Tanzania

# PRIVATE OPERATION IN THE RURAL WATER SUPPLY IN CENTRAL TANZANIA: QUICK FIXES AND SLOW TRANSITIONS

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# Abstract

*This paper is designed to assess the role of private sector participation in developing and sustaining rural water schemes. The data used is from the Geodata 3 Survey (corrected 9/6/2006) performed in 2004-6 in the regions of Tabora, Dodoma, Singida and Kiteto District, Manyara region. To determine whether private firms deliver a better service this paper will pose three key questions: 1. Is there a correlation between private management schemes and improved outputs (functionality rate, water quantity/quality) at the total population level or at regional and district levels; 2. What are private management schemes doing that other schemes are not – are there fundamental hardware or service differences; 3. Can a pattern of causation between better service and the private sector be established and if so what are the implications.*

## Author's Acknowledgements

I am extremely grateful for the hospitality, support and information offered by WaterAid Tanzania and the staff in the Dodoma, Singida and Dar es Salaam offices. Their assistance and the funding made available was vital to this report. I would also like to thank the district WAMMA teams and Stevens Mwendi for the constant assistance and through commitment to facilitation of the fieldwork in this study.

# Table of Contents



List of Boxes, Charts and Tables

# 1. Introduction

This report presents the main findings of a limited qualitative study of the role of the private sector in developing and sustaining rural water schemes in Tanzania. Specifically it contrasts the performance of privately operated schemes with other forms of management and identifies barriers and flaws in implementing a private management system on a larger scale. Key issues that have emerged and will be discussed are the contract between operator and village, the availability of on-going support and maintenance, village size and engine type, and finally financial issues, particularly adherence to cost-recovery.

Private operators were found to be generating greater amounts of public savings contributing to better sustainability, however there are numerous real and perceived barriers to initiating a privately operated scheme. The impact of district level support was found to be a significant factor particularly in the creation and supervision of contractual agreements and in the provision of ongoing access to maintenance and technical support. Private sector engagement in the role of technical support and maintenance is limited, partially due to policy and lack of expertise, but also due to the minimal profits to be gained from ward or even district sized technical support firms. Nevertheless certain villages expressed a keen interest in improving their ability to address technical problems through local channels. The ability to generate large volumes of income in a relatively short space of time has meant that some villages are able to function fairly autonomously whereas smaller or more sparsely populated villages are not even able to generate cost-recovery levels of income and are left entirely exposed in the event of a broken, stolen or silted water source.

Since 2004 there has been an ongoing survey to map water points in the central Tanzanian regions. The data is being collected by Geodata, and the survey has been funded by Water Aid. This data covers 37 variables identifying location, type of water point, management and functional status. So far, the survey has mapped all water points in Singida, Tabora and Dodoma Regions and some districts within Manyara Region. The depth of coverage allows comparison to be drawn between regions and districts as well as profiling types of extraction system and types of management with the rate of functioning distribution points (DPs).

The primary goals of this report are to produce valuable analysis directly from the data as well as investigate questions that emerge from this analysis. To achieve this second goal a follow-up survey was designed based upon the findings from the water point mapping data. The scope and time frame of the field work has meant that a purposive survey framework was chosen in which representatives from eight villages in Dodoma region as well as four DPs in the Singida peri-urban were interviewed. Villages were chosen primarily to investigate specific findings from the data and so most of the villages chosen represent an anomaly of some kind.

In the next section, this paper will present a brief background of rural water policy and experience in Tanzania since independence. This background will help contextualise the study as well as identifying and explaining the function of National Water Policy management types existing in practice (Section 2). In the following section (Section 3) this paper will present an analysis of the Geodata water point mapping survey to identify trends in the rural water sector that help explain the role of the private sector.

The enquiry framework of the follow-up survey is based upon these findings. Section 4 will firstly elaborate on the framework itself and then explain the implementation of the survey. The findings from the survey will then be presented. Section 5 will use the findings to discuss the impact and relevance of this analysis and provide a conclusion.

# 2. Background

Shortly after independence the Government of Tanzania began formulating a 'free water for all' policy. The policy was consolidated in 1971 and aimed to provide every rural inhabitant with access to adequate, potable water free of charge by 1991. Upon implementation the Government was responsible for developing, operating and maintaining water supply systems with no cost recovery. Many of the projects were funded by donors particularly the Swedish in the 1970s. The result was a heavily burdened Government and no commitment by the beneficiaries. By 1996 less than 50% of the rural population had access to improved water sources and many of these sources had broken down. In 1991 a new strategy was established to shift some responsibility and increase community participation.

## 2.1 The Area of Study

The main research undertaken in this study focuses on three regions in Central Tanzania: Dodoma, Tabora and Singida and takes specific examples from ten villages and two urban DPs across three districts: Mpwapwa and Dodoma Rural in Dodoma Region and Singida Urban district in Singida. The climate and physiology of the area will not be discussed in detail, but certain key facts should be highlighted.

Rainfall across the three regions is approximately 500-1000mm annually but is notoriously unreliable and sporadic. There is normally a single wet season from October to April, the rest of the year remaining dry and sunny. The past two years have seen particularly poor rains and as a result the primarily agriculture-dependent economy of the area has suffered.

Dodoma and Singida are particularly dry and as a result, groundwater is one of the major sources and is vital in the dry season. The water table depth varies from just a few meters to over 100m in some places. Most of Dodoma Rural has a low water table and so tends to install deeper diesel driven pump systems. This is also suitable to the demographic as the population tends to be centred in villages rather than more sparsely distributed as in Singida.

Mpwapwa region is more mountainous and as a result water table depth is variable but the large number of natural springs has meant that gravity systems that pipe spring water from the source into villages are common. The physiology does have a tendency to isolate specific villages from water sources, a prime example being Berege, which will be addressed in more detail in Sections 4 and 5.

Singida Urban is particularly dry but the water table is fairly high so smaller hand-pumps are the favoured technology in the peri-urban. The sparse population of the peri-urban has created a major challenge to provide access to the level stipulated in the National Water Policy. As a result the urban water authority, SUWASA, found it difficult to manage and effectively left control over the peri-urban water sector to the village level. Donors have filled the funding gap and all villages have hand-pumps installed within the past 5 years, but ongoing support remains a problem and the villages seem to remain largely dependent on donors.

## 2.2 History of Rural Water Supply Management

Over the past twenty years Tanzania has been transitioning from a socialist economy where water provision was entirely the responsibility of the state to a more liberal economy where cost-recovery is a necessity. The attitude towards paying for water has developed at different rates in different parts of the regions and this has had an impact on the effectiveness and even the feasibility of different types of management.

The 'free water for all' policy was initiated by Nyerere in 1971 and officially ended with the 1991 National Water Policy reform although effectively the policy was largely abandoned in the mid-80s.

During this time villagers would operate pumps on a relatively informal basis and district level engineers would make routine trips to provide maintenance and support. As early as 1981[1] there were calls for water committees to be established that would manage operation and maintenance (O&M) of village pumps on a more formal basis and train an attendant to oversee the pump.

By 1985 the need to cost recovery was apparent. Villages that used diesel fuelled extraction systems were already paying for diesel so, while paying for water was starting to be discussed at the policy level, there was already expectation of paying in some villages. In 1991 a new National Water Policy was adopted which established a village water committee (VWC) to manage the scheme, a water fund to collect the proceeds and strategies to improve efficiency of spare parts and cost-effectiveness. The water fund was to be administered by both the VWC and the District Water Engineer (DWE).

The transition was a slow one. Poor decentralisation of the sector and little effort to coordinate the sector left regional and district officers with few resources and there was continued dependence on donor funding for most projects. In Dodoma, and later in Singida, WaterAid established and partially funded cross departmental, district-level teams to provide demand responsive support services for WATSAN projects (WAMMA in Dodoma, SAMME in Singida) . Separate technical support teams were established to provide maintenance and spare parts services (PEMS in Dodoma and SEMA in Singida).

By the end of the 1990s, reforms within the Ministry of Water to decentralise funding had not materialised and cost-recovery management under Village Water Committees was failing to meet targets. Several new management schemes, some initiated by donors, but many initiated at the district or even village level began to take hold. Paving the way in 1993 was Berege in Mpwapwa, which, in desperation, had persuaded a wealthy villager to manage their single ageing water pump. The 2002 National Water Policy encouraged these new types of management, emphasising private management and 'ownership' and changing the government role more to one of regulation and support.

*Box 2.1 Time Line*

| | |
|---|---|
| 1971 | 'Free water for all' begins |
| 1971-1975 | Heavy donor investment in Singida, Tabora and Dodoma |
| 1980s | 'Water decade' – the region misses out on most national investments. |
| 1985 | A new water policy is discussed that incorporates VLOM and cost recovery. |
| 1991 | National Water Policy reform – funding of projects remains a problem and progress becomes dependent on few remaining donor programmes. |
| Mid 1990s | Revenue system reform and new budget support approach |
| 2002 | New National Water Policy promotes private engagement and village level ownership of systems. |

The governments' endorsement of multiple and also extremely malleable management schemes combined with many different actors offering support or funding has produced a rather bewildering array of different projects and schemes. Dodoma rural has been considerably successful in introducing private operators and establishing district-wide standards such as the price of water and a common contract. Mpwapwa has favoured a much more grassroots approach while the villages in Singida peri-urban were all advised to follow a strategy of community management through Water User Associations (WUA) as part of the WATSAN project.

Box 2.2 describes and differentiates the different management types and how they function. These definitions are based upon the terms used in the Geodata survey with some additions.

[1] Kauzeni (1981)

*Box 2.2 Management Types*

**Village Water Committee** – Initiated as a formalised water point management structure in the 1991 Water Policy, these bodies continue to exist in all villages visited in Dodoma (although not in Singida) as a regulatory body with elected membership. They are effectively the default management framework across the three regions. The VWC is a cosignatory with the DWE to the village water fund.

**Private Operator** – An individual or group that is contracted by the VWC or other official body to undertake operation and some maintenance of the extraction system or single DP for an arranged fee. **Tenderer** is sometimes used as an alternative name; **Wakala** is the official term in Dodoma Rural and some other areas; Mpwapwa more commonly uses **Mbia**, or 'caretakers'.

**Water User Association** – A legal entity autonomous from village government that oversees the management of an entire extraction system. The WUA has its own fund which functions as the village water fund. Officially, it will have authority over the Water User Groups (WUGs) using the water source.

**Water User Group** – These are the sub-village level management groups that are responsible for operation and maintenance of specific DPs within a WUA. In practice, sub-villages do not always create WUGs so management will revert to the WUA. Has its own bank account to fund small repairs and regular maintenance.

**School** – Refers to extensions of systems to schools. The water points are public but managed fully by the school and are often obligated to pay a contribution to the village water fund.

**Private** – A privately funded extension to a water system. The owner may sell on the water and often must allow public access to any DP on the private system.

**Company** – A legal entity sometimes under contract.

**Board/Trust** – Also a legal entity, autonomous from village government that takes the place of VWCs.

**Government** – Only very few DPs of this type exist and they are almost exclusively in Iramba district, Singida. While there is no first hand evidence to explain this system it most probably describes a take-over by village government in the absence of a VWC or other management type.

# 3. Data Analysis

The Geodata dataset has recorded a total of 6812 different DPs across the study area. Of these, the vast majority of the observations (86%) are managed by VWC. No other single management type represents more than 3% of the total. Prior to 2002, national policy stipulated that each village must have a VWC so other management types are generally new actors taking some or all of the role of the VWC. The alternative management types are usually highly localised, linked to specific projects or districts. This analysis is designed to profile the alternatives and assess how they are performing and how they developed with a focus on private operators.

## 3.1 Using the Data and Defining Functionality Rate

The data used for this study was compiled by Geodata between 2004-2006 covering all water points in the Dodoma, Singida and Tabora regions and Kiteto district in Manyara region. Unfortunately, at the time of the research, data entry and cleaning problems could have resulted in some errors in the analysis[2].

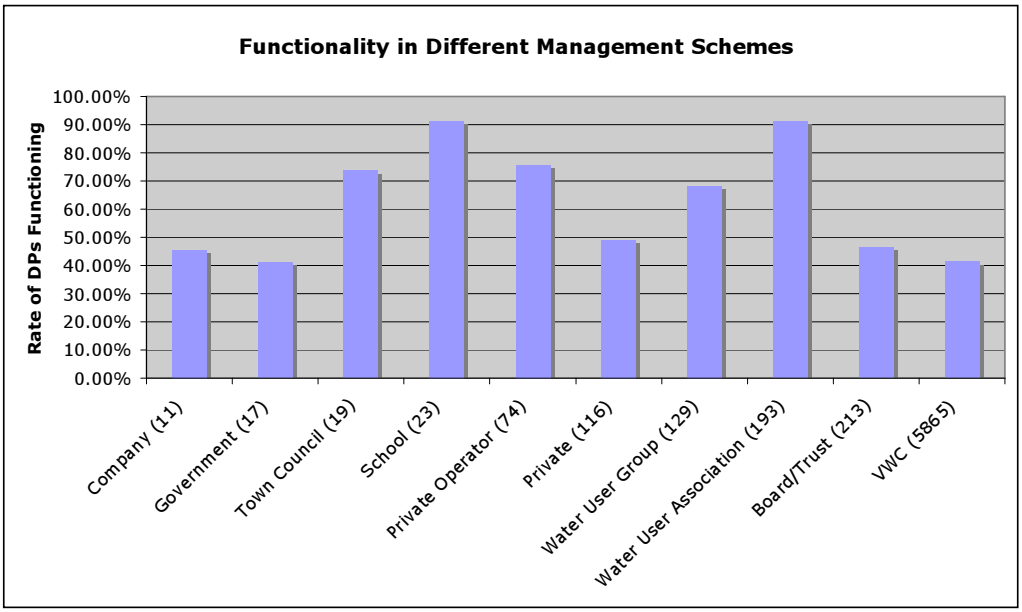
'Status' is used in this analysis due to its valuable properties as an indicator, but the implications will keep in mind the above mentioned potential problems. Given the timeframe of the project and the relatively little change between Geodata 3 and Geodata 5 this analysis will not switch data sets to Geodata 5, however it will take into consideration the changes.

Functionality as used in this analysis refers to:

$$\frac{\textit{Functional Waterpoints}}{\textit{Total of all Waterpoints}}$$

By this definition 'functionality' is the ratio of functional systems within the population. The accuracy of the measure is compromised by known errors in distinguishing functioning from non-functioning in a binary process, however, with the current data set this is the best estimate of the ratio of functioning water points within the whole.

*Chart 3.1 – Functionality by management system*



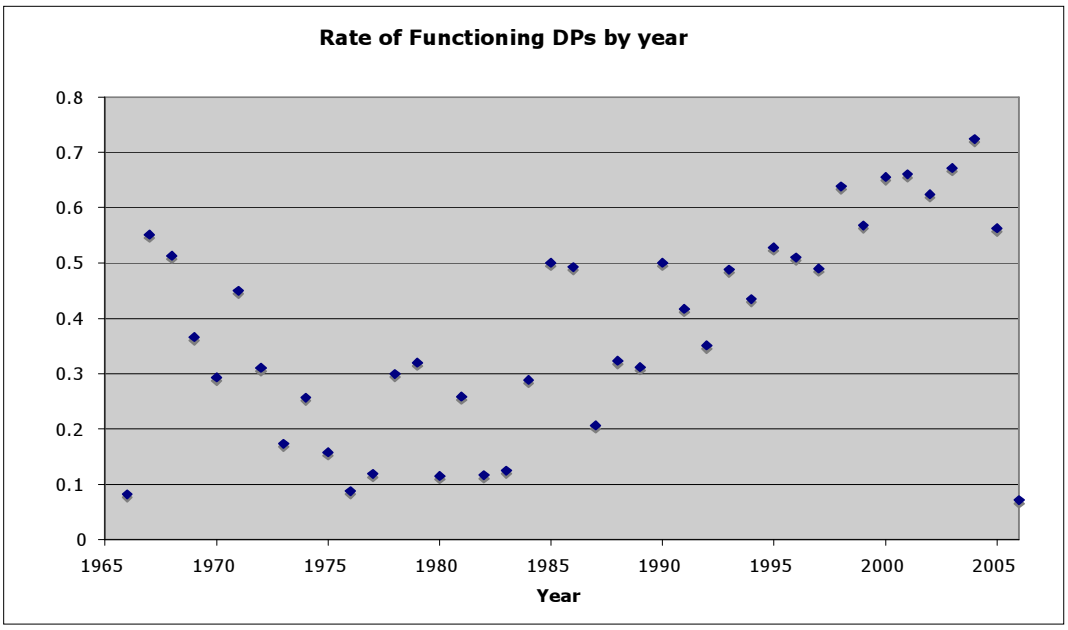

[2] The known and potential errors identified within the status indicator are as follows: category specification due to spelling errors, inappropriate class inclusion, poor binary distinction between functional/non-functional, some 'under repair' observations were classed as such despite no action being taken, there has been a noted seasonal change in operation where pumps are only operated in the dry season.

Chart 1 displays management type listed in order of number of observations. The VWC category has the lowest functionality rate apart from Government but several other management types have similar functionality levels. The question arises: does management type make a difference?

## 3.2 Age as a factor.

There are four commonly used extraction systems in the study area: pump and engine, Afridev hand-pumps, Tanira hand-pumps, and gravity systems. Pump and engine schemes have a functionality rate of 48% and the others vary between 60% and 70%. The maintenance requirements and operation cost of pump and engine schemes are higher so it can be expected that the systems are under repair, or awaiting repair for longer and the data may reflect this. Age of the systems is also a factor:

*Chart 3.2 – Functionality by year of construction*



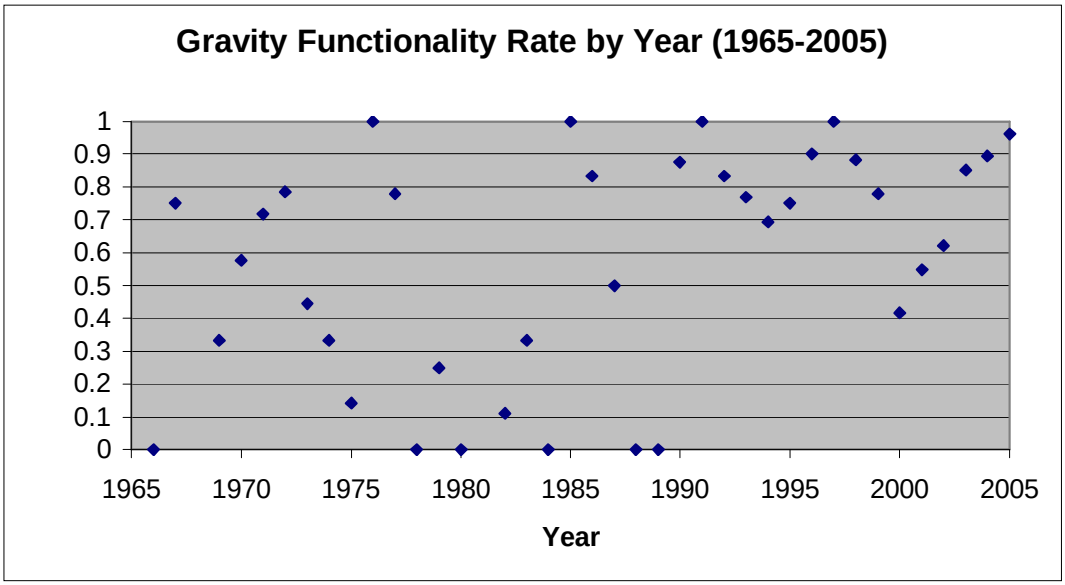

Many of the pump and engine observations are broken systems installed in the 1970s and awaiting replacement, whereas the hand pump observations are all from newer installations.

A simple starting point is to assess what effect the age of the system has on functionality and whether management type has any impact on this. Chart 3.1 lists the dataset by date of installation and displays the rate of functioning DPs that were installed in each year. There is a clear correlation between age and functionality but this fairly linear relationship falters for the years before 1975.

A likely cause of this deviation is that over the 30+ years since these systems were installed, pumps that failed have disappeared and are not recordable in a current survey. The realistic lifespan of all systems varies. Information from WAMMA teams and the SEMA workshop suggest that hand-pumps last 7-8 before major rehabilitation is required. Pump and engine systems vary; many require fairly significant maintenance costs within a few years but a few last over thirty years if the systems are well maintained. The hardware manufacturer and the quality of installation also have a large effect.

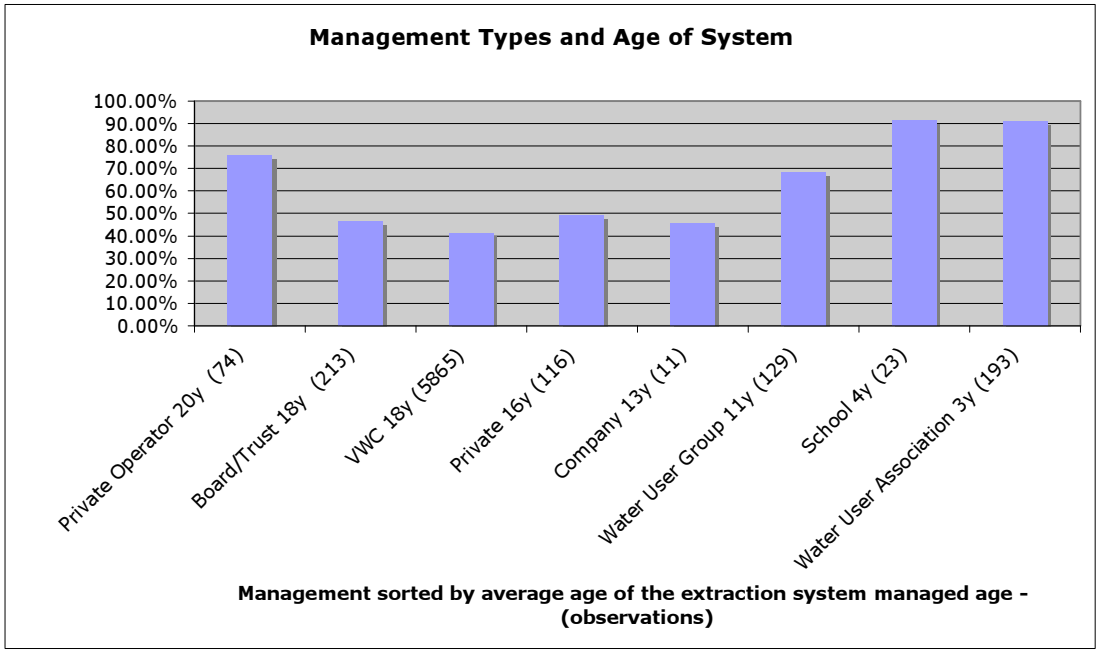
The data shows the functionality of gravity systems to be unaffected by age (Chart 3.3). According to the Mpwapwa WAMMA team, theft or damage of piping causes temporary non-functionality but generally the failure of the system is due to the water source drying up.

*Chart 3.3 – Functionality rate of gravity-fed schemes by year of construction*




While this evidence suggests that age has a major impact on the functionality of all but gravity systems, the data set is dominated by VWC managed observations. Chart 3.4 illustrates the relationship between the average age of systems in a given management type and functionality. Except for 'Private operator', the data shows again that there is a correlation between age and functionality. School and WUA managed DPs have a notably higher functionality rate as would be expected for systems less than 5 years old. The fact that there is not much variance between the older systems and, more importantly, that they have functionality rates that fall within a few percentage points of the VWC rate shows that, in the longer run, management does not seem to have a major effect on functionality. The exception appears to be in the private operator observations.

*Chart 3.4 – Age and management type*




This evidence suggests that private operators are doing something different. A common concern with privatisation is that private agents tend to pick off the best and most profitable schemes. More specifically, it is unlikely that a private agent would continue to operate a non-functioning scheme for an extended period. This effect may explain part of the anomaly, but the fact remains that, on average, private operators manage the oldest schemes. This finding is important as it suggests that there is

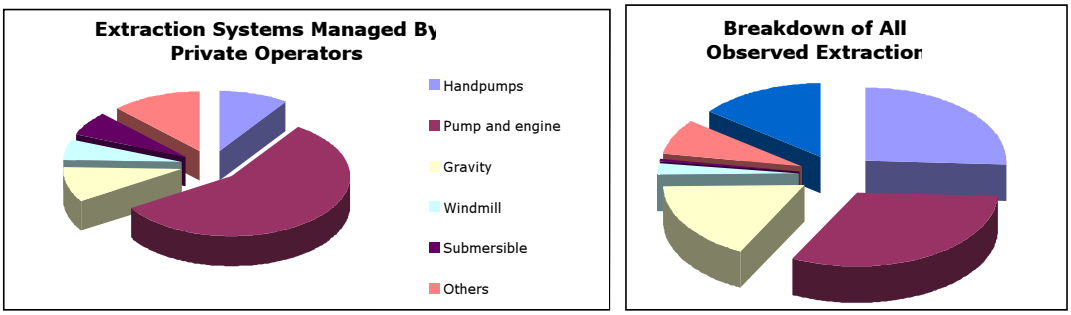
profitability in ageing schemes despite the fact that maintenance is expected to be significantly higher. The data is unable to illustrate exactly how these schemes are made profitable and the follow-up survey will address two issues: are private operators bringing in expertise? Or alternatively are they simply generating more money to afford parts and servicing?

## 3.3 What is the Private Sector Doing Differently?

Almost all private operators are found in Dodoma region, most in Kondoa district although the WAMMA teams and the DWE in Dodoma Rural have shown that private operators now manage over half of the schemes in Dodoma Rural. This may be partially an error on the part of the surveyors, but many of the villages have only recently introduced private operators. Private operators have a much higher percentage of pump and engine systems as Chart 3.5 shows. This may well explain why the average age is older.

Approximately 80% of DPs were described as good quality (no fluoride, milkiness or salinity) and pump and engine systems have a similar rate. The systems managed by private operators are 94% good quality. Quality is largely dependent on physiology so this figure probably reflects the quality of ground water in Kondoa (88% compared with 78% good quality across the data set) but also may be an indicator that private operators are choosing better quality sources. There is no evidence that private operators have introduced any kind of filtration so it is unlikely that private operators are responsible for the better quality.

*Chart 3.5 – Extraction systems managed by private operators*

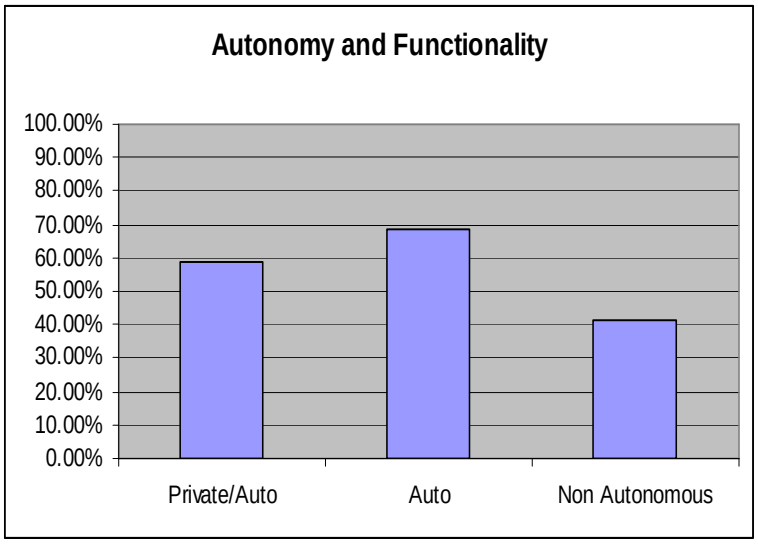



A different story is told when looking at water quantity. 83% of private operators manage DPs with 'enough' water whereas the average across the dataset is only 36% with enough water. This difference is not explained by either the physiology (Kondoa has 45% of DPs with 'enough' water) or by the greater proportion of pump and engine schemes (pump and engine schemes average 41%). Despite this finding, water quantity may not be a very accurate variable. There is almost always a variation between wet and dry season as villagers will draw significantly less water from the source and use rainwater or shallow wells for washing and bathing. Furthermore, it is somewhat inconsistent that private operators manage more DPs with 'enough' water than there are functional.

## 3.4 Autonomy and Management

By the late 1990s it was evident that VWCs were not meeting expectations in cost-recovery. The 2002 National Water Policy emphasizes that governments role should change to one of a facilitator and regulator rather than implementer and leave management to more autonomous groups. VWCs are strongly linked to village government and as such are no longer approved by national policy as management schemes. The three regions are slowly introducing new actors and institutions to manage the schemes and in Dodoma particularly the VWC has been redesigned as a regulatory body. However, most water points still remain under the management of VWCs. By classing the different management types into different levels of autonomy the data is able to show how more autonomous schemes are providing a higher rate of functional DPs.

*Chart 3.6 – comparing functionality rates by autonomy of operator*




Autonomy is introduced as an indicator to group management types by the freedom with which the scheme is able to operate. The indicator is defined in three categories: non-autonomous which includes government, VWC, and town council run schemes; autonomous, comprised of WUAs including the Singida WATSAN Project, WUGs, Board/Trust and school run schemes; and schemes run privately by either a tenderer, a company or by the group classed as 'private'. While more autonomous management schemes as a whole do have a much higher proportion of functional DPs, it is interesting to note that private management does not appear to have as large of an effect. The difference between the Autonomous and Private/Autonomous categories can be explained by the Singida WATSAN project, which has installed 142 brand new pumps that have seen very few failures. Removing these observations from the chart results in the two categories both having a functionality rate of 60%.

# 4. Follow-Up Survey

An analysis of the impact of privatisation in any sector is necessarily affected by the very nature of private enterprise. Now in the third decade of the era of privatisation studies have increasingly come to favour privatisation over public provision of services, but these studies come with a sizeable number of caveats[3]. Surviving privatisation as a commercial enterprise and leaving the public sector with the provision of less commercially viable services there is an immediate bias in favour of privatised firms. Furthermore the criteria for the private and public sectors differ (commercial vs. social goals) so the assessment of service delivery success will not necessarily reach similar outcomes. The structure of the follow-up survey attempts to encompass multiple qualitative variables to draw a clearer picture of the dynamics of service improvement under private management if indeed there is improvement.

## 4.1 Fieldwork and interview structure

Given the scope and timeframe of this project, purposive surveys will be taken in villages selected based upon analysis of the Geodata survey and information derived from interviews. Informal interviews with WAMMA members, guided interviews with DWEs and structured interviews based upon questionnaires at the village level. Stephen Mwendi of the Dodoma Rural WAMMA team translated for all the interviews at village level and facilitated many of the other interviews.

The villages chosen are mostly ones in which a private operator manages the system, the exception being the Singida peri-urban villages as well as Dabalo, Mazae Nje and Chungu. The Singida villages were chosen to explore how WUAs function and also whether there are any measures being taken to ensure that the new systems will remain sustainable. Dabalo was chosen because the surrounding villages all have successful private operators, yet in this village there was a violent response when one was introduced. Mazae Nje recently had a large gravity scheme installed and yet the management remained a VWC. Finally, Chungu is in the process of gathering investment for a new scheme and intends to use a private operator once the system is installed.

Of the private operator schemes Huzi and Mtitaa were chosen without prior research for the pilot study. Chenene and Haneti were chosen as they have had successful private operators for several years and like Huzi and Mtitaa used the standard Dodoma Rural contract. Berege was the first village to introduce a private operator and therefore the longest exposure to it yet has had several problems throughout this time. Finally, two DPs within Singida town were chosen to compare private operators in urban with rural areas.

The enquiry framework for the village level surveys is of three parts[4]. Firstly, there is a section designed to outline the village size and wealth and also the background of the specific interviewee. Efforts were made to interview men and women, government, VWC, private operator and other members of the village particularly health workers if available. The second section is designed to create new numerical variables to assess cost-recovery and sustainability and compare pump and engines with other systems. The final section asks qualitative questions to draw a picture of attitudes within the village and what has been going wrong (or right) as well as investigate the provisions of the management contract if one exists.

## 4.2 Research Findings

Sustainability of water sources is closely related with access to parts and ability to pay for them. The village water fund is the best indicator available to assess whether or not a village can afford spares or not. Since the 1990s there has been significant emphasis on standardizing the types of pumps used. This survey was not able to find any evidence at the village level that finding parts was a major problem; the bottleneck is finding the funds to pay for them.

[3] See Fine (2006) Forthcoming

[4] See Appendix A for the questionnaire.

The results from the survey show a wide variety in the size of the village water funds but clear linkages to other variables[5]. The size of the fund is not particularly dependent on village size but the district, the distance from a main road, the type of pump, the contract, and the length of time of regular payment for water all seem to have an impact.

The variable 'distance from main road' was designed as a simple proxy for development in terms of wealth and education. During the course of the survey it became clear that distance from the main road and also distance from the nearest large town had an impact on the cost of maintenance. The chain block used for lifting rods is expensive to transport and the villages are liable for this cost. The chain block itself is not a particularly expensive piece of equipment and it was interesting to note that Haneti was preparing to invest some of its village water fund in buying a chain block to eliminate transport costs. There is also potential for wealthier villages to invest in equipment and rent it to neighbouring villages. There is no evidence of private interest in a business of this type and it is probable that a firm would need to service a large number of businesses before it can be profitable.

It has been acknowledged by WAMMA teams across the regions as well as by WaterAid staff that villages with systems requiring diesel are more likely to accept a private operator. There are several stated reasons for this: diesel and regular maintenance as obvious costs contributing to willingness to pay; the critical mass of population required for a pump and engine installation is sufficient to generate profitability; and also some perceived prestige from using a pump and engine. Villages with diesel engines will, in practice, have been paying for diesel since the installation of the scheme so the attitude towards paying for water will have been built, in some cases for several decades.

The quantitative section of this survey attempted to estimate the cost of water per litre of diesel. Unfortunately, no golden rule emerged and this cost will depend on the type and health of the diesel engine as well as the depth and circumference of the borehole. Furthermore it is difficult to assess the costs of operation and maintenance, as it is generally only known to the private operator.

The revenues, at least in Dodoma Rural, are slightly more transparent. The contract is awarded to the bidder who can offer the highest monthly contribution to the village water fund. Failing to meet this monthly sum results in termination of contract and loss of the bond (equaling two months contributions). The excess revenues become profit for the private operator and are not documented. It has been argued that water meters and a ratio system for dividing revenues will improve transparency and stabilize profits. Singida Town Council has had water meters in place for several years and the accounting data for the entire system is readily available and up to date. It is unclear how well meters will work in villages; the accounting & regulating capacity may not be able to sustain this kind of system.

Private operators themselves have in some villages requested meters as a way to regulate their employees. What it will do for incentives is less clear; Berege has opted to install meters and use a ratio system for village water fund contributions. It remains to be seen whether this system generates larger contributions but in Berege it is already clear within only a few months of the scheme that the private operator is utilizing the 20% of revenue earmarked for maintenance as income on top of the 39% awarded by the contract. It is unlikely, although still plausible, that private operators using the Dodoma Rural contract are seeing as much as 59% of the revenue as income.

Cost-recovery for pump and engines is complex to calculate and highly subjective. Maintenance and operational costs are high, but the rapid growth of village water funds under private operators is a clear indicator that ongoing costs are being met. Some funds are growing at a rate of several million shillings annually after accounting for costs incurred. It is unclear whether this rate of growth is enough to be completely self-sufficient (ie. enough to cover a complete reinstallation of the system after the expected lifespan), but it is certainly enough for some villages to start looking to investment the money in technical equipment and savings funds.

Cost-recovery for hand-pumps is clearer. After investigating the account books and consulting with technical staff at the SEMA workshop in Singida a rough guide to the ongoing costs of both Afridev and

[5] For the quantitative results see Appendix B

Tanira pumps was established (Chart 4.1). The levels are expected to remain stable after 5 years as this cost represents fairly significant repairs.

The cost of a full installation of a new hand-pump, either Tanira or Afridev, as witnessed on recent invoices is approximately TSH 1.8 million (although this figure does increase steadily year by year). Both types of pump are estimated to have a life span of approximately 7 years so to be self-sustainable the village should aim to generate this kind of amount every seven years. Chart 4.2 illustrates the sort of annual contributions the village water fund will need for cost recovery to take place. Assuming ten hand-pumps in a village and replacement after 7 years, these numbers mean that the contributions to the water fund will have to average around TSH 3million per year before costs. This kind of figure is very likely to be beyond the means of most smaller villages but the cost-recovery levels with no replacement is much more manageable.

*Chart 4.1 – Estimated annual maintenance costs for handpumps*

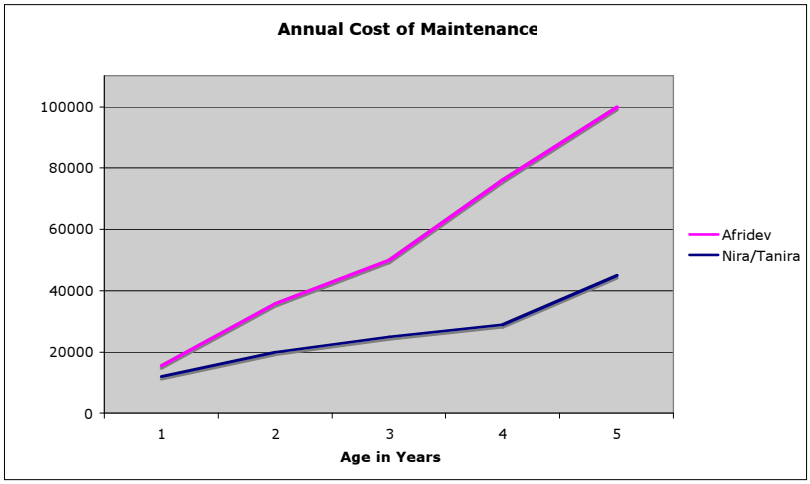
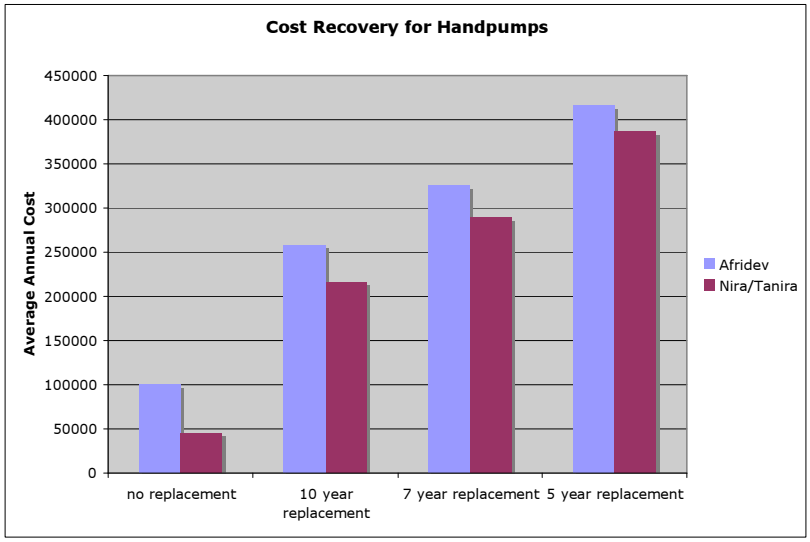



*Chart 4.2 – Estimated cost recovery requirements for handpumps*




The village of Dabalo in Dodoma Rural has only hand-pumps as an improved water source. The WAMMA teams and local government attempted to introduce a private operator to manage the scheme but after three days a small number of villagers reacted violently to the scheme and it was ended. Nevertheless, the private operator deposited TSH 30,000 in contributions to the water fund in those three days from twelve working pumps. This shows that for the majority of the population there is no lack of willingness to pay per bucket, even for hand-pumps. If this figure is representative of the money that could be generated from hand-pumps managed by a private operator then it is on par with the estimated annual cost of a seven-year replacement plan.

Evidence across the survey showed that private operators are much more likely to provide greater efficiency in fund collection. The study of villages using in Singida peri-urban confirmed that WUAs, despite their fairly autonomous status do not generate funds with anything near the efficiency of private operators. Manguanjuki and Mtipaa in Singida peri-urban share a pump and engine system and were advised to use a WUA structure. The system is clearly flawed; the scheme has deliberately been protected from the influence of the district water officials by applying for a 'water right' and the creation of legally registered WUGs and the WUA. Both of these entities have their own accounts although the financial responsibilities for each body remain unclear.

The result is that the two villages are generating almost no revenue from the system and have isolated themselves from the DWE and urban water authority. With the pump being brand new, the effects are not being felt yet: the cost of diesel is being covered but no savings are being created to finance any future maintenance. For a village that is contemplating paying for electricity lines to be installed this chaos in managing the water supply could have been avoided. The management system was designed by the implementers of the project (WaterAid) and simply used as a template for all villages in the project area. All other villages only use hand-pumps so WUAs may be more appropriate, for these two villages it is not. The project was designed to install a large number of pumps in a short time to an area particularly in need of access to water. This type of 'quick-fix' (the project was well funded but constrained to a three year cycle) is very helpful in providing immediate poverty reduction, but lacks the depth needed to build sustainability. The urban authority (which technically these villages fall under) has many years experience in designing contracts and working with private operators and could have provided significant assistance if it had been consulted. Significant reform will have to be made to the management schemes in these villages or they will remain dependent on donor support.

There has been a good deal of research on Berege so a detailed discussion will not be made here. However, there are two observations from the village that contribute to this particular study. The first relates to improved service; the initial (and up until last year only) private operator, Kennedy Msinga, was invited to take over management as a result on the condition of paying for repairs to the aging system. Under Mr. Msinga the price for water was extremely high and there are reports that certain villagers were given preferential treatment in access to water, while some were actually denied access. While this is by no means desirable, the fact remains that the cost of purchasing water was reduced by 85%. The events were a clear example of the negative impacts that a predatory private operator can bring. Standardized contracts and local government supported regulation have minimized this kind of effect in Dodoma Rural where, despite the position often being highly lucrative, private operators are very replaceable and the large bond, sometimes almost TSH 1million is a sufficient deterrent.

The second point regards the detail of the contract. Berege was assisted in drawing up a new contract by the district WAMMA team after the sudden death of Mr. Msinga. The new contract fails to sufficiently address the very problems that Mr. Msingas management caused. The contract is for three years and the 'bond' is non-refundable. This significantly reduces the incentive for the private operator to perform well. With a stipulation that he can receive his bond back if the VWC chooses to terminate the contract, the financial risk of the arrangement is firmly on the side of the village water fund, which is far from ideal. When asked, the village government and VWC did not seem to grasp these issues and even the local WAMMA team seemed happy with the contract. It is vital that WAMMA teams coordinate better amongst themselves as sound advocacy, particularly in complex legal arrangements is one of the most productive services they have to offer.

Mazae Nje, also in Mpwapwa provided a very different story although the situation may be rare. In 2003 a gravity scheme was installed in the village and the VWC has continued to function as the operator. Gravity schemes are particularly expensive to install, this one costing approximately TSH 200million, but the ongoing operation and maintenance costs are low. Prior evidence would suggest that the incentive to pay for water would be low given the negligible running costs. Despite this, the village water fund is surprisingly large; it has reached almost TSH 2million within three years with the water costing half the rate per liter that most schemes charge. The VWC has applied to use some of this revenue to invest in more DPs and piping to another village. This evidence shows that willingness to pay is not limited to diesel run schemes although the precise reasons for efficient revenue collection were unclear.

# 5. Conclusions

The success of cost-recovery policies and private operation is highly circumstantial. The WAMMA team and the DWE in Dodoma Rural are systematically instituting private operators and a standard contract in all villages. They have generally met with moderate success. The transition is helped by the fact that most villages have a pump and engine system making a standard contract appropriate and that the villages are relatively densely populated but these are not necessarily conditions of success.

The response in villages has universally been that private operators have improved the service with the exception of Dabalo. The reasons cited were primarily that the DPs were kept running for more of the year with maintenance being dealt with more efficiently. In Dodoma Rural there is a fairly standard practice to reduce or eliminate the price of water for the elderly or infirm. It would be advisable to enter a clause outlining this practice into the standard contract allowing the regulatory bodies to ensure it becomes universal.

Pump and engine schemes will almost always be able to generate a profit and given the increased efficiency in O&M there is good reason to encourage more villages to adopt private operators. The survey of hand-pump costs shows that villages using them will probably remain dependent on support from donors or government in the event of a replacement being necessary. However, given that hand-pumps have a significantly shorter life span that pump and engine schemes it is extremely misguided to assume that the cost-recovery level is so much less. The attitude tends to be that negligible profitability means hand-pumps can never be managed by private operators. Evidence from Dabalo shows that this may not be the case, but the creation of a private operator will need to be handled with extreme care.

There is a possibility that without a sound contract and sufficient facilitation of transition, villages will interpret the contributions to installation and 'ownership' as a good reason not to pay ongoing costs. WAMMA teams are well placed to provide this facilitation and coordination between districts will help build a useful facilitation framework. This suggestion by no means encourages WAMMA and other support teams to cut and paste successful schemes from other districts but instead formulate contract arrangements based on local requirements.

During the research for this report it became apparent that while financial responsibilities for O&M had been transferred to the village level there was a lack of commitment and ability for government to transfer responsibility of decision-making. The choice of technology is highly unlikely to rest at the village level and commonly will by-pass district level officials as well especially with donor funded projects.

An interview with village officials in Chungu, Mpwapwa revealed that realistically the village had been told a number in shillings that they would have to collect and pay in order for a World Bank funded project to begin. They were aware that the project involved a diesel engine but could not say whether it was two engines or one, how much the total project would cost or even how they intended to generate the full contribution. This does beg the question of whether it is appropriate to try and bridge such a vast (and costly) knowledge gap for the sake of ownership.

The shared system in Manguanjuki and Mtipaa provides a good example of necessary and unnecessary engagement between installer and community. The geographical nature of the area eliminated all but a diesel engine from appropriate extraction systems; however, failure to coordinate and properly inform the community about the installation meant that one of the outlying sub-villages was completely missed by the distribution system and as discussed above, the advised management system was probably inappropriate.

# References

Kauzeni, A.S. (1981) Villagers' expectations and Attitudes Towards Traditional and Improved Water Supplies. Research Report No.50, Dar es Salaam University: Dar es Salaam.

Fine , B.(Forthcoming 2006), Public Service Provision and Poverty Alleviation in Africa: Departing the Road to Privatisation, SOAS

# Appendix A – Enquiry Framework

*Within Village – 4 units:*

- VWC
- Management
- One woman or women's group (bath attendant)
- One man or men's groups

What is the biggest problem with the water supply?

| Location: | Village: |
|---|---|
| Region: | Population: |
| District: | Last Cholera outbreak: |
| Village: | Nearest Main road (km): |
| Sub-Village: | Next nearest water source if this breaks (km): |

*Interviewee:*

Name: Age: Gender: Organisation:
Religion: (status in village):

*Management (quant):*

Type:
What is the price of water?: Wet: Dry:
When did you start paying for the water?:
How much is in the water fund account?:
[How many people bid for the wakala position this season?]
[How big is the bond?: ]
How many shillings are collected per month?:
How much does it cost the Wakala or management per week to run the service?:
How many litres are produced per day?:
Dry(tank size): (tanks/day):
Wet(tank size): (tanks/day):
Max pop served (eg if other towns have shortage):
Is there enough(y/n):

*Management (qual):*

Is there a contract for the management?: Can you explain/produce it?:
Does the VWC meet regularly? Can you show me minutes of the meetings?:
Are you satisfied with the management?: Why?:
Are you satisfied with the Village Water Committee?:
Are you satisfied with the wakala (or WUG/A)?
[Are you happy with the bidding process?]
[Does the size of the bond exclude many members of the village?]
How is the Wakala (or WUG/A) chosen? (bid for tender process):
What are the conditions of the bond/contract?
Who is able to terminate the contract?
What are the provisions for the young, the elderly, the disabled?:
Who are you serving apart from villagers?:

*Pump/engine (quant):*
Pump type: Engine type:
Population served by the pump?:

Borehole depth/circumference:
Litres of water per day
Litres of diesel per day (or per tank):
Cost of diesel per liter:
Is the water quality good?:
When did the pump last break?:
When did the engine last break?
Who fixes the pump/engine?
How long does it take to fix the pump/engine?:
How far is the nearest source for spares?:
0-10km: 10-100km: 100km+:

***Pump (qual):***

Is this the best pump for your village?
If yes, why? :
If no, why do you have this pump?:

Does the District Water Department (give its share of funding/)help for maintenance (over TSH 50,000?):
Is this expected?:
If the District Water Department can not finance repairs what will you do?:
Who is affected by the price of diesel?

***Final questions:***

Do you have many villagers leaving for cities?:
Do they often send back money for construction or repairs?:
What management is the best for the water supply?
What is the Biggest Problem with the water supply?
[If they say that they have already answered this question, apologise and say:]
What can be improved the most with your water supply?

# Appendix B – Summary of Study Villages

*Table B.1 – Summary of Sample Villages – July 2006*

| *Village* | *District* | *Region* | *Main road (km)* | *Pop'n served* | *Manag-ement* | *Contract* | *Pump Status* | *Pump types* | *Engine type* |
|---|---|---|---|---|---|---|---|---|---|
| Dabalo A/B | Dod Rural | Dodoma | 50 | 8500 | VWC | None | some working | hand pump | none |
| Haneti | Dod Rural | Dodoma | 0 | 5182 | PO | DodRur Stand | working | Mono | Lister |
| Chenene | Dod Rural | Dodoma | 0 | 3285 | PO | DodRur Stand | working | Mono | Lister |
| Mtitaa | Dod Rural | Dodoma | 18 | 6352 | PO | DodRur Stand | working | Mono | Lister |
| Huzi | Dod Rural | Dodoma | 50 | 4000 | PO | DodRur Stand | working | Cemo | Lister |
| Berege | Mpwapwa | Dodoma | | 5000 | PO | Berege | working | Mono | Lister |
| Mazae Nje | Mpwapwa | Dodoma | 5 | 4458 | VWC | none | working | Gravity | none |
| Chungu | Mpwapwa | Dodoma | 5 | 4000 | VWC | none | insufficient | Gravity | none |
| Manguanjuki | Singida Urban | Singida | 10 | 2665 | WUA | unspecified | working | Mono, Afridev | Chinese, none |
| Mtipaa | Singida Urban | Singida | 10 | 3000 | WUA | unspecified | working | Mono, Afridev | Chinese, none |
| Bus Station | Singida Urban | Singida | 0 | | PO | SingUrb Stand | insufficient | Subme-rsible | Electric |
| TCRS | Singida Urban | Singida | 0 | | PO | SingUrb Stand | insufficient | Subme-rsible | Electric |

*Table B.2 – Summary, continued*

| *village* | *fund size* | *declared monthly contributions* | | *price of water (per litre)* | | *date began paying regularly* | *years this manage-ement system* | *Install date* | *DPs* | *DPs working / being used* |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *wet* | *dry* | *wet* | *dry* | | | | | |
| Dabalo A/B | 120,000 | variable | variable | 0 | 0 | 3 days | | | 14 | 12 |
| Haneti | 4,600,000 | 170,000 | 400,000 | 1 | 1 | 1986 | 4 | 2003 | 7 | 6 |
| Chenene | 10,000,000 | 50,000 | 360,000 | 1 | 1 | 1986 | 4 | 2003 | 6 | 5 |
| Mtitaa | 3,400,000 | 70,000 | 250,000 | 1 | 1 | 1999 | 7 | 1999 | | |
| Huzi | 3,000,000 | 10,000 | 350,000 | 1 | 1 | 2002 | 4 | 2002 | | |
| Berege | 1,800,000 | 30,750 | 205,000 | 1 | 1 | 1993 | 2 months | 2005 | | |
| Mazae Nje | 1,900,000 | 90,000 | 200,000 | 0.5 | 0.5 | 2003 | 14 | 2003 | 7 | 3 |
| Chungu | 900,000 | 0 | 50,000 | 0 | 1 | 2005 | 14 | 1995 | | |
| Manguanjuki | 150,000 | 0 | 103,500 | 1, monthly | 1, monthly | 2005 | 1 | 2005 | 1,7 | 1,7 |
| Mtipaa | 260,000 | 0 | 160,500 | 1, monthly | 1, monthly | 2005 | 1 | 2005 | 5,1 | 5,1 |
| Bus Station | | | 280,000 | 0.5 dom (15TSH/25l) vendors | 0.5 dom (15/25) vendors | 2000 | 6 | | 1 | 1 |
| TCRS | | | 144,000 | 0.5dom (15TSH/2l) vendors | 0.5dom (15/25) vendors | 2000 | 6 | | 1 | 1 |