| 1. Fair and equitable payment system based on actual water used | 1. Still very expensive |
| 2. Current systems are built very ruggedly | 2. Track record on performance still short |
| 3. Good dispensing resolutions achieved | 3. "Teething" problems still need to be sorted out, e.g., vulnerable electro-mechanics to impurities in water |
| 4. Software management systems provide useful water usage trends | 4. Computer and software support may be problematic in some rural areas |
| 5. Reasonable range/options available for different applications | 5. Pre-payment devices will always be attractive to "test" vandals |
| 6. Full pressure supply | |

**Conventional Metering and Billing**

| Advantages | Disadvantages |
|---|---|
| 1. Relatively inexpensive capital costs to home owner | 1. Can be relatively difficult to establish institutional arrangements to enforce payment |
| 2. Equitable payment based on actual water used | 2. Needs relatively large infrastructure for operations and maintenance |
| 3. Full pressure supply depending on availability from source | 3. May require sewage infrastructure due to large amount of water available |
| | 4.*Promotes usage of large quantities (and* wastage) |
| | 5. Management systems needs to be more vigilant against "illegal" connections |

**Equity Value or Trickle Feed**

| Advantages | Disadvantages |
|---|---|
| 1. Evens out peak demand on main system | 1. Low on-site pressure supply |
| 2. Suitable for upgrade as demand grows | 2. Not suitable for instantaneous large demand greater than average daily supply |
| 3. Results in savings in bulk system components | 3. A significant capital outlay is required from home owner |
| 4. Flexible billing system, i.e. can be used as prepayment system | 4. Equity value can be tampered with unless accompanied by water meter (at additional cost) |
| 5. Lower capital cost to service provider under certain circumstances, e.g., if yard infrastructure paid for by home owner | 5. Aesthetics need to be given greater consideration |

**Manually Filled Individual Storage Tanks**

| Advantages | Disadvantages |
|---|---|
| 1. Evens out peak demands on main system | 1. If provided at full pressure, the system may be more prone to losses through leakages. |
| 2. Suitable for upgrade as demand grows | 2. May not be suitable for instantaneous large demand greater than daily average flow |
| 3. May result in savings on bulk system components | 3. A significant capital outlay is required from the home-owner |
| 4. Flexible billing system, i.e., can be used as pre-payment system | 4. Aesthetics need to be given greater consideration |
| 5. Water vendor ensures that system is properly operated and maintained | 5. Low on-site pressure |
| 6. Creates more employment opportunities through ensuring small businesses | |
| 7. Lower capital cost to service provider under certain circumstances, e.g., if yard infrastructure paid for by home owner | |

## Infrastructural Requirements for Each Option

The main requirement needed to effect or implement any of these systems is that sufficient pressure is available in order to drive water through the devices. Suppliers for the two main pre-paid meters in South Africa claim that pressure drops across their meters is negligible or less than 1m of water. The pressure required to supply water to either trickle feed tanks or other individual storage tanks will, again, be a function of the height of the storage tank.

As indicated earlier, studies have indicated that there is a direct inverse relationship between the amount of water consumed by a household to the average distance walked to fetch the water. Therefore, the source and bulk shared infrastructure of a scheme need to be sized to cope with the expected higher demand from higher level of services schemes. Whilst the daily requirements can be expected to be fairly fixed and determined by the sum of reservoirs regarding schemes with dispersed storage tanks, the situation may be less certain in schemes with either prepayment meters or conventional metering and billing systems. Schemes with the two latter cost recovery systems/level of service should, therefore, be capable of providing per capita supplies of 50-150 l/day.

A computer system with a database management programme is generally required for schemes with prepayment meters. This then maximises on the abundance of information, which can be stored on each token such as water use patterns of particular homesteads and other demographic data. Regarding manually filled individual storage systems, a computer system may be considered and "nice to have" but not essential at the water vendor level at least. Depending on the site of the scheme and the number of water vendors, it may be absolutely necessary as the number of water vendors increases and the data becomes too voluminous to manage.

The issue about human resource requirements for each technical option is very difficult to predict as it is project specific depending on a number of variables such as;

- the nature of the responsible water authority, e.g., water committee, water utility, state structure (local authority), etc.
- the magnitude of the scheme

- geo-positional nature of scheme, e.g. rural, peri-urban, etc.
- the scheme's proximity from commercial service centres
- complexity of the bulk scheme to operate and maintain, i.e. does it include flocculation processes, pre-filtration stages, etc.
- the source of water - borehole, bulk supplied, spring, etc.

Hence, whilst it may be interesting to classify the human resource considerations for each option, it would be a futile exercise as demonstrated above.

The infrastructural requirements for each option could, therefore, be summarised as follows:

| Requirements | Pre-paid Meters | Conventional Metering | Trickle Feed | Manually Filled Storage |
|---|---|---|---|---|
| **Water Pressure *** | Low | Low | Low | Low |
| **Source Water volume** | Med-High | Med-High | Low-Med | Low-Med |
| **Computer System** | Yes | Sometimes | No (Generally) | Sometimes |
| **Human Resource Needs** | Variable | Variable | Variable | Variable |

** At yard node interface*

## General Costs For Each Option

Under similar conditions, the costs to be expected in upgrading to each option are similar with differences markedly influenced by the costs of the storage tanks as well as pre-paid meters. The table below illustrates typical costs (*excluding human resource considerations*);

| Item | Pre-Paid Meter | Conven-tional Meter | Trickle Feed | Manually Operated Tank |
|---|---|---|---|---|
| Piping + Fittings | R200-R300 | R200-R300 | R200-R300 | R200-R300 |
| Meter | - | R150 | R150 | R150 |
| Pre-Paid Meter | R800 | - | - | - |
| Storage Tank | - | - | R400-R600 | R350-R500 |
| TOTAL | R1000-R1100 | R350 - R450 | R750 - R1050 | R700 - R950 |

## Summary

It is clear that water supply policy in South Africa needs to adopt and be responsive to the large section of the rural population who have *aspirations not only for a basic supply of quality water, but also to* have the choice of a higher level of service.

Different technical options have been discussed above which are suitable for application under certain circumstances. What is clear though, is that whichever option is adopted, it has to be able to effect *the recovery of operations and maintenance costs* to ensure that the scheme is operated in a sustainable manner. In addition, the options discussed above can be used to upgrade older schemes and enable them to provide higher levels of service in a cost recovery mode.

A founding principle of the Mvula Trust is the support for a Demand Responsive Approach (DRA) to sustainable development.. A critical characteristic of this approach is for communities to make informed choices about service options and delivery and to get 'buy-in' from communities. Their willingness to pay for their choice of service lies at the root of this 'buy-in'.

As part of the debate around financing higher levels of water services (on-site) in rural communities, a number of different loan options are discussed in the following sections.

The first section, Retail Loan Option, is a calculus model that was developed to assist formal and informal finance institutions to calculate potential risk if loans are made to individuals. The aim is to entice finance institutions to consider loans to poor rural households.

The model was developed for individual lending, as Mvula's first experience and pilot projects showed a reluctance by the financial sector to enter into group loans.

## Individual Loans

Individual loans were favoured for repayment reasons on the part of the finance sector because there could be a contractual relationship between the borrower and the lender. The belief was that as soon as another entity (such as a community-based organisation) was involved, risk would increase, especially if the finance institution could not exercise control over the entity. Unless the CBO has a proven track record of cost recovery and repayments (including monthly O&M and/or a deposit payment) a loan to them as a group would not be a viable option.

The departure point in seeing individuals as loan recipients or credit clients, was based on individual accountability and creditworthiness. The ultimate objective of this particular investigation was to provide a credit basis to individuals desiring housing and repeat infrastructural loans.

## Group Loans

The calculus model developed under the section, Savings Investment Option, is rooted in international microcredit trends, which centre credit provision on solidarity group pressure. It departs from the premise that financing and credit should be tailored around existing savings scheme principles and habits in rural areas. Different types of savings schemes exist in South Africa which could be explored as possible vehicles for credit to poor rural households.

- The solidarity group method adopts, as a foundation, traditional community savings principles including rotating savings (in South Africa it is called 'Moholiswana') where the group contributes an amount of money monthly or weekly and each member of the group has a turn to receive all the money. This money can be used by the individual member to purchase an item ordinarily outside his/her financial boundaries, or the money can be put up as collateral to borrow against. In peer group lending the members who receive the loans, repay them on a weekly or monthly basis, with the group providing the guarantees for this repayment.
- Internationally, different ways of peer group borrowing and lending exist. An example of this traditional method in South Africa is called 'Stokvels' or Savings Societies[1]. A stokvel is an informal rotating credit union where members agree to contribute a fixed amount of money regularly into a common pool and the funds so collected are allocated to members on rotation or in a time of need.
- The term stokvel derives from the early nineteenth-century cattle or stock fairs in the 1800s. The modern stokvel evolved from the burial societies that were formed during the gold mining boom in response to harsh conditions and widespread disease. Burial society members contributed to a pool of funds that were used to bury them when they died. The modern stokvel also serves as an employment agency and advice bureau.

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[1] Much of section is taken from a book edited by the author. The chapter quoted was written by G van Staden and M Stewart in *Pospects for Progress: Critical Choices for Southern Africa* (Edited by Minnie Venter), 84-107, Maskew Miller Longman, 1994.

- *The National Stokvels Association of South Africa was founded in 1988, in order to bridge the divide between the formal economy and the informal community-based institutions that had evolved over a century in developing environments.* Black savings in South Africa *pro rata* are the highest on the continent, yet black South Africans have been denied access to savings pools that they have helped generate.

- In a typical stokvel, all members of the group are obliged to borrow from the central 'kitty', every month. The monies are repaid at an interest rate lower than the normal bank prime rate and the surplus attained monthly from the interest, is saved by the group. At the end of a 12-month period, the collective savings are shared amongst the group on an equal share basis, or invested in a conventional financial institution or the Stock Exchange or the group may decide to buy shares in a company as shareholders.

# *financial model*

# *retail loan option*

## Introduction

The Rural Water Supply Finance Model is, firstly, a tool to assess the financial viability of water supply schemes in rural villages when on-site services are provided to all or some households. Secondly, it is a tool for deciding on financing options for such schemes. These functions are related, since favourable financing arrangements may render a scheme viable that would otherwise not be so. Thirdly, the model can be used to determine the tariffs that will need to be charged by the service provider.

The model calculates the amounts that households will be required to pay to make the service financially viable. These amounts include both payments to the service provider and payments on private loans. It compares these payments with the amounts that households are willing to pay for water. The total amount that will remain unpaid during the course of a year is then calculated, on the assumption that households pay no more than their maximum indicated amounts. The summary indicator of viability is the net cash flow of the scheme for the year. If this is negative, the scheme is not financially viable and must be reconsidered.

## Model scope

The model has been developed for application in rural villages where new water supply systems are to be provided, or where water supply systems have been provided to the level of a standpipe service and are to be upgraded to provide on-site connections.

For the sake of simplicity only two levels of service are provided for, namely public standpipes and on-site services.

Only residential consumers (households) are considered.

## Technical specifications

The model is an Excel worksheet, and requires a Windows environment.

## Structure of the model

The model is organised on ten sheets, numbered 1 to 10. Inputs and outputs are ordered in a logical progression, as described below. The number and heading of each sheet is given in brackets in the description that follows. The name the tab in included, in inverted commas.

**The model is organised as follows:**

- a description of the area, planning year etc. (1. Project description "Des")
- demographic and income data (2. Demography and income "Res-CUs");
- three scenarios for the provision of services, and the capital costs associated with each scenario (3. Investment scenarios and capital costs "Scenarios");
- financing options for each scenario (Capital grants and finance to be raised "Capsubs"; 5. Sources of finance "CapFin");
- the consumption associated with each scenario, including provision for water losses (6. Estimated water consumption "Cons");
- the costs of running the system for each scenario including, asset replacement, pumping, treatment and other operating and maintenance costs (7. Asset replacement, operating and maintenance expenditure (R per year) "O&M");
- the payments required of households to ensure full cost recovery (8. Monthly bills "Bills");
- the likelihood of unpaid bills if the payments required exceed the amounts that households are able/willing to pay (9. Willingness to pay and total amounts unpaid "WTP"); and
- a summary sheet of the key input and output variables, in a format suitable for printing (10. Summary "Summary").

Key outputs are the amounts of finance to be raised per household and the monthly payments required. The indicator of viability is the total expected amount of unpaid bills: where unpaid amounts are predicted the investment option is not likely to be financially sustainable and changes need to be made. Possible changes are discussed in the final section of this manual.

## Protection, colour coding and number format

### Protection

The sheets are protected so that the user can change data only in the input blocks. This is to prevent accidental deletion of formulae as well as illegitimate changes to the calculations or outputs.

## Colour coding

The model is colour coded to allow for the easy identification of essential inputs, optional inputs, default values, ordinary outputs and key outputs.

Essential information is entered in the **bright yellow blocks**. There are no default values for these inputs and if the user does not enter any information the model will read the value as zero.

Optional inputs are entered in the **light blue blocks**. These are inputs for which the model provides default values. If the user leaves a blue block blank, the default value will be used.

The **green blocks** are for highlighting purposes. On sheet 3 they highlight the capital cost per household of the secondary infrastructure to be provided ("Scenarios"). On sheets 4 and 5 they highlight the amount of finance that needs to be raised per household ("CapSubs" and "CapFin"). On sheets 8 and 9 they highlight the monthly payments that are required.

Default values are displayed in **blue against the white background**. Bold blue defaults are simply numbers that have been entered, while normal blue defaults have been calculated from other inputs in the model. The method of calculation is generally recorded in a comment box on the screen[2].

General information and outputs are displayed in **black against the white** background.

Headings are highlighted in **pale yellow**.

## Number format

All (numerical) inputs must be entered in number format. Where percentages are being entered, the model automatically converts the number entered to a percentage. For example, the user is requested to enter an interest rate on private loans (sheet 5). An entry of "30" is read by the model as 30 percent. If the user were to enter "0.30", or "30%", the model would interpret this as 0.3 percent.

## Model inputs and outputs

### 1. Project Description

On this sheet the user records information such as the name of the village, the base year, the person responsible for the assessment and the run number. The run number is for record keeping purposes only, for example run 1 may be the first round of modelling and run 2 may be the second round after costs and/or service levels have been re-evaluated.

It is important to enter the base year as a number, since this is used to calculate the year displays in the remainder of the model.

### 2. Demography and income

The population and number of households must be entered here. The model uses households rather than population as the unit of evaluation, but calculates the average size of households to serve as a cross-check on the numbers entered.

[2] Comment boxes may be viewed by resting the cursor on a cell which displays a red dot/triangle in the top right-hand corner. In Excel 3.1, the command "View, notes" must be selected.

The expected rates of growth in the number of households in the base year, and five years later, are requested. Rates of growth for the intervening years are extrapolated. The model is designed to evaluate the financial viability of the water supply system for a population five years after the base year. If the user wishes to deal with the current number of households only, then he/she should enter as "0" the expected growth.

Information on household income distribution is entered in four categories. The default categories are R0-R500 per month, R501 to R1 000 per month, R1 001 to R2 000 per month and more than R2 000 per month. The percentage of households that falls into each of these categories must be entered for the base year, and an estimate made of the likely distribution in five year's time. The default income distribution for the base years reflects the distribution in a "typical" rural settlement in South Africa. The default income distribution for year 5 is the income distribution in the base year.

Although defaults are provided, it is important that the income distribution information is as accurate as possible for the village under consideration. Income distribution and willingness to pay (discussed below) critically affect the likely affordability of the services to be provided.

The model calculates an average monthly income based on category averages. This is for information only and is not used in any further model calculations.

## 3. Service level scenarios and capital costs

### *Service level scenarios*

In the table entitled "Residential services by (year 5)", the service level scenarios are determined by entering the proportion of households who, in year 5, will be provided with water from public standpipes only. The model then calculates the proportion to be provided with on-site water.

Scenario 1 is fixed as the base-line scenario in which all households are provided with standpipe water only. Scenarios 2 and 3 are designed by the user. Scenario 3 is intended to be the most ambitious (or the most expensive) scenario, and scenario 2 an intermediate scenario. The model calculates, and displays, the number of households with standpipe and on-site services respectively.

For example, let scenario 2 be one in which 60 percent of households receive yard tanks by year 5, while the remaining 40 percent remain served by public standpipes only. Let scenario 3 be one in which all households receive yard tanks. The procedure is as follows:

- Enter the name of the on-site service ("Yard tank") into the yellow block below "Public standpipes").
- Enter "40" into the yellow block below "Scenario 2".
- Enter "0" into the yellow block below "Scenario 3".
- Press F9 to calculate[3].

The model will then display a "0", "60" and "100" in the blocks next to "Yard tanks". This means that in year 5, respectively 0%, 60% and 100% of households will have been provided with the on-site service for each scenario. Respectively 100%, 40% and 0% will have access to public standpipes only. The numbers of households involved are displayed in the bottom two rows of the table.

## Capital costs

When entering capital costs, a clear difference is made between "primary" infrastructure and "secondary" infrastructure.

**Primary infrastructure** includes all bulk infrastructure, connector pipelines, reservoirs, primary reticulation pipe work and public standpipes.

The total cost of providing the infrastructure required for scenario 1 must be entered in the two yellow blocks below "Scenario 1" (cells H7 and H8). Construction costs are entered in the top block, and other costs area entered below this. The latter costs refer to items such as

[3] Excel may be in manual or automatic calculation mode. If in manual mode, the user must press F9 in order for the model to calculate. If in automatic mode, the model calculated each time a number has been entered. To change the calculation mode, see "Tools, Options, Calculation" on the tool bar.

overhead costs, management fees and training. Costs are entered in R'000.

If additional primary infrastructure needs to be provided in scenario 2, then the cost of this *additional* infrastructure must be entered in the next column (cells I7 and I8). For example, if the provision of yard tanks to 60% of households requires and additional borehole and reservoir, the cost of this additional infrastructure must be recorded here.

If scenario 3 requires primary infrastructure over and above that sufficient for scenario 2, the *additional* costs must be entered in the final column of the table (cells J7 and J8). For example, increasing coverage to 100% of households may require additional pumping capacity.

The total cost of primary infrastructure for each of the scenarios is shown as the cumulative total (row 10).

The **secondary network** refers to the *additional pipelines*, and any other infrastructure required for on-site services, which is *shared* by households[4].

The total amount required for scenario 2 is entered in the yellow block next to "Secondary network" (cell I12). This is entered in R'000 (not per household).

The additional amount required for scenario 3 is entered in the yellow block in the "Scenario 3" column (cell J12)

Cumulative totals are displayed in the row below this. The *cost per household* of the secondary distribution network is displayed in *green* for each scenario.

**"Terminals"** refer to the pipelines and on-site terminals that serve individual sites. This therefore refers to the infrastructure that is not shared by other households. Costs are entered as Rands per household.

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4 Distribution stations can be classified as either primary or secondary, depending on how they are to be financed: if they are to be financed by along with the primary network (usually by means of a capital subsidy), then the are best included as primary infrastructure.

The full cost of the infrastructure, if fully purchased, is entered in the top row for each scenario (cells I17 andJ17). If the per site cost is the same for both scenarios, a cost for scenario 2 only needs to be entered and the model will use this cost for scenario 3 (i.e. default for scenario 3 = cost for scenario 2).

The next four rows make provision for reducing the cost of this infrastructure, for example by households providing labour or bricks. A subtotal is then shown (row 22).

Provision is made for a percentage discount on the final cost (entered as a number).

The final cash cost per household of the terminals is shown in green.

**4. Capital subsidies and finance to be raised**

**Capital subsidies** for "primary" and "secondary" infrastructure are dealt with separately.

The total amount of grant finance to be provided for primary infrastructure in scenarios 1, 2 and 3 must be entered in the appropriate blue blocks (cells D8 – F8). If no values are entered, the model assumes that all "primary" infrastructure is paid for by means of a capital grant. Thus, the values in blue below the "Primary grant" boxes are the cumulative total costs of the primary infrastructure, which the model uses as default values (see "3. Investment scenarios and capital costs" cells H10 – J10).

The total amount of grant finance to be provided for the secondary network and on-site terminals is entered in the next row of yellow blocks. The model assumes that no subsidy is available for this "secondary" infrastructure. The black values below the "Secondary grant" boxes show the total costs of this infrastructure, but are for information only and are not used as defaults.

The model then calculates, and displays, the total amounts of capital finance to be raised for primary and secondary infrastructure respectively. These are shown in R'000. The totals are also displayed. (Rows 15-17).

The last table on this sheet translates the capital costs of the primary and secondary infrastructure, and the finance to be raised, to amounts per household. Different amounts are applicable to households with public standpipes and on-site services respectively. The amounts of finance to be raised per household are highlighted in green. The top green blocks highlight the amounts to be raised for secondary infrastructure, and the bottom green blocks show the total amounts. The total amount for each scenario = (the amount to be raised for primary infrastructure) + (the amount to be raised for secondary infrastructure).

Note the model assumption that all households share equally in the costs of the primary infrastructure.

**5. Sources of finance**

The next step is to decide on the sources of finance. The total amounts to be raised per household are displayed in green. These amounts are the same as those displayed in green on the previous screen (4. Capital grants and finance to be raised, rows 28 - 29).

The user needs to decide on the amounts to be paid up-front, by means of individual loans and, where applicable, by means of institutional loans (i.e. loans raised by the service provider). The amounts to be raised by means of institutional loans and paid up-front are entered in the yellow blocks for the three scenarios (below each other) by service type (next to each other). The model calculates the amount to be raised by means of individual loans as the residual. The percentage distribution of these sources is shown in the columns next to the input blocks, and the monthly capital charges (interest and redemption payments) due per household on the loans are displayed to the right of these.

The total amounts to be raised, and the total interest and redemption to be paid by the village as a whole, are displayed in the last two columns in Rands (columns M and N).

The capital charges (interest and redemption payments) displayed are calculated using the interest rates and repayment periods entered by the user at the top to the sheet (yellow blocks, row 5).

For scenarios 2 and 3, the totals of unpaid bills are displayed (in red) to the right of the sheet. The purpose of this is to immediately see the effects of alternative financing options on the likely financial viability of the programme. This can however be properly evaluated only after other recurrent costs and information on willingness to pay have been entered. These unpaid amounts are intended for use once all the information has been entered and the model is being fine-tuned.

### 6. Estimated water consumption

The user enters the expected monthly consumption of households by service type, and expected physical losses as a percentage of total consumption. The model then calculates total water demand. Default amounts can be used in the absence of local information.

Water consumption information is required to calculate operating expenditure, particularly when bulk water is purchased, pumped and/or treated. It can also be useful as a check on whether the proposed primary infrastructure is designed to supply an appropriate amount of water: too little capacity will lead to obvious problems of supply while excessive capacity may mean higher than necessary asset replacement and maintenance costs.

### 7. Asset replacement, operating and maintenance expenditure

Recurrent costs (other than finance charges) are dealt with on this sheet.

- Asset replacement costs are entered as a percentage of the construction cost of the infrastructure. Different percentages apply to primary infrastructure, the secondary network and terminals. Defaults are provided for these inputs. The total costs per year for the three scenarios are shown in the last three columns of the table (cells H9-J9).
- Pumping costs are recorded by entering the percentage of average daily flow that is to be pumped in each scenario, and the cost of diesel and/or electricity in terms of the cost per kl of water pumped (c/kl). The average daily flow for each scenario is displayed at the top of the table (cells I6-J6). The total annual costs are displayed in the row in which costs are entered (cells H12-J12).
- Treatment costs are recorded by entering a cost per kl of water treated (c/kl). The total annual costs are displayed as above.

- Bulk purchase costs are recorded by entering a cost per kl of water bought (c/kl), and the percentage of the total amount used that is purchased. The total annual costs are displayed as above.
- Other expenditure is entered as an amount per annum for each scenario (cells H17-J17).
- Maintenance costs are entered as a percentage of the construction cost of the infrastructure, as in the case of asset replacement (see above).
- Staff costs are calculated for each scenario by entering the number of staff employed in each of four categories, at salaries entered by the user.
- Provision is made for overheads as a percentage of staff costs. A default value of 10 percent of staff costs is provided.

The model then calculates total costs per annum for each of the scenarios, in Rands (row 31). It also calculates the cost per kl of water sold and of water used, the latter including physical losses (R/kl, rows 32 and 33).

**8. Monthly bills**

All the cost information required to calculate monthly payments is now available. Provision should however be made for **non-payment**. In all villages it is financially prudent for the service provider to make some provision for non-payment. For example, funeral expenses may mean that a household has insufficient resources to pay its water bill for a month or two. If provision is made for this, then the service provider can accommodate such problems without jeopardising its financial viability. A non-payment rate of, say 5% should be allowed.

It is important to note that this non-payment is different from a permanent unwillingness/inability to pay for the services provided. Unpaid bills for the latter reason are dealt with on the next sheet as a "willingness to pay" issue.

Having set a non-payment rate, monthly payments (or household bills) can be calculated:

Up-front payments and capital charges were set on sheet 5 ("Sources of finance"). The decision to be taken on the current sheet is the amount to be paid to the service provider by households with and without on-site services respectively. The amounts to be paid are determined by entering **a payment ratio** for each scenario in the blue blocks (cells HG9 and I9). For example, entering a "2" for the on-site service means that the average monthly payment for this service will be twice the payment for a standpipe service.

The decision on payment ratios is assisted by the provision of monthly cost ratios, which are calculated from the monthly costs of service provision displayed in the third table on this screen. The cost ratios are displayed to the right of the payment ratios in the top table. The default payment ratios are equal to these cost ratios.

Once the payment ratios and "normal" non-payment rates have been set, the model calculates monthly water bills payable to the service provider to ensure that its total annual expenditure requirements are met. These are displayed in the last three columns of the top table, for scenarios 1, 2 and 3 respectively.

Other information displayed on this screen includes the up-front payments and monthly capital charges due on personal loans. All payments due by households are thus displayed here. "*Total monthly payments*" refers to payments on personal loans plus payments to the service provider. These are displayed in *green*. Total unpaid bills, which are calculated on the next sheet and discussed below, are reflected here directly below the total monthly payments.

The total monthly income required by the service provider to ensure financial viability is shown in the last line on the sheet.

## 9. Willingness to pay and amounts unpaid

The monthly payments necessary for financial viability have been set on the previous sheet. The question to be answered on this sheet is whether households are able/willing to make these payments. In order to establish this, it is necessary firstly to establish willingness to pay by income category, and secondly to allocate services to income groups to match willingness to pay with monthly bills.

- The user enters the amounts that households in each income category are willing to pay in the blue blocks in the top right hand table (cells E7 to E10). The default amounts shown to the right of the input blocks are calculated as respectively 10%, 7.5%, 5% and 5% of the average income for each category.
- Total monthly bills are displayed in green in the top right hand table. The amounts shown here are the total amounts calculated on the previous screen and highlighted in green ("Bills", K14-M15).
- The model allocates services by assuming that on-site connections are allocated to higher income households first (bottom right hand table).
- The total amounts billed, paid and unpaid per year are shown in the bottom left hand table. The total amounts paid are calculated by assuming that households whose bills exceed the amounts they are able/willing to pay, pay as much as they are able/willing to. The remainder becomes "unpaid bills".

## The meaning of unpaid bills

If a scenario produces unpaid amounts, it means that (some) households are receiving services that they cannot afford or are unwilling to pay for. The service provider will not remain financially viable, and the scenario needs to be re-examined to see where changes are possible. Possible changes, within reason, include :

- negotiating increases in the amounts that households are willing to pay;
- financing the infrastructure in a different manner, for example by requiring larger up-front payments and thus smaller personal loans;
- reducing the cost of on-site services for example by encouraging villagers to provide their labour and make bricks;
- negotiating more favourable loan conditions;
- reducing the proportion of households who are to receive on-site services;

- reducing operating and maintenance costs, for example by a different staffing system; and
- reducing the amount of bulk and/or connector infrastructure provided, if provision is made in this for large amounts of excess capacity. This can save on asset replacement and maintenance costs.

If these steps fail to eliminate non-payment, a more fundamental rethink of the project is necessary and a decision needs to be made whether on-site service water provision is an option for the specific community.

# *Spreadsheets -- Examples*

The following spreadsheet examples were taken from an existing rural community, Isulubashe-Mvunyane, KwaZulu-Natal, South Africa.

## Project Description:

**Rural Water Supply Finance Model**

**1. Project description**

| | |
|---|---|
| Province: | **K/N** |
| Village: | **Myunyane** |
| Description : | **Peri-urban village** |
| Run: | 1 (=1,2,3 etc.) |
| Scenarios | Scenario 1 is standard : public standpipes only for residential consumers<br>**Scenario 2 : partial upgrading to yard tanks, depending on affordability**<br>**Scenario 3 : 100% upgrading to yard tanks** |
| Base year: | **1998** |
| Assessment by: | **Minnie V-H** |
| Date(dd/mm/yy) | **3/98** |

# Demography & Income:



## 2. Demography and Income

**Population** 4,500

**Households**

| | |
|---|---|
| **Total households** | 479 |
| People per household | 9.4 |

**Household growth**

| | 1998 | 2003 |
|---|---|---|
| **Growth rate in year** | | |
| **Number h/holds in year** | 479 | 479 |
| **Estimated population in year** | 4,500 | 4,500 |

**Income distribution**

| Income category | from | to (R/pm) | Average income | % H/hs 1998 | Number 1998 | % H/hs 2003 | Number 2003 |
|---|---|---|---|---|---|---|---|
| very low | | | 250 | 27 | 129 | | 129 |
| low | | | 751 | 34 | 163 | | 163 |
| middle | | | 1,501 | 32 | 153 | | 153 |
| high | | more | 3,501 | 7 | 34 | 7 | 34 |
| Average income (R /CU pm) | | | | 1,048 | | 1,048 | |
| | 0 | 500 | | 33 | | 27 | |
| | 501 | 1,000 | | 32 | | 34 | |
| | 1,001 | 2,000 | | 26 | | 32 | |
| | 2,001 | more | | 9 | | 0 | |

# Investment Scenario & Capital Costs:

Rural Water Supply Finance Model  Myunyane  1 Base year: 1998

## 3. Investment scenarios and capital costs

**Residential services by 2003**

**% of households with service indicated:**

| | Scenario 1 | Scenario 2 | Scenario 3 |
|---|---|---|---|
| Public standpipes | 100 | 50 | 0 |
| Yard tanks | 0 | 50 | 100 |
| **Number of households with services indicated :** | | | |
| Public standpipes | 479 | 240 | 0 |
| Yard tanks | 0 | 240 | 479 |

**Capital costs (R'000)**

| "PRIMARY" infrastructure | Scenario 1 Total for scenario 1 | Scenario 2 Additional to scenario 1 | Scenario 3 Additional to scenario |
|---|---|---|---|
| Construction cost | 824 | | |
| Other costs | 238 | | 0 |
| Total | 1,062 | 0 | 0 |
| Cumulative total | 1,062 | 1,062 | 1,062 |
| "SECONDARY" network | na | 30 | 6 |
| Cumulative total | na | 30 | 36 |
| Cost per site (R/hh with on-site) | na | | |

| TERMINALS: Total fully purchased cost (R/hh) | Sc1 R/hh | Sc 2 R/hh | Sc 3 R/hh | |
|---|---|---|---|---|
| | Yard tanks | 946 | | 946 |
| Minus : labour costs (R/hh) | | 146 | | 146 |
| training of plumbers | | 110 | | 110 |
| own bricks | | 50 | | 50 |
| | | | | 0 |
| sub-total | | 640 | 640 | |
| % discount on remaining cost | | 20 | | 20 |
| Actual cost of terminals (R/hh with on-site) | | | | |
| Total project cost of terminals (R'000) | | 123 | 245 | |

**Notes**

# Capital Grants & Finance to be raised:

Rural Water Supply Finance Model | Myunyane | 1 | Base year: 1998

## 4. Capital grants and finance to be raised

### Capital grants (R'000)

| (R'000) | Scenario 1 | Scenario 2 | Scenario 3 | |
|---|---|---|---|---|
| **Primary grant** | | | | for infrastructure excluding secondary network and on-site terminals |
| Defaults = construction cost | 1,062 | 1,062 | 1,062 | for infrastructure excluding secondary network and on-site terminals |
| **Secondary grant** | na | | | for secondary network and on-site terminals |
| cost (R'000) = | | 153 | 281 | for secondary network and on-site terminals |

### Finance to be raised (R'000)

| | | | | |
|---|---|---|---|---|
| **Primary infrastructure** | 0 | 0 | 0 | excluding secondary network and on-site terminals |
| **Secondary infrastructure** | na | 153 | 281 | for secondary network and on-site terminals |
| **Total** | 0 | 153 | 281 | |

| | Cost per household (R/hh) | | | Capital to be raised (R/hh) | | |
|---|---|---|---|---|---|---|
| | Scen 1 | Scen 2 | Scen 3 | Scen 1 | Scen 2 | Scen 3 |
| **Secondary infrastructure (i.e.secondary network and terminals)** | | | | | | |
| Yard tanks | na | 637 | 587 | na | [illegible] | [illegible] |
| **Primary infrastructure (i.e. infrastructure required for standpipe service only)** | | | | | | |
| Public s/p | 2,217 | 2,217 | 0 | 0 | 0 | 0 |
| Yard tanks | na | 2,217 | 2,217 | na | 0 | 0 |
| Average per h/h | 2,217 | 2,217 | 2,217 | 0 | 0 | 0 |
| **Total** | | | | | | |
| Public s/p | 2,217 | 2,217 | 0 | 0 | [illegible] | [illegible] |
| Yard tanks | na | 2,854 | 2,804 | na | [illegible] | [illegible] |

# Sources of Finance:

Rural Water Supply Finance Model          Myunyane          1     Base year: 1996

## 6. Sources of finance

| | Interest rate (% pa) | Repayment period (years) | | Interest rate (% pa) | Repayment period (years) |
|---|---|---|---|---|---|
| **Institutional loans** | 20.0 | 8.0 | **Individual loans** | 45.0 | 2.0 |

| | | Pub. s/p | | I&R | Yard tanks | | I&R | Total to be raised (R) | Total I&R (R per year) | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Scenario 1** | | R/hh | % | R/hh pm | R/hh | % | R/hh pm | | | |
| | Institution loan | | 0% | 0 | | | | 0 | 0 | |
| | Indiv. loan | 0 | 0% | 0 | | na | | 0 | 0 | |
| | Own money | | 0% | na | | | | 0 | na | |
| | total | | 0% | | | | | 0 | 0 | |
| **Scenario 2** | | | | | | | | | | |
| | Institution loan | | 0% | 0 | | 0% | 0 | 0 | 0 | |
| | Indiv. loan | 0 | 0% | 0 | 537 | 84% | 38 | 128,674 | 110,423 | |
| | Own money | | 0% | na | 100 | 16% | na | 23,950 | na | **Unpaid bills** |
| | total | | 0% | | 637 | 100% | | 152,624 | 110,423 | 0 Rands |
| **Scenario 3** | | | | | | | | | | |
| | Institution loan | | 0% | 0 | | 0% | 0 | 0 | 0 | |
| | Indiv. loan | 0 | 0% | 0 | 427 | 73% | 31 | 204,608 | 175,587 | |
| | Own money | | 0% | na | 160 | 27% | na | 76,640 | na | |
| | total | | 0% | | 587 | 100% | | 281,248 | 175,587 | -20,990 Rands |

# Estimated Water Consumption

Rural Water Supply Finance Model Myunyane 1 Base year: 1998

## 6. Estimated Water Consumption

**Household Consumption (kl/month per household) Total in 2003 (kl/month)**

| Type of service | kl/hh/month | | l/cap/day | Scenario 1 | Scenario 2 | Scenario 3 |
|---|---|---|---|---|---|---|
| Public standpipes | | 4.0 | 14 | 1,916 | 958 | 0 |
| Yard tanks | 5.4 | 6.0 | 19 | 0 | 1,293 | 2,587 |
| **Total water consumption (kl/mnth)** | | | | **1,916** | **2,251** | **2,587** |

**Total water consumption and losses (kl per year)**

| | Scenario 1 | Scenario 2 | Scenario 3 | |
|---|---|---|---|---|
| Total consumption | 22,992 | 27,016 | 31,039 | |
| Physical water losses (as % water consumed) | | | | (Enter as number, not %) |
| Physical losses (kl per year) | 3,449 | 4,052 | 4,656 | |
| Total bulk water provided (kl per year) | 26,441 | 31,068 | 35,695 | |
| Physical water losses (as % water supplied) | 13% | 13% | 13% | |
| | 15 | 15 | 15 | |

# Asset Replacement, Operating & Maintenance Expenditure:

Rural Water Supply Finance Model Myunyane 1 Base year: 1996

**7. Asset replacment, operating and maintenance expenditure (R per year)**

| Bulk and distribution infrastructure | | | | | | Scenario 1 | Scenario 2 | Scenario3 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Average daily flow (kl/day): | 72 | 85 | 98 | | | |
| Asset replacment | % of construction cost | | | | | Cost (R pa) | Cost (R pa) | Cost (R pa) | | | |
| | Primary | Secondary | Terminals | | | | | | | | |
| | | | | | | 5,310 | 9,289 | 13,027 | 0.5 | 1.0 | 3.0 |
| Pumping | % average daily flow pumped | | | diesel cost | electricity | | | | | | |
| | Scenario 1 | Scenario 2 | Scenario3 | c/kl | c/kl | | | | | | |
| | | | | | | 0 | 0 | 0 | | | |
| Treatment | Cost of chemicals (c/kl) | | | | | | | | | | |
| | | | | | | 0 | 0 | 0 | | | |
| Bulk purchase | c/kl | % purchased | Scenario 1 | Scenario 2 | Scenario3 | | | | | | |
| | | | | | | 0 | 0 | 0 | | | |
| Other general expenditure | | | | | | | | | | | |
| Maintenance | % of construction cost | | | | | | | | | | |
| | Primary | Sec net | Terminals | | | | | | | | |
| | | | | | | 5,310 | 9,289 | 13,027 | 0.5 | 1.0 | 3.0 |
| Staff costs | Staff category | Average salary (R pm) | Number of staff per category | | | | | | | | |
| | | | Scenario 1 | Scenario 2 | Scenario3 | | | | | | |
| | category 1 | 150 | | | | 0 | 0 | 0 | | | |
| | category 2 | 500 | 1.0 | 1.0 | 1.0 | 6,000 | 6,000 | 6,000 | | | |
| | category 3 | 1,000 | | 1.0 | 1.0 | 0 | 12,000 | 12,000 | | | |
| | category 4 | 2,000 | | | | 0 | 0 | 0 | | | |
| | TOTAL STAFF | | 1.0 | 2.0 | 2.0 | 6,000 | 18,000 | 18,000 | | | |
| Overheads | as % of staff costs | | | | | | | | | | |
| | Primary | Sec net | Terminals | | | | | | | | |
| | | | | | | 600 | 1,800 | 1,800 | 10.0 | 10.0 | 10.0 |
| Total | | | | | | 17,220 | 38,377 | 45,855 | | | |
| Cost (R/kl of water sold) | | | | | | 0.75 | 1.42 | 1.48 | | | |
| Cost (R/kl of water used, including physical losses) | | | | | | 0.65 | 1.24 | 1.28 | | | |

# Monthly Bills:

Rural Water Supply Finance Model    Myunyani 1    Base year 1998

## 8. Monthly bills

| | Sc 1 | Sc 2 | Sc 3 |
|---|---|---|---|
| % non-payment | | | |

**Monthly bills set so that service provider breaks even in year 5, after allowing for non-payment**

| Payments to service provider | Cost ratios | | | Payment ratios | | | Monthly water bills (R/hh pm) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Scen.1 | Scen. 2 | Scen. 3 | Scen.1 | Scen. 2 | Scen. 3 | Scen.1 | Scen. 2 | Scen. 3 |
| Public s/p | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 1.0 | **3.00** | **5.68** | **0.00** |
| Yard tanks | 0.0 | 1.4 | 8.0 | | | | **0.00** | **7.67** | **7.98** |
| | | | | | 1.4 | 8.0 | | | |

| Total payments by households | Once-off capital payments (R/hh) | | | Monthly payments on individual loans | | | Total monthly payments (R/hh per month) | | |
|---|---|---|---|---|---|---|---|---|---|
| Service Levels | Scen.1 | Scen. 2 | Scen. 3 | Scen.1 | Scen. 2 | Scen. 3 | Scen.1 | Scen. 2 | Scen. 3 |
| Public s/p | 0 | 0 | 0 | 0 | 0 | 0 | [redacted] | | |
| Yard tanks | 0 | 100 | 160 | 0 | 38 | 31 | 0 | [redacted] | |
| Unpaid bills (Rands per year) | | | | | | | 0 | 0 | -20,990 |

**Average Monthly Cost per household to service provider**

| | Scenario 1 | | | Scenario 2 | | | Scenario 3 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Water cons | Total cost | Unit cost | Water cons. | Total cost | Unit cost | Water cons. | Total cost | Unit cost |
| | Kl/hh pm | R/hh pm | R/kl | Kl/hh pm | R/hh pm | R/kl | Kl/hh pm | R/hh pm | R/kl |
| Pub.s/pipes | 4.0 | 3.00 | 0.75 | 4.0 | 5.68 | 1.42 | 0.0 | 0.00 | 0.00 |
| Yard tanks | 0.0 | 0.00 | 0.00 | 5.4 | 7.67 | 1.42 | 5.4 | 7.98 | 1.48 |

| | Sc 1 | Sc 2 | Sc 3 |
|---|---|---|---|
| Total income required by service provider (R pm) | 1,435 | 3,198 | 3,821 |

# Willingness to Pay and Total Amounts Unpaid:

Rural Water Supply Finance Model — Myunyane — 1 — Base year: 1996

## 9. Willingness to pay and total amounts unpaid

**Willingness to pay**

| | Av. hh inc (R pm) | max % WTP for water | maximum WTP (R/hh pm) | |
|---|---|---|---|---|
| very low | 250 | 10% | | 25 |
| middle | 751 | 8% | | 56 |
| low | 1,501 | 5% | | 75 |
| high | 3,501 | 5% | | 175 |

**Total amounts billed and paid** (R per year)

| | Total billed | Total paid | Total unpaid |
|---|---|---|---|
| **Scenario 1** | | | |
| Public s/p | 17,220 | 17,220 | 0 |
| **Scenario 2** | | | |
| Public s/p | 16,331 | 16,331 | 0 |
| Pub.s/pipes | 132,470 | 132,470 | 0 |
| TOTAL | 148,801 | 148,801 | 0 |
| **Scenario 3** | | | |
| Public s/p | 0 | 0 | 0 |
| Pub.s/pipes | 221,442 | 200,452 | -20,990 |
| TOTAL | 221,442 | 200,452 | -20,990 |

**Monthly Payments (R per month)***

| | Scenario 1 | Scenario 2 | Scenario 3 |
|---|---|---|---|
| Pub.s/pipes | [redacted] | [redacted] | [redacted] |
| Yard tanks | 0 | [redacted] | [redacted] |

**Allocation of sevices**

**% h/hs with given service and income level**

| | Pub.s/pipes | Yard tanks |
|---|---|---|
| **Scenario 1** | 100% | 0% |
| **Scenario 2** | | |
| very low | 27% | 0% |
| middle | 23% | 11% |
| low | 0% | 32% |
| high | 0% | 7% |
| **Total** | 50% | 50% |
| **Scenario 3** | | |
| very low | 0% | 27% |
| middle | 0% | 34% |
| low | 0% | 32% |
| high | 0% | 7% |
| **Total** | 0% | 100% |

## Summary:

Rural Water Supply Finance Model | Myunyane | 1 | Base year: 1998

### 10. Summary

| | Scenario 1 | Scenario 2 | Scenario 3 |
|---|---|---|---|
| **SERVICES** | | | |
| % households with on-site connections | 0% | 50% | 100% |
| **CAPITAL COST** | | | |
| Cost of shared infrastructure per h/hold | na | R 125 | R 75 |
| Cost of terminal per h/hold, full purhase cost | na | R 946 | R 946 |
| Cost of terminal per h/hold, after contributions | na | R 512 | R 512 |
| **FINANCE** | | | |
| Finance for primary infrastructure per h/h | R 0 | R 0 | R 0 |
| Finance for secondary network and terminals per h/h | na | R 637 | R 587 |
| Upfront payment per h/h for Yard tanks | na | R 100 | R 160 |
| Private loans for h/holds for Yard tanks | na | R 537 | R 427 |
| **OPERATING AND MAINTENANCE COSTS*** | | | |
| Monthly O&M cost per h/h with standpipes only | R 3.00 | R 5.68 | na |
| Monthly O&M cost for h/holds with Yard tanks | na | R 7.67 | R 7.98 |
| **MONTHLY PAYMENTS** | | | |
| Total for h/holds using public standpipes | **R 3.00** | **R 5.68** | **na** |
| Payments on private loans per h/h with Yard tanks | na | R 38.42 | R 30.55 |
| Payment to service provider per h/h with Yard tanks | | R 7.67 | R 7.98 |
| Total monthly payments per h/h with Yard tanks | | **R 46.09** | **R 38.53** |
| **UNPAID BILLS (TOTAL, RANDS)** | R 0 | R 0 | R 20,990 |

| | rate (%) | years |
|---|---|---|
| Conditions for private loans (interest rate, repayment period): | 45% | 2 |

*Note : O&M cost per h/hold calculated as (average cost per kl) X (monthly consumption per h/hold)


# *savings investment option*

## *Savings Investment Finance Model*

### Introduction

The Savings Investment Finance Model is a tool to assess the cost and affordability to households of proving on-site connections in rural villages, when the upgrading is communally financed. Communal or group financing can mean either joint saving, or joint saving and commercial loans using savings as collateral. In both options, upgrading is staggered.

The model calculates the amounts that households will be required to pay to make the service financially viable. These amounts include both payments to the service provider and payments to finance the on-site connections. It compares these payments with the amounts that households are willing to pay for water. The total amount that will remain unpaid during the course of a year is then calculated, on the assumption that households pay no more than their maximum indicated amounts. The summary indicator of viability is the net cash flow of the scheme for the year. If this is negative, the scheme is not financially viable and must be reconsidered.

### Model scope

The model has been developed for application in rural villages where water supply systems have been provided to the level of a standpipe service, and are to be upgraded to provide on-site connections. It is assumed that the bulk and connector system has sufficient capacity to cater for the additional consumption, or that any such additions will be grant financed.

For the sake of simplicity only two levels of service are provided for, namely public standpipes and on-site services.

Only residential consumers (households) are considered.

## Technical specifications

The model is an Excel worksheet, and requires a Windows environment.

## Structure of the model

The model is organised on twelve sheets, numbered 1 to 12. Inputs and outputs are ordered in a logical progression, as described below. The number and heading of each sheet is given in brackets in the description that follows. The name of the sheet is included, in inverted commas.

The model contains the following main components:

- a description of the area, planning year, etc. (1. Project description "Des");
- demographic and income data (2. Demography and income "Hhs");
- three scenarios for the provision of services, the replacement value of shared infrastructure and the capital costs of providing on-site connections (3. Investment scenarios and capital costs "Scenarios");
- for the purposes of financing, information on the division of households into 'stokvel' groups, as well as interest rates and inflation rate (4. Financing options: Groups, interest rates and inflation "Stokvels");
- financing option 1: savings only, or the "pure" Stokvel option (5. Financing option 1: Savings ("pure" Stokvel option) "FinOp1")
- financing option 2: savings and communal loans (6. Financing option 2: Communal loans with savings as collateral "FinOp2")
- graphs associated with financing option 2 (7. Financing option 2: Graphs)
- the consumption associated with each scenario, including provision for water losses (8. Estimated water consumption "Cons");
- the costs of running the system for each scenario including asset replacement, pumping, treatment, staff and other operating and

maintenance costs (9. Asset replacement, operating and maintenance expenditure (R per year) "O&M");

- the payments required of households to ensure full cost recovery (10. Monthly bills "Bills");
- the likelihood of unpaid bills if the payments required exceed the amounts that households are able/willing to pay (11. Willingness to pay and total amounts unpaid "WTP"); and
- a summary sheet of the key output variables, in a format suitable for printing (12. Summary "Summary").

**Key outputs** include the amounts that households need to pay each month to finance the upgrade and pay the water service provider. The **indicator of viability** is the total expected amount of unpaid bills: where there are unpaid amounts, the investment option is not likely to be financially sustainable and changes need to be made. Possible changes are discussed in the final section of this manual.

## *Protection, colour coding and number format*

### Protection

The sheets in the model are protected so that the user can change data only in the input blocks. This is to prevent accidental deletion of formulae as well as illegitimate changes to the calculations or outputs.

### Colour coding

The model is colour coded to allow for the easy identification of essential inputs, optional inputs, default values, ordinary outputs and key outputs.

- Essential *information* is entered in the **bright yellow blocks.** There are no default values for these inputs and if the user does not enter any information the model will read the value as zero.
- Optional inputs are entered in the **light blue blocks.** These are inputs for which the model provides default values. If the user leaves a blue block blank, the default value will be used.

- The **green** blocks are for highlighting purposes. These are essential outputs.
- Default values are displayed in **blue** against the white background. Bold blue defaults are numbers that have been directly entered, while regular blue defaults have been calculated from other inputs in the model. The method of calculation is generally recorded in a comment box on the screen[5].
- General information and outputs are displayed in **black** against the white background.
- Headings are highlighted in **pale yellow.**

### Number formats

All numerical inputs must be entered in **number format**. Where percentages are being entered, the model automatically converts the number entered to a percentage. For example, the user is requested to enter an inflation rate (sheet 4). An entry of "10" is read by the model as 10 percent. If the user were to enter "0.10", or "10%", the model would interpret this as 0.1 percent.

## *Model inputs and outputs*

### Project Description

On this sheet the user records information such as the name of the village, the base year, the person responsible for the assessment and the run number. The run number is for record keeping purposes only, for example run 1 may be the first round of modelling and run 2 may be the second round after costs and/or service levels and/or financing options have been re-evaluated.

[5] Comment boxes may be viewed by resting the cursor on a cell which displays a red dot/triangle in the top right-hand corner. In Excel 3.1, the command "View, notes" must be selected.

## Demography and income

The population and number of households must be entered here. The model uses households rather than population as the unit of evaluation, but calculates the average size of households to serve as a cross-check on the numbers entered.

This version of the model assumes a fixed number of households, since the upgrade should be completed within a relatively short space of time. If the area is experiencing rapid growth and new households are to be included in the project, the user must estimate the *final* number of households in the village.

Information on household income distribution is entered in four categories. The default categories are R0 to R500 per month, R501 to R1 000 per month, R1 001 to R2 000 per month and more than R2 000 per month. The percentage of households that falls into each of these categories must be entered. The default income distribution reflects the distribution in a "typical" rural settlement in South Africa.

Although defaults are provided, it is important that the income distribution information is as accurate as possible for the village under consideration. Income distribution and willingness to pay (discussed below) critically affect the likely affordability of the services to be provided.

The model calculates an average monthly income based on category averages. This is for information only and is not used in any further model calculations.

## Service level scenarios and capital costs

### Service level scenarios

In the table entitled "**Residential services**", the service level scenarios are determined by entering the proportion of households who, in year 5, will be provided with water from public standpipes only. The model then calculates the proportion to be provided with on-site water.

Scenario 1 is fixed as the base-line scenario in which all households are provided with standpipe water only. Scenarios 2 and 3 are designed by the user. Scenario 3 is intended to be the most ambitious, in which the highest proportion of households receive on-site connections, and scenario 2 is an intermediate scenario. The model calculates and displays the number of households with standpipe and on-site services respectively.

For example, scenario 2 could entail 60 percent of households receiving yard tanks by year 5, with the remaining 40 percent being served by public standpipes only. Scenario 3 could be one in which all households receive yard tanks. The procedure is as follows:

- Enter the name of the on-site service (e.g."Yard tank") into the yellow block below "Public standpipes").
- Enter "40" into the yellow block below "Scenario 2".
- Enter "0" into the yellow block below "Scenario 3".
- Press F9 to calculate[6].

The model will then display a "0", "60" and "100" in the blocks next to "Yard tanks". This means that, respectively, 0%, 60% and 100% of households will be been provided with the on-site service in each scenario. Respectively 100%, 40% and 0% will have access to public standpipes only. The numbers of households involved are displayed in the next three columns of the table.

## Replacement value of shared infrastructure

The user is asked to enter the replacement value of the shared infrastructure. "Shared infrastructure" refers to all bulk infrastructure, connector pipelines, reservoirs, primary reticulation pipe work and public standpipes "Replacement value" refers to the cost of constructing the infrastructure at current prices. The cost is entered in R'000s.

[6] Excel may be in manual or automatic calculation mode. If in manual mode, the user must press F9 in order for the model to calculate. If in automatic mode, the model calculates each time a number has been entered. To change the calculation mode, use "Tools, Options, Calculation" on the tool bar.

The purpose of this information is to estimate the amount that needs to be spent on maintenance each year, and the amount that needs to be put aside for asset replacement (see screen 9 "O&M").

## Capital cost of on-site connections

**"Terminals"** refer to the pipelines and on-site terminals that serve individual sites. This therefore refers to the infrastructure that is not shared by other households. Costs are entered in Rands per household.

- The full cost of the infrastructure, *if fully purchased*, is entered in the top row for each scenario (cells G18 and H18). If the per site cost is the same for both scenarios, a cost for only scenario 2 needs to be entered and the model will use this cost for scenario 3 (i.e. default for scenario 3 = cost for scenario 2).
- The next four rows make provision for reducing the cost of this infrastructure, for example by households providing labour or bricks. A subtotal is then shown (row 23).
- Provision is made for a percentage discount on the final cost (entered as a number).
- The final cash *cost per household of the terminals* is shown in *green*.
- The total cost of the project is shown in black in the last row of the table, in R'000.

## Financing options: Groups, interest rates and inflation

The next step is to decide how the on-site connections are to be financed. Two options exists, both of which involve communal saving and the staggering of upgrading. For both of these options, the community is divided into a number of savings groups ("stokvels"). One or more of these groups is upgraded at regular intervals, while all groups continue to make contributions until the project is completed and all loans have been repaid.

The rules of the programme are as follows:

1. If a household wishes to leave the scheme, it can be "bought out" by a household wishing to join. The new household must take over the assets and liabilities of the departing households, so that the effect on the scheme is neutral. The terms of this take-over are privately negotiated between the parties.
2. If a household wishes to join the scheme when there is no household wishing to be bought out, the new household must make a lump-sum contribution equivalent to the total contributed by existing participants, plus interest.
3. If a household wishes to leave the scheme but there is no household wishing to join, it forfeits the contributions already made. Such households may be compensated at the end of the project if there are savings left, but this is at the discretion of the community.

On this screen, the total number of households and the numbers that are to be provided with on-site connections in scenario 2 and scenario 3 are displayed. Provision is made for more households to drop out of the scheme than join it, and the user is asked to specify the net number of drop-outs for each scenario (default = 0).

The number of savings groups ("Stokvels") must then be specified for the two scenarios, and the number of households in each group is displayed (row 16)[7].

Three other inputs are required (all of which have defaults), namely the **deposit rate** (i.e. the interest earned on savings), **the borrowing rate** and the **inflation rate**. The defaults are estimates of current rates (1998). The loan repayment period is specified on screen 6.

The inflation rate is important because the cost of the terminals increases over time. The longer the project period, therefore, the higher the average (nominal) cost per connection.

When entering interest and inflation rates, remember that they need to be entered as numbers, not decimals or percentages. For example, enter "22" if you wish to record an interest rate of 22 percent.

[7] The calculations assume that all the groups are of equal size.

## Financing option 1: Savings ("pure" stokvel option)

The first financing option entails all participating households making monthly contributions, which are deposited in a bank account to earn interest. When sufficient finance has been saved, one or more groups are upgraded. All groups continue to make contributions, and the savings are withdrawn at regular intervals until all participating households have on-site connections. Additional contributions can be made if the participating households want a lump sum at the end of the period. This option is referred to as the "pure" Stokvel option, because it does not involve raising loans.

In the table entitled "**Timing**", for each scenario the user specifies:

1. **The frequency of upgrading phases**, i.e. the number of months between the upgrading of groups. In this option, this is also the initial saving period. For example, if a "3" is entered as the frequency of upgrading phases, then all groups save for 3 months before any upgrading is done. Then, every 3 months the selected number of groups (see point 2 below) are upgraded. The final group is upgraded as soon as enough finance is available (default = every 4 months).
2. The **maximum number of groups to be upgraded per phase.** The model assumes that this number will be upgraded in all phases except the last, when the remaining group(s) will be upgraded (default = calculated so that there are no more than 5 upgrading phases).

The model then shows the number of phases that will be required, and the number of months taken to complete the project. Since the final group is upgraded as soon as enough has been saved, the final phase may be shorter than the preceding phases.

In the table entitled "**Contributions and additional savings**", the user specifies the amount that the participants wish to have saved as a group after completion of the project (default = 0). The total cost of the project is displayed for information (row 14). The model then calculates, and displays, the monthly contributions that are required to (1) finance the upgrade and (2) provide additional savings. The **total monthly contribution** required is displayed in *green*.

The bottom set of tables displays various items of **information** for the two scenarios. The first two rows show the number of connections per phase for the initial phases and the last phase respectively.

The average cost per connection is shown in the next row for each scenario, in nominal terms. The higher the rate of inflation, and the longer it takes to provide the connections, the higher will be this average cost.

The total value of the contributions made over the period per household for upgrading (before interest) is shown in the following row, and this may be compared to the average cost. In this option, the value of contributions made for upgrading will always be lower than the cost because of the interest earned on accumulated savings. The final row shows the total value of contributions per household, including both contributions towards the upgrading and towards additional savings.

## Financing option 2: Communal loans with savings as collateral

This financing option entails a combination of communal saving and borrowing, using stokvel savings as collateral and as a source of interest income. Borrowing in this manner can significantly improve the loan terms, while the interest earned on savings helps to finance the project.

Option 1 is the cheaper option in terms of the total contribution made per household. However, if households can afford only relatively small monthly payments, this option would extend the project over too long a period. The second option allows the infrastructure to be built over a relatively short space of time, using loans that are cheaper than if households were to raise individual loans.

The procedure is as follows: participating households (in their "Stokvel" groups) all contribute a certain fixed amount each month for a set number of months. A loan is then raised to finance the upgrading of a predetermined number of groups. All the groups continue to make monthly contributions, but now only some of the money goes into the savings account while the rest is used to pay the capital charges on the loan. After a set number of months, a second loan is raised and a larger portion of the monthly contribution now goes towards paying capital charges. This continues until the last group(s) have been provided with infrastructure. Households then continue to make monthly contributions until all the loans have been paid off. The community will generally be left with an amount of money saved, the size of which will depend on the monthly contributions made.

The **"Timing"** information for this option is entered in the same format as for option 1, with the exception that the initial savings period is specified separately from the frequency of upgrading phases.

In the table entitled "**Contributions and additional savings**", the user specifies:

1. the **loan repayment period** (default = 24 months), and
2. the **monthly contribution per household** (default = calculated, on the basis of the cost per connection, loan repayment conditions and the initial savings period). This determines the viability of the programme, and the instruction is therefore highlighted in *green*.

The model then displays the following information:

1. The **total number of months during which contributions** are made, including the initial savings period and the months required to fully repay all the loans. This is limited in the model to 60 months plus the initial saving period. If this maximum is exceed, a message "time!" will appear in the green block below (row 17) and the model will not calculate the total amount saved.
2. The **amount saved** after completion of the project. This amount cannot be zero if loans are staggered, as explained on the next screen. In addition, the value of the savings account cannot fall below zero at any stage during the period. If the monthly contributions are too low to maintain a positive balance in the savings account, a message "savings!" will appear in the green block below (row 17) and the model will not calculate the total amount saved.
3. The **total cost** of the project, for purposes of comparison with the amount saved in each scenario.

The bottom set of tables displays various items of **information** for the two scenarios, as for option 1. The first two rows show the number of connections per phase for the initial phase(s) and the last phase respectively. The third row shows the average nominal cost per connection, and the last row shows the total contribution per household over the full period. In this option, the total contribution will always exceed the cost due to the interest paid on loans.

## Financing option 2: Graphs

This screen provides a graphical representation of savings and loans for scenarios 2 and 3 respectively.

The top two graphs show the total value of the savings account (green) and the cumulative (or total) loan repayments made on loans, including both interest and redemption. If the "savings" message appears on the previous screen, the savings (green) line will fall below zero in the relevant scenario. The value of savings after the project is shown by the value of the green line at the end of the project. The cumulative loan repayment is usually an S-curve because monthly repayments are initially small, increase as more loans are raised then decrease as loans are paid off and no new ones are taken out. This pattern of repayment is the reason why the total value of the savings account will be greater than zero at the end of the period (since monthly contributions are constant).

The two bottom graphs show the total monthly contributions made by the community (green), and the total monthly value of the loan repayments (black). It will be seen that total contributions are constant over the period, while loan repayments generally begin small, peak around the middle of the period and tail off at the end. This is because a larger number of loans are being repaid in the middle of the period than at either end. The exact shape of graph however depends on the repayment period, the frequency of upgrades and the rate of inflation.

## Estimated water consumption

The model user enters the expected monthly consumption of households by service type, and expected physical losses as a percentage of total consumption. The model then calculates total water demand. Default amounts can be used in the absence of local information.

Water consumption information is required to calculate operating expenditure, particularly when bulk water is purchased, pumped and/or treated. It can also be useful as a check on whether the proposed primary infrastructure is designed to supply an appropriate amount of water: too little capacity will lead to obvious problems of supply while excessive capacity may mean higher than necessary asset replacement and maintenance costs.

## Asset replacement, operating & maintenance expenditure

Recurrent costs (other than finance charges) are dealt with on this sheet.

- Annual asset replacement costs are entered as a percentage of the replacement cost of the infrastructure (default = 0.8 percent). The replacement value is displayed, as entered on screen 2, and the total cost per year is shown in the last three columns of the table for each scenario (cells H9-J9). Note that this is not necessarily an actual expense, but a provision for future asset replacement. The user may wish to cancel out this expenditure (by entering a "0") while households are financing the upgrading.
- Pumping costs are recorded by entering the percentage of average daily flow that is to be pumped in each scenario, and the cost of diesel and/or electricity in terms of the cost per kl of water pumped (c/kl). The average daily flow for each scenario is displayed at the top of the table (cells I6-J6). The total annual costs are displayed in the row in which costs are entered (cells H12-J12).
- Treatment costs are recorded by entering a cost per kl of water treated (c/kl). The total annual costs are displayed as above.
- Bulk purchase costs are recorded by entering a cost per kl of water bought (c/kl), and the percentage of the total amount used that is purchased. The total annual costs are displayed as above.
- Other expenditure is entered as an amount per annum for each scenario (cells H17-J17).
- Maintenance costs are entered as a percentage of the replacement cost of the infrastructure, as in the case of asset replacement (see above).
- Staff costs are calculated for each scenario by entering the number of staff employed in each of four categories, at salary amounts entered by the user.

- Provision is made for overheads as a percentage of staff costs. A default value of 10 percent of staff costs is used.

The model than calculates total costs per annum for each of the scenarios, in Rands (row 31). It also calculates the cost per kl of water sold and of water used, the latter including physical losses (c/kl, rows 32 and 33).

## Monthly bills

All the cost information required to calculate monthly payments is now available. Provision should however be made for **non-payment** to the service provider. For example, funeral expenses may mean that a household has insufficient resources to pay its water bill for a month or two. If provision is made for this, then the service provider can accommodate such problems without jeopardising its financial viability. A non-payment rate of, say, 5% should be allowed.

It is important to note that this non-payment is different to a permanent unwillingness/inability to pay for the services provided. Unpaid bills for the latter reason are dealt with on the next sheet as a "willingness to pay" issue.

Having set a non-payment rate, monthly payments (or household bills) can then be calculated. The first decision to be taken on the current sheet is the amount that needs to be paid to the service provider by households with and without on-site services respectively. The amounts to be paid are determined by entering **a payment ratio** for each scenario in the blue blocks (cells HG9 and I9). For example, entering a "2" for the on-site service means that the average monthly payment for this service will be twice the payment for a standpipe service.

The decision on payment ratios is assisted by the provision of monthly cost ratios, which are calculated from the monthly costs of service provision displayed in the third table on this screen. The cost ratios are displayed to the left of the payment ratios in the top table. The default payment ratios are equal to these cost ratios.

Once the payment ratios and "normal" non-payment rates have been set, the model calculates monthly water bills payable to the service provider to ensure that its total annual expenditure requirements are met. These are displayed in the last three columns of the top table, for scenarios 1, 2 and 3 respectively.

The second table on this screen displays the monthly household contributions toward the upgrade for financing option 1 and option 2 respectively. The second decision to be taken by the user is the **financing option** to be used. Entering a "1" into the blue block at the top right hand corner of the table will select option 1, otherwise option 2 will be selected (by default).

The *green* blocks in the last three columns display the **total monthly payments** due by households, both to finance the upgrade and to pay the service provider for operating the service. Total unpaid bills, which are calculated on the next sheet and discussed below, are reflected here directly below the total monthly payments.

The total monthly income required by the service provider to ensure financial viability is shown in the last line on the sheet.

## Willingness to pay & amounts unpaid

The monthly payments necessary for financial viability have been set on the previous sheet. The question to be answered on this sheet is whether households are able/willing to make these payments. In order to establish this, it is necessary firstly to establish willingness to pay by income category, and secondly to allocate services to income groups to match willingness to pay with monthly bills.

- The user enters the amounts that households in each income category are willing to pay in the blue blocks in the top right hand table (cells E7 to E10). The default amounts shown to the right of the input blocks are calculated as respectively 10%, 7.5%, 5% and 5% of the average income for each category.
- Total monthly bills are displayed in *green* in the top right hand table. The amounts shown here are the total amounts calculated on the previous screen and highlighted in green ("Bills", K14-M15).
- The model allocates services by assuming that on-site connections are allocated to higher income households first (bottom right hand table).

- The total amounts billed, paid and unpaid per year are shown in the bottom left hand table. The total amounts paid are calculated by assuming that households whose bills exceed the amounts they are able/willing to pay, pay as much as they are able/willing to. The remainder becomes "unpaid bills".

### Summary

Table 1 on the final sheet of the model summarises the key features of the two finance options for each scenario, in terms of monthly and total contributions per household, costs and total amounts saved by the community.

Table 2 summarises the key features of the scenarios modelled. The first row shows the percentage in each scenario with on-site connections. The second row shows the full purchase cost of each connection, and the third row shows the actual cost after household (in-kind) contributions and negotiated discounts. The next row shows the monthly financial contributions to be made per household to finance the on-site terminals. The financing option selected is displayed in the first column of the Table.

Monthly payments are then shown for households using public standpipes and those with on-site terminals respectively. The final row shows the total amount of unpaid income per annum for each of the scenarios.

## *The meaning of unpaid bills*

If a scenario produces unpaid amounts, it means that (some) households are receiving services that they cannot afford to or are unwilling to pay for. The service provider will not remain financially viable, and the scenario needs to be re-examined to see where changes are possible. Possible changes, within reason, include:

- negotiating increases in the amounts that households are willing to pay and/or longer saving periods between upgrades;
- financing the infrastructure in a different manner, for example selecting option 2 if option 1 has been selected;

- reducing the cost of on-site services for example by encouraging villagers to provide their labour and make bricks;
- negotiating more favourable loan conditions and/or higher rates on savings accounts;
- reducing the proportion of households to receive on-site services;
- reducing operating and maintenance costs, for example, through a different staffing system.

If these steps fail to eliminate non-payment, a more fundamental re-think of the project is necessary.

## Project Description

| | |
|---|---|
| Province: | **K/N** |
| Village: | **Myunyane** |
| Description : | **Peri-urban village** |
| Run: | **1** (=1,2,3 etc.) |
| Scenarios | Scenario 1 is standard - public standpipes only for residential consumers<br>**Scenario 2 : partial upgrading to yard tanks**<br>**Scenario 3 : 100% upgrading to yard tanks** |
| Base year: | **1998** |
| Assessment by: | **Minnie V-H** |
| Date(dd/mm/yy) | **98/09/30** |

## Demography and Income

**Population** 4,500

**Households**

| | |
|---|---|
| **Total households** | 479 |
| People per household | 9.4 |

**Income distribution**

| Income category | from | to (R/pm) | Average income | % H/hs | Number |
|---|---|---|---|---|---|
| very low | | | 250 | **27** | 129 |
| low | | | 751 | **34** | 163 |
| middle | | | 1,501 | **32** | 153 |
| high | | **more** | 3,501 | **7** | 34 |
| Average income (R /CU pm) | | | | 1,048 | 479 |
| | **0** | **500** | | **33** | |
| | **501** | **1,000** | | **32** | |
| | **1,001** | **2,000** | | **26** | |
| | **2,001** | **more** | | 9 | |

# *Investment scenarios and capital cost*

**Residential services**

| % of households with service indicated: | | | | Number of households : | | |
|---|---|---|---|---|---|---|
| | Scenario 1 | Scenario 2 | Scenario 3 | Scenario 1 | Scenario 2 | Scenario 3 |
| Public standpipes | 100 | 60 | 0 | 479 | 287 | 0 |
| **Yard tanks** | 0 | 40 | 100 | 0 | 192 | 479 |

**Replacement value of shared infrastructure** (R'000) **1,062**

**Capital cost of on-site connections (R'000)**

| | | | | | |
|---|---|---|---|---|---|
| | **TERMINALS: Total fully purchased cost (R/hh)** | **Sc1 R/hh** | **Sc 2 R/hh** | **Sc 3 R/hh** | |
| | | Yard tanks | 946 | | 946 |
| **Minus :** | labour costs (R/hh) | | 146 | | 146 |
| | training of plumbers | | 110 | | 110 |
| | own bricks | | 50 | | 50 |
| | | | | | 0 |
| | sub-total | | 640 | 640 | |
| | % discount on remaining cost | | 20 | | 20 |
| | Actual cost of terminals (R/hh with on-site) | | 512 | 512 | |
| | Total project cost of terminals (R000, real) | | 98 | 245 | |

**Notes**

# *Financing Options: Groups, interest rates and inflation*

## HOUSEHOLDS AND GROUPS

**Rules:**
1. New households will "buy out" departing households where possible.
2. If no households are leaving, new households must pay full contributions + interest to join
3. If there are no new households to "buy out" those departing, the latter forfeit their contributions.

| | | Scenario 2 | | Scenario 3 | |
|---|---|---|---|---|---|
| | **Total h/hs** | **479** | | **479** | |
| **Number h/hs receiving** | **Yard tanks** | **192** | | **479** | |
| | **Net drop-out (no. h/hs)** | | 0 | **0** | 0 |
| | **Number of groups** | **8** | | **23** | |
| | H/hs per group | **24** | | **21** | |

**INTEREST RATES**

| | | |
|---|---|---|
| **Deposit rate (% pa)** | | 12 |
| **Borrowing rate (%pa)** | | 22 |
| Net borrowing rate (% pa) | 10.0 | |

**INFLATION RATE**

| | | |
|---|---|---|
| **Inflation (% pa)** | 12 | 8 |

# *Financing Options: Savings (pure stokvel option)*

**TIMING**

| | Scenario 2 | | Scenario 3 | | |
|---|---|---|---|---|---|
| **Frequency of upgrading phases** | | 4 | | 4 | **(every ... Months).** This is also |
| **Max. no. groups upgraded per phase** | | 2 | | 5 | the initial savings period. |
| Total number phases | 4 | | 5 | | |
| **Total months to complete project** | 16 | | 18 | | (project completed as soon as sufficient finance saved) |

**CONTRIBUTIONS AND ADDITIONAL SAVINGS**

| | Scenario 2 | | Scenario 3 | |
|---|---|---|---|---|
| **Amount saved after completion R** | | 0 | | 0 |
| Total cost of project R | 106,897 | | 270,087 | |
| Monthly contribution to finance upgrade | 34 | | 30 | |
| Additional monthly contribution | 0 | | 0 | |
| **Total monthy contribution** | 34 | | 30 | |

| | Scenario 2 | Scenario 3 |
|---|---|---|
| Connections per phase (except last) | 48 | 104 |
| Connections in last phase | 48 | 62 |
| Average cost per hh (nominal) | 558 | 564 |
| Total paid per h/hold for upgrading | 550 | 556 |
| Total contribution per household | 550 | 556 |

# *Financing Option 2: Communal Loans with Savings as collateral*

**TIMING**

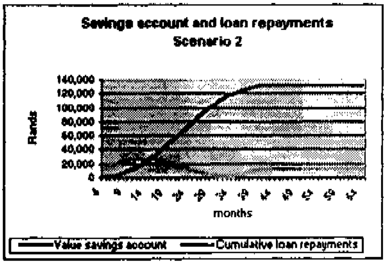
| | Scenario 2 | | Scenario 3 | | |
|---|---|---|---|---|---|
| **Initial savings period (months)** | | 4 | | 4 | |
| **Frequency of upgrading phases** | | 4 | | 4 | **(every ... Months).** |
| **Max. no. groups upgraded per phase** | | 2 | | 5 | |
| Total number phases | 4 | | 5 | | **(max = 15 phases)** |
| **Total months to complete upgrading** | 16 | | 20 | | (final upgrade done at end of appropriate saving period) |

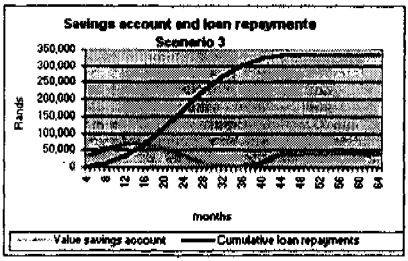
**CONTRIBUTIONS AND ADDITIONAL SAVINGS**

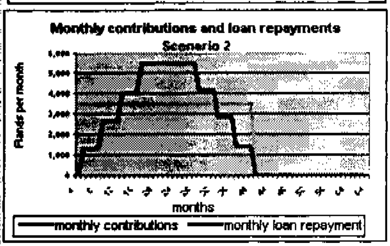
| | Scenario 2 | | Scenario 3 | | |
|---|---|---|---|---|---|
| **Loan repayment period (months)** | | 24 | | 24 | |
| **[illegible] per month)** | 18 | 23 | 17 | 23 | |
| Total months contributions made | 39 | max = 64 | 43 | max = 64 | contibutions are made until the loan is fully repaid |
| **Amount saved after completion R** | 12,526 | | 41,497 | | |
| Total cost of project R | 106,887 | | 270,661 | | |

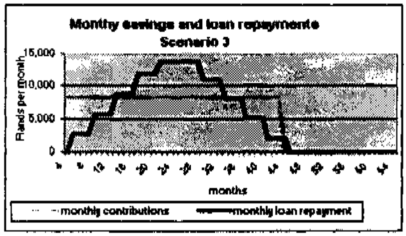
| | Scenario 2 | Scenario 3 |
|---|---|---|
| Connections per phase (except last) | 48 | 104 |
| Connections in last phase | 48 | 62 |
| Average cost per hh (nominal) | 558 | 565 |
| Total contribution per household | 702 | 731 |

# Financing Option 2: Graphs



# *Estimated Water Consumption*

**Household Consumption (kl/month per household)** (after completion of upgrade)

| Type of service | kl/hh/month | | l/cap/day | Scenario 1 | Scenario 2 | Scenario 3 |
|---|---|---|---|---|---|---|
| Public standpipes | | 3.0 | 11 | 1,437 | 862 | 0 |
| Yard tanks | 5.4 | 6.0 | 19 | 0 | 1,035 | 2,587 |
| **Total water consumption (kl/mnth)** | | | | **1,437** | **1,897** | **2,587** |

**Total water consumption and losses (kl per year)**

| | Scenario 1 | Scenario 2 | Scenario 3 | |
|---|---|---|---|---|
| Total consumption | 17,244 | 22,762 | 31,039 | |
| **Physical water losses (as % water consumed)** | | | | (Enter as number, not %) |
| **Physical losses (kl per year)** | 2,587 | 3,414 | 4,656 | |
| **Total bulk water provided (kl per year)** | 19,831 | 26,176 | 35,695 | |
| Physical water losses (as % water supplied) | 13% | 13% | 13% | |
| | 15 | 15 | 15 | |

# Asset replacement, Operating & Maintenance Expenditure

| Bulk and distribution infrastructure | | | | | | Scenario 1 | Scenario 2 | Scenario3 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Average daily flow (kl/day): | 54 | 72 | 98 | | | |
| Asset replacment | % of replacement value, shared infrastructure | | | | | Cost (R pa) | Cost (R pa) | Cost (R pa) | | | |
| | Value (R'000) | | % | | | | | | | | |
| | 1,062 | | | | | 8,496 | 8,496 | 8,496 | 0.8 | | |
| Pumping | % average daily flow pumped | | | diesel cost | electricity | | | | | | |
| | Scenario 1 | Scenario 2 | Scenario3 | c/kl | c/kl | | | | | | |
| | | | | | | 0 | 0 | 0 | | | |
| Treatment | Cost of chemicals (c/kl) | | | | | | | | | | |
| | | | | | | 0 | 0 | 0 | | | |
| Bulk purchase | c/kl | % purchased | Scenario 1 | Scenario 2 | Scenario3 | | | | | | |
| | | | | | | 0 | 0 | 0 | | | |
| Other general expenditure | | | | | | | | | | | |
| Maintenance | % of replacement value, shared infrastructure | | | | | | | | | | |
| | Value (R'000) | | % | | | | | | | | |
| | 1,062 | | | | | 10,620 | 10,620 | 10,620 | 1.0 | | |
| Staff costs | Staff category | Average salary (R pm) | Number of staff per category | | | | | | | | |
| | | | Scenario 1 | Scenario 2 | Scenario3 | | | | | | |
| | category 1 | 150 | | | | 0 | 0 | 0 | | | |
| | category 2 | 500 | 1.0 | 1.0 | 1.0 | 6,000 | 6,000 | 6,000 | | | |
| | category 3 | 1,000 | | 1.0 | 1.0 | 0 | 12,000 | 12,000 | | | |
| | category 4 | 2,000 | | | | 0 | 0 | 0 | | | |
| | TOTAL STAFF | | 1.0 | 2.0 | 2.0 | 6,000 | 18,000 | 18,000 | | | |
| Overheads | as % of staff costs | | | | | | | | | | |
| | Value (R'000' | 0 | % | | | | | | | | |
| | | | | | | 600 | 1,800 | 1,800 | 10.0 | 10.0 | 10.0 |
| Total | | | | | | 25,716 | 38,916 | 38,916 | | | |
| Cost (c/kl of water sold) | | | | | | 149 | 171 | 125 | | | |
| Cost (c/kl of water used, including physical losses) | | | | | | 130 | 149 | 109 | | | |

# Monthly Bills

| | Sc 1 | Sc 2 | Sc 3 |
|---|---|---|---|
| % non-payment to service provider | | | |

**Monthly bills set so that service provider breaks even in year 5, after allowing for non-payment**

| Payments to service provider | Cost ratios | | | Payment ratios | | | Monthly water bills (R/hh pm) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Scen.1 | Scen. 2 | Scen. 3 | Scen.1 | Scen. 2 | Scen. 3 | Scen.1 | Scen. 2 | Scen. 3 |
| Public s/p | 1.0 | 1.0 | 0.0 | 1.0 | 1.0 | 1.0 | 4.47 | 5.13 | 0.00 |
| Yard tanks | 0.0 | 1.8 | 6.8 | | | | 0.00 | 9.23 | 6.77 |
| | | | | | 1.8 | 6.8 | | | |

**Financing for options 1 and 2** Option selected (1=savings only, 2= savings and communal loans) 2 2

| Total payments by *households* | Option 1: savings only (*"pure" stokvel*) | | | Option 2 : loans using *savings as collateral* | | | *Total monthly payments (R/hh per month)* | | |
|---|---|---|---|---|---|---|---|---|---|
| | Scen.1 | Scen. 2 | Scen. 3 | Scen.1 | Scen. 2 | Scen. 3 | Scen.1 | Scen. 2 | Scen. 3 |
| Public s/p | na | na | na | na | na | na | [illegible] | [illegible] | [illegible] |
| Yard tanks | na | 34 | 30 | na | 18 | 17 | na | [illegible] | [illegible] |
| | | | | | | Unpaid bills (Rands per year) | 0 | 0 | 0 |

**Average Monthly Cost per household to service provider**

| | Scenario 1 | | | Scenario 2 | | | Scenario 3 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Water cons | Total cost | Unit cost | Water cons. | Total cost | Unit cost | Water cons. | Total cost | Unit cost |
| | Kl/hh pm | R/hh pm | c/kl | Kl/hh pm | R/hh pm | c/kl | Kl/hh pm | R/hh pm | c/kl |
| Pub.s/pipes | 3.0 | 4.47 | 149 | 3.0 | 5.13 | 171 | 0.0 | 0.00 | 0.00 |
| Yard tanks | *0.0* | *0.00* | *0.00* | *5.4* | *9.23* | *171* | *5.4* | *6.77* | *125* |

**Total income required by service provider (R pm)**

| Sc 1 | Sc 2 | Sc 3 |
|---|---|---|
| | | |

# *Willingness to pay and total amounts unpaid*

**Willingness to pay**

| | Av. hh inc (R pm) | max % WTP for water | maximum WTP (R/hh pm) | |
|---|---|---|---|---|
| **very low** | 250 | 10% | | 25 |
| **middle** | 751 | 8% | | 56 |
| **low** | 1,501 | 5% | | 75 |
| **high** | 3,501 | 5% | | 175 |

**Total amounts billed and paid** (R per year)

| | Total billed | Total paid | Total unpaid |
|---|---|---|---|
| **Scenario 1** | | | |
| Public s/p | **25,716** | **25,716** | **0** |
| **Scenario 2** | | | |
| Public s/p | 17,689 | 17,689 | 0 |
| Pub.s/pipes | 62,613 | 62,613 | 0 |
| **TOTAL** | **80,302** | **80,302** | **0** |
| **Scenario 3** | | | |
| Public s/p | 0 | 0 | 0 |
| Pub.s/pipes | 136,632 | 136,632 | 0 |
| **TOTAL** | **136,632** | **136,632** | **0** |

**Monthly Payments (R per month)**

| | Scenario 1 | Scenario 2 | Scenario 3 |
|---|---|---|---|
| Pub.s/pipes | [redacted] | [redacted] | [redacted] |
| Yard tanks | na | [redacted] | [redacted] |

**Allocation of sevices**

**% h/hs with given service and income level**

| | Pub.s/pipes | Yard tanks |
|---|---|---|
| **Scenario 1** | 100% | 0% |
| **Scenario 2** | | |
| very low | 27% | 0% |
| middle | 33% | 1% |
| low | 0% | 32% |
| high | 0% | 7% |
| **Total** | **60%** | **40%** |
| **Scenario 3** | | |
| very low | 0% | 27% |
| middle | 0% | 34% |
| low | 0% | 32% |
| high | 0% | 7% |
| **Total** | **0%** | **100%** |

**Table 1 Summary and comparison of finance options**

| | Description of financing option | Monthly payments (R/hh) | No. monthly payments made | Total contribution per h/hold (R) | Average cost per household (R) | Total amount saved after project (R) |
|---|---|---|---|---|---|---|
| **Scenario 2** | | | | | | |
| Option 2 | "Pure" stokvel | 34 | 16 | 550 | 558 | 0 |
| Option 3 | Savings and communal loan | 18 | 39 | 702 | 558 | 12,526 |
| **Scenario 3** | | | | | | |
| Option 2 | "Pure" stokvel | 30 | 18 | 566 | 564 | 0 |
| Option 3 | Savings and communal loan | 17 | 43 | 731 | 565 | 41,497 |

***Table 2. Services, monthly payments, bills and non-payment***

| | Scenario 1 | Scenario 2 | Scenario 3 |
|---|---|---|---|
| **SERVICES** | | | |
| % households with on-site connections | 0% | 40% | 100% |
| **CAPITAL COST** | | | |
| Cost of terminal per h/hold, full purhase cost | na | R 946 | R 946 |
| Cost of terminal per h/hold, after contributions | na | R 512 | R 512 |
| **FINANCE FOR ON-SITE TERMINALS** | | | |
| **Option selected: 2: Savings and communal loans** | | | |
| Monthly contribution towards investment | na | R 18 | R 17 |
| **MONTHLY PAYMENTS** | | | |
| Total for h/holds using public standpipes | R 4.47 | R 5.13 | na |
| Total monthly payments per h/h with yard connectio | na | R 27.23 | R 23.77 |
| **UNPAID BILLS (Total per year, Rands)** | R 0 | R 0 | R 0 |

# *training*

*training*

## Training for Cost Recovery & Sustainability

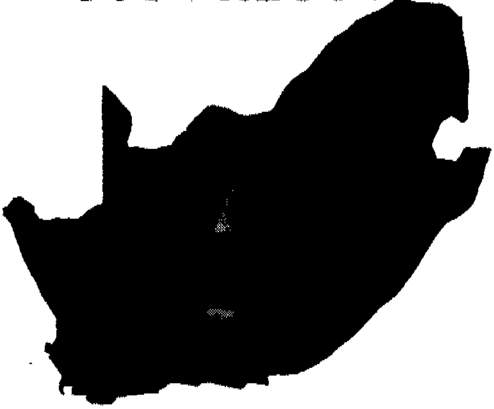
The Mvula Trust has been an innovative leader in demand-driven approaches to water supply and sanitation provision since its inception in 1993. The approach is unique in that it engages communities in decision-making and management of water services (including sanitation). Mvula's experience has supported what other international community water and sanitation projects have argued for years, i.e.- effective capacity at the local level is a prerequisite to ensuring the sustainability of water and/or sanitation schemes.

Currently, in South Africa, very little training is being provided in the community water supply and sanitation (CWSS) sector. There are various *ad hoc* project-related attempts to improve the skills base of water and sanitation committees, consultants and local government staff. In Mvula's experience and through funders' evaluations of the impact of this training, these courses vary considerably in terms of quality and content and, for various reasons, usually lack meaningful impact. There is a significant gap between training needs and opportunities in the CWSS sector.

The training component included in this Help Manual forms part of a larger initiative to develop an integrated South African CWSS sector-specific training programme which links proven participatory training methods with the specific opportunities and constraints encountered in the sector. The training approach utilises participatory training methodology. The material examples on the following pages used in both poster and board formats, depict the messages in the table below. If focuses firstly on the benefits of water, the reasons for communities to sustain their own systems, community choice – both technical and financial, etc. The material is interpretative, and should be used in conjunction with the slides and field experience.

| WHAT IS THE MESSAGE? | | MOTIVATION |
|---|---|---|
| 1. | Consumers need to pay for water services | Why pay for water?<br>❖ Sustainable systems<br>❖ Maintaining the system<br>❖ No more grant funding<br>❖ No more free diesel<br>❖ Not enough state money |
| 2. | You are not paying for water alone | ❖ Yard connection infrastructure<br>❖ Convenience<br>❖ Closer proximity<br>❖ Paying for clean water<br>❖ Better health |
| 3. | There are different ways to manage water payment systems | ❖ Choice of technical option<br>❖ Choice of type of payment (flat rate or consumption)<br>❖ Most suitable to community circumstances (affordability)<br>❖ Most suitable to water resource<br>❖ Compromise with service authorities and providers |
| 4. | There are different ways to pay for a yard tap | ❖ Choice of payment option<br>❖ Suit the pockets of community members<br>❖ Communities must be willing to pay for a yard tap |

# COST RECOVERY



# The basics: Approach

## *Intervention and Facilitation for Cost Recovery*

- To approach cost recovery in a holistic manner, based on Demand Responsive Approach.
- To establish a firm linkage between payment for water, economic growth, e.g savings schemes, a Village Bank, etc.
- To facilitate a process of complete understanding amongst local government and the communities about their respective roles and responsibilities.

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# The basics: Approach

*(Cont..)*

- To facilitate a process of cross-subsidisation of household infrastructure between local government and communities.
- To create an awareness amongst consumers of the benefits of water and their obligations to foster sustainability.
- To create a link between water and an ethos of savings.
- To use water as an entry-point for poverty alleviation and job creation through the facilitation of multi-sectoral partnerships.

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# Cost Recovery: Introduction

**Why do consumers need to pay for water?**

- Capital funds = insufficient
- Public funds = insufficient
- Payment guarantees sustainable supply
- Health and other social benefits
- Economic growth potential & poverty alleviation

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# Payment Pre-conditions

## Communities will pay if they:

- Have a choice of technical options
- Have a choice of type of payment system
- Have a choice of service level: yard connection and/or standpipe
- Are willing and able to pay for water
- Have affordable and resource-applicable technical options
- Have a workable compromise between WSA and WSP
- Acceptable service standard and delivery

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# Payment Environment

## Consumers will pay if:

- They get their chosen service level
- The standard and quality of water is acceptable
- They perceive benefits such as:
  - a relationship between water and production
  - poverty alleviation and economic activity
  - relative cost of water versus other expenditure
- It is in the common interest of the community
- An enabling policy environment exists

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# Payment Environment

**Consumers will pay if: (continued..)**

- There is enforcement of payment policy
- They have a perception of ownership and responsibility
- There is transparency and accountability in financial management
- A conducive institutional framework exists

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# Financial Options for Rural Water Provision

# Rural Water Provision

**Finance Options**

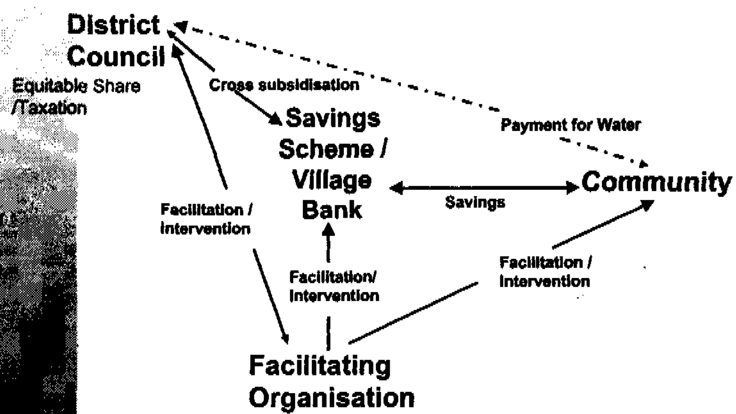
**- Community mobilised funds --**

- Savings Investment (Stokvels) Option
- Savings ('pure' Stokvels) Option
- Institutional Loans
- Retail Loan Option
- Cross Subsidisation

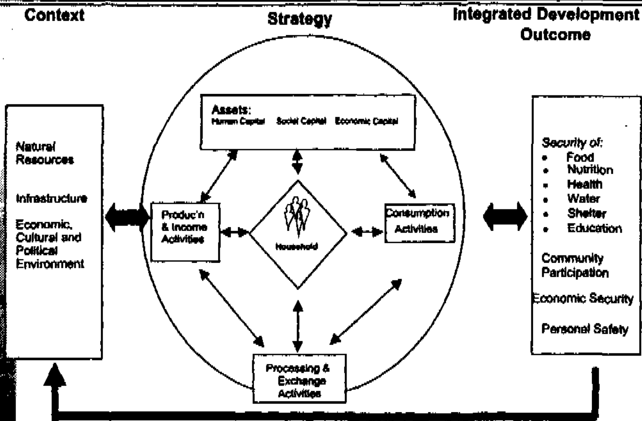
# Mobilising Funds: Yard Connections

- **Formalised Savings schemes:**
  - individual savings to fund household infrastructure
  - *individual savings as collateral to borrow money*
  - group savings to implement block infrastructure
  - savings as collateral for group borrowing (Grameen Bank principles)
  - SOCIAL INTERVENTION NEEDED TO MOBILISE SAVINGS
- **Cash payments:**
  - yard tap only installed if household pays for infrastructure
  - PROJECT AT RISK OF A STOP-START & PROLONGED IMPLEMENTATION

# How can Cross Subsidisation work?



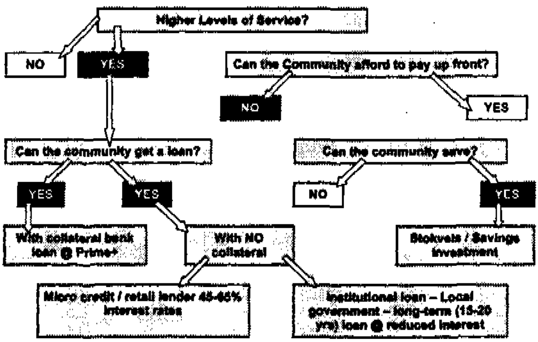
# Integrated Development Model -- using water as an entry point for mobilising money




After Swift 1989, Drinkwater 1994, Drinkwater and Frankenberger, 1999, Carney 1998

Levels of Service & Cost Recovery Programmes, Policy Unit, Braamfontein 2092, Johannesburg

# Flow Chart for Financing Yard Connections



# Rural Water Provision

## Savings-Investment Option

**What is the Savings-Investment (Stokvel) Option?**

- A stokvels is a community savings scheme & operates on a solidarity peer group pressure principle.
- Members of a stokvel constitute a group that exerts pressure on one-another to fulfil their financial obligations.
- Stokvels is similar to a savings scheme or a savings co-operative.

# Rural Water Provision

## Savings-Investment Option

**What is the Savings-Investment (Stokvel) Option?**

- This option hinges on mobilising savings from individuals who participate in the scheme.
- Individual savings is pooled into group savings & is used as collateral against borrowings.
- Savings are invested to build a credit record.

# Rural Water Provision

## Savings-Investment Option

**What is the Savings-Investment (Stokvel) Option?**

- Investments are made in the name of the Stokvel.
- The participating Stokvel members benefit directly from the investment yield.
- [illegible] Stokvel itself will become the credit [illegible]er.
- [illegible]itworthiness will hinge on the perfor-[illegible]ce of the Stokvel

# Rural Water Provision

## Savings-Investment Option

**What is the Savings-Investment (Stokvel) Option?**

- Stokvel savings are invested in a formal financial institution with earnings at commercial interest rates.
- [illegible] loan for on-site water provision is taken [illegible] against the savings as collateral at a [illegible]tiated low interest rate.

# Rural Water Provision
## Savings-Investment Option

**What is the Savings-Investment (Stokvel) Option?**

- The collateral is on-going against borrowings and interest is offset against the loan.
- Stokvel savings and borrowing occur parallel.
- The loans are staggered and repayments calculated taking both interest earned and top-up amounts into account.

# Rural Water Provision
## Savings-Investment Option

**What is the Savings-Investment (Stokvel) Option?**

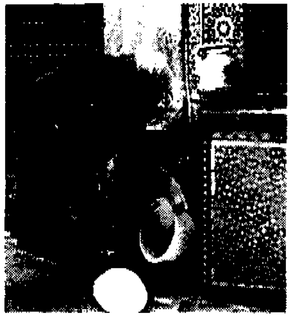
- The loan repayment % constitutes the difference between % interest earned and % interest paid.
- The duration of the process depends on the levels and speed of savings.

# Rural Water Provision

## Savings-Investment Option

**What is the Savings-Investment (Stokvel) Option?**

- When all loans are repaid the Stokvels savings can then be applied at the discretion of the participating member groups.



# Rural Water Provision

## Savings-Investment Option

**Advantages**

- This option is possible if there is a total buy-in from members.
- Group pressure enhances repayment potential.
- Savings groups take responsibility for the implementing time.

**Disadvantages**

- No enabling environment currently exists for this type of loan arrangement.
- Training savings groups is expensive.
- A *facilitating organisation* is crucial to the process.

# Rural Water Provision
## Savings-Investment Option

**Advantages**

- The whole community ultimately benefits from the savings scheme.
- The Stokvel members can become credit-worthy.
- Further credit at negotiated rates

**Disadvantages**

- On-site water provision cannot happen simultaneously to all households.
- The process is long and members may loose interest.

# Rural Water Provision
## Savings ('pure' Stokvel) Option

- In the instance of the Savings ('pure Stokvel) Option, no money is borrowed and the stokvel savings are deposited and withdrawn as and when the community needs it.
- No savings are amassed.

# Rural Water Provision: Institutional Loan Option

**What is an institutional loan?**

- It is an urban model for paying for a utility through levies, tariffs and taxes.
- A state structure such as a local authority negotiates a loan with the DBSA at a low interest rate, repayable over a 10-20 year period.

# Rural Water Provision: Institutional Loan Option

**What is an institutional loan? (cont.)**

- The local authority takes full responsibility for the repayments.
- The local authority has the obligation to put its own management processes in place for the collection of levies, tariffs or taxes.
- The management structure used by the local authority can be negotiated with the Water Committee

# Rural Water Provision: Institutional Loan Option

- **Community**

Water tariff determined in conjunction with Local Authority

Tariffs collected by Water Services Provider (WC)

- Service Agreement entered into between Water Services Provider and Authority (WSAct)

- **Local Authority**

Tariffs determined & levied by Local Authority and Water Services Provider (WC)

Upkeep of resource i.t.o. negotiated obligations.

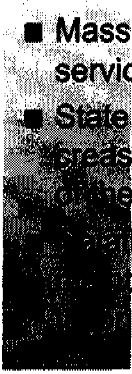
# Rural Water Provision: Institutional Loan Option

**Mvula Trust Facilitation Process**

Service Agreement between Water Services Provider and Authority

- Tariff setting and affordability
- Monitoring of duties and responsibilities i.t.o. Service Agreement
- Management obligations of Water Committee
- Financial negotiations with financial institutions

# Rural Water Provision: Institutional Loan Option



**Advantages**

- Low repayment rates
- Massification of on-site services
- State obligation increases to the poorest of the poor
- Relatively secure maintenance expectations

**Disadvantages**

- Low financial capacity of *local government*
- Low management capacity of local government
- Tariff collection linked to specific technical option

# Rural Water Provision: Institutional Loan Option

**Disadvantages**

- Not geared towards financial independence in communities
- Tariff repayment record not accepted by formal financial institutions.
- Questionable long-term sustainability

# Rural Water Provision
## Retail Loan Option

**What is the Retail Loan Option?**

- Retail lenders normally work in conjunction with financial guarantee schemes.
- These schemes underwrite a % of the anticipated payment defaults.
- The retail lender enters into a loan agreement with individual community members or with a constituted organisation.

# Rural Water Provision
## Retail Loan Option

**What is the Retail Loan Option? (cont.)**

- Loans are not supported by individual or community collateral.
- One condition for a loan may be a small deposit from individuals, which is used as security.
- O & M payment history is taken into account when a loan is considered.

## Rural Water Provision
## Retail Loan Option

### What is the Retail Loan Option?(cont.)

- Retail lenders calculate their interest rates and repayment terms according to risk and market factors.
- Repayment terms are short: between 18-24 months.
- Interest rates are calculated to compensate for the high risk factor.
- As a result of the risk factor, interest rates are substantially higher than formal banking institution rates.

## Rural Water Provision
## Retail Loan Option

**Advantages**

- Obtaining credit depends on a small number of variables and it is easier than with a formal banking institution.
- On-site water can be provided for an entire community at one time.

***Disadvantages***

- Interest rates are very high.
- Repayment time is short.
- Repayment amounts exceed capacity to pay.
- Default rates are increased as a result of *high repayment* amounts

# Rural Water Provision
## Retail Loan Option

**Advantages**

- A good repayment record will ensure commercial credit-worthiness.
- Repayment record is accepted as a credit reference by formal banking institutions.
- A commercial agreement is entered into.

**Disadvantages**

- Administration cost to collect money from individuals is high.
- After the loans have been repaid, communities do not retain any financial independence.
- Sustainability is suspect.

# Technical Options for Yard Connections

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## Levels of Service

- Rudimentary Systems
- RDP Level
- Low Pressure yard connections
- Medium Pressure yard connections
- Full Pressure yard connections

# Technical Options

- Option 1:
  - Mixed levels of service: communal standpipe + yard taps and flat-rate payment system
- Option 2:
  - Higher levels of service: yard taps and manually metered payment system (considering the indigent)
- Option 3:
  - Higher levels of service: yard taps and pre-payment metering payment system (considering the indigent)
- Option 4:
  - Higher levels of service: yard tanks and manifold system (pre-payment)

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# Technical Options

- Option 1:
  - Communal standpipe + yard tap and flat-rate payment

  1. ***Households pay a set fee for their yard connection.***
  2. ***Households who do not want a yard connection obtain water from standpipe and pay a set amount of e.g. R20 per month.***
  3. ***Households who have a yard connection pay a set amount of e.g. R30 per month***

- Option 2:
  - Higher levels of service: yard taps and manually metered payment system

  1. ***Households pay a set fee for their yard connection***
  2. ***Council supplies meter and x length of pipe and ownership rests with Council (see Cross-subsidisation model)***
  3. ***Monthly payment for water consumed with tariffs set to take the indigent into account.***

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# Technical Options

- Option 3:
  - Higher levels of service: yard taps and pre-payment metering payment system
  1. *Households pay a set fee for their yard connection.*
  2. *Households enter into a savings scheme and contribute to the cost of the pre-payment meter system -- pipes*
  3. *Council pays of the bulk of the pre-payment system -- meters*
  4. *Monthly consumption is paid for up-front*
- Option 4:
  - Higher levels of service: yard tanks (pre-payment)
  1. *Households enter into a savings scheme and contribute to the cost of the tank in their yard.*
  2. *Households pay in advance for tanks to be filled.*

  The type of tank system depends on the management and institutional arrangements agreed upon.



# Technical Options

- Option 5:
  - Higher levels of service: Manifold System (Water Bailiff)
  1. *Households contribute to the cost of reticulation from the manifold to their yards.*
  2. *A flat rate system applies and is paid to the bailiff who manages the manifold.*

  Operations depend on the management and institutional arrangements agreed upon between households, committee and council.
- COMMENTS

  **The chosen option depends on:**
  - Existing reticulation -- reticulation upgrade necessary or greenfields project?
  - Numbers of households desiring Higher Levels of Service -- economies of scale.
  - Management system in place.
  - Institutional co-operation

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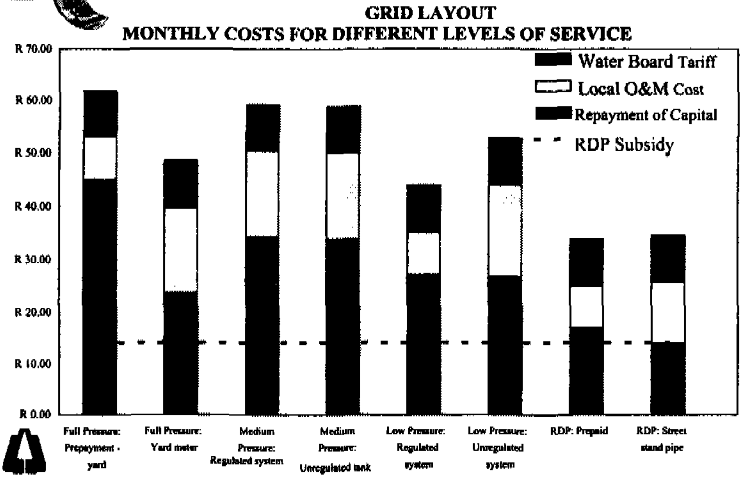
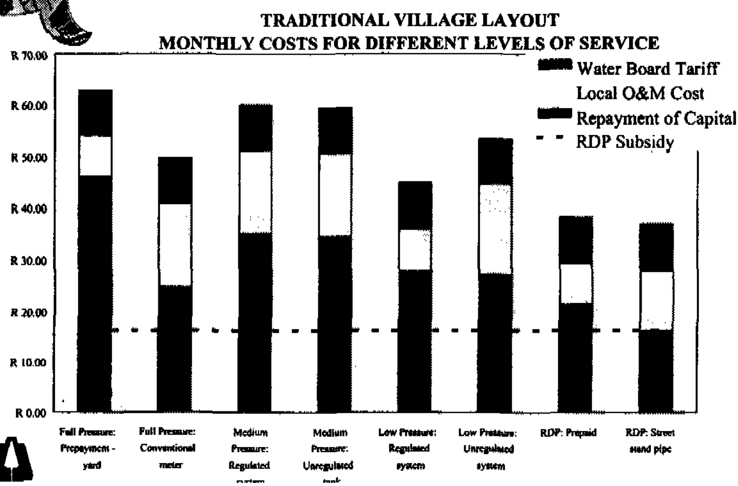
# ical O&M Costs - grid layout




# ical O&M Costs - traditional



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