

Department of Rural and Urban Planning
University of Zimbabwe

for National Action Committee
Water and Sanitation Studies Fund

Community Maintenance of Handpumps

Frances Cleaver

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I hope that all those who contributed feel that their participation was worthwhile and that they find this report of some use to them in their work.

Frances Cleaver,
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February 1990.

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SUMMARY

Chapter 1 Introduction

In an attempt to ensure the efficient functioning of rural water supplies in Zimbabwe a Three Tier System of maintenance is being introduced. This consists of Waterpoint Committees at user level, Pump Minders at Ward level and a skilled District Maintenance Team. This study concentrates on the first tier of maintenance (ie the community and waterpoint committees) in evaluating the strengths and weaknesses of the system.

Chapter 2 Methodology

The study was undertaken in eight districts, namely; Tsholotsho, Gwanda, Shamva, Mutoko, Buhera, Charter and Chegutu. A sample survey of 480 handpumps was followed up with case studies of selected waterpoints.

Chapter 3 Data

Technology

The majority of pumps sampled were Bush, Bucket and Blair pumps. At the time of the survey 83% of the pumps sampled were in working order although 32% of these were judged to be in need of some repair. The average age of the sampled pumps was 8.8 years, the minimum being 1 and the maximum 61 years.

Usage

Bush Pumps had the highest number of users and a large proportion were used by schools, clinics and other institutions (hereafter referred to as 'schools'). Blair Pumps fell into the medium user range and Bucket Pumps were used by the least number of households although a substantial number were also used by 'schools'. The proportion of pumps used for livestock and garden watering was similar (38%) and a total of 21% were used by 'schools'.

Breakdowns

Of the pumps sampled, 53% had broken down at least once in the 12 months preceding the survey. Bush Pumps experienced more breakdowns overall and more multiple breakdowns than Buckets or Blairs.

There was no direct relationship found between the number of users and the number of breakdowns. Pumps used by 'schools' and for livestock watering broke down more frequently than those used for garden watering.

There was some correlation between the age of the pump and the number of breakdowns. Several of the younger pumps suffered

multiple breakdowns with the rate evening out in middle age and increasing again as the pumps became very old.

Maintenance

The major reporters of breakdowns were the Waterpoint Committees and the users. The majority of breakdowns were mended within a month with Bush Pumps generally out of action for less time than Blair or Bucket Pumps.

The main menders of breakdowns were the DMT followed by the Pump Minders. Bucket Pumps were more likely to be mended 'locally' (by village or ward level menders) than were Bush Pumps.

Those breakdowns reported by Waterpoint Committees were mended the fastest although the different menders were broadly comparable in the time they took to repair the pumps.

District Comparisons

The data was analysed district by district to show differences between them. An attempt is made in District Characterisation table to assign values to these comparative figures.

Chapter 4 District Profiles

This chapter consists of descriptions of the maintenance system in each district followed by a presentation of the relevant data. Detailed case studies of selected waterpoints are also presented. These illustrate the lack of uniformity in the organisation for maintenance in different parts of the country. They also show that although many communities are only nominally involved, there is substantial potential for greater participation of the community in the management of their water supplies.

Chapter 5 Data Analysis

Organisational Factors

Organisational complexity was one of the problems found to be affecting the maintenance system. The theoretically simple Three Tier Maintenance system is more myth than reality and coordination between the agencies involved is highly variable. Good communications are hindered by the lack of uniformity in the structures, budgeting and policies of different ministries. Physical constraints such as a lack of finance and transport also limit the extent of institutional support for maintenance.

The agencies involved are mostly highly bureaucratic and seem unable to respond flexibly to community initiatives. Paid development workers at village and ward level are often substituted for 'the community' in participatory tasks. It was found that District Water and Sanitation subcommittees generally prioritise issues of implementation for discussion, rather than those of operation and maintenance.



The reporting and recording of pump maintenance activities is extremely poor and contributes little to the information needed for the effective planning, operation and monitoring of the maintenance system.

Three Tier System

The third tier of the District Maintenance Team seems to be relatively efficient at corrective maintenance where they have adequate transport or decentralise their operations within the district. However, because of the way in which they operate, they can be obstructive to the participation of the community in maintenance and they sometimes undertake repairs which should be done by the Pump Minders.

The second tier maintainers (the Pump Minders) are a very variable group operating in different circumstances from district to district. They are generally constrained by lack of transport, tools and, in some cases, the relevant technical expertise. They are, however, relatively efficient where the Pump Minder system is well established and backed up by active Waterpoint Committees. The Pump Minders generally receive little support or supervision from district level.

Primary tier maintenance is not necessarily dependant on the existence of formal waterpoint committees. Well organised and motivated committees were found operating on the basis of ad hoc user groups rather than committee formalities. Successful committees and user groups were often found to be dominated by one influential individual and operated on a flexible, non-bureaucratic basis. Whilst some committees existed in name only, others were found to be performing more than the required functions. Examples included the making and fitting of spare parts and the collection of substantial sums of money for the maintenance of water supplies.

Some aspects of the Three Tier Maintenance system may therefore promote good maintenance but they do not necessarily ensure it. The system, in practice, promotes corrective at the expense of preventative maintenance by concentrating resources at the higher levels. There are also significant problems in the relationships between the different tiers.

Community Maintenance

This section considers the dynamics of community involvement in maintenance.

Who?

Although women predominate in numbers on the Waterpoint Committees there is little evidence that they are more active than the male participants. This may partly be because the men on committees tend to be postholders (eg Chairman, Secretary, Caretaker) rather than just ordinary members. In some places women were found to be members in name only while their husbands actually performed their

maintenance duties.

Where committees do not exist, people with 'official' status, such as VCWs, Kraalheads and VIDCO Chairmen, often report breakdowns suggesting that committees do possess some authority.

Where different types of users are involved, conflicts often arise. Householders generally seem to believe that if an institution is also using a pump, then the paid staff of that institution must be responsible for it.

The central role of the VIDCO in the organisation of maintenance is theoretical rather than actual and VIDCO involvement varies considerably from district to district. Some VIDCOs were found to be taking on waterpoint management in the absence of committees and others playing no part at all.

Other local leaders were found to be significantly involved in water related activities. Kraalheads played a generally positive role in mobilisation, organisation and providing inputs for the maintenance of the water supply. Development workers often liaised with the Kraalheads in preference to the VIDCO. Some Ward Councillors appeared to be obstructing community initiatives by telling the users that all inputs must be provided by the government. Presumably this is aimed at furthering their own area of influence.

What?

This section considers the different activities which the communities were found to be participating in. Communities are involved in manual, technical, organisational and regulatory tasks relating to the maintenance of their water supply. However, most activities fall into the manual and regulatory categories. In particular rules and regulations regarding the proper use of the pump were universal. There is little or no direct involvement of the community in decision making about water programme activities.

How?

The users are motivated and demotivated by a variety of factors. Generally the users do not identify themselves as the owners of the pumps. The implementing agency is perceived as the 'owner' and therefore the responsible maintenance agent. Participation in implementation does not necessarily promote a sense of ownership or responsibility. People often feel that their contribution to implementation effectively pays off any debt they have to the provider of the facility. Users do, however, feel under an obligation to use the pump properly, hence the prevalence of rules and regulations to ensure this.

The higher the level of institutional inputs in a district, the more likely the community is to adopt an attitude of dependency and to rely on others even for the most simple repairs.

Some major prerequisites for effective participation of the community were identified, these being;



1. A strongly felt need for a protected water supply and
2. A knowledge that government will not provide significant maintenance support.
3. A strong well-motivated local leader.
4. The anticipation of some tangible reward.

Waterpoint Analysis

Several factors relating to the pump and its environment were found to be significant to its maintenance.

VLOM

The technology used dictates the type of maintenance inputs made. Bucket Pumps were found to be repaired by local level menders far more frequently than Bush Pumps. However, local level maintenance does not necessarily reduce the amount of time for which the pump is out of action.

Age of Pump

The age of the pump may indicate the likelihood of its breaking down as younger and older pumps break down at a higher rate than middle aged pumps.

Usage

If livestock usage rather than number of households is taken as an indicator of the level of use of a pump, then it seems that high usage does lead to greater number of breakdowns. However it also seems likely that high-usage pumps are more conscientiously cared for by the community which depends on them. The attitude of the community is partly due to whether there are other sources of water easily available or not. Communities in very dry areas generally are better motivated towards maintenance than those in wetter areas. The more homogeneous user communities seem better able to organise themselves for maintenance than those in which there are a variety of often conflicting interests.

Peripherality

There is some evidence that the more contact the community has with the corrective maintenance system, the less they are likely to do for themselves. Therefore more peripheral communities, whilst losing out on institutional inputs, may be far better at self-help.

Community learning

The concept of 'community learning' may help to explain some aspects of user involvement in maintenance. According to this theory the users and the menders have to learn how to maintain

their pumps over time. They are likely to be able to learn more effectively by practice, through the pump actually breaking down and being mended. Therefore, a greater number of breakdowns could be expected during the first few years of the life of a pump as the various people involved learn how to avoid this happening or how to deal with it efficiently.

Chapter 6

Conclusions and Recommendations

There is little evidence that community participation in its current form substantially improves pump maintenance because the users have no technical, financial or organisational control over the system and minimal inputs into decision making.

A modified two tier system could help to rectify this. The system would involve communities managing their own Operation and Maintenance Fund and buying maintenance inputs from a variety of suppliers. There would be a significant shift in the role of government agencies. They would undertake expanded training, advisory and regulatory activities, playing only a small part in actually undertaking maintenance. Through expanded training a larger pool of people with technical expertise would exist at local level.

The main recommendations of the report can be summarised as follows;

1. A single agency should be responsible for maintenance.
2. There should be a greater emphasis on training all participants on an ongoing basis.
3. Communities should be free to devise different forms of organisation for maintenance within broad guidelines.
4. Where usage of pump is shared between households and institutions, maintenance responsibility must be clarified and accepted by both parties.
5. There should be a very clear delineation of roles between the different tiers of maintenance.
6. The users must have some direct inputs into decision making at district level, possibly through involvement in the Water and Sanitation Sub Committees.
7. The lower tiers of the maintenance system should be provided with sufficient resources to undertake expanded corrective maintenance.
8. The highest tier of maintenance should only undertake specialised activities. They should undertake educational and advisory as well as technical activities.
9. Specific targets should be set for all maintainers and



7
rewarded if achieved.

10. The structure of the maintenance system should be adapted locally to make it appropriate for the particular conditions in the district in which it is operating.
11. Record-keeping should be improved at all levels with a particular emphasis on recording activities at waterpoint level.
12. Budgeting should closely reflect the needs of the district as reflected by information from the improved reporting system. Budgeting should be decentralised as far as possible.
13. Some form of two tier system as outlined above should be piloted in a couple of districts and compared with a trial of a properly resourced three tier system.
14. Care should be taken to ensure that additional donor funds are used to increase the capabilities of the community rather than institutional capacity.
15. Further studies should be undertaken to look into the detailed financing of maintenance, to evaluate the contribution of different institutions and to develop a clearer idea of the factors affecting the reliability of various technologies.

8
CHAPTER 1 INTRODUCTION

1.1 Background

Against the background of the United Nations Drinking Water and Sanitation Decade, Zimbabwe embarked on an extensive development programme to provide primary water supplies to approximately nine million people in rural areas. The scale of implementation and the multidisciplinary nature of this programme gives rise to a huge managerial and planning task. To date the emphasis has primarily been on the construction of new facilities but attention is now turning towards the need for effective local level operation and maintenance systems and reliable methods of monitoring and evaluation.

The interlinked health, social and economic benefits of improved water supply are unlikely to be realized unless the community perceives the facility as appropriate, useful and reliable. The mass nature of the Water Programme has substantial cost implications, and while currently supported by donor funding, the government must be able to devise an operation and maintenance system which is both affordable and sustainable and management issues need to be explored in detail.

It is generally considered to be far easier to construct a water supply than to ensure its continued operation (Glennie 1983 p 97) and the difficulties of finding an appropriate system of maintenance are many. They include problems caused by the complexity of water sector activities and the multiplicity of the very different organizations involved. The functioning of these organizations must somehow be linked to community level activities if benefits are to be achieved and equitably distributed.

1.2 The Maintenance System

Attempts to ensure this in Zimbabwe have included the adoption of a three tier maintenance system as outlined in the National Master Plan Volume on Operation and Maintenance (NMP Vol 5). This system theoretically links into the local administrative structure of villages, wards and districts. At village level, the community is to be involved in basic and preventative maintenance of their water source through the activities of an elected Waterpoint Committee (WPC) which includes one or two voluntary Pump Caretakers. They are assisted in the technical aspects of this task by a peripatetic Pump Minder (PM) operating at ward level and having responsibility for up to fifty waterpoints. He in turn is backed up by a skilled District Maintenance Team (DMT) complete with transport and heavy equipment.

Whilst this system has been incorporated into national policy for the maintenance of rural water supplies, it is not yet a universal reality. The Three Tier System has been implemented in some form in several districts, with the District Development Fund (DDF) as the primary maintenance agency. However, the situation is



complicated by the fact that many districts are allocated insufficient resources to ensure the smooth running of the system. In addition certain technologies (Bucket and Blair Pumps) remain primarily the responsibility of Ministry of Health staff who are not wholly integrated into the largely operated the Three Tier System.

Although there have been some attempts to simplify the maintenance task by standardizing on two technologies (Bush and Bucket Pumps), little attention has been paid to the non-technical factors promoting good maintenance. This is a serious omission for;

'The problems most likely to be experienced in a rural water supply programme are not usually of a technical nature, but are generally due to poor organisation and management.' (Glennie 1983 p. 25)

The purpose of this project was to examine some of these non technical issues and it will be useful to review the general issues here before considering the data.

1.3 Community Participation

The chosen strategy for maintenance in the National Master Plan is one of community participation within a three tier system. Through community participation it is hoped to enhance the benefits obtained as people develop a knowledge of, and sense of responsibility towards, their water source. Breakdowns are consequently minimized and usage maximized. It is anticipated that community participation can also achieve reduced capital and recurrent costs (NMP Vol 4.2 p 510) as, by mobilizing local resources and developing indigenous skills, the need to employ large numbers of skilled technicians is lessened. There is a developmental as well as instrumental rationale for advocating this form of management (Midgley 1986 p 9) which is thought to enhance community level capability and organisation in general. In the words of the Annual Report of the Lutheran World Federation 1986, it promotes 'people development'.

1.4 Organizational Factors

The form of management adopted in Zimbabwe is only one of the possible options; Cairncross identifies a range of six forms of organisation for maintenance ranging from privatization of supplies to total communal ownership and responsibility (Cairncross 1980 p.107). There is little compelling empirical evidence that the chosen system is the most practical one for Zimbabwe, and a number of potential problem areas may be identified.

The involvement of users in the management of their water supplies requires careful planning, monitoring and control to be effective. This means that anticipated cost savings from the reduction of government personnel and inputs may not be achieved if the necessary levels of training, support and supervision are to be

sustained. Indeed,

'Community managed maintenance is highly dependent on the quality of agency support.' (IRC 1988 p.9)

One of the major difficulties of incorporating popular involvement into a government programme is that of ensuring that the bureaucratic organisation is flexible enough to adjust to the diversity and dynamics of community life. The tendency for bureaucracies to apply a blueprint approach to the planning and implementation of national programmes can obstruct real participation and so lessen the benefits obtained (Korten 1986 p. 4/5). The National Master Plan is essentially a blueprint for the development of rural water supplies and as such may take insufficient account of the diversity of local circumstances in Zimbabwe. One of the aims of the project is therefore to evaluate the feasibility of the maintenance system adopted in Zimbabwe and to assess the organizational inputs necessary to ensure long term success.

1.5 The Three Tier System

There is some controversy as to who is capable of doing what within the maintenance system. The National Master Plan recommends the Three Tier System as an effective means of utilizing resources and ensuring accountability. However, the role of the second tier has been questioned in Zimbabwe (GOZ/GTZ 1984, Danida 1987, Norad 1989) and some Districts operate a maintenance system in the absence of Pump Minders. The DDF however in a recent report have defended the potential role of the Pump Minder in the system. ()

The extent of involvement possible from the first tier of maintenance is also disputed. Whilst Roy cites an Indian example of a villager being trained to undertake most preventative and corrective maintenance at village level (Roy 1984), Glennie believes that :

'Consumers are generally unable to maintain rural water supply systems. They have limited financial and technical capacity and only a limited concept of preventative maintenance.' (Glennie 1983 p.101)

It is intended that this study should therefore examine the operation of the Three Tier System and determine whether the maintenance task could be undertaken more effectively within another structure.

1.6 Community Maintenance

Community maintenance is a complex concept to apply practically. The definition of 'the community' may not be a simple matter when the water using community corresponds neither to old traditional boundaries nor to new administrative ones. Furthermore, the



question of exactly who, within the community, should participate is a matter of great importance in determining the distribution of benefits. Wijk-Sibesma identifies women as 'the water using community' because of their role in fetching and carrying water (Wijk Sibesma 1985). Their importance is recognized in the National Master Plan which advocates the choosing of women as Pump Caretakers. In practice, men are often sought out to be Chairmen of Village Water Committees because they possess more authority than women (LWF 1987). The ways in which the village level participants are motivated, rewarded and organized are questions crucial to the success of community maintenance. The attitudes and role of local leadership, and the ways in which they exercise authority, may also be critical to the success of a system based on user participation.

The type of participation undertaken varies considerably and some activities may give rise to more conflict than others. For example, community labour may be relatively easy to organise whereas cash contributions raise problems of collection, accounting and sanctions against non-contributors, as Feachem discovered in Lesotho (Feachem 1978). Through detailed observations at waterpoint level, this study aims to analyze community maintenance in terms of a tripartite classification of who does what and how (Cohen and Uphoff 1977).

1.7 Waterpoint Analysis

The appropriateness, condition and capacity of the water facility will affect the usage and therefore have some effect on the benefits obtained. Despite the recognition of this in the National Master Plan, there is currently very little data on patterns of water usage, changes brought about by the provision of new water supplies and attitudes towards the new facilities. People have traditionally used a variety of sources (NMP Vol. 4.2) and it seems possible that they will continue to do so despite the provision of new ones. The availability and accessibility of other water sources may affect their perceptions of the new source and their willingness to provide maintenance inputs. An example is the reported motivating effect of drought on people's willingness to participate (LWF 1987).

The type of technology supplied and the capacity of the community to maintain it will help to determine their level of participation (Mutizwa p2). The reliability of the supply in terms of the frequency of breakdowns may also shape community motivation. The local context in which community maintenance is expected to take place is therefore examined in this study.

X In summary, there are a number of theories about the best means of ensuring good maintenance of rural water supplies, and a dearth of information about the maintenance and use of existing facilities in Zimbabwe. This study was designed and undertaken in an attempt to throw some light on the local situation.

CHAPTER 2 METHODOLOGY

2.1 Research Techniques

A combination of research techniques were used in this study in order to maximize the collection of both quantitative and qualitative data. It was felt that by doing this a more complete picture of community maintenance would be obtained, reflecting general tendencies as well as local variations. The field work took place between July and October 1989.

2.2 Sample Survey

The first part of the study involved a sample survey to determine the current condition of pumps and their recent history of maintenance. Eight districts (one in each province) were selected to reflect a variety of features including geographical or topographical differences and a range of water programmes implemented by different agencies. As the study was primarily concerned with operation and maintenance rather than implementation, districts with very new projects were excluded. The districts selected were: Tsholotsho, Gwanda, Shamva, Mutoko, Gutu, Buhera, Chegutu and Charter.

Certain wards within each District were selected in discussion with District Staff. (These were mostly from DDF and MOH but also included MLGRUD and MCCD.) The choice of wards was made in an attempt to be fairly representative of the district concerned. Major variations within the District in terms of water availability or water programme implementation were taken into account.

Environmental Health Technicians (EHTs) were mostly recruited as research assistants although DDF staff often participated. Each was given a rough quota of different types of pump to survey in his area. The EHTs were briefed and trained in the field on the selection of waterpoints and the administration of the questionnaire. They also received a set of briefing notes for reference purposes. The aim was to survey 70 water points in each district.

During this stage of the study, initial information was collected about each District to assist in the design of the Case Studies and the briefing of all research assistants for the second phase.

2.3 Case Studies

The case studies were designed to obtain a more detailed picture of pump maintenance from the user level and to try to determine the reasons for good or bad maintenance. Third year BSc students from the Department of Rural and Urban Planning at the University of Zimbabwe undertook most of the case studies. They were trained and given detailed briefing notes containing guidelines for conducting the research and outlines of interviews (See Appendix).



DEFINITION REQUIRED

METHOD

LOCATION

PARTICIPANTS

General information on water programme, problems of management, district characteristics, etc.

Interviews, review of documents and records.

Eight districts: Tsholotsho, Gwanda, Shamva, Mutoko, Gutu, Buberu, Chegutu, Charter-

District officials of ROH, MUGROD, MCOO, NGOs and UZ student research assistants.

Specific information about the wards surveyed and the organisation of maintenance.

Interviews and observations

Selected wards

As above and including field based staff such as EHTs and Pump Minders.

Profiles; history and maintenance.

Sample survey questionnaire.

Selected waterpoints. 70 in each District.

EHTs, some DDF Field Officers and NGO representatives. Also users of pumps.

Organisation of maintenance at community level.

Interviews, observations, group discussions.

Waterpoints and their environment.

Users of pumps, EHTs, PH, local leaders and development workers. UZ student research assistants.

The students were given a target of five waterpoints to be studied in detail, and this they did over a two week period, writing up their own notes afterwards.

2.4 Analysis

Computer analysis of the sample survey data (which eventually consisted of 480 questionnaires) was done on a Tulip pc using Statgraphics software. Analysis of the case studies was done by rewriting them in a consistent form and then extracting key characteristics for comparison.

2.5 The Whole Truth?

Any study of this nature is inevitably subject to accusations both of false generalizations and of unrepresentative details. Possible sources of bias exist in the selection of districts, wards, waterpoints and cases. The number of different people involved gave rise to problems of consistency of administration and interpretation. At all points of the research however, such issues were discussed at length with staff concerned and biases hopefully minimized.

This study was intended to be a preliminary look at community maintenance, rather than a definitive survey. Inevitably, there are many gaps, many questions raised and left unanswered. No account of a situation can be wholly comprehensive and it would perhaps be unwise to extrapolate to a national level the facts and figures relating to the eight districts studied in this project. However, I hope the data will prove a useful indication of certain issues or trends relating to community maintenance of water supplies in Zimbabwe. It would be encouraging if, in subsequent debates, it were decided to undertake further studies in this critical area.

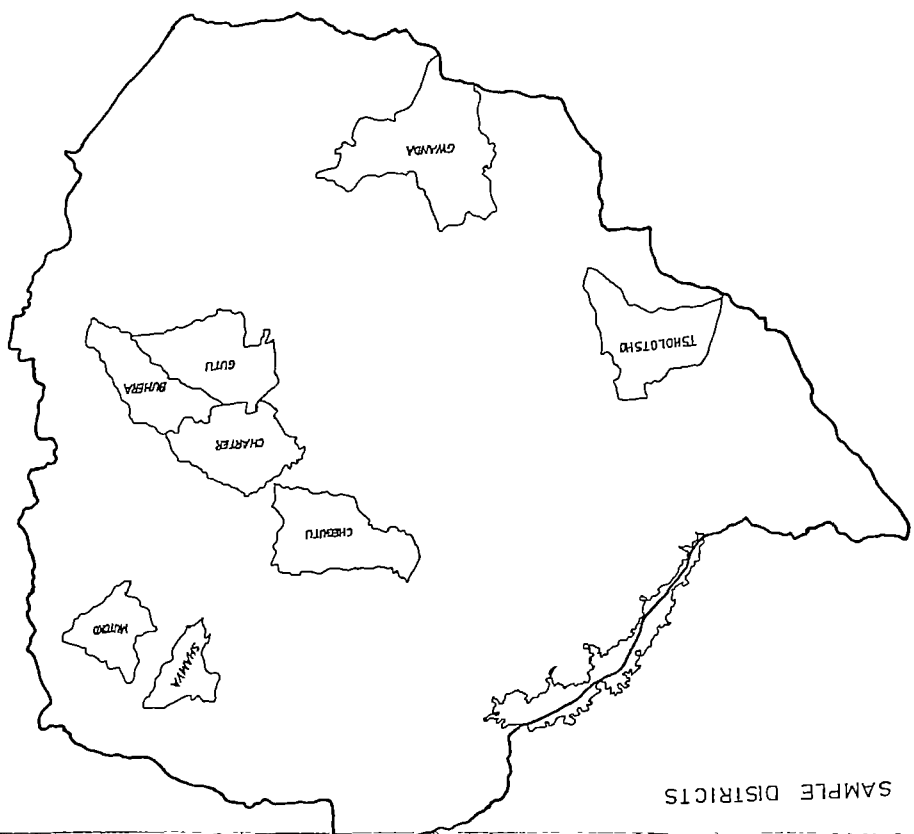
2.6 Organization of the Report

The remainder of this report is organized as follows. In Chapter 3 a summary of the data collected is presented. This includes a description of the overall picture obtained from aggregated district data and a comparison of certain variables between districts. District data is presented in the form of background information, a description of the figures obtained from the sample survey and a presentation of the case studies.

Chapter 4 is an attempt to analyze and explain some of this data in terms of the major issues raised in Chapter 1.

In Chapter 5 conclusions are drawn from this analysis and recommendations made both for improving the maintenance system, and for further studies in this area. The recommendations include a proposal for an alternative maintenance system in Zimbabwe.





SAMPLE DISTRICTS



proportion had multiple users.

Bucket pumps were, in general, used by far fewer people; 66% of those sampled being used by 10 households or less. No Bucket Pumps fell into the 80 + user range, but a surprisingly high percentage had 'multiple' users. (A category labelled 'schools' in the data).

Blair pumps fell into the medium user range, again with a fair number of 'multiple' users.

In summary, the numbers of pump users can be presented as follows. Figures shown in brackets indicate the actual number of a sample.

TABLE 3 : PUMP USAGE

| NO OF USER HOUSEHOLDS: | TYPE OF PUMP | | |
|---------------------------|--------------------|---------------------|--------------------|
| | BUSH (276) % | BUCKET (94) % | BLAIR (89) % |
| Up to 10 | 8 | 66 | 47 |
| 11 to 80 | 62 | 23 | 38 |
| 80 + | 9 | 0 | 2 |
| Multiple users | 20 | 14 | 12 |

Looking at uses other than domestic (drinking, washing and cooking), similar proportions of pumps were used for garden and livestock watering. In addition to pumps with solely household users were 21% which had institutional users. These included schools, clinics, diptanks, and are referred to here as multiple users or simply 'schools'.

TABLE 4 : TYPE OF USAGE

| | LIVESTOCK | GARDENS | SCHOOLS |
|-----------------|-----------|---------|---------|
| % sampled pumps | 38 | 38 | 21 |

3.1.3 Breakdowns

A breakdown was defined as the pump not producing water. Technical problems which still allowed the pump to function, albeit inefficiently, were not classified as breakdowns. However a pump which had dried up completely was classified as broken down. From



CHAPTER 3 DATA

3.1 The General Picture

3.1.1 Technology

Of a total sample size of 480 pumps, the majority fall into three categories: Bush, Bucket and Blair Pumps. In analysing the data it was decided to mainly concentrate on the first two as it is national policy to standardise on these technologies. Blair Pumps have been included in the tables comparative purposes. The number of other types sampled (Nsimbi, National and Mono Pumps) was too small to be significant. All 'Bush type' pumps including the old Murgatroyds were classified Bush Pumps. The different pumps sampled expressed as a percentage of the total is:

TABLE 2: TYPE OF PUMPS SAMPLED

| | |
|--------|-----|
| Bush | 58% |
| Bucket | 20% |
| Blair | 19% |
| Nsimbi | 1% |
| Others | 2% |

At the time of the survey, 83% of these pumps were in working order (defined as producing water) although of these working pumps 32% were judged to be in need of some repair. Whether a pump was in need of repair was judged by the enumerators on the basis of their own observations and the reports of the users. It is therefore a fairly loose term but broadly taken to mean that the pump could operate more effectively if some repairs or preventive maintenance were done.

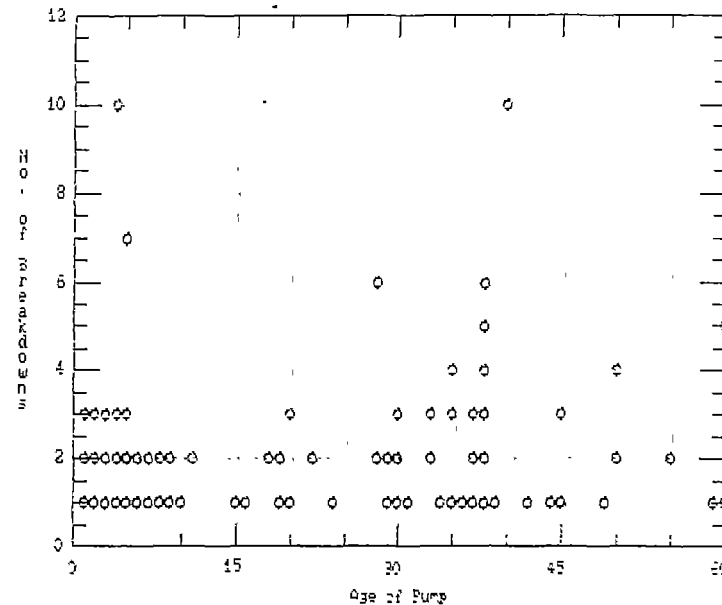
The average age of the pumps sampled was 8,8 years but the range extended from 1 year to 61 years. Assessing the age of some of the older pumps in Gutu and Tsholotsho often proved difficult because they had been installed before the users were born or prior to them moving into that area. This average is upwardly distorted by a number of very old pumps; in fact the majority sampled were significantly younger with the mode of the sample being 1 year and the median 3 years.

3.1.2 Pump usage

The average number of user households per pump sampled was 30.5 the minimum being one household and the maximum 300. In themselves these figures give only a vague picture of the levels of usage because a pump nominally used by 300 households may in fact be serving merely as a backup to other sources or for seasonal use only.

The Bush Pumps generally had the highest number of users with the majority being used by between 11 and 80 households. A fairly high

Figure 2 : BREAKDOWNS BY AGE OF PUMP





the sample, 53% had broken down at least once on the 12 months preceding the survey. The total number of actual breakdowns was 400, several of the pumps breaking down more than once. Overall this works out at 0,83 breakdowns per pump over the year.

When analysed by type of pump the breakdown rates were as follows:

TABLE 5 : BREAKDOWN RATES FOR DIFFERENT PUMPS

| BREAKDOWNS IN PREVIOUS YEAR | TYPE OF PUMP | | |
|-----------------------------|-----------------|------------------|-----------------|
| | BUSH (277) % | BUCKET (95) % | BLAIR (91) % |
| None | 39 | 55 | 64 |
| One | 40 | 42 | 33 |
| Two | 12 | 3 | 1 |
| Three | 5 | 0 | 2 |
| Over three | 4 | 0 | 0 |

There was no relationship between the number of breakdowns and the number of households using the pumps. However pumps with multiple users and those used for livestock watering had broken down more in the previous year than those used for gardens.

TABLE 6 : BREAKDOWN RATES BY PUMP USAGE

| BREAKDOWN RATE (Overall ave 53) | USAGE OF PUMP | | |
|---------------------------------|--------------------|----------------------|--------------------|
| | GARDENS (182) % | LIVESTOCK (183) % | SCHOOLS (104) % |
| | 52 | 65 | 63 |

There was some correlation between the age of pump and breakdowns although this was not strong and the relationship is not a simple one. As can be seen from the scatterplot (Figure 2), breakdowns tend to be clustered within the first five years of life of the pump and then again from about 28 years upwards. (One breakdown value of 20 has been omitted from this chart as it is considered a rogue value and does not considerably alter the picture.) The number of pumps with no breakdowns in the year does decline after 40 years of age and multiple breakdowns become more common. However, several pumps in their first few years of life also break down repeatedly and a few high values are evident in these early years.

Figure 3 : REPORTERS

7 Breakdowns by reporter

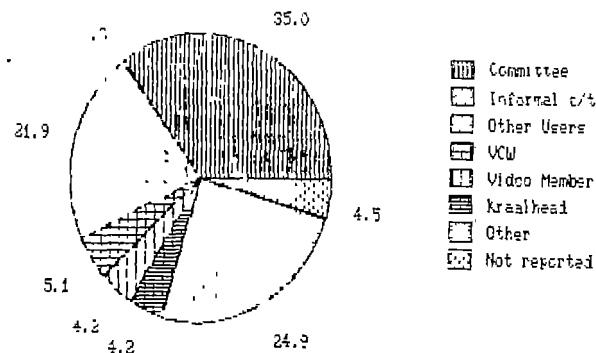
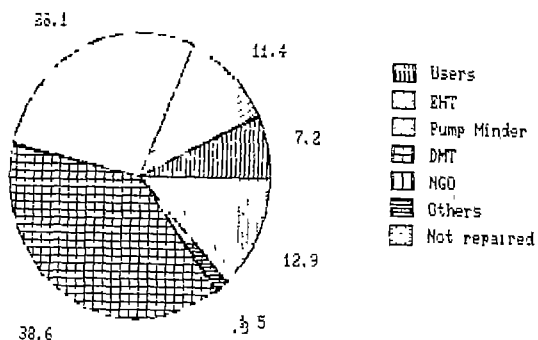
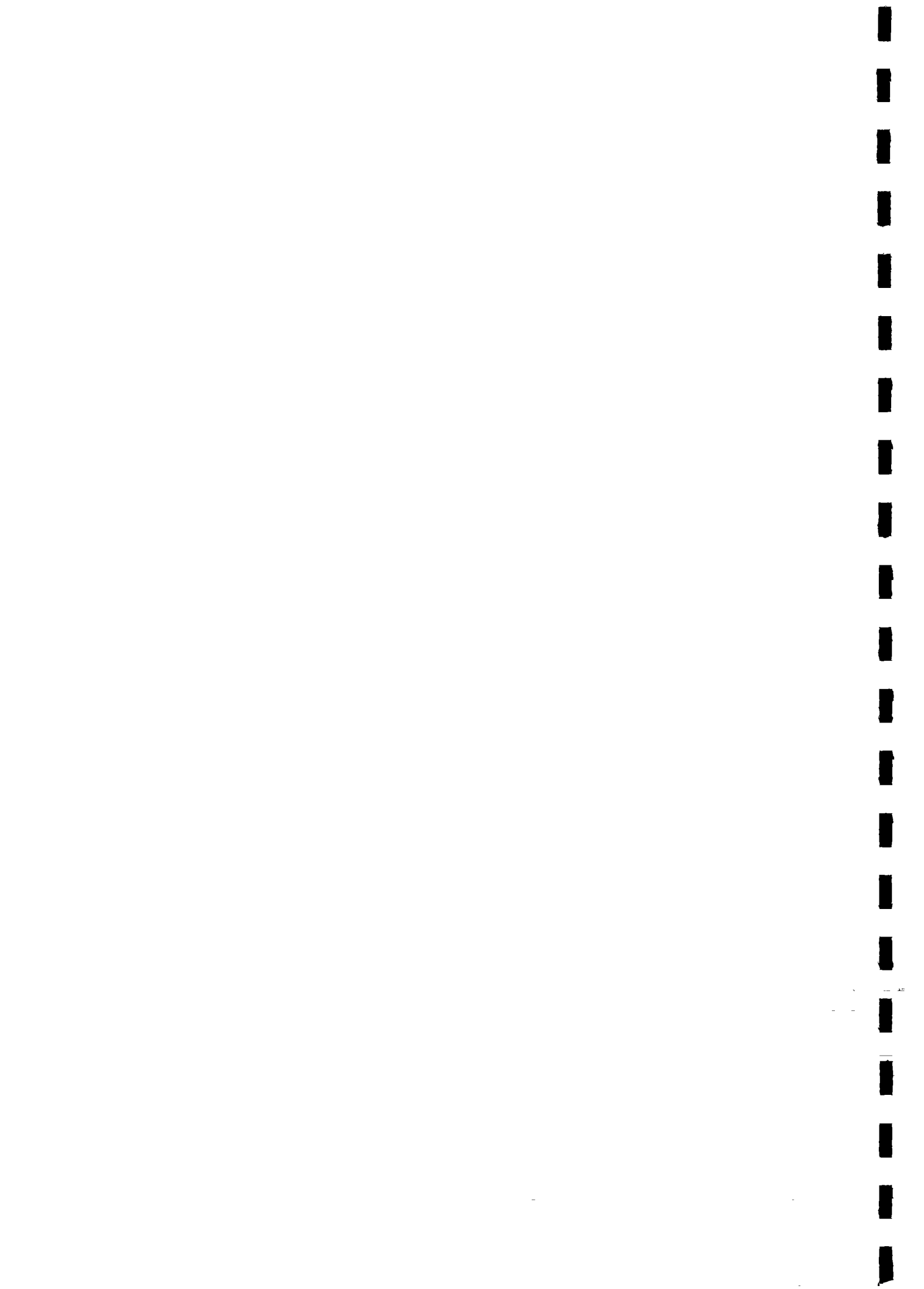


Figure 4 : MENDERS

7 Breakdowns by mender





3.1.4 Maintenance

The pie chart (Figure 3) shows who reported the breakdowns which occurred during the previous year (The data for reporters, downtimes and menders was collected for up to three breakdowns for any pump. If more than three breakdowns occurred, only the first three were counted for this purpose.

As can be seen the majority of reports of breakdowns were made by the waterpoint committees or, where they do not exist, by the users. The other large category of reporters, 'others', mainly consists of schoolteachers, clinic staff and businessmen although the occasional policeman and councillor also feature here.

The length of time between a pump breaking down and being mended is here called 'downtime'. The overall downtimes for the breakdowns recorded are as follows:

TABLE 7 : DOWNTIMES

| | DAYS | | | | MONTHS | | |
|--------------|------|-----|------|-------|--------|-----|----|
| | 1 | 2-7 | 8-14 | 15-28 | 1-2 | 3-5 | 6+ |
| BREAKDOWNS % | 9 | 32 | 14 | 18 | 11 | 8 | 9 |

When counted by pump they appear as in the table below. This shows that Bush Pumps were generally out of action for less time than either Blair or Bucket Pumps.

TABLE 8 : DOWNTIMES BY PUMP

| DOWNTIMES | TYPE OF PUMP | | |
|--------------|--------------------|---------------------|--------------------|
| | BUSH (234) % | BUCKET (44) % | BLAIR (35) % |
| Up to 7 days | 40 | 34 | 37 |
| 8 - 14 days | 17 | 7 | 11 |
| 15 - 28 days | 19 | 20 | 11 |
| 1-5 months | 18 | 23 | 14 |
| 6 months + | 6 | 16 | 26 |

The data collected included details of who mended the breakdowns. There are four main categories of menders with 'others' a very small group, mostly representing NGOs. The percentage of breakdowns mended by the various categories of people were as shown in the Figure 4.

The 'not mended' category mostly refers to those pumps which at the time of the survey were not functioning. Sometimes this includes pumps which had dried up. The table below shows who mended the different types of pumps. Only the major categories of menders have been shown here and those breakdowns not yet mended at the time of the study have been excluded.

TABLE 9 : MENDERS OF DIFFERENT PUMPS

| MENDER | TYPE OF PUMP | | |
|-------------|--------------------|---------------------|--------------------|
| | BUSH (232) % | BUCKET (46) % | BLAIR (36) % |
| Users | 3 | 28 | 6 |
| EHT | 3 | 30 | 36 |
| Pump Minder | 35 | 11 | 3 |
| DMT | 48 | 9 | 25 |

If the first three categories (Users, EHTs and Pump Minders) are considered 'local' menders then it is apparent that a substantially greater proportion of Bucket Pumps are repaired locally as opposed to Bush or Blair Pumps.

TABLE 10 : 'LOCALLY' MENDED BREAKDOWNS

| | |
|--------------|-----|
| Bush Pumps | 41% |
| Bucket Pumps | 69% |
| Blair Pumps | 45% |

3.1.5 Efficiency

Downtime was used as an indicator to assess the efficiency of the system. Downtimes were therefore compared with both reporters and menders to see whether either group had any effect on the length of time the pumps were out of action. The following table shows how quickly breakdowns reported by the main categories of reporters were mended.



TABLE 11 : REPORTERS OF BREAKDOWNS BY DOWNTIMES

| DOWNTIME | COMMITTEE (117) % | USERS (72) % | OTHERS (82) % |
|--------------|-------------------------|--------------------|---------------------|
| Up to 7 days | 50 | 39 | 24 |
| 8 - 14 days | 15 | 21 | 13 |
| 15 - 28 days | 19 | 17 | 26 |
| Over 1 month | 16 | 23 | 37 |

As can be seen breakdowns reported by members of waterpoint committees were mended slightly more quickly than those reported by Users and substantially faster than those reported by 'Others'.

A similar table drawn up for the major menders looks like this:

TABLE 12 : MENDERS OF BREAKDOWNS BY DOWNTIMES

| DOWNTIME | USER (24) % | MENDER EHT (38) % | PM (93) % | DMT (129) % |
|--------------|-------------------|----------------------------|-----------------|-------------------|
| Up to 7 days | 58 | 42 | 45 | 43 |
| 8 - 14 days | 4 | 11 | 16 | 16 |
| 15 - 28 days | 17 | 18 | 19 | 21 |
| Over 1 month | 20 | 29 | 20 | 21 |

If we count breakdowns mended in the first two weeks, Users and Pump Minders are the fastest menders followed very closely by the DMT with the EHT lagging a little behind. The figures though are very close and it should be noted that Pump Minders and the DMT mend substantially greater numbers of breakdowns than the other two categories.

3.2 District Comparisons

3.2.1 Introduction

This section is intended to show some of the key differences between the districts surveyed by presenting tables of comparative data.

It should be noted that due to rounding, some series of percentages do not add up to 100.

Where 'Overall average' appears on the table this refers to figures derived from the aggregated data of all eight districts.

3.2.2 District characterization

The District Characterization table is an attempt to make a judgement about what the data means and to place districts on a scale. This is, by definition, a subjective exercise, but every attempt has been made to be consistent in assigning values.

Some of the judgments, such as those for predominant technology, are easy to make from the available data. Others, such as those for breakdown rates, are more difficult. To ensure some internal consistency, values have been assigned here according to the division of the data values into lower, middle and upper quartiles. This technique reflects the spread of the data and is less liable to distortion by extreme values than, say, calculating the average. It should be noted though, that the terms 'high' 'medium' and 'low' are applicable to the range of data itself and are not independent values. Thus a 50% breakdown rate will be called 'moderate' because it falls in the middle range of values from the eight districts. It is up to the reader to decide whether a 50% breakdown rate is acceptable in maintenance terms. The values given in the District Characterisation table are, therefore, only valid in comparisons between the districts.



TABLE 13 : TYPE OF PUMP

| DISTRICT | PUMPS | | | | | NO. OF PUMPS |
|----------------|-------|--------|-------|--------|--------|--------------|
| | BUSH | BUCKET | BLAIR | NSIKBI | OTHERS | |
| | % | % | % | % | % | |
| TSOLOLOFO-1 | 98 | 2 | 0 | 0 | 0 | 46 |
| GRANJA | 89 | 0 | 2 | 6 | 4 | 53 |
| SHAMVA | 74 | 4 | 61 | 0 | 0 | 70 |
| MUTOKO | 62 | 10 | 28 | 0 | 0 | 50 |
| GUTU | 13 | 87 | 0 | 0 | 0 | 61 |
| BUMERA | 84 | 16 | 0 | 0 | 0 | 70 |
| CHARTER | 60 | 19 | 6 | 6 | 10 | 70 |
| CHESUTU | 35 | 15 | 48 | 0 | 2 | 60 |
| SAMPLE AVERAGE | 59 | 20 | 19 | 1 | 2 | |

TABLE 14 : AGE OF PUMPS

| DISTRICT | AGE | | |
|----------------|---------|---------|---------|
| | AVERAGE | MINIMUM | MAXIMUM |
| TSOLOLOFO | 28 | 1 | 61 |
| GRANJA | 18 | 1 | 39 |
| SHAMVA | 3 | 1 | 27 |
| MUTOKO | 5 | 1 | 16 |
| GUTU | 3 | 1 | 42 |
| BUMERA | 15 | 1 | 44 |
| CHARTER | 4 | 1 | 44 |
| CHESUTU | 3 | 1 | 10 |
| SAMPLE AVERAGE | 9 | 1 | 61 |



TABLE 15 : PUMP USAGE

| DISTRICT | AVERAGE DEER | SCHOOLS | GARDENS | LIVESTOCK |
|----------------|--------------|---------|---------|-----------|
| | % HOUSEHOLDS | % | % | % |
| TSOLOLOSHO | 63 | 28 | 46 | 76 |
| SHANDA | 33 | 42 | 47 | 62 |
| SHAMVA | 22 | 16 | 31 | 23 |
| MUTOKO | 27 | 20 | 22 | 30 |
| GUTU | 8 | 7 | 66 | 15 |
| BUMERA | 67 | 17 | 27 | 71 |
| CHARTER | 24 | 24 | 20 | 37 |
| CHEBUTU | 27 | 26 | 30 | 22 |
| SAMPLE AVERAGE | 31 | 21 | 38 | 38 |

TABLE 16: BREAKDOWN RATES

| | BREAKDOWN RATES % |
|----------------|-------------------|
| | % |
| TSOLOLOSHO | 86 |
| SHANDA | 68 |
| SHAMVA | 33 |
| MUTOKO | 54 |
| GUTU | 37 |
| BUMERA | 54 |
| CHARTER | 41 |
| CHEBUTU | 45 |
| SAMPLE AVERAGE | 50 |

The breakdown rate is defined as the percentage of pumps sampled which broke down at least once in the previous year.

TABLE 17: BREAKDOWN RATES BY TYPE OF PUMP

| DISTRICT | PUMP BREAKDOWN RATES ¹ | | | | |
|----------------|-----------------------------------|----------|---------|----------|----------|
| | BUSH % | BUCKET % | BLAIR % | NGIMPI % | OTHERS % |
| TSOLOLOSHO | 87 | 0 | - | - | - |
| SHANDA | 66 | - | 100 | 67 | 100 |
| SHAMVA | 53 | 30 | 28 | - | - |
| MUTOKO | 45 | 60 | 75 | - | - |
| GUTU | 63 | 37 | - | - | - |
| BUMERA | 64 | 0 | - | - | - |
| CHARTER | 38 | 38 | 50 | 50 | 57 |
| CHEBUTU | 37 | 44 | 38 | - | - |
| SAMPLE AVERAGE | 61 | 45 | 38 | 37 | 61 |

¹ A breakdown rate is defined as the percentage of pumps sampled which broke down at least once in the previous year.

It should be noted that some of the real values for example for Ntsabi Pumps and Others are very small.



TABLE 18 : BREAKDOWNS BY USAGE

| DISTRICT | GARDENS % | LIVESTOCK % | SCHOOLS % |
|----------------|--------------|----------------|--------------|
| TSHOLOTSHO | 3 | 59 | 38 |
| GWANDA | 26 | 67 | 45 |
| SHANYA | 13 | 44 | 73 |
| MUTOKO | 42 | 40 | 100 |
| SUTU | 51 | 67 | 26 |
| BUHERA | 53 | 64 | 65 |
| CHARTER | 31 | 42 | 41 |
| CHEBOTU | 45 | 77 | 53 |
| SAMPLE AVERAGE | 52 | 63 | 63 |

TABLE 19: REPORTERS

| DISTRICT | REPORTERS OF BREAKDOWNS | | | | | | | |
|----------------|-------------------------|--------------------------|------------|----------|------------|-------------|-------------|----------------------|
| | WFO % | INFORMAL C/TAKER % | USERS % | VOW % | V:DCD % | K/HEAD % | OTHERS % | NOT REPORTED % |
| TSHOLOTSHO | 59 | 0 | 4 | 0 | 6 | 4 | 25 | 1 |
| GWANDA | 26 | 0 | 26 | 0 | 2 | 17 | 14 | 2 |
| SHANYA | 22 | 0 | 11 | 4 | 22 | 11 | 19 | 11 |
| MUTOKO | 6 | 3 | 6 | 13 | 6 | 3 | 58 | 3 |
| SUTU | 5 | 0 | 75 | 8 | 0 | 0 | 5 | 5 |
| BUHERA | 53 | 0 | 10 | 2 | 2 | 0 | 23 | 2 |
| CHARTER | 31 | 0 | 5 | 0 | 0 | 0 | 27 | 6 |
| CHEBOTU | 0 | 0 | 55 | 25 | 0 | 0 | 17 | 10 |
| SAMPLE AVERAGE | 35 | 0 | 22 | 5 | 4 | 4 | 25 | 5 |



TABLE 20 : DOWNTIMES

| DISTRICT | DOWNTIMES | | | | | MONTHS 1-6 | 6- |
|----------------|-----------|-----|------|-------|----|---------------|----|
| | DAYS | | | | | | |
| | 0-1 | 2-7 | 8-14 | 15-28 | 29 | | |
| | % | % | % | % | % | % | % |
| TEHOLGOND | 7 | 42 | 18 | 20 | 4 | 1 | 7 |
| BANOLA | 2 | 57 | 5 | 7 | 5 | 12 | 12 |
| BHAKVA | 3 | 54 | 18 | 6 | 19 | 4 | 3 |
| MOTOND | 3 | 6 | 9 | 10 | 16 | 22 | 39 |
| EUTV | 16 | 24 | 3 | 16 | 14 | 14 | 11 |
| SUHERA | 0 | 13 | 22 | 40 | 11 | 5 | 4 |
| CHARTER | 22 | 10 | 16 | 17 | 25 | 6 | 0 |
| CHEBUTW | 17 | 30 | 27 | 10 | 7 | 3 | 3 |
| SAMPLE AVERAGE | 9 | 32 | 14 | 18 | 11 | 5 | 9 |

1) DOWNTIMES are defined as the time between breakdown and repair of pumps

TABLE 21 : MENDERS

| DISTRICT | USERS | E.H.T | PUMP MINDER | D.M.T | OTHERS | NOT REPAIRED* |
|----------------|-------|-------|----------------|-------|--------|------------------|
| | % | % | % | % | % | |
| TEHOLGOND | 0 | 0 | 07 | 59 | 0 | 4 |
| BANOLA | 12 | 0 | 67 | 9 | 0 | 16 |
| BHAKVA | 4 | 11 | 0 | 63 | 6 | 16 |
| MOTOND | 0 | 16 | 0 | 47 | 3 | 34 |
| SLTL | 27 | 24 | 18 | 7 | 4 | 21 |
| SUHERA | 0 | 0 | 22 | 37 | 6 | 6 |
| CHARTER | 0 | 9 | 50 | 16 | 0 | 25 |
| CHEBUTW | 6 | 40 | 0 | 43 | 4 | 7 |
| SAMPLE AVERAGE | 7 | 12 | 22 | 39 | 2 | 10 |

* 'Not repaired' indicates that at the time the survey was undertaken the pumps had not been repaired.





Sanitation Sub-Committee meeting in 1988 it was estimated that 314 of these pumps were in need of immediate rehabilitation and 461 had no cattle troughs or fencing. The average depth of the boreholes is 90 metres but this deepens to 120 or 140 metres in the drier parts of the District. The five wards in the extreme West suffer the most from inadequate water supplies as they have very old boreholes (some sunk in the 1940s) which, because of their depth, often yield salty water. There are few other sources of water and people may travel long distances, up to 10 km, between waterpoints. Maintenance of the existing facilities is made more difficult by the scattered population and by the sandy soils. In the words of one councillor the area could be considered a 'disaster district' in terms of water supply.

Some small non-governmental organisations are operational in the District; namely ORAP and World Vision. Amongst other activities, they supply engine pumps to communities.

A Water and Sanitation Sub-committee was formed in 1988 and has drawn up plans for an integrated project for the District worth \$4,5 million over the next five years. The focus of this plan is on the rehabilitation of existing boreholes with only 31 new ones to be constructed in Phase 1 to accommodate Forestry Commission and Resettlement area populations. The plan was completed in early 1989 but to date has received no commitments from funding agencies. This year the District Council allocated \$50 000 of its budget to water development.

Personnel available to the DDF include 13 Pump Minders and 4 Water Supply Operatives who, along with the casuals, provide the maintenance service to 21 wards. The Ministry of Health has only 7 EHTs and 2 SEHTs who, assisted by 4 Health Orderlies, cover the same constituency.

The total DDF District budget spent on maintenance, and rehabilitation in 1988/89 was just over \$70 000. This does not include salaries for the Field Officer, WSOs or clerks.

Maintenance

There is a Three Tier Maintenance system operational in the District although coverage is not uniform due to the insufficient number of Pump Minders and the lack of transport. At District level the DDF hire their vehicles from the Roads Division. There are 13 Pump minders covering 21 wards.

Waterpoint Committees comprised of the users are in existence at most waterpoints although their composition varies considerably. Training of these committees is undertaken by the DDF with the LGPOs and the people are mobilized for the training by the Ward Councillor. Training takes place in each ward once every two years and the UNICEF training cards are used for this purpose.

There are four DDF substations in the District, in addition to the headquarters in Tsholotsho. These are the base for Pump Minder activities, such as reporting, and for the casuals and WSOs. There is also a clerk who maintains the records and reports to the

District Headquarters.

An example is the DDF substation at Dhlamini, which is about 84 km from Tsholotsho centre. The substation covers three wards and from it operate 2 Pump Minders, 1 Casual, 1 Water Supply Operative and a Clerk. From here some of the pumps which they look after are 45 kilometres away and it is impossible to use bicycles because of the sandy roads. The DDF personnel often negotiate informal arrangements with the bus drivers operating on these routes to transport the Pump Minders around. The sub-station has no transport of its own but may occasionally request the use of a tractor from Tsholotsho.

The Pump Minders were mostly trained by the Lutherans and then handed over to the DDF. They have between 60 and 70 pumps each to look after.

Reporting and Recording

The reporting system is that the users, theoretically the Waterpoint Committee, but in practice often not, contact the Pump Minder who does the repair and then reports directly to the substation. Here the activity is recorded in a book and a summary sent to the DDF, Tsholotsho where the information is entered onto the Pump Record Card. The Pump Record Card system was started relatively recently (1986) and so mostly only new information is recorded. According to the DDF records there are about 50/60 breakdowns a month in the District but in August 72 were recorded and the number is likely to rise considerably through the dry season. Additionally there may be a number of unreported breakdowns.

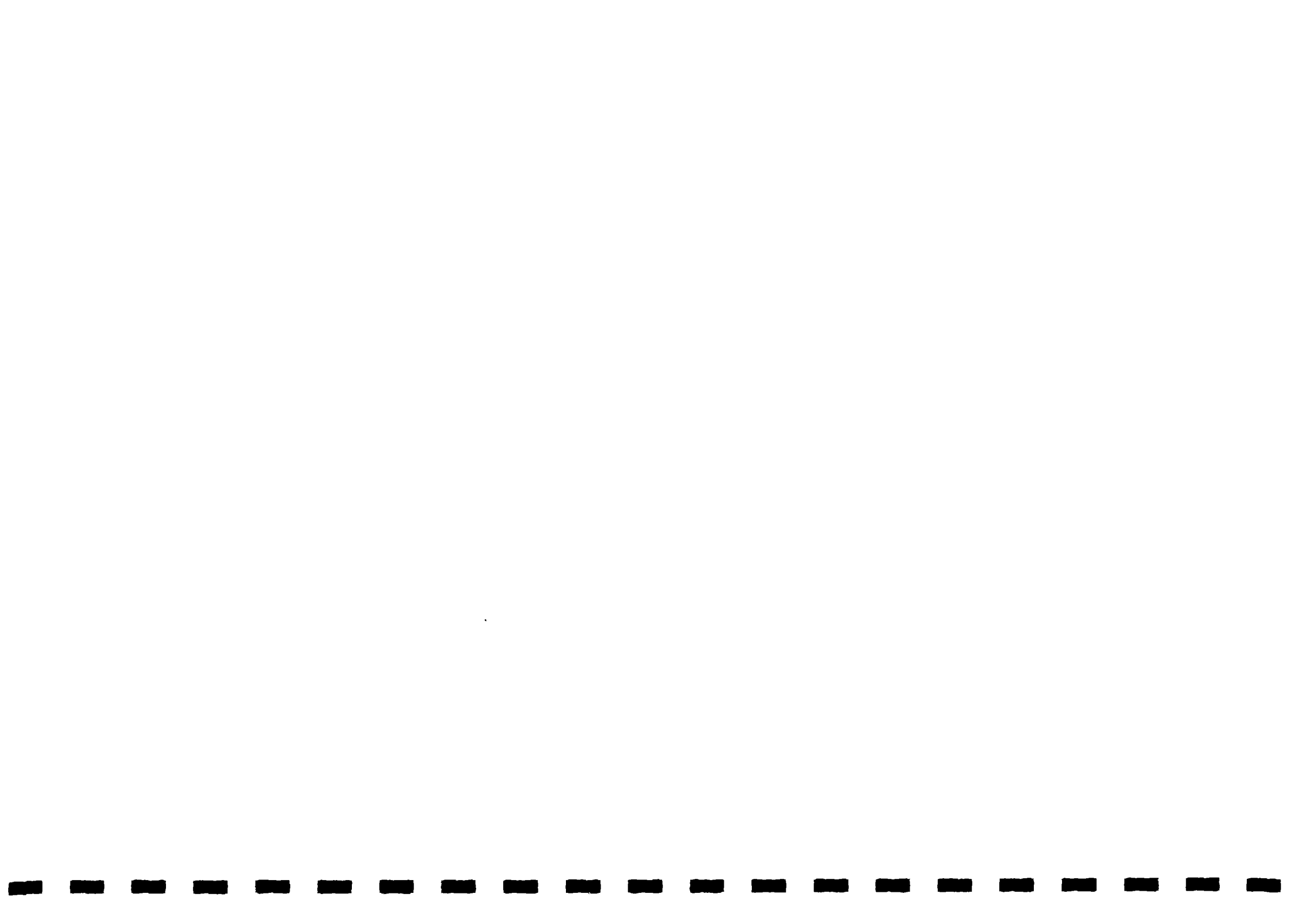
The people often report breakdowns directly to the EHTs who then pass the information on to the DDF.

Spares

A major constraint on the efficiency of the DDF is the shortage of spare parts, apparently due to an insufficient budgetary allocation. According to local staff the DDF receives \$150 for maintenance of each pump every year. In practice the real costs are much higher because of the age of the pumps and the cost of many of the spare parts. The rehabilitation budget is sometimes used for purchasing spares and old pumps may be cannibalized to refit new ones. There is no allocation whatsoever for spare parts for engine pumps so, when they break down, they are removed for 'safekeeping' to DDF headquarters. Sometimes the implementing agency may supply the spare parts for engine pumps. Parts are distributed on a regular basis to the substations. When LWF/CADEC were operational in the area DDF requested additional spares from them according to need but they are no longer able to do this.

Community Participation

The community participate in maintenance through the Waterpoint Committee and by helping the Pump Minder to do repairs. They also send scotchcarts to fetch the Pump Minder and tools, although this is sometimes the cause of some dispute as the scotchcart owners



feel that they should receive some reward for the use of their transport. Also, the use of scotchcarts becomes less possible as the dry season continues and the draught animals become thinner and weaker. However, if the Pump Minder is fetched with his tools, he and the community together can pull out up to 120 metres of pipes without additional help.

The community usually provides hospitality to the Pump Minder if the need arises. Some communities collect money for spare parts and others do not. The degree of participation of the community seems to be strongly linked to local leadership, traditional and modern. The theory is that the water programme should largely be channelled through the modern leadership. However, but traditional leaders, particularly kraalheads, have always been involved in matters of water supply and the EHTs and VCWs make extensive use of them in communicating with the people.

Whilst there is considerable variation in the extent of community participation, there are some striking examples of self-help, with locals making and fitting their own spare parts or collecting money to buy new ones. The DCDO believes that the potential for community participation in water supply projects is unlimited because of the great need. However VCWs report that because of the people's disillusionment and distrust of government they want to see some evidence of government commitment to their District before they participate themselves.

Many people express the preference for engines because the handpumps are so heavy to operate. Many of the deep ones require at least four adults pumping together to raise water. Several people claimed that the community would be able to maintain these themselves but there is little evidence to support this.

Occasionally, when the District Maintenance Team mends a pump, there is little community participation and therefore communication between the parties suffers.

4.1.2 Tsholotsho District Data

Technology

The overwhelming technology of the pumps sampled was Bush Pumps (98%) which is compatible with the predominance of Bush Pumps in the District. The majority (79%) of the pumps sampled were working at the time of the visit but most (72%) of these were deemed to be in need of repair. The pump population is an old one with the average age being 28 years. The minimum age was 1 year and the maximum 61 years, although the exact accuracy of the ages of the oldest pumps may be questionable. There were very few pumps between 10 and 20 years old.

Pump Usage

The average number of user households per pump was 43 with the range extending from 9 to 130. Of the total sample, 46% were used for watering gardens (mostly communal nutrition gardens) while a

higher 76% were used for livestock watering. This reflects the dearth of other water sources in the District and the dependence on the protected waterpoints for all water usage. Those pumps which are not used for livestock watering are usually near to a dam which may be used for this purpose. The usage of a pump may also differ through the year as people try to preserve the water in the borehole watering livestock elsewhere until those other sources dry up. Of those sampled 28% were used by 'schools'.

Breakdowns

The breakdown rate of pumps in Tsholotsho was high. Of the 47 pumps sampled, a total of 106 breakdowns were recorded over the past year, working out at 2.3 breakdowns per pump. Overall, 85% of the pumps sampled had broken down at least once in the past year. The figures indicate that certain pumps had a very high level of multiple breakdowns. The figures are no doubt upwardly distorted by one pump which recorded 20 breakdowns in the previous year. This figure, based on information by the users, may not be entirely accurate but is certainly indicative that the pump is highly unreliable. Despite this and the fact that the sample may have been biased towards pumps in the drier parts of the district, the figures probably do not represent a serious overestimation of breakdowns because there may be some user under reporting of breakdowns. This may be because users only remember breakdowns which seriously inconvenienced them because of the time the pump was out of action. If a pump is repeatedly breaking, the times in between breakdowns when it functions properly may not be specifically remembered, especially if it only functions properly for a few days before breaking again.

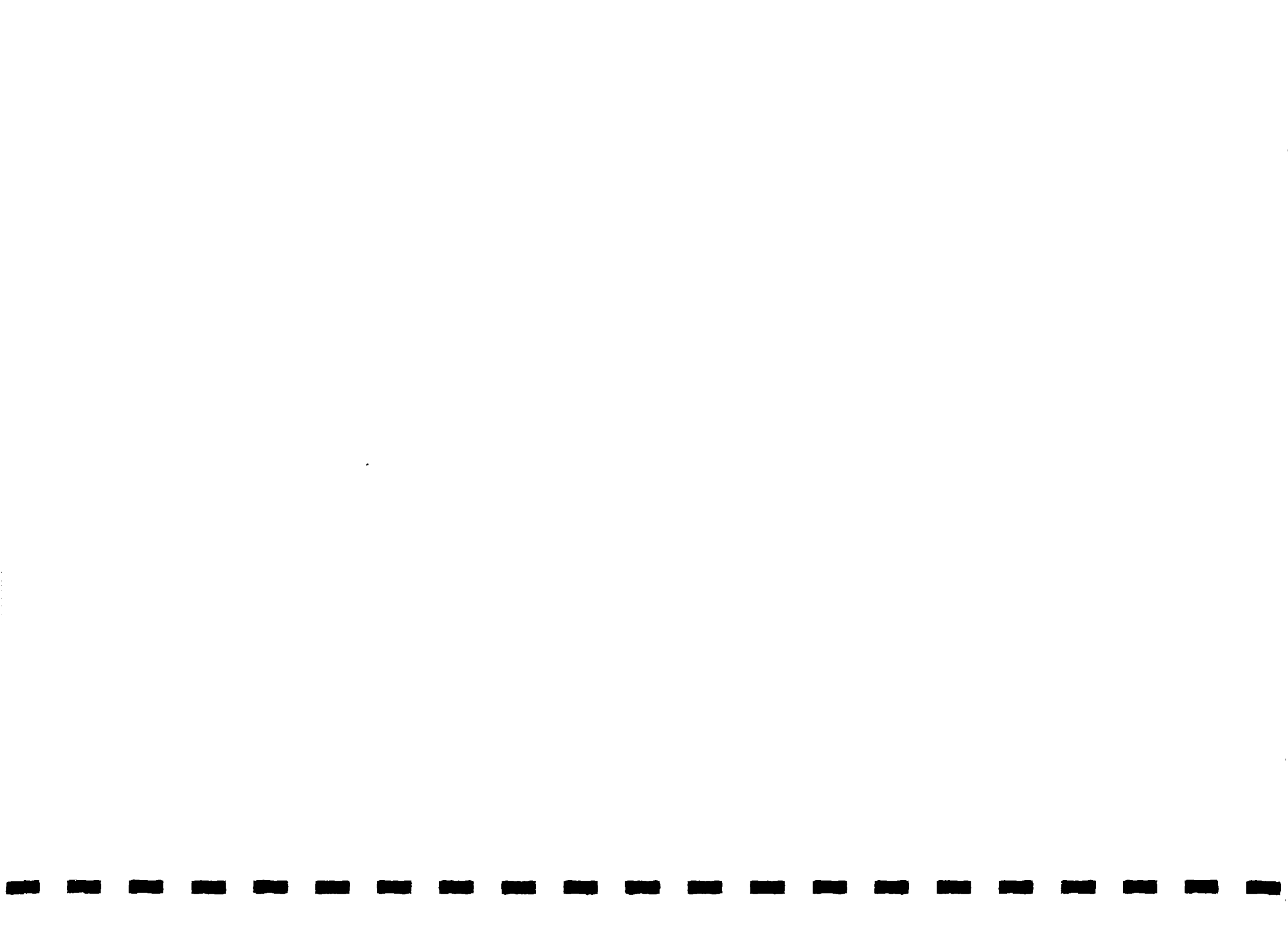
The breakdown rates for those pumps used for gardens and livestock watering were comparable to the overall breakdown rate, being 81% and 89% respectively, whilst the rate for those used by 'schools' was higher at 92%. These figures indicate the intense usage to which pumps are put in the District.

There appeared to be a moderate correlation between the age of the pump and the number of breakdowns suffered, possibly explained by the fact that many of the pumps were extremely old. The scatterplot of age and breakdowns shows mostly low value breakdowns in the pumps up to 10 years old (ie they may break down once or twice a year) whereas the older pumps (over 20 years) often break down three or four times a year.

Maintenance

The system of Waterpoint Committees is apparently well-established in Tsholotsho. The majority of breakdowns (59%) were reported by a member of the Waterpoint Committee with a few also being reported by other users and the village leaders (VIDCO Chairmen and Kraalheads). A substantial 25% were reported by 'Others', these consisting of; Dip Attendants, Teachers, District Officers and Pump Minders.

Downtimes were relatively moderate considering the breakdown load on repairing agencies. Nearly half the recorded breakdowns (49%) were repaired within a week, a total of 67% within two weeks and



the majority (87%) within one month. Most of these breakdowns were repaired by the DMT and the Pump Minders.

Efficiency

The committee members seemed to get the quickest response to their reports of breakdowns with 72% being repaired within 2 weeks compared to 56% of those reported by 'Others'. This could be partially explained by the fact that 'Others' tend to report where the committee has failed to report, or failed to get a response. In this way they may be acting as 'second stage reporters'.

The menders were comparable in efficiency in that both had over 90% of repairs completed within a month. However, the Pump Minder mended more within two weeks (82% as opposed to 65%). This may be due to the fact that it takes longer to report to the DMT if they are further away, and that they might be repairing pumps which the Pump Minder has already tried but failed to repair. Of those mended by the DMT, 5% took more than six months to repair, possibly because of the non-availability of spare parts. The quick response of the DMT to breakdowns may be attributed to the decentralization of this service to substations throughout the District which, despite the lack of transport, helps to improve the reporting and response times.

4.1.3 Tsholotsho Case Studies

(1) Thembile Waterpoint (Ward 7)

Situation and facilities

There are two waterpoints at Thembile situated within 3 km of each other. The village is in the far West of the District, approximately 10 km from Tsholotsho town and 20 km from the nearest health facility and DDF sub-station at Pumula. The next nearest working pump is the engine pump at the local store, 10 km away.

The two boreholes are numbered 28 and 29. Borehole 28 is an old Murgatroyd pump, said by users to be 35 years old. It appears in fairly good condition, the fencing around is intact and permanent wooden sheer legs are in place. There is a derelict tank and scaffolding adjacent to the pump. Borehole 28 is situated in open space at one end of the village, fairly close to the homes of the Kraalhead. VICO Chairman and Ward Councillor.

At the other end of the village is Borehole 29. This is a modified Bush Pump mounted on an old engine mounting. There has been a pump on the site for the last 19 years but it was unclear exactly how old this one is. Borehole 29 has no soakaway, spillway or cattle trough. It is adjacent to the diptank and close to a small dam (approximately 70 m x 70 m). The Village Community Worker lives nearby.

Maintenance

At the time of the visit, both pumps had been out of action for about 18 months. The locals and the Pump Minder believe that there was a technical problem with the pumps although DDF officials at the substation believed that the waterpoints may have dried up. No record of these breakdowns could be found at DDF headquarters.

The breakdown of Borehole 28 was reported by the Kraalhead and the waterpoint was inspected by the DDF Maintenance Team, who happened to be passing, a day later. The breakdown of Borehole 29 was reported once by the Caretaker on behalf of the Waterpoint Committee. Neither breakdown has been reported since then although representations have been made to the Ward Councillor.

Waterpoint Committee

There is one Waterpoint Committee which covers both pumps and consists of the Kraalhead and two female members. The Kraalhead remembered being trained for one day at Pumula Mission, but the other committee member interviewed had received no training. The Kraalhead said that his duties were to mobilize people to help the DDF team and in liaison with the VIDCO Chairman, to solve any problems arising.

Both female members of the committee are married and live with their husbands in the village. The one interviewed said that her duties were to maintain the borehole pump and ensure that villagers do not wash their clothes close to the site. Prompted by the kraalhead she said that she greases and tightens bolts, for which purpose she keeps a spanner at her house. She was chosen to be on the committee about one year ago but the committee has never met since she joined it. There is no book for recording breakdowns.

This committee member is a voluntary untrained pre-school teacher and a participant in the local savings club. She initially had no idea who 'owns' the pump although, when prompted by the Kraalhead and VIDCO Chairman, said 'the DDF'. She expects the DDF to provide grease, tools and spare parts.

In addition to the Waterpoint Committee, a local man is nominated to maintain the surroundings of the pumps, for example mending fencing when required.

Water Usage

When working Borehole 28 is used by 58 households and Borehole 29 by 20 households and the diptank. Some users travel as far as 6 km to these boreholes.

The current source of water is the small dam situated near Borehole 29. The dam has water in it all year around but is shared by livestock and wild animals (especially elephants) as well as the villagers. When the boreholes are working people use borehole water exclusively for drinking and cooking. However, they are now using the dam for all purposes. The VCW encourages people to boil dam water for drinking but they resist because it 'kills the taste'. Dam water is always used for brewing beer because borehole water is too hard and turns the beer sour. The dam water is



brown and totally opaque, but it never dries up.

There is a Nsimbi pump situated immediately adjacent to the dam but this is non-functional. It was installed by the LWF but as they are no longer operating in the District people do not know who is responsible for its maintenance.

Because of the lack of water in the area, the diptank is not being used and no cattle in the vicinity are being dipped. According to the users, the Diptank Attendant offered \$10 to whoever would fill the diptank by bringing dam water in scotchcarts. The people refused this offer because in the words of the kraalhead 'No one does that'.

When the pumps are working there are certain rules about their use. These are; that no livestock may be watered at the pumps, large drums may not be used to collect water and no one under 18 may use the pumps. Any breach of these regulations is dealt with at a village meeting organized by the VIDCO Chairman and Kraalhead.

Development

The Vidco Chairman, who was trained last year at Pumula Mission, listed the main problems of his village as:

- a. Lack of water
- b. Wild beasts (especially elephants) eating the crops
- c. Malaria
- d. Distance to health facility

There are no development projects in this village although the VCW is hoping to establish some nutrition gardens around the dam. The Kraalhead claimed that many people have left the area because of the problem of water. Both VIDCO Chairman and Kraalhead believed that community contributions to development activities could only consist of labour, as many of them were nearly destitute. The VCW said that it is difficult to mobilize people unless they can see tangible results from a project.

During the week in which this research was carried out, a prospecting team from MEWRD, working with DDF, sited two new boreholes in this area because of the DDF's belief that Boreholes 28 and 29 are dry.

(2) Dadamjema Waterpoint (Ward 2)

Situation and facilities

The waterpoint at Dadamjema, Borehole 159, is situated in Ward 2 approximately 4 km from Dhlamini Business Centre. The nearest working pumps are at the business centre and another one 3km away. The DDF substation is based at Dhlamini. There is a dam 7 km away. The furthest households served are about 1,5 km away but the caretaker is close by - about 500 m from the pump.

The pump is an old Murgatroyd reputed to be 61 years old and regularly used by 54 households and the diptank. At times up to 73 households depend on this pump. Headworks include an apron, spillway, cattle trough, fencing and permanent wooden sheerlegs.

During the war the village's other pump, an engine was dismantled and taken away by the DDF 'for safekeeping' but has never been returned.

Maintenance

At the time of our first visit in July the pump was working but the water had dried up, as it does every year, by our return in September. Before it dried up the pump was working but with serious problems. The users remembered three breakdowns of the pump in the last year, excluding the current drying up, each lasting up to a month. However, records held at the Dhlamini substation showed four breakdowns - the details being as follows:

1. Pump reported as 'Repaired 12/10/1988'. No information on length of breakdown. Leather cups replaced by Water Supply Operative.
2. Pump reported as broken on 31/10/1988 by a user. Mended by the Pump Minder based at Dhlamini on 12/11/1988. Rods refitted.
3. Pump reported as broken on 10/3/1989 by users. Repaired 20/6/89 by Water Supply Operative.
4. Pump reported as repaired by Pump Minder on 4/7/89. Leather cups replaced.

Waterpoint Committee

The Waterpoint Committee consists of one man who acts as 'Caretaker' and two women, neither of whom have husbands living at home. The Caretaker lives the closest to the pump and has been on the committee for three years. He is also a member of the Zanu-Zapu integration task force. He received no training as a caretaker but perceives his duties to be to see and report to the VIDCO Chairman or Kraalhead any breakdowns. If they do nothing about it he goes to the Councillor. The Caretaker keeps no spanners or grease and the Pump Minder does not make routine visits. Breakdowns are usually reported directly to the DDF substation, rather than to the Pump Minder. According to the Councillor, they know that the Pump Minder cannot do a good job because of insufficient tools.

The Committee meets monthly at the Kraalheads house although no formal records are kept of these meetings. The Caretaker perceives the Committee's duties as being to clean and sweep the pump surrounds and to monitor the rules of the waterpoint. These are that no children may use the pump and that water must not be splashed around. The Committee is also responsible for maintaining the fencing for which the Kraalhead provided all the wooden posts. The caretaker believes that the pump belongs to the Government.



Local Maintenance Initiatives

On our first visit to the waterpoint in July, a local man was sitting by it making a new wooden headblock for the pump. He said that he was doing it because it needed doing. No one had asked him to. The old block was split and cracking and new ones were not available from DDF at Dhlamini. The man had borrowed tools from various members of the community, fashioned a new block and fitted it with the help of the caretaker. The whole process took one day.

Some of the bolts on the pump have been replaced (in an improvised form) by the Diptank Attendant.

The day after our second visit in September, the Kraalhead held a meeting with the villagers at which it was decided that each household should contribute \$2 towards the purchase of necessary spare parts. However, because they were unsure of which parts to buy, the VIDCO Chairman was first to pursue this matter with the Ward Councillor and the DDF before collecting the money. This meeting may have been prompted by the fact that the Ward Councillor had asked the District Council for an improvement in their water supply but the response was that there were no funds for new boreholes or for spare parts. The money collected is to be kept in a Post Office Savings account in Tsholotsho. The Kraalhead did not see this move as an implicit criticism of the DDF as he feels they can never be effective because of the dearth of transport and spare parts.

Water Usage

There are no restrictions on water usage from this pump when it is working. However, when it is out of action the users sometimes face hostility when they go to use another community's pump.

The VCW tries to teach people to boil dam water but few do it. Even when the pump is working people are not strict about the use of protected water for drinking.

Dipping of cattle in the area has ceased completely and the nutrition gardens have now dried up through lack of water.

Development

Despite the fact that many of the people in the village were on drought relief and elephants had further destroyed their crops, they expressed themselves willing to provide tools and labour for any development project. However, there was some scepticism expressed about government officials and politicians who promise developments and fail to come up with the goods.

The VCW said that people in this area are very enthusiastic about building Blair toilets.

(3) Samuhuru Waterpoint (Ward 1)

Situation and Facilities

This Bush Pump is situated in the North West of the District, about 31 km from Dhlamini substation and over 80 km from Tsholotsho centre. The Pump Minder lives 7 km away and it is 3 km to the next working pump. There is a cattle trough and permanent wooden sheer legs but no other headworks. Close to the Bush Pump, which was installed by the DDF in 1985, is a small dam (100 m distant) and an engine pump donated by ORAP but currently not functioning.

Maintenance

The Bush Pump is not in good working order as it rattles and shakes a lot and yields very little water. During the school holidays, immediately preceding our visit, it had been out of order but had recently been mended by the Pump Minder. There were no obvious signs of local care and maintenance and the pump had not recently been greased. Greasing is seen as the sole duty of the Pump Minder.

The schoolteachers generally report breakdowns to the Pump Minder as they believe that the community is not conscientious in this task. Also it is thought that a written request for repair, coming officially from the school, elicits a speedy response.

When there is a breakdown the schoolteachers ask the Kraalhead to send a scotchcart to fetch the Pump Minders and tools. This may take up to a week. The Kraalhead also organises members of the community into assisting the Pump Minder. The Pump Minder often does not come immediately but waits until there are other pumps to repair in the area and does them all together.

According to the users, the Bush Pump had broken down up to ten times in the past year, although it was usually mended within two weeks.

The Engine Pump had been broken down for four months because of a missing spare part. There is a council employed engine operator to look after this pump which is 3 years old.

Waterpoint Committee

Both waterpoints are covered by one committee which consists of three members, a male chairman and two women. One of the women was interviewed. She has been a committee member for a year and has attended two training sessions on pump maintenance. She perceives her duties as being to report breakdowns to the DDF and to supervise the community in keeping the place clean. Cleaning and sweeping is done once a month.

The committee does not meet regularly and does not record its activities. 'Some of the members' feel that meeting is a waste of time when they are not paid for their work. The interviewee did not want to be on the committee but was chosen by the community and told that she could not refuse. Problems are reported to the



Kraalhead or the Vidco chairman.

Three rules relating to pump use are imposed by the committee.

- a. Children must not play with the pumps.
- b. No livestock may be watered at the pumps.
- c. No water must be splashed around the area.

The committee member interviewed is a widow and also belongs to the local Savings Club.

Water Use

The Pumps are used by up to 40 households in the community as well as the 18 teachers households. The school does not take pump water for gardening as the dam is used for this purpose. The schoolteachers prefer to use the Bush Pump rather than the engine because they feel that the tank into which the engine water is pumped is not clean.

For the previous two years the small dam dried up at the height of the dry season and when this happens those with scotchcarts fetch additional water from the next pump 3 km away.

The committee member interviewed collects most of her water from the dam (4 x 20 litre buckets) but she also takes one bucket a day from the Bush Pump. This water is shared between the eight members of her household.

Development

Support for development projects in this area is a problem. Many people are said to be unable even to contribute \$10 per annum to the school maintenance fund. However, unwillingness may partially account for this inability as the Ward Councillor stated strongly that he believed that drought stricken people should not be asked to make contributions.

The Councillor stated that he believed that the area was a 'disaster district' in terms of water, there being, at that time, nine non functioning boreholes in the ward.

People in the area express unwillingness to be villagised until they see the infrastructure provided. The projects which do exist such as piggery and nutrition garden projects all struggle because of lack of water.

(4) Mhlabeni Waterpoint (Ward 2)

Situation and facilities

Mhlabeni Pump is situated in Hlangamani village about 4 km from the DDF substation at Dhlamini. This twenty year old Murgatroyd

pump is situated on open ground towards the southern end of the village. The nearest user is the VCW who lives about 400 m away. The pump has permanent wooden sheer legs, barbed wire fencing and a cattle trough.

Maintenance

The Pump was working at the time of our visit but was creaking badly and very difficult to pump. This is a particular problem for the first users in the morning who have to pump for many minutes before water comes.

The pump had recently been greased and some bolts replaced by wires. The VIDCO Chairman organises the community to raise money for grease and make minor repairs.

Although the Caretaker remembered three breakdowns in the previous year, DDF records show far more:

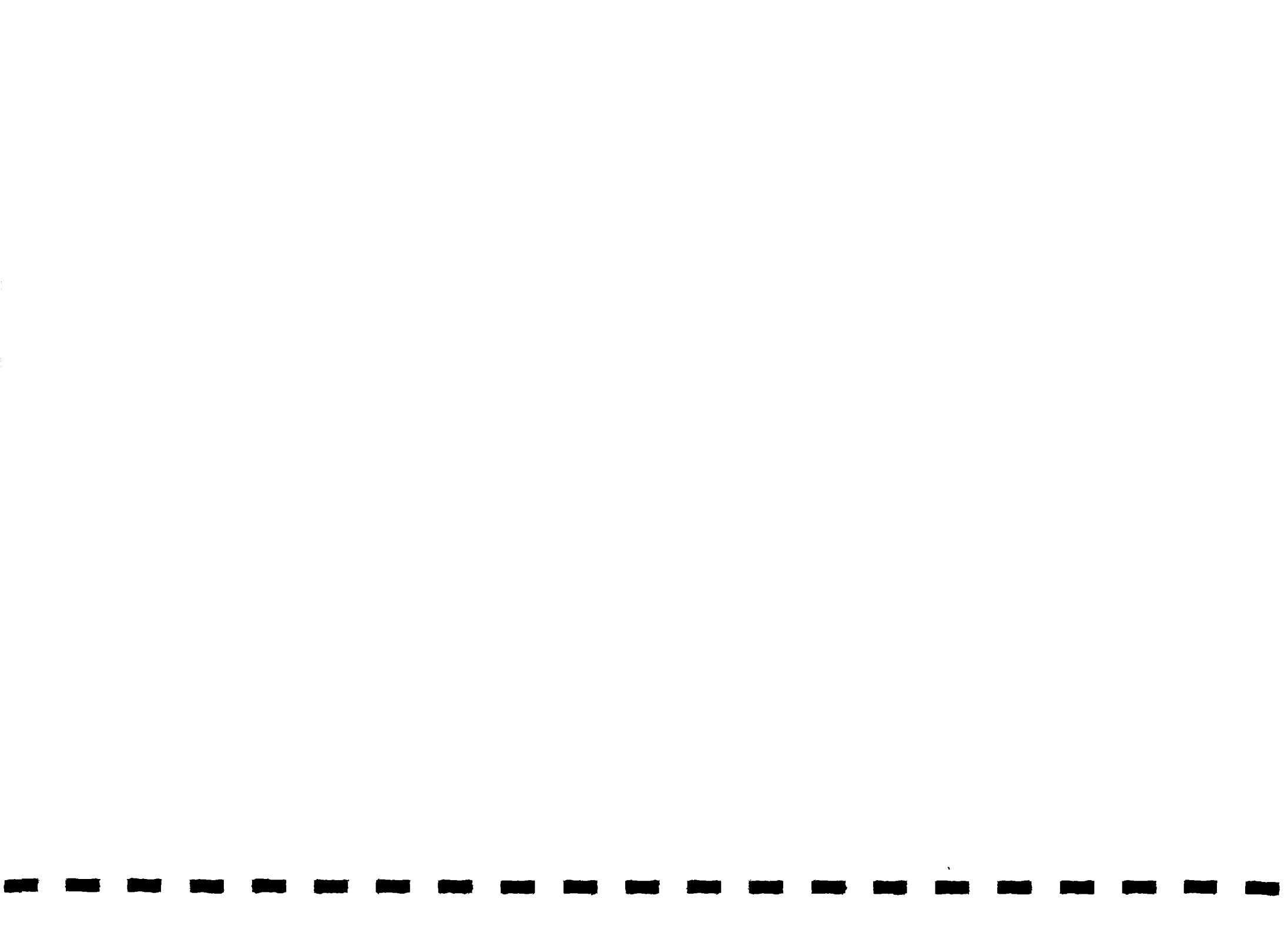
1. 14.10.88 Reported by Kraalhead. Repaired 17.10.89 by Pump Minder who fitted new pipes.
2. 15.11.89 Reported by Kraalhead, Repaired 16.11.89 by Pump Minder. Pipes refitted.
3. 23.1.89 Reported as repaired by WSO who fitted new leather cups.
4. 25.1.89 Reported by VCW. Repaired 27.1.89 by WSO who fitted new bearing block.
5. 27.4.89 Reported as repaired by Pump Minder who fitted new pipes, nipple and rod.
6. 15.7.89 Reported by local minister. Repaired 2.8.89 by WSO who fitted leather cups.
7. 16.8.89 Reported as repaired by Pump Minder who diced the rods.
8. Reported 4.9.89 Still awaiting details of repairs done. Functioning when visited on 14.9.1989.

The reports of breakdowns are made directly to the DDF substation at Dhlamini. When the pump is not functioning the users go to fetch water from the engine pump at Dhlamini. Sometimes they face hostility there, as the engine pump is already overused.

Waterpoint Committee

There are four people on the Waterpoint Committee: two women and two men, all of whom live in the village with their respective spouses. The committee member interviewed was a young woman who had been in the post for a year. She also belongs to the Area Committee of the Master Farmers Club.

The interviewee was trained twice at a certain waterpoint 3 km



away. She regards it as her duty to see that the community cares for the pump and keeps the place clean. She keeps a spanner and grease and, if the grease gets finished, the committee organises a collection to buy some more. They also ensure that the fencing is well maintained.

The committee meets fortnightly and records their activities in a book. They approach the VIDCO for assistance in organizing the community and for the reporting of breakdowns. The following rules are imposed and monitored by the committee.

- a. Users must not lay the arm of the pump to the ground
- b. The gate must be kept closed against animals.
- c. No drums must be filled there and each user may only fill one bucket at each visit.

Although there is sufficient water in the borehole the users are troubled by the repeated breakdowns.

Water usage

This is the only source of water in the area, there being no dams or other pumps, so this pump is used for all purposes including livestock watering.

The pump is very heavy, usually it takes three adults to pump it but in the dry season no less than five are needed. The women therefore organise themselves into groups and come to the pump on a roster basis, starting at 4 am.

The committee member, who lives 1 km away, reported collecting 3 x 20 litre buckets a day to be shared amongst the nine members of her household (6,5 litres per person per day). The VCW who lives much closer collects 8 x 20 litres a day for twelve people (13 litres per person per day).

Development

In the previous year people of this village acting on their own initiative, collected a total of \$179 to contribute towards the sinking of a new borehole which, they felt, was desperately needed.

The money was taken to the District Council who later returned it to them because they had insufficient funds to take any action. The money is collected by the kraalhead and Vidco chairman who would now like to know how best to spend it to improve their water supply situation.

The people of this village are very enthusiastic about building latrines - the only constraint is a lack of cement.

4.2 Gwanda District

4.2.1 Background

Gwanda district is situated in Matabeleland South Province, in a drought afflicted area characterized by rainfall of less than 500 mm per year. Most of the District is situated in Natural Region 5 and while there is plenty of drought resistant vegetation (mopani and baobab), grass is scarce. The land is hilly and characterized by a very dispersed pattern of settlement.

The District is divided for administrative purposes into 18 wards.

Water Programme

The major water programme in the District was started in 1980/81 by the Lutheran World Federation. There is currently, however, no major implementation project being undertaken, although there is evidently a need for the rehabilitation of the many dry wells in Gwanda.

Because of the dryness of the area, nearly 90% of waterpoints are fitted with Bush Pumps. In total there are 109 boreholes and 750 wells (handdug and hand augered) in the District, as well as 71 dams and 15 piped water schemes.

The MEWRD has been involved in drilling on a small scale, otherwise implementation has been a joint DDF/LWF activity. MOH has little involvement in the Water Programme save for monitoring the few wells fitted with Blair and Bucket Pumps.

The DDF staff consists of 12 Pump Minders and the DMT, the Field Officer (Water) and a Clerk. On the DMT there are 3 Water Supply Operatives, each with a specified area of responsibility. There are three DDF substations in the District, each manned by a caretaker.

The DDF is responsible for the construction of headworks and provides a builder and assistant for this purpose whilst the community provides the remaining labour.

There is a Water and Sanitation Sub-committee which is attended by the NGOs in addition to the relevant ministries. As maintenance is considered exclusively a DDF responsibility, it is rarely discussed at these meetings which mainly feature issues of implementation.

The non availability of transport and the poor condition of the existing DDF fleet is a great constraint on water programme activities.

Community Participation

Community participation in the implementation of improved water



supplies has been variable as mechanical drilling rigs allow little scope for such involvement. Activities had also been affected by the security situation in the Province and many people believe that now there is peace, it is now government's duty to provide for them.

Maintenance

There is a well-established Three Tier Maintenance system although it does not, in effect, cover the whole District. The LWF started training Pump Minders in 1980-81 and handed them over to government in 1984. Now there are 12 Pump Minders covering 18 wards and cycling up to 50 km to reach their pumps.

Most waterpoints have Waterpoint Committees which usually consist of 3-4 women and which are elected to carry out cleaning, reporting and minor maintenance (i.e. tightening of bolts and greasing). Some of the women on these committees reported resistance from their husbands to their membership.

Reporting and Recording

If there is no Pump Minder within reporting distance, the community collects money to send someone by bus to report directly to the DDF.

The DDF operates a Pump Record Card system which was originally started in 1982. However, until 1987 there was no clerk at the District level and so the system never operated properly. Whenever a Pump Minder undertakes repairs, a committee member is supposed to sign to confirm it before the report is submitted to the District for the updating of the Record Card. Although those operating it assert that the system now functions well, few of the cards contain detailed histories and it was found that at least one of the Pump Minders operating in the District is barely literate.

Spare Parts

There appear to be few problems regarding the supply of spare parts as DDF obtains them directly from the suppliers in Bulawayo. There is, however, a lack of tools for the Pump Minders.

4.2.2 Gwanda District Data

Technology

A comparatively small number of pumps was sampled in this District, the vast majority of them being Bush Pumps. The majority of those sampled (70%) were working at the time of the visit although over half of these were deemed to be in need of some repairs.

The pump population in Gwanda is an old one with the average age being 18 years. These figures should not be read too literally as many of the users of the Gwanda pumps did not know their exact age, the pumps having existed since before they were born, or before

they moved into an area. Therefore, several of the pump ages are guesses based on the type of technology and the known age of other similar pumps in the area. These approximated ages mainly apply to the pumps which are over 20 years old.

Pump Usage

The average number of user households per pump was 23. As would be anticipated in a dry area, 62% of pumps were used for watering livestock while 47% were used for watering gardens. It is likely that in areas like this domestic and livestock water needs take priority, followed by water for vegetables only if there is sufficient. Many of the gardens watered by such pumps would in fact be communal or nutrition gardens. Schools and other multiple users drew water from 42% of the pumps sampled, this being a very high proportion in comparison to other districts. This probably indicates the dryness of the District and the crucial importance of protected waterpoints there.

Breakdowns

The breakdown rate was high for this District with 68% of the pumps having broken down at least once in the previous year. This figure may be slightly distorted by the inclusion of some wells which had dried up without the pump actually breaking. The total number of breakdowns recorded was 71 which, if evenly distributed, works out at 1.3 per pump.

There appeared to be a moderate positive correlation between age of pump and number of breakdowns, with the oldest pumps generally being the ones with the multiple breakages. Pumps under ten years old, when they had broken down, generally did so only once in a year.

Little relationship was evident between number of users and breakdowns, with the highest number of breakdowns being scattered between 15 and 35 user households which is where the majority of the pumps fell.

The breakdown rates for those pumps used for watering gardens was 56%, for livestock 67% and for 'schools' 45%. Generally these figures are lower than the overall breakdown rate. A tentative explanation could be that in Gwanda, when pumps are used for additional purposes or by multiple users, it is because there are no other water sources available. Therefore people are more likely to care for their pump properly because they are totally dependant on it.

Maintenance

Downtimes were generally moderate with over half (59%) of the pumps mended within a week, 64% within two weeks and the majority within a month. However, a substantive minority (29%) were outstanding for longer than this with relatively high proportions remaining out of action for over 3 months. The Pump Minder was by far the most frequent repairer, mending 63% of the recorded breakdowns. The Users and the DMT repaired comparable numbers of pumps.



The predominance of Pump Minder repairs would explain the generally moderate downtimes. It also suggests that the DMT may not be very efficient and this would explain the existence of a number of much higher downtimes. These could be pumps which the Pump Minder has failed to repair and which are awaiting the attention of the DMT.

Efficiency

The existence of a Waterpoint Committee appeared to facilitate fast repair as 81% of breakdowns reported by committee members were repaired within 2 weeks.

Other users were less efficient with 455 of reported breakdowns being repaired within 2 weeks and 45% taking three months or more.

Kraalheads and VCWs had mixed success with a proportion of their reported breakdowns being mended very quickly whilst the rest took a long time, 3 months or more.

The major repairers, the Pump Minders, mended 81% of the breakdowns reported to them within two weeks and 90% within a month. The Pump Minder system was first started in Gwanda and, being well-established, should be relatively efficient. From the data presented here it appears to be efficient at curative maintenance while having little effect on preventative maintenance). The DMT were considerably slower at mending with only 25% of breakdowns mended within two weeks and 50% taking longer than 3 months, although it must be remembered that they may be repairing the more difficult and technical breakdowns than those undertaken by the Pump Minder. Of the relatively small number of breakdowns mended by the Users, all were completed within one week.

Those recorded as 'not mended' (16%) had all been awaiting repairs for over three months indicating that they may be the waterpoints which had dried up rather than broken down.

4.2.3 Gwanda Case Studies

(1) Mfana Bush Pump, Nhwali Village.

Situation and facilities

This Bush Pump is situated about 50 km from where the Pump Minder lives in Ward 13. It is an old pump, possibly up to 40 years old but the interviewee had no specific information on dates. The pump was originally fenced but the fencing has since been removed. There is a cattle trough.

Maintenance

The place appeared dirty and untidy and the fencing materials had been removed by the villagers. Bolts needed tightening and the pump was poorly greased. There was some evidence of community contributions to maintenance as the outlet pipe had been secured

to a vertical pole by some wires.

The original pumping handle had been replaced with a wooden pole by the Pump Minder.

Because the Pump Minder lives so far away he does not make routine visits but comes only when called.

The pump had broken down six times in the previous year, according to the interviewee, and each time the Caretaker had reported the breakdown to the Pump Minder. All breakdowns had been mended by the Pump Minder in quite a short time; approximately a week on each occasion. At the time of the visit it was obviously not in good repair.

The committee was comprised of the following people:

1. Committee member 1

| | |
|-----------------------|--|
| Position : | Keeps spanners (caretaker) |
| Length of Service: | Five years |
| Age: | 40 years |
| Sex: | Female |
| No of children: | 8 |
| Marital Status: | Married |
| Occupation of spouse: | Not employed |
| Location of spouse: | Stay together |
| Other positions: | Member of the Supplementary Feeding Programme Project. |
| Training: | None |
| Duties: | Keeps spanners and reports to the Pump Minder. Greases the pump. |

2. Committee member 2

| | |
|--------------------|---|
| Positions: | Member |
| Length of Service: | Five years |
| Age: | 47 years |
| Sex: | Female |
| No of children: | 4 |
| Marital Status: | Divorcee |
| Other positions: | None |
| Training: | None |
| Duties: | Reports to the Pump Minder when there is breakdown. |

3. Committee member 3

| | |
|-----------------------|---------------|
| Position: | Member |
| Length of Service: | 5 years |
| Age: | 33 years |
| Sex: | Female |
| No of children: | 2 |
| Marital Status: | Married |
| Occupation of spouse: | Unemployed |
| Location of spouse: | Stay together |



| | |
|-----------------|---|
| Other positions | None |
| Training: | None |
| Duties: | Reports to caretaker and checks that children do not play around with the pump. |

Water usage

The pump is used by 35 households for domestic purposes and for livestock watering. People do their washing at the waterpoint although there are no washing slabs. The next borehole (Mpoping) is used when this one is out of action and is about one kilometre away.

(2) Mpoping Bush Pump, Nhwali Village.

Situation and facilities

This old Bush Pump is situated in Nhwali village, Ward 13 and serves 23 households. There are no headworks and the place is very marshy. The users interviewed said that no one could remember its installation, 'It was here when we were born', so we can assume it is at least forty years old.

Many different pipes have been added to the pump structure over the years.

Maintenance

The apron has been broken completely and has been replaced by heavy stone blocks, attached by wires to the pump in order to stop it from moving up and down when pumping. The spillway is also non-existent and stepping stones have been placed to enable people to negotiate the mud around the pump.

According to the interviewee (who was an adult literacy tutor) the pump has broken down at least six times in the past year. On each occasion the Secretary of the Supplementary Feeding Project Programme (SFPP) reported the breakdowns and the DDF Pump Minder was able to mend them all within about three weeks.

The committee is comprised of three women, who claim to meet three times a month to discuss problems of pump maintenance, abuse of the pump by users, neglect of cleaning duties by users and cases of outside members 'illegally' using the pump.

They claim to always report breakdowns themselves to the Pump Minder although it seems that the Secretary of the SFPP actually reported all breakdowns this year.

The committee members claimed to have nothing to do with the VIDCO which, they said, had no involvements in water maintenance. The committee has so far never raised funds for maintenance. They strongly feel that it is the governments pump and that the

| | |
|-----------------------|---|
| Occupation of spouse: | Unemployed |
| Location of spouse: | at home |
| Other positions: | None |
| Training: | None |
| Duties: | Greases the pump and reports breakdowns to the Pump Minder. |

Water Usage

The pump is used by 23 households for domestic use and livestock watering and by the nearby SFPP nutrition garden members for watering vegetables.

There are no rules regarding water usage. Alternative sources are a Bush Pump, 1 km away, and one at Mhwali Business centre, 3 km away.

(3) Kokoro Pump. Nhwali Village.

Situation and facilities

This Nsimbi pump is situated in Nhwali village, on open ground, about 500 m from the nearest user households. The pump was installed by LWF in 1983.

Maintenance

The pump was not in working order at the time of the visit and has, in fact, been out of action since February 1987. According to the Pump Minder this breakdown was due to a shortage of spare parts. There is a Waterpoint Committee which reports to the Pump Minder. The committee only meet on an ad hoc basis when there is something specific to discuss. The committee members lived quite close to the water point.

The members were as follows:

1. Committee Member 1

| | |
|---------------------|--|
| Position: | Member |
| Length of Services: | 4 years |
| Age: | 50 years |
| Sex: | Female |
| Children: | 7 |
| Marital Status: | Divorcee |
| Other positions: | None |
| Training: | None |
| Duties: | Report breakdowns to the Pump Minder and health problems to the EHT (such as people washing very close to the pump). |



government should therefore meet all the costs, including those of spare parts. When talking to people about this issue they frequently ask 'for what did we fight during the war if government wont provide?.' They claim that the Pump Minder is often delayed in repairs because the Government does not provide sufficient spare parts.

Each user is supposed to clean the waterpoint, and the cattle trough in particular. The person who comes first in the morning to water his or her animals, is supposed to do this.

Technical repairs are left to the Pump Minder and committee members are 'not allowed' to do any more than tightening bolts and greasing. Even the woman who keeps the spanner and grease does not tighten or grease herself, but her husband does it.

There has been some conflict over water use with people from other waterpoints coming to water their cattle at Mpoping. To resolve this the committee members consulted the VIDCO chairman and held a meeting with to resolve it.

The committee members are as follows:

1. Committee Member 1

Position: Member
 Length of service: 3 years
 Age: 42 years
 Sex: female
 No of children: 5
 Marital status: married
 Occupation of spouse: Gwanda town
 Other positions: None
 Training: None
 Duties: To report breakdowns to the Pump Minder.

2. Committee Member 2

Position: Member
 Length of Service: 3 years
 Age: 45 years
 Sex: Female
 No of children: 6
 Marital status: Divorcee
 Other positions: None
 Training: None
 Duties: Keeps spanner and grease

3. Committee Member 3

Position: Member
 Length of service: 3 years
 Age: 48 years
 Sex: female
 Marital status: Married

Households wishing to use this pump will pay \$20 to the owner as a joining fee. After that they pay nothing more towards the maintenance. The pump is used for household consumption and livestock.

(5) Nhwali Primary School Pump.

Situation and facilities

This four year old Bush Pump is situated close to Nhwali Primary School but outside the school fence. The pump was working at the time of the visit.

Maintenance

Although working at the time of the visit, the pump was in need of repair. However, at the moment the school cannot call in the DDF to do repairs because they are supposed to meet certain preconditions before the DDF will cooperate. These are to fence the waterpoints and to build a cattle trough. The primary and secondary schools have now resolved to provide cement for the construction of troughs and to contribute funds for the purchase of fencing equipment. However, the headworks builder has failed to arrive despite being contacted two months previously.

Some nuts and bolts were missing from the pump but had been replaced with wires.

The pump had never actually broken down in the past year.

Water Usage

The waterpoint is used by a primary and secondary school, Nhwali Business Centre and eight households. It was originally intended exclusively for school use but because it is situated outside the school fence, and because drought conditions persist, the community is allowed to use it. They are however, given certain conditions for example they must not bring drums to the waterpoint, only buckets, and no watering of livestock is permitted.

The water from the pump is used to grow crops for the school and to water gardens.



2. Committee Member 2

Position: Member
 Length of Service: 4 years
 Age: 56 years
 No of Children: 8
 Marital Status: Married
 Occupation of spouse: Peasant
 Location of spouse: At home
 Other positions: None
 Training: None
 Duties: Keeps spanners and grease. Although she is supposed to grease the pump, this duty is usually done by her husband.

3. Member No. 3

Position: Member
 Length of Service: 4 years
 Age: 52 years
 Sex: Female
 No of children: 6
 Marital Status: Divorcee
 Other positions: None
 Training: None
 Duties: Reporting breakdowns to the Pump Minder.

Water Usage

The waterpoint is used by 27 homes for household purposes and for livestock watering. As the pump is now out of order, the users have removed the cover slab and are using tins and rope for drawing water. The EHT is concerned that the water might soon become contaminated and unfit for human consumption.

(4) Moyo Bush Pump, Nhwali Village.

Situation and facilities

This is a private Bush Pump built by the owner, Mr Moyo, before independence. It serves his own and six other households.

Maintenance

The pump was not working at the time of the visit and was badly in need of repair. There is no fencing and heavy stones are needed to prevent it from moving up and down when pumping water. The pumping handle was broken and the pump was badly in need of greasing. The bolts needed tightening.

Water Usage

The water is heavily polluted and not fit for human consumption.

appeared to be working well, while the sample of Bucket Pumps was too small to really reveal anything about their performance.

Usage

In Shamva presumably because of the availability of other sources of water, only 23% of the pumps were used for livestock watering and 31% for gardens. A fairly low 16% of pumps had 'schools' for users.

The average number of users was 22 households per pump, the range of those sampled being from 2 to 100. It may be assumed in Shamva that many nominal users of a pump also have their own private household wells.

Breakdowns

The total number of breakdowns (27) in the previous year was relatively low, working out at 0.4 per pump. Of the sampled pumps 33% had broken down in the previous year but there were few multiple breakdowns. The breakdown rate for those pumps used for gardens was only 18% but those pumps used for watering livestock broke down at a much higher rate of 44%. The highest breakdown rate, 73% was amongst those pumps with multiple users, perhaps indicating that an inappropriate technology was in use here. This is partially confirmed by the fact that 36% of pumps in the 'schools' category were Blairs.

There was a moderate positive correlation between number of users and breakdowns, again possibly indicating the limitations of the Blair Pump technology when heavily used.

There was little or no correlation between age of pump and breakdowns, as could be anticipated in a district with a fairly uniform and young pump population.

Maintenance

Where breakdowns occurred, the pattern of reporting was eclectic with the Waterpoint Committee, Vidco Chairmen, users, Kraalheads and 'Others' all featuring. However, the numbers of reports made by each are too small to be able to deduce anything. This picture may reflect the lack of an overall maintenance system in the District and the very recent establishment of Waterpoint Committees.

The DMT was by far the major repairer, mending 63% of breakdowns with the EHT mending 11%. The rest, few in number, were repaired by 'Users' and 'Others'.

Efficiency

It is not possible to discern major patterns in the efficiency of reporters because this category is so diverse and because of the smallness of the sample. Likewise with the repairers, although it is possible to say that the DMT repaired 88% of breakdowns within two weeks which appears remarkably efficient. Only three



4.3 Shamva District

4.3.1 Background

Shamva is situated in Mashonaland Central Province towards the extreme south-east, bordering on Mashonaland East. Most of the District is Natural Region 2A and 2B with average annual rainfall according to national figures. There are two communal lands in the District, Bushu and Madziwa, as well as resettlement and commercial farming areas. The total population is estimated to be about 84 000 people.

Water Programme

There is currently no major water programme in the District, although one three year project recently ended in 1988. This was the joint IDRC/Blair Research Laboratory Schistosomiasis Control Programme in Madziwa, under which waterpoints and toilets were constructed. There are currently over 80 Bush Pumps in the District but there are no reliable figures on the other types of pumps.

Staff available for work on the water programme include those from MOH, namely; one EHO, two SEHTs, six EHTs and two Health Orderlies. The DDF has one Field Officer, two Water Supply Operatives, one Builder and three Casual Workers. There are 110 Village Community Workers operational in the district.

The MOH and DDF have jointly been training Waterpoint Committees in their maintenance duties. The MOH also trains builders, selected by the community, to line wells.

There is a District Water and Sanitation Sub-Committee and yearly workshops on water and sanitation matters are held. These involve all local leaders and include ViIDCOs, WARDCOs, VCWs, church leaders, traditional midwives, party leaders etc. They are regularly followed up with additional workshops at Ward level.

The Ministry of Community and Cooperative Development has, so far, played a fairly minor role in the water programme. There are no strong links between the different ministries involved although formal contact does take place at the District Development Committee and at Water and Sanitation Sub-Committee meetings. The Ministry of Health and the DDF are based in different parts of the District.

Maintenance

There is no Three Tier System operational in Shamva, there being no Pump Minders. Neither has there been any comprehensive system of involving the community in maintenance although waterpoint committees have been set up in some parts of the District (mostly Madziwa). In Bushu they are just in the process of establishing the committees. The DCDO suggested that it is the VCWs and Ward Coordinators from his ministry who will choose the Pump Caretakers

and Waterpoint Committees.

Reporting

The existing situation regarding reporting of breakdowns is that for Bush Pumps the users (or committee members) report directly to the DDF in Madziwa, or to Local Government in Shamva who then radio the message to the DDF. Those with Blair Pumps or Bucket Pumps report to their local EHT.

Spares

The DDF do keep a few spare parts for MOH pumps so that they can repair them if they see the need when travelling around the District.

Transport

Transport is a problem to all the ministries. The different departments of the Ministry of Health at Shamva operate a rota system whereby they each know that they will have the use of a vehicle at least one day a week.

Ward Level Information

Two wards were studied in detail, namely Ward 11 in Bushu Communal Lands and Ward 4 in Madziwa Communal Lands. Ward 11 has an estimated population of 4 756 and Ward 4 approximately 4 466.

In Ward 11 the Pump Caretakers and Waterpoint Committees have yet to be chosen. In Ward 4 the EHT claimed to do little maintenance of pumps because in practice the DDF does most of it. It was generally true of local leaders in both wards that domestic water supply was not regarded as their first development priority. Those which took precedence were the need for better roads, for pre-schools, dams and diptanks. There was some feeling expressed amongst village leaders (Vidco members) that traditional leaders were hampering them in their development work.

Most local leaders identified their role in the water programme solely in terms of project implementation (ie determination of needs and siting of waterpoints), ignoring the operation and maintenance side completely. The DDF Field Officer (Water) believed that the local leaders need more training in development issues and techniques. One local councillor stated that people were losing interest in development projects because so many promises had failed to materialise.

4.3.2 Shamva District Data

Technology

The majority of pumps sampled were Blair Pumps (61%) and nearly all were working at the time they were visited. The next largest category was Bush Pumps at 34%. Of those working only 9% were deemed to be in need of repair. Both Bush Pumps and Blair Pumps



appeared to be working well, while the sample of Bucket Pumps was too small to really reveal anything about their performance.

Usage

In Shamva presumably because of the availability of other sources of water, only 23% of the pumps were used for livestock watering and 31% for gardens. A fairly low 16% of pumps had 'schools' for users.

The average number of users was 22 households per pump, the range of those sampled being from 2 to 100. It may be assumed in Shamva that many nominal users of a pump also have their own private household wells.

Breakdowns

The total number of breakdowns (27) in the previous year was relatively low, working out at 0.4 per pump. Of the sampled pumps 33% had broken down in the previous year but there were few multiple breakdowns. The breakdown rate for those pumps used for gardens was only 18% but those pumps used for watering livestock broke down at a much higher rate of 44%. The highest breakdown rate, 73% was amongst those pumps with multiple users, perhaps indicating that an inappropriate technology was in use here. This is partially confirmed by the fact that 36% of pumps in the 'schools' category were Blairs.

There was a moderate positive correlation between number of users and breakdowns, again possibly indicating the limitations of the Blair Pump technology when heavily used.

There was little or no correlation between age of pump and breakdowns, as could be anticipated in a district with a fairly uniform and young pump population.

Maintenance

Where breakdowns occurred, the pattern of reporting was eclectic with the Waterpoint Committee, Vidco Chairmen, users, Kraalheads and 'Others' all featuring. However, the numbers of reports made by each are too small to be able to deduce anything. This picture may reflect the lack of an overall maintenance system in the District and the very recent establishment of Waterpoint Committees.

The DMT was by far the major repairer, mending 63% of breakdowns with the EHT mending 11%. The rest, few in number, were repaired by 'Users' and 'Others'.

Efficiency

It is not possible to discern major patterns in the efficiency of reporters because this category is so diverse and because of the smallness of the sample. Likewise with the repairers, although it is possible to say that the DMT repaired 88% of breakdowns within two weeks which appears remarkably efficient. Only three

EHT repairs are recorded which makes it difficult to judge efficiency.

The speedy response time of the DMT may partly be explained by the good infrastructure in Shamva, the absence of large distances to travel and the relatively low breakdown rate.

4.3.3 Shamva Case Studies

(1) Chiyangwa Pump, Ward 11.

Situation and facilities

The one year old Bush Pump is situated about 100 metres from the nearest household (and about 3 km from where the EHT is based.) Headworks consist of a spillway and apron, a cattle trough, a washing slab and a fence. It serves 17 households and a shopping centre. During project implementation the community provided sand, gravel and bricks.

Maintenance

The pump was in good working order at the time of the visit. The surroundings and headworks were all in good repair. However, DDF records showed that;

- 1. On 21.12.88 the cup leather follower was tightened.
- 2. On 04.07.89 a worn out T-base plate was removed.

There is a waterpoint committee and the interviewee was the Vice Chairperson. Her details are as follows:

| | |
|-----------------------|---|
| Position: | Vice Chairperson |
| Age: | 34 years |
| Sex: | Female |
| Children: | 7 |
| Marital status: | Married |
| Occupation of spouse: | Working for chemical company in Bindura - not staying at home. |
| Other positions: | Secretary for the Party at Village level. |
| Training: | None |
| Duties: | To maintain the grounds around the pump and to report any breakdowns. |

So far the committee has met only once but it would report to the VIDCO if it encountered problems in the execution of its duties. The VIDCO would be expected to provide help and advice.

No money has been collected for maintenance to date although this is now being discussed. The aim being to establish a small fund for bus fares for reporting and other maintenance related expenses. Spare parts are currently being provided by the DDF. The committee has no tools and have not organized the people into



cleaning the grounds, a task which it performs itself.

There are some rules regarding usage of the pump. These aim at preventing damage to the pump and at maintaining the cleanliness and good condition of headworks and surrounds.

Water Usage

Before this pump was fitted, water was collected from another bush pump close to a school about 1.5 km away. This source is still used by those members of the community who are closer to it. In the case of this pump breaking down, the users will temporarily revert to the use of the school pump.

Only one household in the water using community has its own well.

The fitting of this pump has considerably reduced the distances that people travel to collect water.

(2) Dadiya Waterpoint, Ward 11.

Situation and Facilities

This Blair Pump is situated about 4 km from the EHTs base on the road from Shamva to Madziwa Mine. The nearest user is 120 metres away and the pump is used by a nearby preschool as well as the villagers. The pump was fitted by MOH four years ago with the help of the community who provided bricks, gravel, sand and a builder.

Maintenance

The pump was not working at the time of the visit and the surroundings were unclean. There was no visual evidence of the community contributing to the upkeep of the waterpoint.

The handle of the pump was substituted the previous year but the new handle is said not to be fitting into the piston and so is still giving problems. The pump broke down twice last year and twice this year and the EHT has taken a long time to come and do repairs this year.

There is a Waterpoint Committee although there was little evidence that it was doing its job properly. The interviewee is the Vice Chairman of the committee and his details are as follows:

| | |
|-----------------------|--|
| Position: | Vice chairman |
| Length of Service: | 1 year |
| Age: | 46 years |
| Sex: | Male |
| No of children: | Eight |
| Marital status: | Married |
| Occupation of spouse: | Housewife |
| Other positions: | None |
| Duties: | Report breakdowns and man the grounds. |

The committee is said to meet monthly and to report its deliberations and problems to the VIDCO. So far it has collected no money but there are plans to do so.

The interviewee believes that the pump belongs to the MOH which therefore provides all the spare parts. The people are supposed to repair the headworks and they are organized into rosters for cleaning the grounds (although these appeared uncared for). They are also taught to use the pump carefully.

Water Usage

Before this pump was fitted, people fetched water from a nearby river. However this is no longer being used and when this pump breaks down another one nearby is used as an alternative source. No households in the community have their own well.

Some conflicts have arisen over water usage because some people have tried to use the apron as a washing slab which is considered by the Committee to be unhygienic.

(3) Zvomuya Waterpoint, Ward 4.

Situation and facilities

This Bush Pump was fitted by DDF only this year. It is situated in a school yard but central to the 17 village households who also use it. The pump has an apron and spillway and a 'DDF fence' around it. This pump was fitted on a well which was dug and lined by the community.

Maintenance

The pump was in excellent condition at the time of the visit but its surroundings were disordered and dirty. There was no history of breakdowns since it had been fitted.

There is a Waterpoint Committee and the interviewee is a member of it. Her details are as follows:

| | |
|-----------------------|--|
| Position: | Member |
| Length of service: | 3 months |
| Age: | 28 years |
| Sex: | Female |
| No of children: | 3 |
| Marital status: | Married |
| Occupation of spouse: | Labourer at CMB (Mt Darwin), not living at home. |
| Training: | None |
| Duties | Organism people to clean the pump surrounds. |



The committee holds no tools, spares or grease. They believe that the pump is 'owned' by the DDF who must therefore provide spares and do the repairs/reports.

The committee is said to meet monthly and reports to the VIDCO as necessary to solicit support if users are refusing to cooperate. There are two areas of conflict. Firstly, people are refusing to pay some small subscriptions levied for the maintenance of the pump because they believe DDF should do all maintenance. Secondly, they are refusing to cooperate in a cleaning roster because they believe that the schoolchildren should perform this duty. There are rules about the use of the pump which aim to minimise damage to the pump.

The committee reports problems with the pump to the DDF.

Water Usage

There are several alternative sources of water locally. Before this pump was fitted people used a well in the school yard which is now being used to water the school gardens. There is also a Bush Pump, 100 metres away. Two households in the community have their own wells. However, people prefer the water from this pump because it is cleaner than that from the well and softer than that from the Bush Pump. It is not used for watering livestock.

(4) Nyakabani Waterpoint, Ward 4.

Situation and facilities

This Blair Pump was installed three years ago on an existing well. The pump is located close to the main highway and is centrally located to its eight user households. It is about 4 km from where the EHT is stationed. Headworks include an apron, and a spillway and there is a garden surrounding the waterpoint. The pump was fitted by Blair Research Laboratory (BRL) under the Madziwa Schistosomiasis Control Programme. The pump is situated in someone's yard, and the female head of household is the unofficial caretaker.

During project implementation the community provided food, sands and bricks.

Maintenance

The pump was not working at the time of the visit although the surroundings were clean and the pump had been working perfectly until this breakdown.

Although there is no formal Waterpoint Committee, there is an unofficial caretaker and her details are as follows:

| | |
|--------------------|----------------------|
| Position: | Unofficial caretaker |
| Length of service: | 3 years |
| Age: | 50 years |
| Sex | Female |

| | |
|-----------------------|--|
| No of children | 7 |
| Marital Status | Married |
| Occupation of spouse: | Butcherboy in Bindura, does not stay at home due to work. |
| Other positions: | None, but she is a member of the Womens League and of a Church. |
| Training: | None |
| Duties: | Cleaning the surroundings and tightening the bolts. |

The caretaker believes that the BRL owns the pump and that the MOH is responsible for providing the spare parts through its EHT.

She tried to organize the other users into helping to clean the pump but they have refused and even resort to the use of other pumps. As a consequence she does all the cleaning herself. If there are any technical difficulties with the pump the caretaker reports to the EHT. Any conflicts about pump usage are referred to the VIDCO.

The caretaker keeps some spanners for pump maintenance which were given to her by the Ministry of Health. There are a few rules which relate to the use of the pump and are aimed at minimizing damage.

Water Usage

Before the pump was fitted, a well on the pump site was used. Two user households also have their own wells. In the event of a breakdown they use a pump about 400 m away.

(5) Chidawaenzi Waterpoint, Ward 4.

Situation and Facilities

This Blair Pump is located about 3 km from where the EHT is based. It is situated in the yard of the VIDCO Chairman and is used by a total of 15 households, all of whom are closely located around it. The one year old pump has an apron and a spillway and was fitted by the MOH. The community participated in implementation by providing labour, bricks, sand and food.

Maintenance

The pump was working at the time of the visit although there was no evidence of community maintenance and the users said that no preventative maintenance had ever been carried out.

There is no Waterpoint Committee and the users say that no maintenance record cards were ever issued for this pump. The user in whose yard it is situated therefore acts as the unofficial caretaker.

Waterpoint Committee

The details of the unofficial caretaker are as follows:



| | |
|-----------------------|---|
| Position | Unofficial caretaker |
| Length of service | 1 year |
| Sex | Male |
| No of children: | 18 |
| Marital status | Married with two wives |
| Occupation of spouses | Housewives staying at home |
| Other positions | Vidco Chairman, School Chairman, District chairman of the National Farmers Association. |
| Training | None |
| Duties: | To clean the grounds and to report any breakdown to the EHT if they occur. |

No money has ever been raised for maintenance. the interviewee believes that the pump is owned by MOH and that they are responsible for providing the spare parts. The MOH did give some spanners to the caretaker for the purpose of preventative maintenance.

The community will be able to repair any damage to the headworks as some local builders have already been trained for this duty.

So far there have been no conflicts regarding the use and maintenance of the pump. There are no real rules followed at this pump except on the advice of the EHT.

Water Usage

Before this pump was fitted, people used an unprotected well nearby. However, this is now defunct and the only alternative source of water is the river. No user households have their own wells.

4.4 Mutoko District

4.4.1 Background

Mutoko District is situated in Mashonaland East Province. It mostly consists of Natural Region IV although some of the southern part of the District is in Natural Region III. The area is generally hilly and subject to severe mid-season dry spells with annual average rainfall of 450 mm - 650 mm.

Population figures are 137 000 according to the Ministry of Health and 143 000 according to the Department of Physical Planning, the discrepancy possibly being due to the figures for the resettlement areas.

Of the 31 wards in the district, 19 are in the Communal Lands and the rest are in the resettlement schemes and Small Scale Farming Areas.

Water Programme

To date there has been no large scale water programme covering the whole District. However, in 1988/9 five wards benefitted from a NORAD drought relief well sinking project. This was felt by district officials to have been a successful exercise because the funds were easily available, ensuring the speedy supply of equipment and materials which helped to achieve a high level of motivation and community participation.

There is a current proposal for an Integrated Rural Water Supply and Sanitation Project for the District which was due to start in July 1989. However, at the time this research was carried out funding had still not been finally confirmed. The project targets are to sink 30 new deep wells and 30 new boreholes, to rehabilitate 40 old wells and 40 boreholes. Rehabilitation would take the form of replacing old equipment and constructing headworks. The project is planned to take place over three phases and to benefit six wards.

There is a Water and Sanitation Subcommittee operating at District level which all the relevant ministries attend.

Problems in implementing water programme activities are similar for the various ministries. There is a severe lack of manpower which reduces ministerial efficiency. For example the DDF have only one Field Officer (Water), one assistant, two WSOs and six casuals. The MOH has only three District level staff and six EHTs.

There is also a problem of communication in the District between the various ministries who do not all have offices in the same place. Some do not even have telephones. This makes it difficult to deal with their sometimes conflicting or overlapping areas of interest. The fact that not all ministries are fully decentralized to District level means that problems are often referred to Provincial level so increasing the time before a solution is found.

Communications with the community are hampered by a lack of



transport. Contact therefore usually takes place at the big events such as the Mutoko Agricultural Show or World Health Day activities. This is considered by District Officers to be unsatisfactory because contact is brief and follow ups are difficult. 'Awareness meetings' are also conducted in the community by the DCDO with the participation of the various ministries, if transport is available.

Some difficulties with community mobilization are experienced. These often occur because the communities do not perceive projects as their own and rarely are allowed any significant role in decision making about the projects. National guidelines about community participation sometimes hinder full involvement. An example is the requirement that the community should dig the first three metres of a well. Although this is intended as a minimum requirement it is usually perceived as the maximum required of the community who then expect 'government' to finish the job.

Traditional beliefs and leadership structures are very important within the District and the Party is also found to be useful in mobilization, as it is usually closer to the people than are government officials.

Maintenance

There is no Three Tier Maintenance system in the District and no Pump Minders although there are plans that such a system should be introduced sometime this financial year. There are no Waterpoint Committees. Therefore maintenance is done entirely by the DDF District Maintenance Team, and by the EHT. The DDF is responsible for the Bush Pumps and for Bucket Pumps handed over to them by the MOH and the EHT is responsible for the upkeep of Blair Pumps.

Grease is given by the DDF to the Ward Councilors who are supposed to distribute it to VIDCOs who then select an unofficial caretaker. However at the time of the research the majority of the Councilors in the District had been suspended from duty and so the community was resorting to using its own grease.

The activities of the District Maintenance Team are severely hampered during the dry season because of the diversion of transport to grain haulage just at the time where there is the greatest need for pump maintenance.

Reporting and Recording

Theoretically the system for reporting faults or breakdowns is :

USERS → VIDCO → COUNCILLOR → DDF

However, because of the current lack of Councilors, the system has been temporarily modified to :

USERS → VIDCO → PARTY OFFICIALS → DDF

In practice, however, many of the users find some way of reporting directly to the DDF themselves.

The DDF started the Record Card system in 1988. There is no systematic recording of repairs carried out by MOH staff, although some general information may be extracted through the monthly reports submitted by the EHTs.

Community Participation

The DCDO and his staff are involved in the theoretical training of communities in the importance of looking after their pumps and of reporting breakdowns quickly. They encourage people to use their own grease and wire and to mend fencing when it is broken down by cattle. However, community maintenance and cleaning is ad hoc and no one is specifically designated to do it. In mobilizing the community the DCDO always first approaches the Chief and then the Party.

4.4.2 Mutoko District Data

Technology

The majority of pumps sampled in Mutoko were Bush Pumps (62%) with a substantial number of Blairs (28%) and a few Buckets. At the time of the visit, 78% of the pumps were working, the majority of these being Bush Pumps. Less than half the Blair Pumps were working at the time of the visit.

The pump population was a relatively young one with the average age being 5 years and the maximum age only 16 years.

Usage

The average number of user households was 27 but the range extended from 3 to 300. A minority (30%) of the pumps were used for livestock watering and less (22%) for watering gardens. Similarly, the number of sampled pumps used by 'schools' was low at 20%. There is no obvious explanation for these low figures for other types of water usage other than the existence of alternative water sources. Except in drought years, Mutoko is not one of the driest districts and so it is possible that people are used to relying on other sources of water. This tendency would be reinforced by the relative dearth of protected waterpoints because of the lack of any large-scale water programme over the past few years.

Breakdowns

The breakdown rate of pumps at 54% was similar to the national average. The total number of breakdowns in the previous year was 34 spread over 27 pumps, so there were few multiple breakdowns. The average number of breakdowns per sampled pump was therefore 0,7.

Blair Pumps had broken down the most in the past year (79%),



followed by Bucket Pumps at 60% and Bush Pumps at 45%. The high breakdown rates for Blair and Bucket Pumps suggests these may be an inappropriate technology for a borderline dry area.

Those pumps used for gardens and for livestock had similar breakdown rates of 46% and 40% respectively which is lower than the overall District figure. Those used by 'Schools' had a massive 100% breakdown rate. This could suggest that where waterpoints are used for livestock and gardens it is because there are no other sources around and therefore the pumps are well-looked after. Looking more closely at this category it appears that those used by 'schools' break down into the following :

| | |
|--------------|-----|
| Bush Pumps | 30% |
| Bucket Pumps | 20% |
| Blair Pumps | 5% |

These pumps with multiple users may well be overused, particularly if the pump is a low technology one. However as there is little correlation between number of users and breakdowns, the explanation may be that multiple user pumps are less well maintained than those used only by households.

There was a very weak positive correlation between age of pumps and frequency of breakdowns with most of the higher value breakdowns occurring between three and five years of age.

Maintenance

Where breakdowns did occur, the pattern of reporting was eclectic as would be expected where there is no established system of committees. The largest category of reporters was 'Others' (59%), these being mainly councillors, headmen and shop assistants or businessmen. The next biggest category of reporters was Village Community Workers (13%) and the remaining reporters only reported one or two pumps each. Downtimes were generally high with only 22% of breakdowns repaired within a month and the outstanding for one to six months or more.

The most active mender was the DMT (47%) followed by the EHT (16%). A very high proportion (34%) of the breakdowns remained unrepaired at the time this research was conducted, whether for technical or organizational reasons is unclear. Some of these may have dried up and be awaiting rehabilitation.

Efficiency

No clear picture of the comparative efficiency of different reporters emerges, although it can be said that none seemed particularly effective with generally high downtimes. The major menders, the DMT and the EHT were both quite slow at mending pumps.

Ward Information

This information was mostly gathered from Kawere ward in the north of the District, bordering on Mudzi and the Nyamapanda Road. The Ward has a population of 5 478 which is served by five Bush Pumps,

three Blair Pumps and two Bucket Pumps.

There is an EHT resident in the ward who participates in maintenance. The community usually provide labour and lend tools for this purpose and greasing is usually done by users who have scotchcarts or wheelbarrows. Cleaning up of waterpoints is left to the users and no one in particular is designated as responsible. The EHT had experienced some problems in mobilizing people to use protected sources of water because of the strength of traditional beliefs and the existence of traditional water sources, the 'matsimi emhondoro'. Travelling within the ward is not easy because of the absence of bus services.

4.4.3 Mutoko Case Studies

(1) Moyosvi/Mandebvu Waterpoint

Situation and facilities

This Bush Pump was fitted during the war to replace an engine pump which had provided water for the nearby protected village. The engine pump had been vandalized by the people because it served the protected village.

The pump is situated close to a cooperative garden but about 1 km from the nearest households and 1,5 km from the clinic where the EHT is based.

There is a concrete apron and a cattle trough at the waterpoint. At the time of the visit, the pump was in good working order and well greased but there was little evidence of community maintenance. The surroundings appeared neglected and unclean.'

Maintenance

There is no waterpoint committee and minor repairs like bolt tightening are done by the cooperatives using their own tools. The DDF visits randomly and greasing is done by the cooperators. The EHT, despite living nearby, does not check the pump because it is not used for human consumption. The Village Community Worker said she did nothing to mobilize people to keep this site clean as it was not truly a community well.

Over the lifetime of the pump, only one breakdown is remembered by the users and that is when the pump was vandalized by a member of the community who removed the bolts. The possible motives for this vandalism were thought to be resentment that the pump was too far from user households (but was benefitting the cooperators) and bitter memories of its association with the colonial past. The incident is not shown in DDF records because it occurred before the current record card system was operational. Apparently it took the DDF two weeks to replace the bolts.

No cleaning is done of the site because the water is not used for household consumption.



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Water Usage

Water from the pump is not used for household consumption because it is too far away from the users and the water is salty. Also there are alternative services available at the nearby school and clinic, more conveniently situated for the users. One user also stated that it was not used because it was difficult to pump but, on testing, this was found to be untrue.

The cooperators interviewed stated that the water from the pump had enabled them to earn a living from the sale of garden produce. There are 14 cooperators, all of whom live locally.

Despite the fact that several people said it was not a community well, during the dry season the locals take their cattle to drink at the point.

(2) Kawere School Pump.

Situation and facilities

This is a new Blair Pump installed in April 1989 by MOH working with the community. It is situated on someone's garden plot (currently uncultivated) and is shaded by nearby mango trees. The site is about 600 m from the primary school. The pump is fenced with barbed wire and locally available wooden poles. A rocky outcrop outside the fenced area is used for washing clothes there being no cement for the construction of a washing slab. The only headworks are a spillway and apron. There is no soakaway. It is about 1 km from where the EHT lives.

Maintenance

The area generally appeared unclean with rotting leaves lying around. The fencing already requires repairing with some of the poles falling down. This state of affairs was apparently because the school children who usually did the cleaning were on holiday and none of the user households do any cleaning. One of the users interviewed stated that the VIDCO decides on the management of the waterpoint at village meetings. There are certain rules relating to the use of the pump, these being :

1. Everyone is welcome to drink from the waterpoint.
2. No two people should pump water at the same time.
3. Water must only be spilt in the spillway.
4. No one may bathe or even wash their face at the waterpoint.
5. Users should leave the waterpoint at least in the same state of cleanliness as they found it.

The user interviewed stated that she believed that the users owned the pump and so must be responsible for maintenance. They must use their own tools and if necessary contribute financially for this purpose. She said she always attended the village meetings

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where these matters were discussed. She felt that the installation of the pump had resulted in less deaths among children.

Another user who was also the women's representative on the VIDCO defined her role in relation to the water programme as mobilizing people into participating and disciplining those who abused the waterpoint. Everyone in the village was expected to contribute to implementation by providing materials or labour, moulding bricks or feeding well sinkers.

Although they had not yet had occasion to discipline anyone for waterpoint abuse the interviewee thought they could do so by withdrawing the offenders party card if necessary.

Water usage

The waterpoint is used by the primary school including the teachers households, and about six other households. The water is used for household consumption only, a community garden being impossible as it is already sited on someone's plot. The other adjacent gardens have their own shallow wells and these were the previous domestic source of water before this pump was installed.

(3) Kawere Clinic Waterpoint

Situation and facilities

This Blair Pump serves a clinic and surrounding households and is fitted with an apron, a spillway and a fence. It was installed in 1984. The local EHT stays at this clinic. At the time of the visit the surroundings were clean and well maintained and the pump was working.

Maintenance

The interviewee was a Mr Mandebvu, caretaker of the clinic and a member of the user community. Since 1984 he said that the pump had broken down three times. The first time it was out of action for four weeks because the breakage was serious and a complete overhaul of the headworks was required. This was done by the community and the EHT.

The second time it broke down it was out of order for one week waiting for loose rings to be tightened. The EHT carried out the repair using tools provided free of charge by the headman.

The third breakdown was similar to the second, the pump was out of action for four days and the EHT repaired it as before. The EHT could find no records of these repairs having been carried out.

Water Usage

The pump is used by 10 households in addition to the clinic (and staff households). When this pump was out of action the clinic



staff used Mandebvu borehole or the Blair Pump at the school.. However most other users resorted to shallow wells in their gardens. Mr Mandebvu, the caretaker, used an unprotected deep well (Mandebvu well) when he is not at work. This is over a kilometre from the clinic and despite being unprotected is used by 48 households. Because it is deep and the top open, it is dangerous for children to collect water there. Mr Mandebvu stated that he is well aware of the dangers of using unprotected water but he has no choice as the protected sources are too far from his home.

(4) Chizura Waterpoint

Situation and Facilities

This Bush Pump was installed in 1984 by DDF. It is situated close to a dirt road but about 800 metres from the nearest household. The headworks consist of an apron with stones placed around it to prevent erosion.

The VIDCO Chairman said that they had collected money, 20 cents per household or person, to buy cement for the construction of a cattle trough and washbasin at the site. However, the Ward Councillor had discouraged the people from using their own cement, as he said that the government should and would provide. These promises were never fulfilled and as a result the waterpoint still had no headworks.

Maintenance

There was no evidence of community maintenance and the surroundings of the pump were very unclean. DDF records show only one breakdown during the lifetime of the pump, in 1988. The breakage was reported by VIDCO members to the Councillor who reported it to the DDF. New leathers were fitted. The EHT had never officially visited the pump.

There are some regulations regarding the use of the pump :

1. Water must not be used for gardening
2. Water must not be used from this pump unnecessarily when other nearby sources are still functional.
3. The handle of the pump must not be allowed to touch the ground.

Water Usage

The pump apparently is only used in the dry season as the water is salty and so in the wet season people prefer to use their own shallow wells. During the dry season it is used by over 100 households from 3 villages, some walking more than 3,5 kilometres to it. The nearest other perennial sources of water are the 'matsime emhondoro' which are about 5 km away and never dry up. Although these sources are unprotected (for fear of them drying up if tampered with), the Village Community Worker maintains that

they are safe to drink from because the water is clear.

(5) Mariwo Borehole

Situation and facilities

This Bush Pump was installed by the DDF in 1985 and is situated in Madimutsa Village. It is about 1 kilometre from a dirt road and 2,5 km from the local school. As with Chizura waterpoint, users had contributed 20 cents each for cement for headworks, but were ultimately discouraged by the Ward Councillors.

Maintenance

During a recent breakdown the headman replaced bolts which had not been tightened in good time, and so got lost. The bolts had been purchased by the community, each adult member contributing 20 cents. During the 'breakdown' the pump was still functional because people improvised with wires until they had obtained the new bolts. The VCW believes the people of this community are well motivated and require little supervision as they organised collections of money for maintenance spontaneously, without being told to do so by any official. She said people were very willing to provide their own tools for maintenance.

The handle of the pump had been lifted high by the DDF to avoid misuse by children who formerly played with it. The surroundings were not clean, most of the dirt resulting from the brickmaking taking place at the site. (The bricks are for the proposed secondary school).

Water Usage

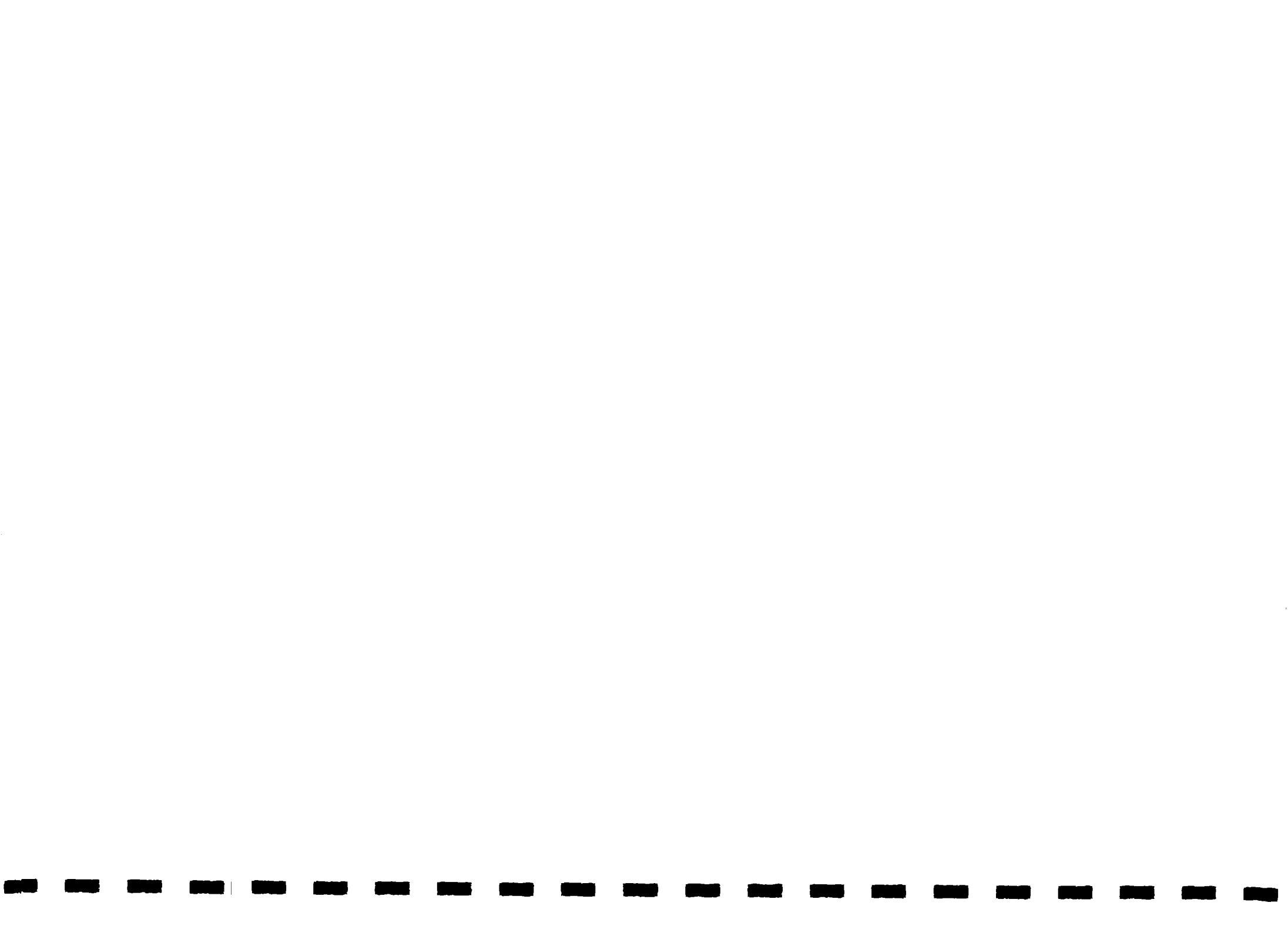
The pump's water is used for household consumption and brickmaking. However, there was a rule that it should not be used for gardening. This pump is also used by those served by Madimutsa School Blair Pump when it dries up.

(6) Madimutsa Primary School Water Point

Situation and Facilities

This Blair Pump was installed by the MOH in 1986 and serves the school, school teachers households and seven other community households. It is situated very close to the teachers household. During implementation, the school children had provided materials and labour on behalf of their parents.

The pump was working at the time of the visit and there was no history of breakdowns over the previous year. The EHT monitors its condition regularly as she visits her husband who is a teacher at the school at weekends.



One of the users interviewed, a teachers wife, said that no one was officially charged with maintenance. People with their own scotchcarts provided grease if necessary and schoolchildren clean the site under a teachers supervision. She claimed that the site deteriorated in school holidays because the community did not take over the cleaning. However, at the time of the visit, despite the absence of schoolchildren, the place was found to be tidy and well-maintained. The VCW claimed to do most of the sweeping herself both during the term and during holidays.

The user interviewed believed that the MOH should provide tools for maintenance as the user community could not afford them. She believed that any conflicts over the use of the waterpoint would be resolved by the Parent Teacher Association and the VIDCO together.

The teachers at the school had each contributed 20 cents towards the maintenance of the nearby borehole - which is an alternative water source when the Blair Pump dries up.

There are tacit agreements about the use of the pump but no formal rules.

Water Usage

The pump is used by the school, the teachers and seven households for domestic purposes. There is also a Bucket Pump installed by the Ministry of Health (1989) in the school garden. This is not used by the community, only for watering the school garden. An alternative source in the dry season is the nearby borehole at Mariwo.

(7) Botsanzira Water Point

Situation and facilities

This Bush Pump is located about 500 m from the Nyamapanda Road and very close to the user households, of which there are 24. It was installed by the DDF in 1985.

Maintenance

The pump was not working at the time of the visit. According to the DDF Field Officer, this was due to loose valves and worn cup leathers which need replacing. There was no evidence of community maintenance and the pump was in need of greasing.

According to a user who was also a member of the VIDCO, there is no formal organisation for cleaning or maintenance. People who have their own grease may offer it, free of charge, as and when necessary.

There are some problems which the VIDCO experiences in mobilizing people to use protected water because the well dries up in the afternoons. This has been a problem since its installation. It was once inspected by the DDF who said the problem was that the pipe was too short to reach the water. The DDF records did not

show any such problem, presumably because it originated before the introduction of the card system.

There are some rules regarding the use and care of the pump:

1. Households should give each other the chance to draw water in the mornings when it is available.
2. The handle of the pump must not be banged on the ground.
3. Users must leave the pump and surroundings cleaner than they found them.
4. The pump must be treated by each user as though it is their own individual well.
5. No gardening is allowed using water from this pump.

Water Usage

When the pump dries up every afternoon people revert to the use of the shallow wells in their gardens. One of the community also has an upgraded household well which five other families also use. Because of the problem of erratic water supply from the pump, the people do not consistently use protected water.



4.5 Gutu District

4.5.1 Background

Gutu is situated in the North of Masvingo Province and is comprised of areas labelled Natural Region III, IV and V. Rainfall varies from less than 450 mm per annum to 800 mm per annum according to the Natural Region. Temperatures similarly range from 18 to 27 degrees centigrade.

The district contains commercial farms, small scale commercial farming lands and resettlement areas. Most of the commercial farming land is in the west of the District (Natural Region 3).

In 1982 the population was 184 268 and was estimated to be growing at a rate of approximately 2% per year. This gives an estimated 1989 population of over 211 500. The district is divided into 38 wards.

Water Programme

The water programme in the District is largely funded by GTZ through CARD (Coordinated Agricultural and Rural Development Programme), but KFW is taking over as the funding agency this year. GTZ has concentrated on the funding of wells fitted with Bucket Pumps by the MOH, while KFW will shift the emphasis slightly to the implementation of boreholes fitted with Bush Pumps by the DDF.

The implementation activity in the district is high. The target is to install 145 boreholes per year while Bucket Pumps are promised to all those with perennial wells. There is a high level of unmet demand for pumps in the community.

The water programme is coordinated through the District Water and Sanitation Subcommittee which meets monthly or more often if necessary. Coordination is promoted by the sharing of offices by MOH, GTZ and KFW.

Ministerial staff involved in the water programme include:

MOH 2 District Environmental Health Officers
 1 Principal Environmental Health Officer
 19 Environmental Health Technicians

DDF 1 Field Officer (Water)
 4 Water Supply Operatives
 2 Assistants
 8 Pump Minders

The MCCD has so far played little part in the water programme and so its staffing levels are not included here. In addition there are advisory staff attached to the NGOs.

Transport does not appear to be as great a constraint as it is in

other districts as there are project vehicles available at District level and some of the EHTs have motorcycles.

Maintenance

There is a Three Tier System of maintenance operational for boreholes which was introduced by the DDF in 1987. It is believed at District level that the DDF is allocated \$150 per year for the maintenance of each borehole. The users contribute nothing towards the cost of maintenance although there are now some tentative plans to introduce some level of community contributions.

There is a Waterpoint Committee for each Bush Pump with the male member of the committee usually responsible for maintenance and minor repairs. Ideally, the committees should have spanners but the DDF has none to give them.

There are only eight Pump Minders in the whole District so they cover up to five wards each. Their training consists of a two week course followed by refresher courses twice a year. Last year it was felt by the DDF that there was an unacceptably high level of breakdowns and so Pump Minders and Water Supply Operatives were sent on a two week course to improve their technical skills.

Some Waterpoint Committees also exist for Bucket Pumps and they are supervised by the EHTs. As with the Bush Pumps there is supposed to be at least one man on the committee to do the 'technical' minor repair jobs. The committee is supposed to collect money for the buying of grease but in practice it is the user living nearest to the pump who supplies the grease. There are no strict rules about the functioning of the committee except that it should have four members. If the pump serves four families or less then there should be a representative from each family on the committee. The MOH provides the committees with spanners. However, often there is no formal committee for a Bucket Pump and the nearest user to the pump is expected to act as informal caretaker.

The EHTs claim to have insufficient tools for their maintenance activities and those they do have are usually provided by the donor. The EHT keeps records of maintenance in a notebook and these are forwarded to the District Offices.

There have been some problems with the stealing of chains for the Bucket Pumps. The first replacement funded by the donor is made by the EHT but subsequently stolen chains are not replaced.

There is some problem in obtaining spare parts for the Bucket Pumps even when supplied by the donor there is a substantial time lapse between the request for the parts being made and the parts arriving.

At Mupandawana Growth Point there is a man who owns a garage and is capable of manufacturing valves for bucket pumps, something he has done as a one-off demonstration on request. He claims that he would be willing to manufacture more if people demanded them but has not yet worked out the unit cost.



At the time that this data was being collected a special exercise in maintenance was taking place in the District. Intensive checking of all Bucket Pumps was being undertaken and any remedial work required was done. The purpose of this was to ensure that all pumps were in good working condition before GTZ left the water programme. The Decade Officer from the Ministry of Health who was carrying out this exercise said that most pumps he saw were functioning but were in need of some minor remedial repairs. The repairs needed often involved the apron and spillway rather than the pump itself.

4.5.2 Gutu District Data

Technology

The predominant technology in the District sample were Bucket Pumps (87%). The majority of pumps were working at the time of the visit but over half (58%) of those working were also in need of repair. There was some difference in working rates as 67% of the Bush Pumps sampled were working compared to 83% of the Bucket Pumps.

The pump population sampled was a young one with an average age of 3,3 years. The ages varied from 1 to 42 years but the median and the mode were both 3.

Pump Usage

The average number of user households per pump was 8 which is low in comparison with other districts reflecting the predominance of Bucket Pumps in Gutu. Nevertheless, the average was probably upwardly distorted by the high user values for the Bush Pumps. User households ranged from 1 to 90.

A fairly high proportion of the pumps were used for garden watering, probably because many of them were sited within someone's garden or household. A relatively small number of pumps were used for watering livestock, again reflecting the type of technology and the existence of other sources of water. Those used for livestock watering are likely to be mostly Bush Pumps. A very low 7% of the sample served business centres, clinics and schools, again a reflection of the 'low-level' technology sampled.

Breakdowns

The total number of breakdowns occurring over the past year was 39 which worked out at 0,6 per pump. Numbers of breakdowns per pump were not high, no pump breaking down more than three times. The overall breakdown rate was, at 57%, comparable to the national average. This represents the proportion of the total pumps to the national average which broke down at least once during the previous year. The Bucket Pumps and Bush Pumps sampled had similar breakdown rates, these being 57% and 63% respectively. Many of the Bucket Pump breakdowns involved the bucket falling down the well or the valve wearing out/coming loose.

The breakdown rates for those pumps used for gardening (60%) was comparable to the overall breakdown rate. This may suggest that any gardening done is not on a large scale, involving only one or two households. Those pumps used for watering livestock had a relatively high breakdown rate of 67% whilst the breakdown rate for 'schools' was a low 25% (the sample size for schools, however, is so low that this figure may be unreliable). The higher breakdown rate for pumps used for watering livestock may be indicative of heavier usage in general, (if they are Bush Pumps) and a more complex technology.

There was little or no relationship found between the age of the pump and number of breakdowns or between the number of users and the breakdown rate. This is possibly partly due to the fact that both user and age values were relatively low and uniform in the pumps sampled.

Maintenance

Where breakdowns occurred they were predominantly reported by the users (75%). Other reports were from committee members and village community workers. The 'others' category of reporters included a headmaster and a chief. A few breakdowns had been unreported.

The downtimes of pumps were moderate to high with only 45% being mended within two weeks, 61% within a month and 39% taking longer than one month to be mended.

A fairly large proportion of the breakdowns were mended by the users themselves (37%), with a similar proportion being repaired by the EHT (34%). The Pump Minder mended 19% and 11% remained unrepaired at the time of the survey. These figures are consistent with the predominance of Bucket Pumps in the sample as it would be expected that many of the breakdowns could be repaired by the users themselves.

Efficiency

The vast majority of breakdowns were reported to the mender by 'Users' rather than by any formal committee. Of those reported by the users, 43% had a downtime of 2 weeks or less and a total 65% were down for a month or less.

Of the few pumps reported by VCWS and 'others' only one was down for less than a week, the others being out of action for a month or more.

Judging from the downtimes, the EHTs were the most efficient menders as they repaired 61% of the breakdowns within a week. The Users and the Pump Minders had rates of 42% and 43% within two weeks respectively. The EHTs had only 23% down for over a month before being mended while the 'Users' had 35% and the Pump Minders 43%. These differences between the Pump Minders and the EHTs may appear because they are dealing with totally different technologies, the EHTs mending Bucket Pumps and the Pump Minders mending mostly Bush Pumps. Also it is possible that the EHTs are more easily accessible than the Pump Minders (there being far



fewer Pump Minders in the District) and that the channel of communication between the users and the EHTs is better established. The relatively high rates of breakdowns mended by the users indicates that the Bucket Pump is close to being a wholly village maintainable technology.

4.5.3 Gutu Case Studies

(1) Chagonda Pump

Situation and facilities

Chagonda Pump is located in Jengwa Village, Ward 34. It is a Bucket Pump and was installed in Mr Chagonda's yard by the MOH in 1986. The pump was fitted on an existing well which was dug in the 1960s and is 50 feet deep. The EHT lives less than a kilometre away and there are alternative protected sources at the clinic or Dawure School, also less than a kilometre distant.

The Bucket Pump has an apron and a drainage channel and at the time of the visit was in good repair.

Maintenance

There is no Waterpoint Committee. The users said that in the previous twelve months the pump had broken down four times and was out of action for a total of eight days. Their major problem is that the chain is old and breaks frequently. This is dealt with by the users themselves who fish out the bucket with homemade hooks.

District level records also record one visit from the EHT in July/August 1989 during which the channel and valve were repaired, although it is not clear whether this was preventative or corrective maintenance.

According to the users, the EHT inspects the pump regularly but they know that the pump now belongs to them and so they must provide all spare parts and tools needed. The users have their own grease which they use on the pump.

Worms were found in the water twice and the users obtained the necessary chemicals for treating this from the Ministry of Health in Gutu.

Water Usage

The pump is now used by only two families but these add up to twenty seven people. In the past it was used by many more families but the majority of these have now dug their own wells.

Water from the pump is used for domestic consumption and for watering a small vegetable garden. This garden used to be bigger but there was insufficient water to support it.

The current users said that there were problems when larger numbers of people used the well because they made the surroundings

dirty.

When there are breakdowns they may use other family wells, the local school or the clinic as an alternative water source.

(2) Muridzo Bucket Pump

Situation and facilities

This Bucket Pump is located in Ward 34 in Jengwa Village and is less than one kilometre from the EHT's base at Dewure Health Centre. The pump is situated on Mr Muridzo's stand and is within 100 m of all three of the user families. The well was dug and lined privately in 1974 and the pump installed with the help of the MOH in 1985. The pump has a concrete apron and a drainage channel.

Maintenance

There is no Waterpoint Committee. According to the users, the EHT is the person responsible for maintenance, although they are also visited periodically by CARD officials who advise them on any problems. For example, CARD officials have advised them to get better pipes and to obtain cement for improving the casing or the apron. The chain has broken twice in the last twelve months and each time was mended by the EHT. One leg of the pump has been shaking for two years and is not yet repaired although this condition was noted in the EHT records at District.

Mr Muridzo, on whose stand the pump is situated, does minor maintenance, such as bolt tightening, and provides the grease.

Water Usage

The pump is used by three families, totalling sixteen people. However, the other two families have their own unprotected wells and so only use this one for drinking water. Mr Muridzo also uses it for washing, watering the garden and for watering livestock using a dish.

According to the Muridzos, because of the costs incurred in digging the well, other families are only allowed to use it if they have no acceptable alternative source. Mrs Muridzo, who is a Red Cross instructor allows people to use her bucket pump instead of letting them suffer diseases from drinking unprotected water. The main problem she experiences is that other users leave the surroundings of her well dirty.

(3) Mubika Borehole

Situation and Facilities

This Bush Pump is situated in Jengwa village and at the time of the visit (September 1989) was not working. The well was dug in 1985 by the community and the pump was installed by the DDF. The pump has no headworks, although the people were promised that the



DDF would construct cattle troughs and washing slabs, nothing has been done yet. The waterpoint is used by four villages and is located in someone's field about 150 m from the nearest user.

Maintenance

The pipes do not now reach the water level and if an extra one was added it would be in the mud. Therefore people have removed part of the cover slab and now collect water using a rope and bucket. As a result of this the water is no longer clean, several tins have fallen into the well and sand gets in from around the cover slab. No one knows whether the pump could now function.

Apart from the current problem only one previous incident had occurred when the pipes dropped into the well.

The DDF and the users are now fighting over who should rectify the current unsatisfactory situation. DDF said they would repair the well if the users first removed the mud and tins. However, the users believe that the DDF should do this as they have all the necessary equipment.

Records show that the Pump Minder visited in July and noted the lack of water and the need for deepening the well.

Waterpoint Committee

The member of the committee interviewed was the caretaker. She is a 32 year old unmarried woman who has no other job but has been on a Red Cross course. She has been the caretaker since 1986 and stays at home.

She has reported the problems with this waterpoint many times to the Pump Minder and to the DDF at District level but has now given up because of lack of response. When she has to travel to report a fault, the community pays for her bus fares. She never received any training for her job although she was promised it at some stage.

The other members of the committee are two women and one man. The women clean the site when it is dirty and the man should tighten the bolts on the pump.

The caretaker listed the duties of the committee as follows:

1. To see that people use the pump properly.
2. To keep the surroundings clean (or organise the users to do this).
3. To keep the grease and lubricate the pump.
4. To collect contributions for the purchase of grease or for bus fares.
5. To organise the users to provide stones for the lining of the well.

6. To provide labour.

The committee only meets if there is a problem and they liaise with the VIDCO over projects and problems.

Some of the people believe that the pump belongs to DDF while others believe it belongs to the community. All parts for repairs are provided by the DDF and the WPC does not have any tools. One problem that the committee faces is of people with their own wells who are reluctant to contribute to the maintenance of the communal one.

Water Usage

There is insufficient water in the well for the number of users for whom it is the primary source. When the water runs out they use a private well about 1 km away. However, when the owner of this well is away from home he locks it because some people were throwing dirt in it. When this pump is working no users are excluded, even if they have refused to contribute towards its implementation or maintenance. As it is the major source of water in the area, people would be greatly helped if the pump was mended.

(4) Gurava Pump

Situation and facilities

This Bucket Pump is situated in Village 3, Ward 35. The well is 53,5 feet deep and the headworks are a concrete apron and drainage channel. The pump was installed on the 9th May 1989 on an existing well but at the time of the visit 5th May 1989 it was not functioning because the water had dried up. The pump was installed by CARD with the assistance of the people who contributed sand and stones.

The well is centrally located in relation to the five user households, each of which is about 150 m away. The EHT lives about 20 km distant. When the pump was constructed the community contributed \$15 to pay the builder for constructing the slab.

Maintenance

The pump was not functioning because there was no water in the well. There is no Waterpoint Committee.

The apron is in need of plastering and the chain for the buckets is too short. According to the users interviewed, the people responsible for maintenance are the EHT and the GTZ Water Engineer. The pump had not broken down before the well dried up.

The people claim they were promised grease and bolts and water treatment chemicals but none have yet been forthcoming. One of the users therefore provides the grease.

If there were any faults with the pump, the users would report



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them to the Village Community Worker living 4 km away.

Water Usage

Of the five households using the well, only one has an alternative source, in the form of a household well. Sometimes users are able to use the borehole nearby at Goronga as an alternative source but in dry periods they go to the Dewure river 4-5 km away.

Other households are also allowed to use this pump if their pumps have broken down.

(5) Goronga Borehole

Situation and Facilities

This Bush Pump is situated in someones field, not far from Gurava Bucket Pump. Some of the user households are closely situated around the water point but it serves a scattered population of five villages covering an area of 3 km in radius.

The pump was installed in 1947 and used to be repaired by Whitehead and Jack through the DDF.

There are no headworks except an old cattle trough which is no longer usable. Cattle therefore drink at the Dewure River. However, the surroundings are dirty, partly because the cattle still frequent the site and partly because there is no drainage.

Maintenance

The pump has had no breakdowns this year but the users are experiencing problems because the handle is loose due to a broken bolt. The Pump Minder maintains it and his most recent records show a visit on July 1989 when the pump was found to be functioning well but in need of greasing.

Waterpoint Committee

The caretaker is the man who lives in the closest user household. He is aged 47, married with four children and is also employed as a Blair toilet builder. He had worked as a caretaker for two years and was originally chosen because he lived closest to the waterpoint. He received no training for his job.

The other three members of the Waterpoint Committee are women. Women were chosen because they visit the waterpoint regularly.

No meeting of the waterpoint committee is held unless there is a particular problem. They do not raise money for grease or any other maintenance purposes as the users willingly provide their own grease and the DDF supply all spare parts.

The Waterpoint Committee mobilizes people to clean the surroundings and provide labour and stones for the promised construction of headworks.

The Caretaker reports to the Pump Minder who regularly checks the pump.

Water Usage

Water from this pump is used for drinking and washing and for watering individual gardens. Cattle no longer drink there. The area has some other bucket pumps but in general these produce very little water.



4.6 Buhera District

4.6.1 Background

Buhera is a large district situated in Manicaland Province. In terms of water supply the District ranges from moderate to dry with an average rainfall of 800 mm a year in the North and 500 mm in the South. The area is badly affected during drought years and is mainly characterised by boreholes with high numbers of users, there being little or no other surface water available. The district is divided into 34 wards.

Water Programme

Until recently Christian Care were operating a fairly large well-sinking project in the District which started in 1984. This has now been handed over to the Government although Christian Care are still involved in some headworks construction. Under the phased project activities included well-sinking borehole augmentation and the establishment of the Three Tier Maintenance system through training of Pump Minders and Waterpoint Committees. Following the withdrawal of Christian Care, the DDF is now involved in the training of Pump Minders and Waterpoint Committees.

DDF now have 12 Pump Minders operational in the District (covering 34 wards), looking after a total of 667 Bush Pumps. Since 1981 MOH have fitted 75 wells with Bucket Pumps and protected one spring. There are 17 EHTs who, like the Pump Minders, cover multiple wards.

The MCCD is only minimally involved in the Water Programme in that they participate in mobilization, mostly when requested to do so by the DDF.

The problems experienced by the Ministries involved include lack of transport and problems in communication as they are not all situated in the same place.

Maintenance System

Although there is a theoretical Three Tier Maintenance system, coverage is patchy because of the dearth of appropriate personnel and the distances to be covered. There are no Waterpoint Committees for Bucket Pumps although if there is a nearby Bush Pump, the same committee covers both. The DDF claims to have insufficient tools for the Pump Minders and insufficient spare parts to allow them to do their job properly. Only one truck is available to them for pump maintenance.

Recording

The DDF are operating a Pump Record Card system but this has only recently been established. The previous recording system started by Christian Care was abandoned. MOH has no standard recording system but some general information can be extracted from the EHT's monthly reports.

Community Participation

Community participation is variable and often the community show some reluctance to participate. They complain that the DDF is paid to do repairs whilst the people are not. They are often slow in providing the materials for headworks construction. Training of the users in greasing and cleanliness is done by the DDF at the pump site.

If there are any problems with community participation, the DDF calls in the MOH, MLGRUD, MCCD and Agritex and these Ministries coordinate their various efforts through combined field trips and formal meetings.

Ward Information

The ward in which the case studies were undertaken, Ward 14, is situated in the North East of the District. There are 14 Bush Pumps in the ward and 2 Bucket Pumps.

The DDF Pump Minder covers a huge area, sometimes cycling up to 80 km a day. Some parts of his area are too far to cycle to but he is reluctant to get buses because of the cost. The Pump Minder has only two spanners and has to obtain more tools from the DDF rest camp 40 km away. He works according to an operating programme prepared by his supervisor to cover each month's duties. According to this programme, there is a pump to be checked daily and repair work must be fitted in between the routine checking. Whilst undertaking this work, he also educates the community on such things as water usage, cleaning the waterpoint and maintaining the fence. He alleges that in the rainy season the community have a tendency to steal the bolts.

The EHT is resident in the ward, but has only two Bucket Pumps to look after. However, he does also monitor the state of Bush Pumps while travelling in the Ward and he liaises closely with the Pump Minder and with Village Community Workers.

According to the Ward Councillor, the development priorities in this Ward are to establish Savings Clubs, to demarcate grazing areas, set up paddocks, and to construct diptanks. He believes that people are resisting development projects (particularly villagisation) because they are disillusioned by unmet expectations. As a consequence, it is difficult even to get them to attend meetings.

4.6.2 Buhera District Data

Technology

The majority of the 70 pumps sampled were Bush Pumps (84%) as would be expected in a relatively dry district, and the remainder were Bucket Pumps. At the time of this research, 86% of the sample were working, there being very little difference between the Bush Pumps and the Bucket Pumps.



The average age of the pumps studied was 12,5 years and there are no 10 to 20 year old pumps in the sample, possibly indicating that implementation ceased during the war years.

Pump Usage

The average number of users per pump was 67 households although this figure seems to be upwardly distorted by a few high values. It is likely that many recorded users also collect water elsewhere or have a seasonal pattern of water use. A high proportion of the pumps sampled were used for livestock (71%) as would be expected in a borderline dry district. Predictably, the number of pumps used for watering gardens is much lower at 39%. Of the sampled pumps 17% had multiple users, suggesting that garden watering only takes place where water is plentiful. Also it indicates that few Bush Pumps are sited close enough to people's gardens to make watering possible.

Breakdowns

The breakdown rate for the District as a whole was 54% and the total number of breakdowns recorded in the sampled pumps over the previous year was 56 (i.e. 0,8 per pump). All the recorded breakdowns had occurred in Bush Pumps, none of the Bucket Pumps had broken down.

The breakdown rates for pumps used for livestock and for gardens was very similar at 64% and 63% respectively. Those with multiple users ('schools') had an extremely high breakdown rate of 83%. All the pumps used by other than household users were Bush Pumps.

A weak correlation existed between age and breakdowns although it was noticeable that several of the pumps had multiple breakdowns in the first few years of their lives.

There was a weak positive correlation between users and breakdowns. Analysis showed that for up to about 15 user households there were no breakdowns. Pumps with between 20 and 70 user households had a far higher breakdown rate, including some multiple breaks, and after that the rate of breakdowns fell slightly. This picture would coincide with the fact that Bucket Pumps, used by fewer people, did not break down at all.

Maintenance

Where breakdowns occurred they were mostly reported by members of the Waterpoint Committee (52%) and 'Others' (33%). 'Others' consisted of school teachers and Pump Minders. In these cases it is assumed that the Pump Minders were first reporters to the DMT.

Downtimes were relatively high with only 40% being down for less than two weeks although 80% were down for a month or less. The major menders were the DMT (57%) and the Pump Minders (32%) with a few being fixed by 'Others'.

Efficiency

The Waterpoint Committee also appeared quite effective with 82% of the breakdowns they reported being mended within a month. 'Others' lagged behind in this as only 65% of the breakdowns they reported were repaired within a month.

At first glance, 'Users' appeared to be the most efficient reporters as 80% of the breakdowns which they reported were mended within two weeks. However, they only reported a total of five breakdowns so the 'efficiency' may be spurious.

Of the pumps mended by the Pump Minders 18% were done within two weeks of breakdown and 77% within a month. The DMT mended none within 14 days but had mended 77% within one month and 87% in two months.

4.6.3 Buhera Case Studies

(1) Mukwasi School Borehole

Situation and facilities

This Bush Pump is situated 100 m from the school and on the periphery of the user households, most of which are concentrated in the southern part of the village. The pump serves 29 households in the community, a Primary School, a Secondary School and the associated teachers houses.

The Pump was installed in 1985 by the DDF and is situated about 1 km from the Pump Minders house.

Maintenance

At the time of the visit the pump was working, but the surroundings were dirty and there was cow dung everywhere. This was partially explained by the fact that the schoolchildren who usually keep the surroundings clean were on holiday and no one else was performing this duty. The bolts were tight, although no spanner had been allocated to the community, but they did not undertake any greasing, this being the sole responsibility of the Pump Minder.

In the past year the pump had only broken once when the pump stand needed repair and the pump itself was out of action for one day as a result.

The DDF Pump Minder visits monthly to check the pump, according to his Operating Programme. He does the routine greasing on these visits and also attends if there are any breakdowns.

Waterpoint Committee

There are three members of the Waterpoint Committee, of whom the



Chairman was interviewed. He was a male school teacher who lived locally and had his own household well. He was 53 years old, married with eight children and lived about 500 metres from the waterpoint. He had been a committee member for three years but had never received any training, this not being necessary for the limited duties which he had to perform. He listed the duties as follows:

1. Ensuring that the pump is well greased (although the Pump Minder actually keeps the grease and does the greasing).
2. Ensuring that the surroundings of the pump are kept clean (mostly by school children).
3. Ensuring that the pump is used properly without 'blasting' the handle on the ground.
4. Reporting any breakdown to the pump minder.

As there have been no major problems with the pump the committee has never met. Theoretically, they are supposed to liaise with the VIDCO but have never done this, again because there were no major problems. According to the interviewee, only the users of pumps implemented by Christian Care received spanners. If there were any major conflicts in the community about pump usage the committee would refer them to the Ward Councillor.

The Chairman believed that the Pump belonged to the DDF who were therefore responsible for providing spare parts and expertise for repairs. The committee had never been allocated a spanner or grease. The Chairman complained that the Pump Minder did not come often enough to do the greasing. The community may help the DDF occasionally, for example by repairing fencing.

During the construction of the waterpoint the community did participate by collecting bricks, sand and stones. This was organised by the Councillors and VIDCO chairmen.

There are certain rules governing the usage of the waterpoint:

1. Do not waste water.
2. Do not fight at the waterpoint.
3. Do not spill dirty water anywhere except in the trough.
4. Do not hit the handle of the pump against the ground.

Water Usage

Users were coming from some distance to this waterpoint because Mukwasi Borehole No. 2 (see next case) was out of action. Five or six of the immediately adjacent user households have their own wells and these are still used for drinking purposes. There are also a number of people with shallow unprotected wells in their gardens. In the case of breakdown of the pump people would revert

to these sources. The water from the pump is used for vegetable watering, livestock and moulding bricks in addition to the usual domestic uses. This had made a difference to peoples lives as the nearest river was 20km away.

The VIDCO Chairman suggested that this high usage of the waterpoint could cause problems, including the continued use of unprotected sources, and that another borehole was needed.

Development

According to the VIDCO Chairman, the priorities for development in this VIDCO were in terms of communications and marketing facilities, rather than water supplies.

(2) Mukwasi Borehole No. 2

Situation and facilities

This Bush Pump was installed in 1952 and the only headworks are an old cattle trough. The users said that Christian Care were to come and construct headworks at the point. The pump is centrally located in the village about 200 m from the Pump Minders residence. It is used by 25 families.

Maintenance

The pump was not working at the time of the visit. It had broken down two weeks previously. The Pump Minder was now waiting for the villagers to congregate and assist him in pulling out the pipes.

The bolts on the pump were tight but the surroundings were dirty and the cattle trough was falling apart.

In the past year the pump had broken down twice. It was visited regularly by the Pump Minder who did all the greasing.

Waterpoint Committee

The first interviewee was the Chairman of the Committee who was also VIDCO Chairman. He was 56 years old, married with ten children. He had received no training in maintenance duties. He perceived the duties of the Committee to be as follows:

1. To meet when the pump breaks down.
2. To monitor whether the pump has been greased.
3. To ensure that the users clean the surroundings (they usually comply).

He felt that there was no need for formal reporting or liaison with the VIDCO as he was also VIDCO Chairman.

The Chairman believed that DDF owned the pump and was solely



responsible for its repair, unlike Christian Care waterpoints where users were supplied with spanners and grease. He felt that the community only had a responsibility to repair the fencing.

Any problems with the pump are reported directly to the DDF Pump Minder and if any conflicts arose the Councillor would be called in to resolve them. He felt that the lack of conflicts so far was due to the small number of users and the existence of household water sources.

During project implementation the community participated in providing materials for construction.

Another member of the waterpoint committee was interviewed. She was 25 years old, married with four children. Her husband stayed in Mutare where he was looking for a job. She was chosen to be a member of the committee because she was near the waterpoint and so can easily monitor activity there. She maintains that there are two rules imposed by the committee:

1. People should not wash in the cattle trough.
2. Children should not be seen playing around the Bush Pump.

She said that as a member of the committee she assigns duties to other members and users and they cooperate with such things as cleaning the surroundings. She felt they needed a washing slab, toilet facilities and a new cattle trough at the waterpoint.

Water Usage

Before this pump was installed, people used wells at their own homes and in their gardens. Eleven of the water using community have their own wells and they only use the borehole for watering livestock. If the borehole pump broke down they would revert to the use of these wells. The provision of this waterpoint means that their cattle do not die during the dry season and that they can grow more vegetables. They also feel that the incidence of diarrhoea has decreased.

Development

According to the VCW for this VIDCO, many people are well motivated towards protecting their own household wells. Referring to communal wells, she felt that people required constant supervision to maintain them in a clean and healthy condition. Amongst her duties relating to the water programme she advises the VIDCOon where boreholes are urgently needed, educates people on the disadvantages of using unprotected water sources and encourages them to boil the water. She also monitors the protecting of household wells using cement provided by the Ministry of Health.

(3) Chiweshe Borehole

Background

This pump is situated in the Chiweshe Grazing scheme where

villagisation is in progress. The people are already living in planned lines and LWF are in the process of providing piped water supply. The paddocks have been fenced. The village previously had four boreholes fitted with Bush Pumps. One of these has already been dismantled and replaced with a diesel engine which is to pump water into a tank for piping to the village. This diesel engine is to be maintained by LWF.

As each family is eventually expected to have its own standpipe (pipes are being laid and the tanks are already there), the three remaining Push Pumps will be used as follows:

1. Where the Bush Pump is aligned with the new pattern of household settlement, it will remain in existence for use as a backup supply if the diesel engine breaks down. The waterpoint committee introduced three years ago will continue to monitor these and repairs will be done by DDF.
2. Where the Bush pump is now situated in an uninhabited area in, or close to, the paddocks, it will remain in existence for use in watering the cattle. The DDF Pump Minder will continue to monitor and repair these.

Situation and facilities

This Bush Pump is situated 100 m from the nearest household, 200 m from Chiweshe Primary School and near the road to Sabi Drift. The waterpoint is approximately 27 km from the Pump Minders base and 15 km from the EHT. It is used by the Primary School, the Clinic and 40 households. Headworks consist of a washing slab, cattle trough, spillway, soakaway and fence. The Pump is 29 years old.

Maintenance

The pump was working at the time of the visit and the surroundings were clean and in good repair. The bolts were tight, All preventative maintenance of the pump is done by the DDF PM who visits monthly.

The EHT also visits and checks the pump but not on a regular basis. The pump had broken down three times in the last year and once it was out of action for 2 months because the Pump Minder had left the Ward to participate in a project elsewhere. At other times it took only a day for the pump to be repaired, the Pump Minder being quick to respond once the message was passed to him because the clinic is a priority user.

Waterpoint Committee

There are three people on the Waterpoint Committee including the kraalhead. The interviewee was a 35 year old woman, married with eight children. Her husband was unemployed and living at home. She had been on the committee for three years and was originally chosen because she lived close to the waterpoint and could therefore convey messages easily.



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The committee received no training in maintenance but their duties are as follows:

1. Ensuring that the surroundings are kept clean.
2. Reporting to the Pump Minder when pumps break down.
3. Ensuring that the community do not misuse the handpump.

The committee meets rarely, only when the pump is out of order and they rarely consult or liaise with the VIDCO. The VIDCO only intervenes if the Pump Minder takes a long time to come and do repairs.

If there are any conflicts or development matters, the VIDCO tries to solve them with the Kraalhead.

As the pump is thought to be 'owned' by the DDF, the community do no repairs as it has no tools, and is in any case not 'entitled' to do so. Any difficulties are simply reported to the DDF Pump Minder.

Water Usage

Of the 40 user households, 31 have their own wells and these were the previous sources before this waterpoint was provided.

School children using the pump constitute a nuisance and therefore special rules for them were negotiated with the headmaster.

1. Only a 'captain' may do the pumping. No other children may enter the pump area but must collect the water from where it has been pumped into the trough.
2. Children should bring sand to fill in the muddy places.
3. The whole community should be mobilized on the correct usage of the headpump.

Water is used for growing vegetables and for watering cattle.

The school and the clinic are the most seriously affected when the pump breaks down as they have to fetch water from the nearby households. This may partially explain the promptness of the PM in responding to breakdowns as the clinic is considered a priority user.

The development priorities for the village as stated by the VIDCO Chairman were :

1. To build some small dams for cattle.
2. To build a new secondary school.
3. To protect individual pumps.

4.7 Charter District

4.7.1 Background

Charter (Charter) District is situated in the Midlands Province and is mainly in Natural Region 3. Annual rainfall averages 800 mm and temperatures average 21 degrees centigrade. The District is highly deforested and most of its rivers dry up in the winter.

The current population is estimated at 140 000. The District's administrative headquarters are located at The Range, about 15 km North East of Charter town but other ministries are based in Charter itself. The District is divided into 24 wards.

Water Programme

There has been extensive donor/NGO involvement in the water programme within the District, although this mainly comes through the funding and provision of materials rather than through implementation.

DANIDA operates in this way, providing materials and transport for the Ministry of Health and DDF to implement the programme. They fund well-sinking (target of 300 pumps to be fitted by 1989) and some rehabilitation of existing waterpoints. DANIDA's initial approach was to saturate one ward with pumps but in consultation with Government ministries this was modified so that implementation is spread over all the wards.

World Vision provides Blair and Bucket Pumps, most of which are installed by the EHTs.

The Ministry of Health and DDF cooperate in the fitting of pumps although mostly concentrating on their own areas of expertise. Between them they also train VIDCOs, Waterpoint Committees, Pump Caretakers and builders. The Ministry of Health has six headwork construction teams and the DDF has three.

There is a Water and Sanitation Subcommittee at District level which meets regularly. EHTs and Waterpoint Committee Chairmen sometimes attend these meetings, especially if they have particular problems to report. There is a District workshop held once every year to discuss water and sanitation related matters, to which all appropriate people are invited. The VCW and EHTs have monthly meetings together at which they discuss problems and progress.

Community Participation

In mobilizing people for the water programme some problems have been experienced in communities where people have their own wells and therefore are disinclined to cooperate in the provision of a communal one. The need for a communal waterpoint remains because other sources may be seasonal. People with their own sources do not usually like others using them but cannot forbid them for fear of witchcraft.



Maintenance

There is a Three Tier System of maintenance although coverage is thin, there being 6 Pump Minders to cover 24 wards. Each waterpoint has a committee consisting of four members or more. These members include a Treasurer whose main duties are to raise money for well-sinking where necessary and to buy grease and bolts to facilitate good and speedy maintenance. The role of the Chairman of the committee is to work closely with the Village Community Workers to ensure that the surroundings of the pump and the headworks are properly cleaned and maintained. The Waterpoint Committee decides on its own rules and if a user breaches these he may eventually be taken to a village court. At District level two women are employed to instruct communities in the care of headworks. They are full time DDF casuals and are also competent in mending pumps. They carry tools but have no transport. Nsimbi Pumps are maintained by the Pump Minders and DMT.

Reporting and Recording

According to the type of pump, reporting is either to the EHT (sometimes via the VCW) or to the Pump Minder. The recording system started in 1987 is that the Caretaker keep a record book at the waterpoint. They report to the EHT or to the Pump Minder who records their activities and from these sources the information is aggregated onto Pump Record Cards which are kept both by the DDF and by the MOH.

Spares

DDF and MOH provide spare parts, most of which are kept at DDF headquarters at The Range. There are complaints of a lack of adequate spares.

Ward Information

The information for the case studies was gathered in Manyene which is divided into two wards. These are situated on high land and the water table is generally quite deep. The ward is characterised by extensive deforestation which has meant that the latrine building programme is very popular. The pump Minder lives over 40km away but is supposed to look after the 41 pumps in these two wards.

The EHT who operates in the ward liaises closely with the VIDCO chairmen and with the Ward Councilors on issues of community mobilization. He felt that constraints on his efficiency include the guidelines that pumps must be situated 500 to 1000m apart and also the occasional practice of nepotism in the siting of wells.

The Ward Coordinator for the Ministry of Community and Cooperative Development holds monthly meetings with other development workers to discuss problems. She plays an active part in community mobilization and believes that there are two main causes of apathy where people refuse to participate. Firstly, people often do not

identify the pumps as their own, but as belonging to the government. Secondly, technologies may be inappropriately sited (e.g. a Nsimbi Pump being sited for 'schools'), resulting in a high level of breakdowns and consequent demoralization amongst the users.

The Ward Councillor had some other explanations for poor participation by the community. He believes that problems occur when there are too many different families in one village, giving rise to disunity. The community is more likely to participate in development activities when all families belong to the same "clan". An example is one village where there are over 16 different families. The VIDCO Chairman instructed all men to participate in digging a community well after receiving cement and a Bucket Pump from the EHT. The men dug half the well and then abandoned it because some village members were refusing to participate as they had their own wells. The VIDCO Chairman then asked all women householders whose husbands were away working to contribute \$10 so that they could employ a well sinker to finish the job. However, not enough money was gathered to pay the well-sinker and therefore he abandoned the job. Now, a year and a half later, the well is still unfinished.

The Councillor also believes that some waterpoints, particularly those sited before independence, were inappropriately sited in livestock rather than domestic areas and they are therefore difficult to supervise properly.

The Pump Minder covering the area finds it impossible to make the three routine visits per month to each pump expected of him because of the distances to be covered. He finds problems in cycling long distances with a tool kit which weighs 35 kg.

The Pump Minder receives about three reports a month of breakdowns from Manyene but believes that the actual incidence is higher, many of them not being reported to him but to the Caretaker or the EHT. He obtains spare parts from The Range which is 40 km away, so he has to wait until transport is available to bring the parts. The Pump Minder not only repairs the pumps but also the fencing and the headworks. Sometimes the community may refuse to cooperate in repairs and in these cases he solicits the assistance of the EHT.

He tries to discourage the use of protected water sources for brick moulding and vegetable gardening, especially during the dry season when it places extra pressure on already over used pumps.

The Pump Minder feels that community participation only really works well with constant supervision, "women usually sweep when they see me coming". He thinks that agricultural activities also take precedence over participation in maintenance. For example, in one village, where people were busy preparing their grain for the GMB, they had not reported their pump failure and had resorted to drinking river water.

The Pump Minder received two months training and goes on yearly refresher courses.



4.7.2 Charter District Data

Technology

The majority of the pumps sampled were Bush Pumps (60%) although there were a substantial number of Buckets (19%) and the rest of the sample comprised Blair, Nsimbi, National and Mono Pumps. A high percentage (87%) of the pumps were working at the time of the visit although 20% of these were judged to be in need of some repair. The pump population was a fairly young one with the average age being 4 years. The oldest pump sampled was 44 years.

Pump Usage

The average number of user households per pump was 24 whilst the highest number of user households recorded was 75. Relatively low numbers of the pumps were used for other purposes suggesting the availability of other sources of water; 23% were used for vegetable gardens and 17% for livestock watering. The proportion used by 'schools' was 24%.

Breakdowns

The overall breakdown rate of the pumps sampled was 41%. The total number of breakdowns in the previous year was 34 which, if evenly distributed, works out at 0,5 per pump. Bush and Bucket Pumps had broken down with the same frequency (38%) while the breakdown rate for Blair and Nsimbi Pumps was higher at approximately 50% and for the other type of pumps higher still at 57%.

The breakdown rates did not vary considerably according to usage. The rates for those pumps used for watering gardens was lower than the overall figure at 31% while the rate for those pumps used for livestock watering was comparable to the overall figure at 42%.

These relatively low rates of failure may suggest that the pumps are not seriously overused because other sources of water are available.

Little correlation was evident between age of pump and breakdown, this probably being due to the fact that few of the pumps were older than 10 years. Of the high value breakdowns which did occur all were in pumps aged between 1 and 5 years.

There was a very weak negative correlation between numbers of users and frequency of breakdowns with most of the high value breakdowns occurring in the 10 to 40 user household range. Those pumps with over 40 user households had few breakdowns. This is probably an indication of the technology in use. It is likely that for up to about 40 households the 'lower' technology pumps are in use, often with an inappropriately high number of users. Those pumps with over 40 user households are far more likely to be Bush Pumps. Additionally the higher the number of users in non-drought areas the more likely it is that alternative sources are also used and so the actual pressure the pump may be quite low.

Maintenance

Of the breakdowns sampled 61% were reported by the Waterpoint Committee and 20% by 'Others'. These 'Others' were primarily schoolteachers, shop assistants and clinic staff.

Downtimes were moderate to high, with only 50% of the pumps down for two weeks or less and a total of 69% mended within a month. A high 31% were down for over a month.

Of the menders the Pump Minder carried out the most repairs (50%), the DMT did 16% and the EHT and users did a few each. A large 19% remained unrepaired.

Looking at the efficiency of the repair system, there was little overall difference in the effectiveness of different reporters. Of those reported by the committee members, 70% were down for one month or less while the comparable figure for all the other reporters was 66%. However, users were slightly different in that more of theirs had been mended within two weeks than those reported by other categories.

The Pump Minder appeared to be of variable efficiency as a mender with 57% of his breakdowns mended within 2 weeks and 70% within a month. However, 25% of the Pump Minders' repairs took between one and two months to complete, probably due to lack of spare parts. In comparison, the DMT mended only 6% within two weeks and 80% within one month, possibly suggesting that they deal primarily with breakdowns referred to them by the Pump Minder, so accounting for the 'delayed efficiency'.

4.7.3 Charter Case Studies

(1) Kariwo Bush Pump

Situation and Facilities

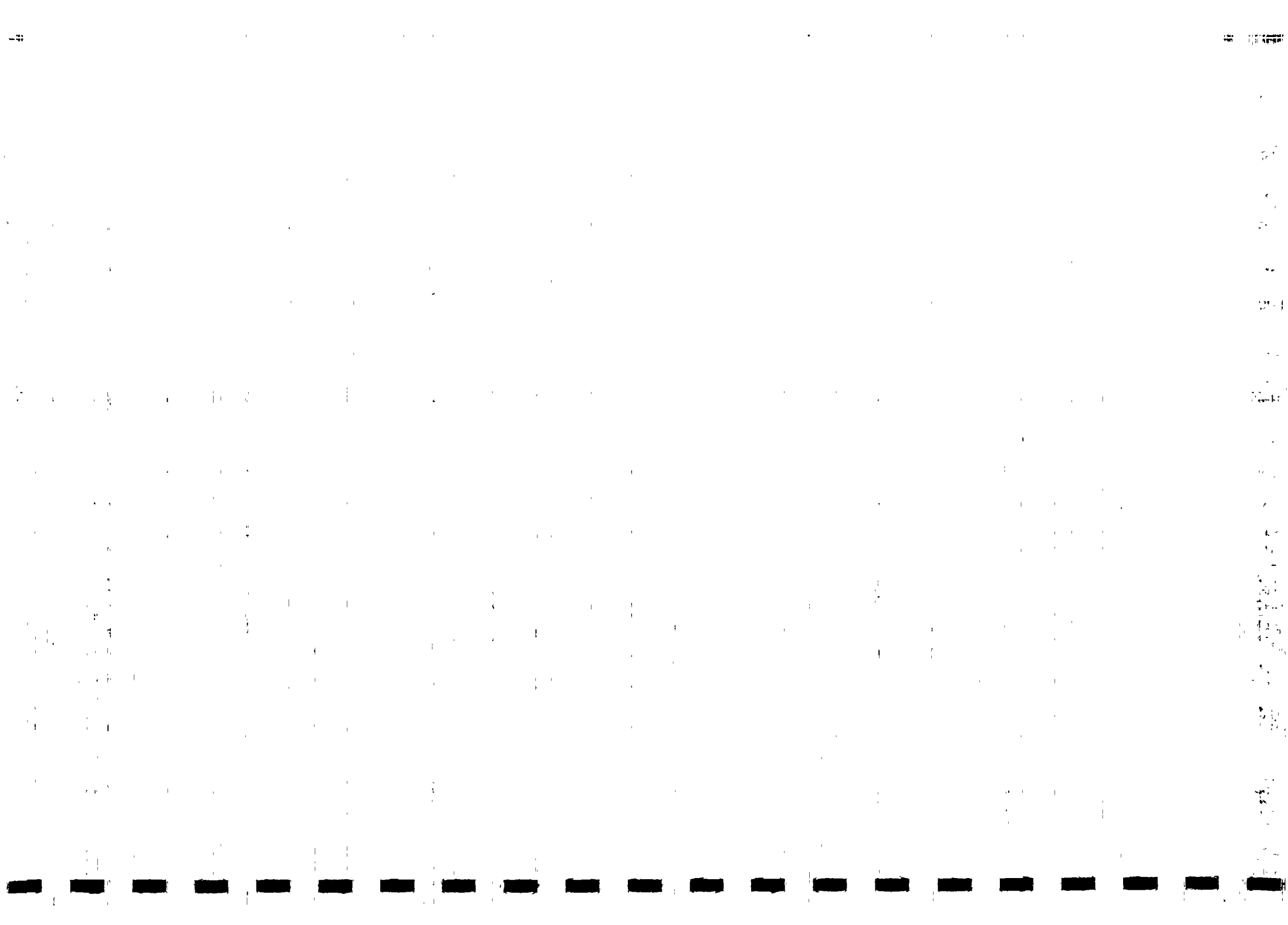
This pump was installed by the DDF in 1987 and is located on the outskirts of the village towards the river bank. There are some gardens between the waterpoint and the river.

The well was dug by a well digger with the help of the community. The Waterpoint Committee was formed prior to the sinking of the well and the Chairman raised \$7 from every household to pay the well digger.

Thirty five households are served by this waterpoint although several of them have their own household wells. All the households are situated very close together making communications with the village easy.

The Chairman of the Waterpoint Committee lives about 700 m away and the pump is located 15 km from where the Pump Minder live.

There are no headworks except for a concrete apron. There is no



spillway and the area is not fenced. The Ministry of Health has however provided seven bags of cement for the construction of headworks. This will be done by the community under the supervision of the Waterpoint Committee and the Village Community Worker.

Maintenance

At the time of the visit the pump was rattling and shaking but still producing water. Some of the bolts had been replaced by wires. So far the pump has never broken down.

The Waterpoint Committee consists of the Chairman who is a fairly old man and is also the Political Commissar of the village, and three women, two of whom are married and have husbands staying at home. All three women are young to middle aged.

The committee was elected before the well was dug and received no training. They have devised their own rules and regulations which are that :

1. No one must misuse the pump.
2. No one must wash at the pump.
3. No one must fill drums at the pump.

The Chairman himself does the cleaning of the pump surroundings.

The committee meets only if it has something to discuss. For example, the previous month they met to organise the building of the headworks. They decided that the people of the village are to provide bricks and they will use their own local builders.

The committee has a book which it bought for itself and in which it records the minutes of the meetings and any other information relating to the pump.

If the pump ever broke down the committee members would report it to the VCW who, in turn, would inform the EHT. The EHT would pass the message on to the Pump Minder. The Pump Minder visits regularly to grease the pump and tighten the bolts. The community themselves have never been provided with grease and spanners but use those belonging to individuals if the need arises.

Everyone in the village is expected to contribute towards the improvement and upkeep of the pump regardless of whether they have their own well.

It is anticipated that there may be some problem with the well drying up as it is only 5 metres deep. There have already been signs of the water table dropping. However, people are reluctant to contribute cash towards deepening it until this actually happens. Cash is collected in place of labour contributions because many households are headed by women, their husbands being away working in town.

Water usage

Most people continue to use their own wells for all purposes except drinking and cooking. In addition, there is another Bush Pump about 2 km away which some also use.

(2) Chambara Township Pump

Situation and Facilities

This National Pump was installed in 1962 and is situated within the grounds of the Council Beerhall. There are washing slabs and a drying line situated a few metres away but separated from the pump by a building. These headworks were constructed earlier this year by the DDF with the help of the community. The community was mobilized for this task by the EHT and the DDF through the VIDCO and the Ward Councillor. Anyone reluctant to participate was threatened with being denied drought relief (if the drought situation arose), or of having their cattle prohibited from the paddocks. There is no spillway for the pump and the soakaway for the washing slabs appeared to be clogged up and ineffectual.

The Pump serves eight shops and their households, as well as the Beerhall, all of which are located close by. In addition, anyone passing through the township may use the pump.

The EHT is situated at the clinic about one kilometre away and the DDF Pump Minder is about 5 km away.

Maintenance

The pump was working at the time of the visit although the surroundings of the washing slab were dirty and littered with rubbish. Parts of the pump had been wired up because it is so difficult to get spare parts for a National Pump.

The Pump broke down once in the past year and was mended by the DDF Maintenance Team.

As the pump is within the Beer Hall grounds it is considered to be the job of the Bar Tender (who is a Council Employee) to look after the pump. However, it was unclear whether this also applies to the washing slabs as these are situated without the beerhall grounds. Users are supposed to clean each time they wash at the slabs.

The Bar Tender has kept spanner and grease for the last four years for the purpose of maintenance although the DDF Pump Minder does visit regularly to do the greasing.

Water Usage

Although only used by eight households there are a considerable number of 'casual' users passing through the township to catch buses, do their shopping or drink beer. According to the Bar Tender, this means that the pump is used 'recklessly' because few



people strongly identify with it.

One household nearby has an unprotected well and Matova's bucket pump (see case below) is an alternative source in case of breakdown.

The pump is not generally used for gardening although the Bar Tender cultivates a small garden immediately adjacent to it.

(3) Matova Bucket Pump

Situation and facilities.

This Bucket Pump is situated on Matova's stand and is less than 100 metres from the National Pump at the township. There are conflicting stories as to why the Bucket Pump was provided at this household. One is that it was intended to set a good example to the community. As Matova is an EHT in another District, it was desirable that he be seen as exemplary in the use of protected water. Another version of the pumps origins are that the other people in the area refused to cooperate in building a communal well as the majority of them have their own household wells. Mr Matova therefore volunteered to have the Bucket Pump installed on his own well which was perennial.

The Pump was installed by the Ministry of Health two years ago and three households participated in this. There are no headworks except for a concrete apron.

Maintenance

To date there have been no spare parts available in the District for the maintenance of Bucket Pumps and so users have been encouraged to improvise especially when chains or valves need repair. The users of this pump secured some additional chain provided by Matova, and have also made some repairs by wiring up broken links. There have been no breakdowns since installation but the users would expect the EHT to help them if there were.

Water Usage

The Pump is mostly only used by two households, Matova's and one of his relatives. However three other families also occasionally use it, presumably when their own wells are dry. Some people who are Matova's friends come from the township to use the pump. Other users sometimes trample the crops when coming to the pump, and some who were non contributors in implementation also use it. However, the Matova family feel that no one can be denied access for fear of witchcraft. The EHT says that he would remove the pump if anyone was denied access.

The Matova family themselves use seven 20 litre buckets daily for a household of five. They have their own concrete washstand / potrack. They do not use the water from the well for gardening.

(4) Chirara Bucket Pump

Situation and facilities

This Bucket Pump is situated in fields about 50 metres from the nearest user household. There was originally a well sunk by 'government' some years ago but never protected. This year therefore the Kraalhead who is also a trained MOH builder protected it and fitted the pump. All five user families helped with construction and the MOH provided the cement and pump. The pump is situated about 1,5 km from the EHT who is based at the nearby clinic.

Maintenance

There is a Waterpoint Committee which was established with the encouragement of the EHT. The Kraalhead is Chairman of the Committee and the other three members are all women. The committee has met but the member interviewed did not remember when. If they had any problems with the pump they would immediately report them to the EHT at the clinic. The role of the committee is considered to be ensuring general cleanliness.

Water usage

There are some problems now as there is little water in the well, and it is difficult even to fill the bucket. However, it is still being used in addition to unprotected household wells and the river.

(5) Mutangadura Bush Pump

Situation and facilities

There are two pumps at Mutangadura within a kilometre of each other. However the first one, installed in 1948, has all but dried up. The new pump was installed in 1988 to back up the old one and has complete headworks; apron and spillway, fencing, cattle trough, washing slabs and drying lines. The community helped with labour and by providing stones during installation. Flowers and shrubs have been planted around the water point and there is an outlet pipe directly from the pump to the cattle trough.

The Bush Pump is situated close to the user households but is over 10 km from the DDF Pump Minders base.

Maintenance

Since the installation of the pump it has not broken down. At the time of the visit the surroundings appeared well kept and the plants were being tended.

There is a Waterpoint Committee which was elected at the time of installation. The Chairwoman of the committee is a woman in her fifties with her husband staying at home. She holds no other



position in the village. The two other female members of the committee are both married and one of the husbands is a teacher at the local school. There is, in addition, one male member of the committee. They meet every Friday and do the cleaning of the waterpoint themselves. The DDF gave them a book in which to record their activities but they have no spanner and grease. The DDF Pump Minder visits to do the greasing and bolt tightening.

There are a few rules relating to the care and use of the pump. Anyone who comes to do laundry there is obliged to clean up the place afterwards. Also the committee must not allow for any loose bolts or for any deterioration of the condition of the pump.

Water Usage

The Pump is nominally used by all households in the village (over 100). However, several of them have their own wells and some still use the old Bush Pump although it has little water. Apparently the water table in the area has dropped considerably over the past few years affecting household as well as communal wells. Children from the nearby secondary school also use the pump in passing.

A problem has arisen over the usage of water from the pump. Some people started to use the pump water for moulding bricks. A few of the elders of the village objected to this because they remember the 1983 drought and believe that all available water should be carefully preserved. They therefore went to complain to the EHT who they believe is the sole local person responsible for water issues. They were reluctant to raise the issue within the village themselves for fear of witchcraft. The EHT then told the community that they must use the water carefully and brick moulding should be done with river water. However, the Waterpoint Committee has now agreed to allow brick moulding from pump water because they feel that there is sufficient water. If the availability of water changes they will review this ruling.

4.8 Chegutu District

4.8.1 Background

The District is situated in Mashonaland West, about 50km south west of Harare. It is characterised by flat country and unreliable rainfall. Although there is a fair amount of surface water, most of it disappears in the dry season.

Water Programme

In 1983 Mhondoro (Chegutu) and Ngezi (Kadoma) Communal Lands were nominated as pilot districts for the EEC Pilot Water and Sanitation project. One of the aims of the project was to provide every household with access to a protected water source and the emphasis was mainly on small handpumps. The project was mostly implemented through the MOH. However, the project only achieved a proportion of its target, resulting in 172 shallow wells (Mostly fitted with Blair Pumps) being sunk and 48 boreholes rehabilitated between 1983 and 1987. At the same time the DDF drilled 80 boreholes resulting in a District total of 477 shallow wells and 94 boreholes (fitted with Bush Pumps or Mono Pumps) by 1989.

In terms of implementation, it is primarily the MOH and DDF who are involved in the Water Programme. The DDF have one Field Officer (Water), two WSOs, one driver and ten casuals. The Ministry of Health has one DEHO, eleven EHTs and five Health Orderlies covering the seventeen wards in the District.

With the ending of the EEC project, the District is now shifting the emphasis of activity from implementation to operation and maintenance. This is reflected by the small budget which the DDF receives for sinking new wells (\$30 000).

The DDF and MOH are based in different parts of the District and so communication between the two is mostly through formal meetings. There is a Water and Sanitation Subcommittee at District level which is chaired by the District Environmental Health Officer. However, at the time of the research this committee had only met once.

Both ministries complained of a lack of transport. The DDF does not have a vehicle dedicated to Water but borrows one from the Roads section, subject to availability. There was also a manpower shortage and some difficulty in obtaining adequate spare parts.

Maintenance

There is no Three Tier System in the district. The DDF operates a Two Tier System with Waterpoint Committees reporting directly to the DMT. At schools the headmaster is usually nominated as 'caretaker' and so does the reporting. The DDF had \$13 800 allocated to them in 1988/9 for maintenance.

The Waterpoint Committees are 'elected' by the community and the DDF has been training the Caretakers in their duties. The MOH do not have Waterpoint Committees at their pumps. Rather, the users



report to the VCWs or to the EHTs who carry out the repairs.

Most of the Blair Pumps are actually situated in someone's yard and this person is then considered to be the 'caretaker'. Coverage is a problem; because of transport problems the DMT may take time to respond to breakdowns and it seems that the EHT does not routinely check pumps in his area.

Community Participation

There are some problems in community participation as the users generally regard the pump as belonging to government and claim that they should not have to do 'government work' for nothing. During the rainy season nuts and bolts are often stolen to be used on scotchcarts and ploughs. Additionally, if a pump is situated at an individual household, other users see no reason why they should contribute to its upkeep.

Reporting and Recording

The DDF are based at Mubayira Growth Point and Pump Caretakers are supposed to go there to report breakdowns to the clerk. The WSOs fill in the Pump Record cards after each repair has been carried out. However, when comparing the users account of breakdowns with the records of the DDF, some under-recording of the incidence of breakdowns or maintenance inputs was detected. It appeared that DDF tend to record only when new parts have been fitted to a pump. If a pump merely required some servicing or adjustment, this is rarely recorded.

The MOH reporting system was found to be inadequate as there is no specific reporting for pump maintenance, it is just incorporated into the EHTs monthly report. Some lack of reporting to the EHTs was evidenced by the EHTs ignorance of two pumps in his area which were not functioning because the water had dried up some time previously.

Ward information

The ward in which the detailed research was done is Ward J which is situated on the outskirts of the District, bordering on Beatrice Rural Council Land. Watyoka Business Centre is the centre of the Ward. There is a reforestation programme being carried out by the Forestry Commission which involves the large scale planting of gum trees. Most Blair Pumps in the Ward are situated at individual households. The Ward Councillor cited the development priorities of the Ward as clean water, toilets and electricity.

He saw a problem in that the community no longer wanted to participate in projects because they were tired of 'empty' promises.

4.8.2 Chegutu District Data

Technology

There was no particularly dominant technology in the sample of pumps taken in this District. Blair Pumps were the most common at 48% with Bush and Bucket following at 15% each. The majority (88%) were working at the time of the visit but of these 32% were in need of some repair. All Bush Pumps were functioning at the time of the visit but 11% of the Bucket Pumps and 21% of the Blair Pumps were non-functional.

The average age of the pumps studied was 3 years and no pumps were older than 10 years.

Usage

The average number of users of the pumps sampled was 27 households although this was probably upwardly distorted by a few very high values.

The usage of pumps for other than domestic purposes was quite low with 33% being used for watering gardens and 22% for watering livestock. The proportion of pumps used by 'schools' and other multiple users was 25% and this divided into 53% Bush Pumps, 40% Blair Pumps and 7% Others.

Breakdowns

There had been 33 breakdowns in the pumps sampled over the previous year which averages out at 0.55 per pump. The breakdowns had occurred in 45% of the pumps. The breakdown rates for the different technologies were Bush 57%, Buckets 44% and Blairs 38%.

Of those pumps used for garden watering the breakdown figure was the same as for overall breakdown figure. Pumps used for 'schools' or other multiple purposes had a breakdown rate of 53%.

There was a weak positive correlation between age of pump and breakdowns although most pumps which broke down only did so once.

There was also a weak positive correlation between numbers of users and breakdowns with most of the multiple breakdowns occurring in pumps with 20 user families or more.

Maintenance

The main reporters of breakdowns were the users (55%) and the VCWs (23%). A few were reported by others, including school heads, and businessmen. The eclecticism of reporters reflects the lack of Waterpoint Committees in this district. The pattern of reporting was fairly uniform with all reporters reporting to both the EHTs and the DMT.

Downtimes were relatively low as 74% of the breakdowns lasted for two weeks or less and 87% for one month or less.



The EHTs and the DMT repaired equal quantities of breakdown (42% each) with a few remaining ones being mended by the users and some remaining unrepaired.

Efficiency

Of those breakdowns reported by the users, 83% were repaired within two weeks and 100% within a month. Of those reported by the VCWs only 57% were down for one month or less.

The 'others' category is too small to really be able to deduce anything from it. All that can be concluded is that the larger category of users gets a relatively good response to their reports of breakdowns.

As indicated by the low downtimes the menders appeared relatively efficient. The EHT mended 62% of his breakdowns within two weeks and 70% within one month while the DMT mended 84% of their breakdowns within two weeks and 100% within a month. The two breakdowns mended by users were both complete within a week.

4.8.3 Chegutu Case Studies

(1) Watyoka Business Centre

Situation and Facilities

This one year old Blair Pump is situated behind some shops about 200 metres from the road and 500 metres from where the Village Community Worker stays. It is used by about 20 households and eight shops. The EHT is based about 10 km away. The only headwork is a drainage channel.

Maintenance

At the time of the visit the pump was working well although the surroundings were dirty and the drainage channel was blocked with leaves. There were no signs of recent greasing.

During the last year the pump had broken down once due to worn out threads and it was out of action for about four months. The local businessman whose shop is in front of the waterpoint reported the breakdown to the Village Community Worker who in turn notified the EHT. The breakdown was essentially repaired by the EHT and the nutrition coordinator who lives nearby.

There is no Waterpoint Committee although the businessman is said to be the informal caretaker in that he reports any breakdowns. Noone is specifically responsible for cleaning, although the women who have market stalls nearby sometimes do it at the request of the Village Community Worker. There are no regulations regarding the usage or maintenance of the pump, people are just expected to use the pump in a responsible fashion according to their own consciences.

Water Usage

Before the pump was fitted people used a number of individual unprotected wells. Six households and two shops in the community have such wells and these are used for washing and gardening and whenever the Blair Pump breaks.

Village Development

The VIDCO Chairman stated that the development priorities in this village were gully reclamation, creation of paddocks and villagisation. They are also involved in reafforestation. The VIDCO Chairman faces problems as he cannot force people to come to meetings or to participate in projects. The VCW said that it was difficult to get those with their individual wells to participate in any communal water related activity.

(2) Watyoka Clinic Bush Pump

Situation and Facilities

This Bush Pump is situated about 100 metres from the Clinic and about 800 metres from the nearest user household. The pump is used by about 12 households, the clinic and staff. It was fitted by the DDF, about two years ago and headworks consist of an apron, and drainage channel only. The DDF offices are about 12 km away from the pump. Despite some dissatisfaction about the siting of the pump, which was considered to be too far from user households, members of the community did participate in digging a trench from the clinic to the pump which was intended to provide water to the clinic. This is not operational. The committee chairman mobilized people to do this.

Maintenance

At the time of the visit the pump was working although it was heavy to operate and in need of some repairs. The moving parts were well greased and the bolts were quite tight but the surroundings were not clean.

According to the users, the pump broke down more than four times in the last year and each time the clinic caretaker reported it. One breakdown was said to be due to the pipes not reaching the water level and so the DDF extended them. The other breakdowns were attributed to minor failures such as the cup leather washers wearing out.

There is no formal Waterpoint Committee but the Health Subcommittee for the clinic takes on this role. The Chairman of the Committee is the clinic caretaker who is responsible for reporting breakdowns to the DDF. Two other members of the committee are nominated as 'pump caretakers'. The details of the committee chairman and one of the caretakers are as follows:

| | |
|-----------------------|----------|
| Position in committee | Chairman |
| Length of service | 2 years |
| Age | 65 years |



Sex Male
 No of children 7
 Marital status Married
 Occupation of spouse Housewife
 Other positions Vice Chairman, Zanu PF branch
 Duties Reports breakdowns to DDF, convenes and chairs meetings.

Position in committee Caretaker
 Length of service 2 years
 Age 45
 Sex Male
 No of children 11
 Marital status Married to four wives
 Occupation of Spouse Housewives
 Other positions Member of Vidco integration task force.
 Training Trained at a workshop held by the DDF at a local school, on how to maintain the pump.
 Duties He is responsible for the greasing and checking of nuts on the woodblock.

The committee meets about twice monthly because of all the health matters it has to discuss. Either VIDCO members are invited to their meetings or reports are made to the VIDCO Chairman. Both men said that the pump belonged to the village although other committee members interviewed believed it belonged exclusively to the Clinic.

The caretaker uses his own personal spanners and grease as these have never been provided by the DDF. There are no specific rules about the use of the pump or the water from it.

Water Usage

Before this pump was fitted some people used individual unprotected wells whilst others used the Blair Pumps at the Business Centre. (see Case Study above). These sources continue to be used for washing or when the Bush Pump is out of action.

(3) Chinembiri Waterpoint

Situation and facilities

This one year old Bucket Pump is centrally situated in Chinembiri Village and is used by about 12 families. Headworks consist only of a small apron. It was installed by the MOH and is located about 2 km from where the EHT is based. During implementation the EHT and Kraalhead installed the pump and cement for the spillway was provided by the Kraalhead.

Maintenance

The pump was working at the time of the visit although the area beyond the apron was muddy and dirty due to the cattle which come to drink the overflowing water there.

Some wires and a bolt indicated that the community has been doing some maintenance itself. The pump only broke down once in its first year of life, this being when the bucket fell down the well. The users were able to repair this themselves promptly, never even notifying the EHT of it.

There is no Waterpoint Committee but the headman acts as the unofficial caretaker. He himself was not available for interview but his wife believes that her husband is actually the owner of the pump. It is therefore their family which should do the minor repairs, cleaning and reporting of breakdowns to the EHT.

Water Usage

The previous source of water was in the gardens 600 metres away. Noone in the village has their own well, and water from this pump is only used for drinking and washing.

Village Development

A VIDCO member stated that development priorities for the VIDCO are :

1. A nutrition garden.
2. A gumtree plantation.
3. A nutrition garden.

However, he pointed out that not all members of the community would agree with the above priorities. Nearly every household in the area has its own toilet.

(4) Madhinha Waterpoint

Situation and facilities.

This Bucket Pump was installed by MOH about three years ago. It has an apron and a drainage channel and is located within the yard of the Village Community Worker. The pump is usually used by eight households although at the time of the visit only the VCWS family was still using it because it was drying up. The pump is located about 14 km from where the EHT stays. Everyone wanted to learn how to use the drilling rig. The well was hand drilled (using a Vonder Rig) with maximum community participation. Apparently the pump was sited at the VCW's house so that she could set a good example to the community. The community alone completed the headworks.

Maintenance

The pump was working at the time of the visit and the surroundings were quite clean. Some greasing had been done but there was no other evidence of community maintenance.



Last year the valve of the pump broke and the whole bucket was replaced. This breakdown was reported to the EHT and took two weeks to mend.

There is no Waterpoint Committee and it is the duty of the VCW to look after the pump. The daughter of the VCW believes that the pump belongs to her mother.

Water Usage

Nearly all households in the village have their own unprotected wells at their homes or in their gardens. These were the previous sources of water and are now used for washing and as a back up when the water in the protected well is running dry.

Village Development

The VIDCO chairman believes that the priorities for development are :

1. Nutrition garden.
2. Creche.
3. Fencing/creation of paddocks.
4. Water and sanitation.

The VIDCO had already made some significant achievements in terms of planting gum trees. The problem being experienced with protected water supplies was that the wells were not being dug deeply enough and so were drying up.

(5) Masasa/Chibuda Waterpoint

Situation and facilities

This Bush Pump was installed five years ago by a company of consulting engineers from Botswana. It is situated between Junction Business Centre and Chibuda village with the nearest household about 800 metres away. The user community consists of 36 households and the business centre. headworks include an apron, and drainage channel, a cattle trough, a washing slab and a surrounding fence. During implementation the householders (excluding the businessmen) were mobilized by the headman to help in construction and the building of headworks.

Maintenance

The pump was working well. The moving parts were well greased and the bolts tight. The surroundings were clean and, according to the users, the pump had not broken down since its installation five years ago.

There is a Waterpoint Committee consisting of four member. However, the two women were away visiting their husbands in Harare and Chegutu while this information was being collected. Details of the other two members are as follows:

| | |
|-----------------------|-----------|
| Position on committee | Caretaker |
|-----------------------|-----------|

| | |
|----------------------|---|
| Length of service | 2 months |
| Age | 47 |
| Sex | male |
| No of children | 7 |
| Occupation of spouse | Housewife |
| Other positions | Committee member of Vidco |
| Training | Trained at a workshop held last year at a local school. |

| | |
|--------|--|
| Duties | To report major breakdowns to DDF. Grease parts and tighten bolts with grease and spanner provided by DDF. |
|--------|--|

| | |
|-----------------------|-------------------------------|
| Position on committee | Member (previously Secretary) |
| Length of service | 5 years |
| Age | 40 |
| Sex | Male |
| No of children | 5 |
| Occupation of spouse | Housewife |
| Training | None |
| Duties | Writing duties |

The committee members said that they meet weekly and report on their deliberations to the VIDCO. The headman stated that while the pump belonged to the people of his village, spare parts had to be provided by Government. The users are organised in a rota to sweep the surroundings.

Water Usage

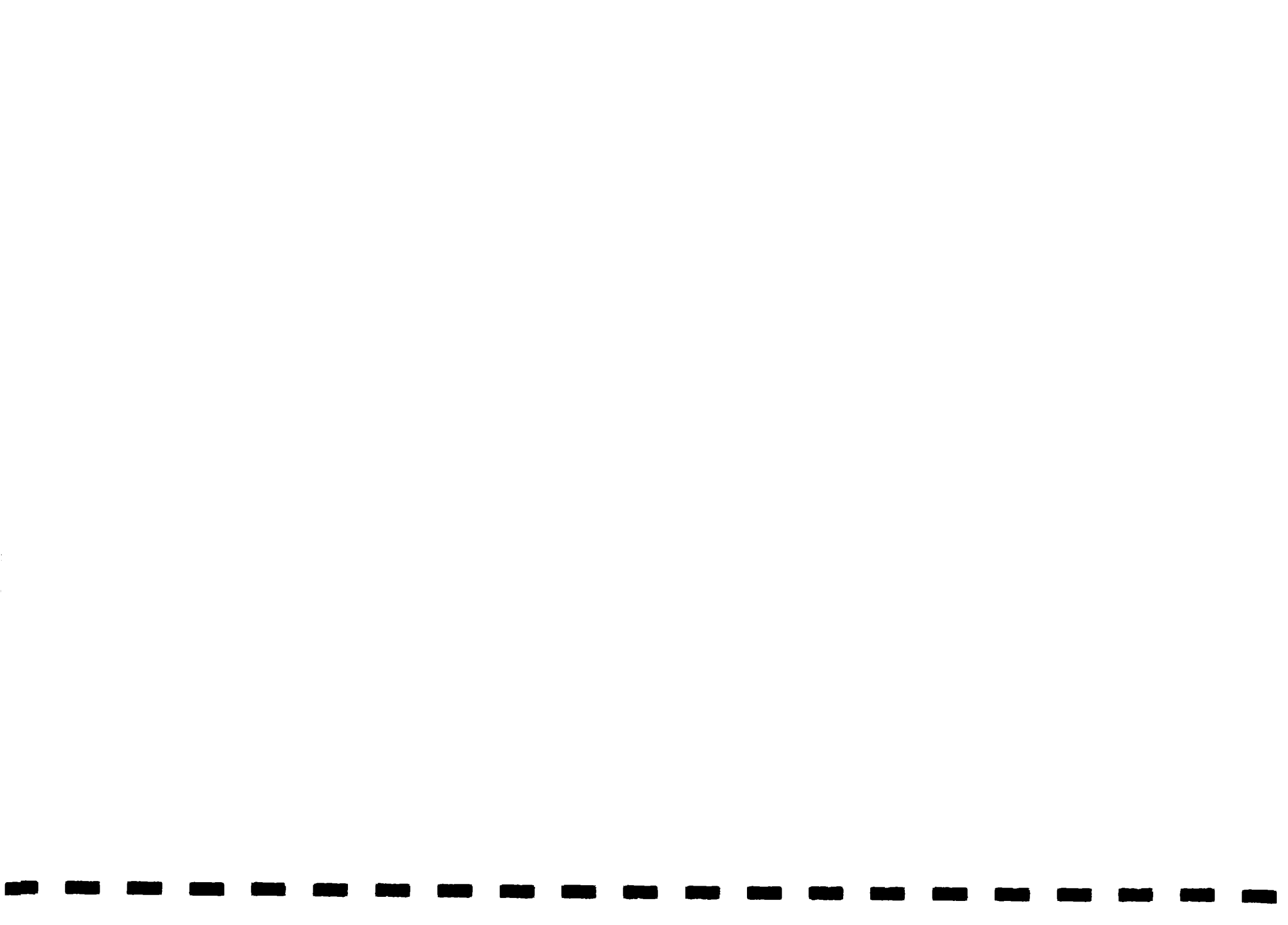
Some conflict has arisen over the usage of the pump as there is a local rule that 'foreigners' must pay \$5 to use the pump. The issue was raised when the Apostolic church held a large meeting of its members nearby and wanted to use the waterpoint. The Ward Councillor intervened on behalf of the Church but the Waterpoint Committee produced a constitution given to them by the Implementing agency which clearly allowed them to charge a fee for use. In the end the Church members were required to pay.

The committee also wished to charge local businessmen and those who fetch water in drums (using scotchcarts). The businessmen did not contribute to project implementation. However, this was not resolved.

Before the waterpoint was sunk, the people fetched water from the vleis and a few open household wells. These sources are now mostly used for washing although those far from the waterpoints still use them for other purposes. Water from the pump is not only used for domestic purposes but to water a large communal vegetable garden.

About six people in the village have dug their own wells although these are unprotected or semi protected.

According to the VCW some people still dig water from the sandy banks of the river.



'Great institutional effort is involved in creating and promoting genuine participation over the long term.' (Korten 1986 p /5)

In this section some of the main patterns emerging from the data are discussed. The analysis is intended to be preliminary and there is the scope for focussing more closely on specific areas of interest in future studies. Here, the discussion concentrates broadly on the issues raised in the introduction.

5.1 Organizational Factors

5.1.1 Institutional complexity

One of the major organizational problems affecting the maintenance system as it currently operates is the one of institutional complexity.

Firstly as we have seen from the data, the Three Tier System is improvised, adapted and lives alongside parallel maintenance systems. The EHTs may be highly involved in technical maintenance and a variety of other local leaders and officials play a role in reporting, mobilization and management. Additional district staff in the form of LGPOs and DCDOs may be involved in training for maintenance. The situation is further complicated by the multiplicity of implementing agencies in the water sector including several government ministries and NGOs.

Thus the theoretically simple Three Tier System, primarily operated by DDF with clear lines of accountability, is more myth than reality.

Coordination and cooperation between the various agencies involved is highly variable. In certain districts the predominance of one technology dictates a lead agency. For example in Tsholotsho, the DDF is almost exclusively the maintenance agency, due to the high proportion of Bush Pumps. In Charter, the Ministry of Health plays the major role in the management of the water programme and this predominance is extended to a high level of involvement in maintenance. However, in most districts there are multiple divisions of responsibility between agencies with few attempts being made to overcome the resulting problems of coordination. Communications with colleagues was often cited by interviewees as a problem due to lack of telephones (Mutoko) or physical distance (Buhera). Within the ministries themselves there is a total lack of uniformity of structure, budgeting and policies. In some, district representation is non-existent (MEWRD), whilst others do not effectively operate their own budget (Environmental Health). Recording and reporting systems studied also varied enormously. Where several agencies operated in one district, inconsistencies of approach arise which are noticed at community level. For example, several users of DDF installed pumps in Buhera complained

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that they did not receive tools for maintenance, unlike neighbouring users of Christian Care pumps. This, trivial though it may seem, appeared to be a serious demotivator.

Although Water and Sanitation Subcommittees generally exist at district level, several are only minimally functional or have only recently been established. Of those whose minutes were scrutinised, it was found that the predominant issues discussed were those of implementation rather than operation and maintenance.

In districts where there had been a donor or NGO funded project which had now finished, Ministry staff expressed disappointment that the only task left to them was operation and maintenance. This was seen as uninteresting and tiresome as it did not bring any of the benefits (in terms of budgets, vehicles, etc) of a large implementation programme. Whilst this attitude was by no means universal, it does indicate that there is a danger of the maintenance task being seen merely as the tedious aftermath of an implementation programme.

The general lack of consistency in approach of the different agencies does not assist in either the motivation of the community nor in the provision of adequate institutional support for community efforts.

5.1.2 Flexibility

A strong theme emerging, particularly from the case studies, is the difficulty of reconciling community participation with an institutionalized maintenance system. The bureaucratic nature of the government structures often renders them incapable of responding appropriately to community initiatives, or of exercising the required flexibility. In this respect national guidelines or policies for community maintenance are often counter productive. For example, the implementation policy which states that the community should dig the first three metres of a well is often misinterpreted to mean that the community should only dig three metres, even when they are quite capable of doing more. Similarly, guidelines for committee membership suggest the post of Chairman, Treasurer and/or Secretary which are duly elected despite the fact that, in many cases, no money is collected and no written records kept. Thus, although communities vary enormously in terms of situation, ability and needs, the 'system' treats them as though they are all the same.

To be an effective promotor and supporter of community involvement, the maintenance agencies must be able to respond positively to community initiatives. An obvious example of the inability to do this comes from a Tsholotsho community which collected \$179 towards the improvements of its water supply. The money was returned to it from the District Council because, according to an official 'it could not be used'.

It should be noted that in several places flexibility is practiced in the operation of the maintenance system. This includes the use of alternative structures for reporting and accountability, for example party officials and Ward Councillors. It also encompasses the working out of local arrangements between field staff and



others, such as an agreement for bus drivers to transport Pump Minders to their destination. However, the practice of flexibility is rarely found above field level.

Added to the general inflexibility of the system are the high levels of involvement of paid development workers and people of 'official status'. These people tend to perform the functions supposedly carried out by 'the community'. Village Community Workers frequently become Pump Caretakers, in practice if not officially. The higher tiers of the maintenance system often communicate with a headmaster or a clinic nurse rather than household users if a pump is shared. Such tendencies tend to discourage the community from thinking that certain tasks should be their exclusive responsibility. These ideas will be returned to the following sections but here it is sufficient to say that government personnel and structures need to develop a greater flexibility in promoting and responding to evidence of community involvement.

5.1.3 Transport

Institutionally, there are some major constraints to effective operation of the system. The lack of transport is the one most frequently mentioned by all staff. In several districts visited there was no vehicle specifically allocated to the DDF for water activities. Vehicles were often hired from the Roads Division, and frequently diverted from water related tasks to other district activities. These included drought relief distribution and grain haulage, which tended to take place just when the need for pump maintenance was at its peak (i.e. in the dry season).

The MOH also has significant transport problems with district staff often sharing a hospital vehicle. One solution to this is practiced in Shamva where transport use is strictly according to a weekly rota which ensures all relevant departments some access to the vehicle during the week.

Places where transport is not a major constraint are primarily those with an intensive donor funded project, such as Gutu. In such places project vehicles help to overcome the deficiencies of government transport provision.

The transport shortage has several major outcomes, detrimental to the maintenance system. Firstly, it prevents district level staff from providing adequate supervision and support to their field staff. Consequently they tend to rely on written reports from the field staff, which vary considerably in their usefulness. In any three tier system the efficiency and effectiveness of the second tier will be critical and if this level is weak the system is likely to malfunction. In our case a fairly heavy burden of maintenance theoretically falls on the Pump Minder (and sometimes the EHT) who receive minimal support in their task from their superiors.

Secondly, the involvement of district staff in mobilization and training of the community is severely limited. For example in Mutare it was mentioned that most such activities took place at

big events such as the Mutoko Agricultural Show, rather than in the community where it would be most effective. Transport constraints may partly account for the general lack of involvement of DCDOs in activities relating to community maintenance.

The third consequence of the lack of transport is that district level technical inputs may be curtailed. The Three Tier System is highly transport dependent, the DMT not being able to function properly without its own vehicle. Transport deficiency at this level leads to a delayed response to calls for assistance from the other tiers and consequently increased downtimes. (This may help to explain Mutoko's high downtimes.)

The shortage of transport then has knock on effects throughout the maintenance system.

5.1.4 Recording

The importance of adequate recording and reporting has already been touched upon earlier. No permanent maintenance system can function properly without adequate feedback and this has so far been lacking. Various attempts have been made to improve the recording system, most notably through the introduction of a Pump Record Card system. However, to date recording remains woefully inadequate. Under-recording of breakdowns is common for a variety of reasons. Some breaks are simply not reported through the normal channels and therefore do not get recorded. (These may include reports made through EHTs, Councillors and VCWs.) Even where the breakdown is reported normally and mended by the Pump Minder, there may be a significant delay in him passing on this information to district level. The collation of information at district level is usually done monthly but it is questionable as to how many of the Pump Minders activities actually get recorded.

Where records do exist they contain little save minimal technical information. This usually includes the date of repair, parts fitted and the name or position of the repairer. When compared with user accounts of breakdowns, the DDF records often show a shortfall. It is possible that the maintenance records are biased in favour of maintenance activities which involves the fitting of new spare parts. Routine maintenance visits and general servicing may rarely be recorded.

Although the general tendency is for the under-reporting of breakdowns, one case was found in which the DDF records showed more breakdowns than the users remembered (Tsholotsho 4). A likely explanation of this is that the community only remember those breakdowns which seriously inconvenienced them or which were separated by a substantial interval of normal functioning. If the pump breaks down again, the day after it has been mended, the two breakdowns may be remembered as one. If the pump breaks down, but is mended within a day, the community may soon forget the incident. Many Waterpoint Committees keep no written records of their own so the veracity of higher level records is difficult to check.

If the DDF recording system is imperfect, the Ministry of Health's system is totally inadequate. There is no standardized reporting system for staff mending Buckets or Blair Pumps. Only two



districts were found where anything resembling adequate records were kept, these being Charter and Gutu. Generally the MOH recording is dependent on monthly written reports submitted by the EHTs. These reports are general and rarely include specific accounts of maintenance activities.

Even where recording does take place, it is doubtful whether the information is put to good use. Many DDF districts only recently acquired a clerk for the keeping of records and so current information is out of date or incomplete. It is difficult to see how sensible budgeting and deployment of resources can be carried out without accurate records. The lack of a system employed by all agencies makes coordination and the collection of comprehensive information an impossibility. Spare parts cannot be ordered nor staff deployed with any great rationality. Monitoring of activities, including successes and deficiencies, is not possible. In summary, the lack of adequate reporting hampers the efficient planning, management and operation of the maintenance system.

5.1.5 Finance

This study did not consider in depth the financial aspects of community maintenance. Finance appears to be a critical area and one which could require an entire study of its own. From evidence gathered during this project, budgeting for maintenance appears both complicated and obscure. Again, the organizational complexity is obvious with DDF having an entirely different budgeting system to the MOH. Thus while DDF field officers at district level have a fair idea of the size and nature of the budget available for maintenance, MOH staff generally do not. This is because they tend to use the 'field vote' shared by other health departments for their maintenance requirements. The situation is further complicated by budgets originating from donors and NGOs which may not be managed by the ministries. Overall, although we have little quantitative data on this subject, there appears to be a general impression at district level that funding bears little relationship to need. This seems particularly obvious in terms of the provision of spare parts and transport.

In summary, the organizational structure which should support and monitor any system of community maintenance, is weak. There are too many agencies involved, a great reliance on bureaucratic structures rather than flexible management and insufficient information and resources to do the job properly.

5.2 The Three Tier System

5.2.1 Definition

According to its advocates, the Three Tier system is an efficient form of maintenance because, in the combination of local participation with two levels of technical skills, it can make the maximum use of limited resources. It is also intended to provide a clear division of roles and an effective reporting system. The

adverse effects of breakdown are supposedly limited because of the combination of effective preventative and corrective maintenance. In this analysis an attempt will be made to assess whether the system as now implemented fulfills this role. Because of the nature of this report we will concentrate mostly on the primary tier.

Firstly, as pointed out in the introduction, it is doubtful whether any of the districts in this study can be said to have a full Three Tier System, in that coverage is generally patchy and agencies other than the DDF participate to varying degrees. In some ways a judgement of the Three Tier System may thus seem unfair. However, one of the aims of this study is to find out whether such a system is practicably implementable within available structures and resources.

For the purposes of this report, a district is judged as having a Three Tier System when it has Waterpoint Committees, Pump Minders and a District Maintenance Team.

5.2.2 The Third Tier

District Maintenance Teams appear to be relatively efficient in corrective maintenance where they have adequate access to transport (as for example in Shamva). However, whilst they are expected to contribute little to preventative maintenance, they may actually obstruct the participation of the community. Communication between the DMTs and the communities served seemed inadequate. Users often did not know when the DMT would come to repair the pump and so could not be present to participate. In fact, little community participation would be required because of the presence of the casuals on the DMT.

The role of the Pump Minder is also sometimes threatened by the existence of the DMT. Several communities claimed to report breakdowns directly to the DMT, bypassing the Pump Minder. Apparently, they perceive the DMT as offering a faster, more technical and therefore better service. Often the Pump Minder did not know of the activities of the DMT in his area, so giving rise to the problems of coordination. Evidence also suggests that in some places the DMT and PM's 'compete' for repair work. The DMT do more repairs overall than the Pump Minders which suggests that the referral structure within the system does not work well. It also indicates that the DMT may well be undertaking non-specialized maintenance tasks, which is an inefficient use of resources.

Where the system does seem to work fairly well is in places where the DMT function is decentralized to DDF sub-stations. As practiced in Tsholotsho, this helped to bring the third tier closer to the second and the Water Supply Operatives and Pump Minders often work hand in hand. However, the distinction between them then becomes blurred and leads to a questioning of the need for three tiers. It seems to be an anomaly of the system that if the third tier has sufficient resources to be effective it then obstructs some of the effectiveness of the other two tiers.



5.2.3 The Second Tier

The Pump Minders are a difficult group to evaluate because of the heterogeneity of circumstances in which they operate. In some places they are too sparsely spread to be able to cover the whole area. In others they appear to have insufficient work unless they appropriate some of the tasks of the community such as greasing and tightening bolts. There is little doubt that in many places Pump Minders are asked to cover areas way beyond their capacity and this leads to problems of transportation and the carriage of tools.

However, in Gwanda, where the Pump Minders sometimes cover huge distances, they appeared relatively efficient, mending more pumps than any other agency. It seems that in places where there are well-established Waterpoint Committees and a reasonable coverage of Pump Minders, corrective maintenance by the second tier can be relatively efficient.

As mentioned in the section on first tier maintenance above, there is often only a vague demarcation of duties between the Pump Minders and the DMT. The Pump Minders mended less repairs overall than the DMT (although this may be accounted for by the two districts with no Pump Minders) and the two tiers were comparable in their efficiency (as judged by downtimes). This suggests that the 'gatekeeper' role of the Pump Minders in determining access to the specialist services of the DMT is not generally practiced.

How do the PMs compare to the other second tier maintainers, the EHTs? The EHTs repaired far fewer pumps overall and were slightly slower than the Pump Minder in doing so, as shown in the table below:

TABLE 23 : COMPARISON OF EHT/PM EFFICIENCY

| MENDER | % PUMPS MENDED | |
|--------|----------------|------------------|
| | WITHIN 2 WEEKS | WITHIN ONE MONTH |
| EHT | 53% | 71% |
| PM | 62% | 81% |

The Pump Minder is specifically trained in maintenance, this being his only role. The EHT on the other hand has a range of other duties and maintenance may play only a small part in his working life. It should be remembered that EHTs may be mending different types of pumps and therefore be faced with different problems to the Pump Minders. However, it would seem that potentially, the Pump Minder could be the most effective agent undertaking corrective maintenance at the second tier level.

This raises the issue of the part the Pump Minder plays in preventative maintenance. From the evidence gathered this seems to be very little. Regular routine checking of pumps is myth rather than reality and only happens where the Pump Minder covers

a fairly small area. Time and distance were most frequently cited as the reasons for Pump Minders not doing routine checks. Only one exception was found of a Pump Minder who worked according to an operating schedule prepared by his supervisor. This included the routine checking of pumps around which corrective maintenance had to be fitted in. It was not possible to check on the effectiveness of the system, particularly as it affected the community's perception of their tasks. It also appeared to be the exception rather than the rule. In terms of organizational support to the Pump Minders, little was found. They are generally unsupervised in the field and may only have contact with district level officers at their monthly meetings. In one or two districts, PMs had been sent on refresher courses or workshops to update their skills but in many places their technical abilities appeared severely limited. The major question which arises from such evidence is this. Is there any point in having a second tier unless it is highly decentralized and easily accessible to the community, competent in terms of skills and resources, and supported by dependable and efficient backup services?

5.2.4 The First Tier

The first tier of the system comprising Waterpoint Committees made up of users, is intended to facilitate good maintenance. It is intended that the committee ensures general cleanliness of the pump and surroundings, undertakes certain routine maintenance duties (greasing parts and tightening bolts) and collects small amounts of money where necessary. They are also supposed to regulate pump usage and to report faults or breakdowns to the pump minder. If the PM comes to mend the installation, the committee members are to organize the users to assist. Such committees exist in places for both Bush Pumps and Bucket Pumps, or sometimes for Bush Pumps exclusively. By no means are all waterpoints covered by a committee.

Where such committees do exist, it does not necessarily mean that the functions listed above will be undertaken. Many committees exist in form but practice little. Several committees studied had received no training in their role. Where training had taken place it was mostly carried out by DDF and included some practical demonstrations. It is likely that the DDF have insufficient resources to follow up such training afterwards.

Awareness of lines of accountability and areas of responsibility are poor and rarely are the committees well supervised. The concept of 'elections' to committees is universally spoken of but the practice may be questionable. There were cases of committee members who had become so under pressure from the community. Few committees keep record books and although many claimed to meet regularly there was little evidence of this. Many have no spanners and some no grease. Often, even where the committees existed, caretaker duties were performed by someone else such as the Kraalhead or VCW.

In contrast, where there were well functioning committees they do all the required functions and more. Often, these committees are



not highly institutionalized, being ad hoc user groups rather than committees. Whatever form they take such 'committees' have a degree of flexible organisation which fits in well with their duties. There is frequently a dominant individual directing activities and meetings take place as required rather than monthly or fortnightly. The most prominent feature of such committees is that they take the initiative in trying to overcome problems of maintenance.

What motivates such committees in their actions? One could speculate that they are more likely to exist where the need for water is great and where the coverage of the area by government agencies is limited. In such a case people should be less dependent on others and see greater rewards in helping themselves. It may also be that it takes time for the communities to learn the role and scope of a waterpoint committee. Thus older committees, such as those found in Tsholotsho, may be more effective than younger ones, such as those in Shamva.

Even well organised and well motivated committees do not necessarily ensure good maintenance as they are highly dependent on other tiers of the maintenance system. Lack of response from other tiers was one of the major problems experienced. There appeared to be some confusion as to how to pursue the matter once a breakdown had been reported to the PM or DDF and no response was gained. A variety of tactics were employed here involving getting headmasters or clinic staff to write 'official' letters to the DDF if they were also pump users and making complaints through Councillors or Party Officials. Inevitably some committees never followed up after reporting once.

In some cases, although a formal committee is in existence, maintenance responsibilities are essentially devolved onto one person. This may be the user living nearest to the pump or someone in authority. Where pumps are used by other than households, it tends to be assumed that the non-household users will be responsible for maintenance. This may work for example where there is a Clinic Caretaker responsible for a pump and accountable to the Health Committee (Mutoko 3, Chegutu 2) but rarely works well where schools or businessmen are nominally responsible. In one exceptional case the Waterpoint Committee took sole responsibility for the pump and were trying to levy contributions from businessmen and other 'outside' users. They felt able to do this because the possibility was mentioned in a constitution given to them by the implementing agency.

Some of these points will be returned to later when we consider the dynamics of community involvement in maintenance. Here it may be useful to summarise the function which committees are commonly expected to do. They are:

- Sweeping and cleaning pump surrounds.
- Greasing.
- Tightening bolts.
- Formulating and monitoring rules about usage.
- Reporting.
- Assisting PM and DMT in maintenance.
- Collecting money - this has not yet been generally introduced.

Additionally, we found a number of other functions being performed by committees or ad hoc user groups. These included:

- Buying spare parts.
- Making spare parts.
- Fitting spare parts.
- Improvised maintenance (when parts or menders not available).
- Providing materials and labour for construction of headworks.
- Providing transport/tools for the PM.
- Collecting larger sums of money.

It is obvious then that some committees are not even meeting minimum requirements in terms of the way they function, whilst others do a lot more than expected.

What does all this activity mean in terms of the effectiveness of the committees? We have only imperfect indicators with which to assist this as they are all dependent on the functioning of other parts of the maintenance system. One indicator is the speed with which breakdowns reported by the committee are repaired, compared to those reported by users not organised into committees. Whilst the Waterpoint Committees reported 35% of recorded breakdowns and 'users' 22%, there was, in fact, little difference between the response time to their reports (although the committees downtimes were slightly lower). Both categories were, however, far better than any others at securing a response to their reports of breakdowns.

It would seem then that some kind of user participation or organisation at first tier level does promote speedy reporting. However, such participation does not necessarily need to be institutionalized in the form of a Waterpoint Committee to be effective.

Here it may be useful to take a brief look at districts with no Three Tier Maintenance System, and see what they substitute for it, particularly at the first tier. In Shamva where some Waterpoint Committees have recently been constructed, the situation is poor with the WPCs badly organised and playing little role in maintenance. In Mutoko, local leadership is stepping into the management of maintenance role with Ward Councillors holding grease and VIDCOs often organizing and imposing regulations on pump use. In Chegutu where there are only a few WPCs other methods of reporting are used including headmasters, VCWs and EHTs as well as users. These districts all perform quite differently in the maintenance task so it is difficult to reach any sensible conclusions about such alternative arrangements.

In summary, it would seem that whilst some aspects of the Three Tier System promote good maintenance, they do not necessarily ensure it. The system emphasizes corrective at the expense of preventative maintenance. It gives few resources or responsibility to those at the lower tiers where preventative maintenance could take place. However, it should be noted that simply providing more resources for maintenance is not the answer. In Gutu where there is an intensive donor funded water programme and few manpower or



transport constraints, community maintenance was minimal. Indeed, EHTs and Pump Minders were reported as replacing chains on Bucket Pumps, a task well within the user's technical capacity. It seems that intensive resourcing of the maintenance system and a satisfactory policy of implementation may increase community dependency rather than self reliance.

Finally, there is a major difficulty in the coordination of a system wherein the tiers do not operate on the same basis. The third tier is essentially an arm of government and therefore operates in far more bureaucratic and structured organisational environment than the other two tiers. It is often difficult to ensure good and effective working relationships between levels of organisation of a very different nature.

Overall then, the Three Tier System as currently implemented does not fulfil its aims of promoting community involvement or of enhancing the preventative maintenance of pumps. In some cases, however, it does have the capacity to perform fairly well in terms of corrective maintenance.

5.3 Community Maintenance

This study attempted to take an in-depth look at the dynamics of various communities to determine factors affecting their participation. This analysis covered communities with and without Waterpoint Committees.

5.3.1 Who?

Firstly, we looked at who was participating. National guidelines encourage the predominance of women on Waterpoint Committees as they are the fetchers and carriers of water and thought to be more conscientious than men in their duties. Women do in fact predominate in numbers on the committees but we found the participating men to be active and conscientious (eg Charter I). This may partly be because the male committee members are generally 'postholders'; Chairmen or Caretakers rather than just ordinary committee members. They also tend to be people with some other position of influence or seniority in their community. This reflects the structure of many rural communities where there is a predominance of female-headed households and the resident males tend to be either very young, very old or some form of local leader.

It has previously been suggested (Cleaver 1987, Saugestad 1988) that 'effectively single' women are likely to be freer to participate in non household activities than married women. The 'effectively single' category includes those widowed, divorced and with husbands working away from home as well as the unmarried. Whilst it did appear that such women were present in considerable numbers on Waterpoint Committees, it was difficult to determine whether this was merely a reflection of their incidence in the community or not. However, several married women with husbands living at home reported some opposition from the men to their

committee activities. The extremes of this were seen in Gwanda where although the women are the nominal committee members (presumably to conform to some guidelines about women's participation) their husbands actually perform their duties for them. Thus, although women often predominate in numbers on the committees, the degree of their involvement depends on the dynamics of their particular community. Nominal involvement of women does not necessarily mean effective participation.

Where Waterpoint Committees do not exist, it is more difficult to determine who is involved in community maintenance. Our imperfect indicator of this is derived from data on reporters of breakdowns. This shows that in the absence of committees, people with some 'official' status generally report breakdowns. These include schoolteachers, Village Community Workers, Kraalheads and VIDCO Chairmen. There seems to be a general belief that such people will illicit a faster response from the maintenance agencies. This belief is disproved by the data. Such a tendency could suggest that where committees do exist, members are assumed to have some status which gives them 'reporting authority' on the same basis as the influential people mentioned above.

So far, we have assumed in this discussion that the waterpoints have sizeable user communities. However, participation is no less important with smaller user communities although it should theoretically be easier to organize. Most formal organisation for participation in such communities is minimal, although committees exist for as few as four user households. In one district there is a requirement that in such a situation each household contributes a committee member. In most cases the person living closest to the pump, or on whose land it stands is the unofficial caretaker. This involves cleaning, improvising repairs, and reporting major faults (See Chegutu 3, Shamva 4). In many cases such people interviewed felt they had proprietary rights over the pump but did not exclude other users for fear of witchcraft (see Gutu 2). Informal obstacles to general usage were however common, including gates, fences and dogs. Communal participation in the upkeep of a pump therefore seems to work best where the user households are from the same extended family or are sufficient in number to ensure that the pump is seen as a genuinely communal, rather than semi-private facility.

As previously mentioned, conflicts may arise over participation where multiple users are concerned. Even if there is a WPC, it is generally expected that the institutional representatives (schoolteachers, council employees, businessmen) will be responsible for maintenance. For example in the case of Shamva 3, the people refused to clean or pay maintenance subscriptions in the belief that the schoolchildren should do all the work. Whilst the institutional representatives often have the capacity to perform maintenance duties, they rarely accept full responsibility and so conflicts arise. This is obviously disadvantageous to pump maintenance.

Local leaders often play a prominent role in the organisation of community participation, both formally and informally. Whilst it is the practice in the water programme activities to recognise the role of traditional leaders in mobilizing the people, policy



stresses that the VIDCO is the lead agency in this respect. However, research showed that the central role of the VIDCO may be theoretical rather than actual and varies considerably from place to place. In many cases, VIDCOs were not sufficiently established to take any initiating role in water activities (eg Buhera 2). Often Waterpoint Committees did not consider themselves accountable to the VIDCO and take problems directly to Ward Councillors. The knowledge and awareness of VIDCO Chairmen of their own role in the maintenance system was variable. Some were unaware that they had any role to play. In common with other users they generally perceived pumps as 'belonging' to government or the implementing agency. Some VIDCOs played a very active role, effectively taking on waterpoint management in the absence of committees (eg in Mutoko).

Whatever the degree of involvement of the VIDCO it did not appear that they were significantly more active than other local leaders. As reporters, they appeared in similar numbers to the Kraalheads and VCWs. In several case studies the VIDCO chairmen and Kraalhead were reported to be working hand in hand on water issues. However, they tended to be involved in different ways. Several VCWs said that they found it most useful to liaise with the Kraalhead over water issues, because of his traditional role in such matters. Kraalheads were frequently found to be contributing materially to waterpoint activities. Examples can be found in the following cases; Chegutu 2, Mutoko 5 and Tsholotsho 3. Other examples of involvement include the Waterpoint Committee which meets at the Kraalheads house (Tsholotsho 2). The provision of materials, transport or spare parts and the organisation of the people is not an uncommon role for the kraalhead to play. The VIDCO Chairmen however, seem to have a more 'political' role in advocating the needs of the community to others. Thus they tend to be the people who liaise with other tiers of the maintenance system, local authority officials and so on. Both Kraalheads and VIDCO chairmen participate in the enforcement of rules and regulations relating to pump maintenance.

In many cases we found local leaders taking community participation beyond the minimum requirements, in their own initiatives (see, for example, the collection of money by villagers in Tsholotsho). However, the record of local leaders wasn't universally positive. Some VIDCO Chairmen and Kraalheads were disinterested in the communal pump because they had their own private water source. In particular, a certain number of Ward Councillors were found to have an obstructive approach to community maintenance. In Mutoko, for example, one Councillor discouraged the people from buying cement for headworks, stating that it was the government's duty to provide. In Tsholotsho another Ward Councillor expressed the strong opinion that people of his ward must not collect money for spare parts, despite the fact that villagers in a neighbouring ward were already doing so.

A possible motivation for this destructive attitude is that councillors perceive water supply as an issue in which they can mediate between the people and the government. By insisting on playing this role they can then be seen as the providers and distributors of the benefits. In Mutoko, Ward Councillors were even the ones who keep the grease for pumps. Presumably if the

people bought their own grease then a certain area of influence would be lost to the councillors.

It appears from the case studies that other leaders may also participate in water supply activities; chiefs and the Party having been mentioned in particular. In Mutoko the community development officials claimed to specifically use party representatives for mobilization because they are considered to be close to the people.

It is difficult to sum up the role of local leadership when such a diverse picture has emerged. However, this may in itself be an important point. Local leaders are not homogeneous in style or motivation and cannot simply be assumed to have the attitudes desired of them by development agencies. It is quite possible that some of them have their own agenda, which has little to do with encouraging community self help. On the other hand, there seems to be great potential in the willingness of village leader to organize, motivate and help to provide for their community.

5.3.2 What?

What exactly does community participation involve?. In the section above on three tier maintenance was listed all the activities which we found communities doing. Rather than repeating this list it seems worthwhile to consider their nature in more detail.

Most waterpoint activities listed involve some form of manual task; providing materials, cleaning, greasing, bolt tightening, helping the Pump Minder and so on. Few of these require any technical skills. Such abilities are occasionally displayed by community members in the making and fitting on new spare parts, although this occurs rarely. Other maintenance-related activities are primarily organizational. These include the collection of money, mobilization of the community, the formation of cleaning rotas and so on. Generally though, only limited organisation of the users is required, often for an one-off activity.

The other major category of community involvement is in regulatory tasks. Nearly every community surveyed (whether it had a Waterpoint Committee or not) had a set of rules and regulations regarding their water supply. These tended to be informal unwritten rules but were well known within the community. Commonly, the rules could be categorized into the following groups. Firstly there were those intended to preserve a limited supply of water. These included prohibitions on certain types of use such as garden and livestock watering or filling large drums from the pump. Secondly, there were those intended to preserve the good condition of the pump. Examples are the banning of children from pump use, or specific guidelines on how to use the pump. Thirdly were those regulations relating to cleanliness and hygiene. These ranged from the requirement of all users to clean up the site to a prohibition on body and clothes washing at the waterpoint.

Few communities ever mentioned specific rules about the obligation of community members to participate. However it was clear that such an obligation was generally accepted as in several communities



people were able to list the sanctions to be applied to non-participants. Interestingly such sanctions did not relate to a withdrawal of access to water supply, but rather limited other village benefits. Examples are the village where people were threatened with having their cattle excluded from the paddocks (Charter 2), of being struck off the drought relief register, or of having party cards confiscated (Mutoko 2) for non participation. Whilst such sanctions had rarely been applied, people were certainly aware of the possibility of their use. These 'punishments' involved non water related activities and were beyond the scope of the waterpoint committee to apply. They would therefore have to involve local leaders.

A major area of participation from which many people (particularly the village leaders) felt themselves specifically excluded, was that of decision making. It was a particular complaint amongst such leaders that whilst the community was asked to provide labour and materials on an ongoing basis, they had very minimal inputs into decision making. Nominal decision making by the community was undertaken at the implementation stage, but very little after that. People therefore felt generally ignorant and powerless in relation to the maintenance system and how it operated, the distribution of resources and other issues. Their only real ability to affect such matters was in soliciting others (eg Ward Councillors) to advance their cause at higher levels. One notable exception to this was in Charter where Water Point Committee Chairmen are periodically invited to District Water and Sanitation Subcommittee meetings, particularly if a problem being discussed specifically affects them. This major area of non-participation no doubt reinforced peoples lack of identification with their pumps (a matter considered in more detail later). To summarise, it appears that in general minimal participatory tasks are currently undertaken by users. However, the exceptional cases of extended participation show the potential for far greater involvement. This will only be possible if the users are well-motivated, an issue to which we now turn.

5.3.3 How?

How are people motivated to participate in the maintenance of their water supplies? This is one of the major problems of running a maintenance programme based on community participation. Firstly, a distinction should be made between participation in implementation and participation in maintenance. The theory is that involvement in implementation will ensure greater user involvement in operation and maintenance. Evidence does not support this theory. Many communities which had participated in implementation were poorly organised for maintenance. Several of those who had never participated in implementation had a higher level of maintenance organisation (this particularly applied to very old waterpoints).

A number of factors explain this. At the implementation stage the community is asked to participate in a very specific way (provision of labour, materials etc) to a one-off-task which has tangible results (eg the construction of a new facility). This involvement requires little sustained organisation and motivation stems from

the anticipation of a real benefit. However, participation in maintenance involves a commitment and organisation over an indefinite time period. Moreover, the resulting benefits may be less tangible as they involve the continued functioning of a facility, which may, despite the efforts of the community, still break down. As the users have little control over the most parts of the maintenance system they may see their participatory efforts 'wasted' as their pump remains out of action for lengthy periods of time. Previous research has considered that committee members participate because they perceive some tangible benefits to themselves from participation (Cleaver 1987). The evidence from this study emphasizes very strongly the demotivating effects of certain factors on such participation.

Contrary to conventional wisdom our study showed that participation in implementation does not necessarily engender a sense of ownership or promote subsequent maintenance. There was little sense of community 'ownership' of the pump, regardless of involvement in implementation. There was however, a certain sense of responsibility towards the pump. Most people interviewed felt that they were entitled to use the pump which nevertheless 'belonged' to the implementing or maintaining agency. Therefore people felt themselves under the obligation to use the pump properly; hence the prevalence of rules and regulations ensuring this. They did not feel that the ultimate responsibility for its good functioning was theirs.

Mostly the implementing agency was regarded as the one responsible for maintenance. This gave rise to serious problems where, for example, a pump had been installed by an NGO which had subsequently withdrawn from the district. In such cases people felt that there was no one left to report the pump breakdowns to.

There were a very small number of cases where people felt that despite the pump 'belonging' to government, the responsibility for maintenance was their own. These were mostly places with very old pumps and few inputs from the government system. The tradition of community maintenance in such places was, of necessity, well established.

There was a strongly expressed feeling amongst several communities that they had fulfilled any obligations to the providers by participation in implementation. They had therefore 'done their bit' and should not have to additionally shoulder the burden of maintenance.

The perception of maintenance as a government responsibility is reinforced when people are in contact with those who hold paid 'government' jobs. These include local council employees as well as Ministry staff. Whether or not such a job is connected with maintenance, it is generally assumed that the postholder should have a greater responsibility for it than the community. This particularly seems to apply to VCWs who were often to be found cleaning pumps themselves because of community negligence. This links with another aspect of motivation which is the issue of pay. Whilst older people generally saw participation as something of an obligation, younger people expressed a strong feeling that participation should be paid. This particularly applied to



identifiable jobs such as that of Pump Caretaker. Such an attitude may be reinforced by past experiences of rewards for participation in development projects (eg in Food for Work Programmes) and by the promises made by politicians during the struggle for independence and afterwards. It is probably more prevalent in areas where rural unemployment is particularly high and young people especially despair of getting a paid job. The tendency for people to see participation in terms of the rewards to be gained was partially illustrated by the people of Chiweshe Grazing Scheme, Buhera. They told us that they were receiving piped water as a 'reward' for participating in villagisation. Several people also expressed a reluctance to take part in this project unless I could specify what benefits it would have for them. It would seem then, that although there is scope for expanded community participation in the maintenance system, this will only be achieved when people anticipate tangible benefits as a result. The following factors seem to be prerequisites for effective participation.

1. A strongly felt need for the protected water supply and
2. A knowledge that government will not/cannot provide adequate support.
3. A strong well motivated local leadership.
4. The anticipation of some tangible reward.

Some aspects of these factors will be considered in more detail below.

5.4 Waterpoint Analysis

The particular environment and condition of any pump will have a bearing on its maintenance. These include the type of technology, its age, location and usage. All these factors affect not only the pump itself but the communities attitude towards it and are therefore important in our consideration of the dynamics of community maintenance.

5.4.1 VL0M

To start with it is worth briefly reviewing the differences between the two main technologies : Bush and Bucket Pumps. Theory would suggest that the more appropriate the technology, the more likely are the users to maintain themselves. Is this in fact supported by the evidence?

According to this research, the breakdown rate for Bucket Pumps (at 45%) is lower than the national average breakdown rates (at 53%) and substantially less than that for Bush Pumps (at 61%). This tells us little though about the maintenance of the different pumps for a variety of reasons. Technologically there is less that

should go wrong with a Bucket Pump and in general they are far younger than Bush Pumps. Often they are situated in a semi-private user environment, unlike the average Bush Pump.

One way of judging the village maintainability of a pump is by looking at the menders of the different technologies. For this purpose it seems valid to include the PMs (and EHTs) as 'local level menders'. This is valid for several reasons. These repairers usually work with the community when undertaking repairs, so the community at least will have a knowledge of the requisite expertise. The PMs and EHTs live and operate at ward level and are in regular contact with the communities they serve. Finally, these second tier menders do not possess highly specialized maintenance skills or equipment, but a basic working knowledge of pump maintenance. Effectively then, for the purposes of judging community maintenance capacity, we can temporarily combine the first and second tiers.

In the table below are presented figures for this combined first tier. The figures for Blair Pumps have been included for comparison.

TABLE 24 : LOCAL LEVEL MENDERS

| MENDED BY | BUSH % | BUCKET % | BLAIR % |
|-------------------------|-----------|-------------|------------|
| USERS | 3 | 28 | 6 |
| EHT | 3 | 30 | 36 |
| PM | 35 | 11 | 3 |
| TOTAL LOCAL MAINTENANCE | 41 | 69 | 45 |

As can be seen, Bucket Pumps are far more likely to be 'locally' maintained than are Bush Pumps.

However, is local maintenance more efficient maintenance? Does the fact that pumps are locally mended effectively reduce their downtimes?

TABLE 25 : EFFICIENCY OF MENDERS

| DOWNTIMES | MENDERS | | | |
|-------------------|------------|----------|---------|----------|
| | USERS % | EHT % | PM % | DMT % |
| LESS THAN 2 WEEKS | 63 | 53 | 62 | 59 |
| LESS THAN 1 MONTH | 80 | 71 | 81 | 80 |

The table shows the different menders to be broadly comparable in



terms of downtimes. It might be expected that local menders would be significantly faster at making repairs than the DMT. In fact this is not the case. A possible explanation is that the DMT may have easier access to spare parts and other resources, a factor which counteracts their geographic distance from the pump. It would appear, then, that local maintenance does not necessarily reduce the amounts of time the pump is out of action, given the lack of resources at community level.

5.4.2 Age of pump

A major feature of technology which may be expected to have some bearing on the rate of breakdowns of a pump is age. Theoretically one could anticipate a correlation between increasing age and increasing numbers of breakdowns of a pump. This would be likely for two main reasons:

- a. The technology becomes weaker as time passes. Parts wear out (and may be impossible to replace) and the pump suffers from general wear and tear. Possibly it also has to cope with increasing numbers of users over time.
- b. With age the pump loses its novelty valve and less care is taken of it. Implementing agencies have long since withdrawn and there is little supervision or mobilization of the people responsible.

However, when age and breakdowns were plotted together, the picture was not a simple one of increasing numbers of breakdowns with increasing years. As can be seen from the scatter plot, the breakdown rate for pumps between one and five years old appears higher than expected. After about five years, the breakdown rate apparently stabilizes until the pumps become much older when it begins to rise again.

5.4.3 Reliability theory

This type of pattern could be explained by a reliability theory of technology. According to this any new technology takes some time to 'settle in' to its new environment and for the environment to adapt to it. This results in an initial period when problems, including breakdowns, may be commonly experienced although there is nothing drastically wrong with the technology. This 'teething' period is followed by several years of good and efficient functioning until the technology moves towards the end of its natural life and problems recur. This seems a sensible model to apply to the functioning of pumps, which are installed in a variety of climatic, geological and user environments. This, however, may be only part of the explanation of age and breakdowns. A complementary one will be outlined at the end of this section, but first we will consider other factors relevant to pump performance.

5.4.4 Usage

The degree of usage of the pump might be expected to have an effect

on the number of breakdowns it suffers. There are rough guidelines for the optimum user populations for pumps and so we should be able to tell whether the pump is over-used or not. For example, Bucket Pumps are designed to be used by between five and ten households. However, in practice such a judgement is difficult to make because many people depend on more than one source of water and so their usage of the pumps is variable. Whilst some households may use pump water for all domestic purposes, others may only use it seasonally when other sources dry up.

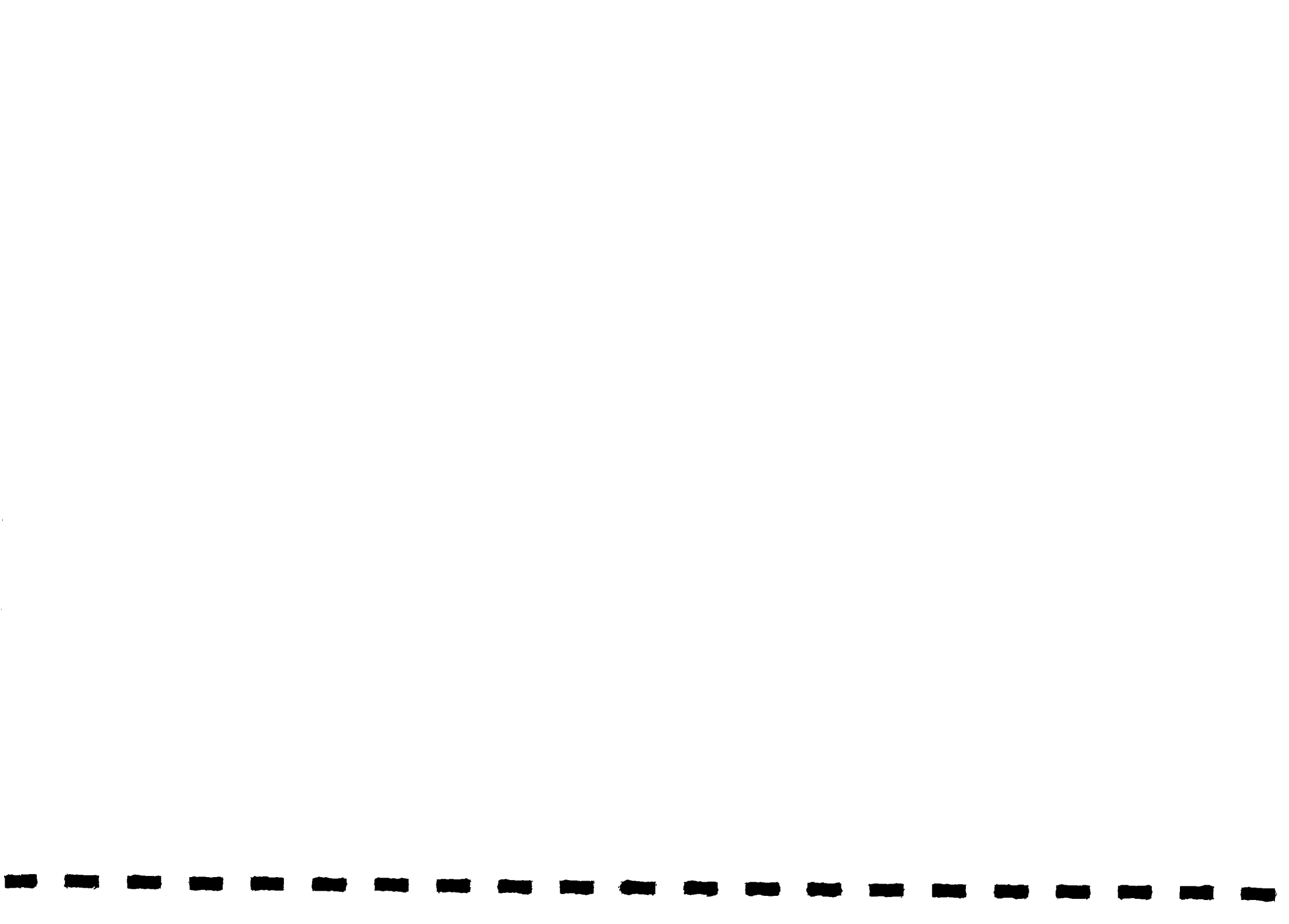
Due to these difficulties in assessing pump users from numbers of households, I decided here to take usage for garden and livestock watering as the main indicators. Garden watering proved to be an unreliable indicator meaning different things in different places. In most places pumps are not used for garden watering. One exception was Gwanda where, presumably, the gardens being watered were communal nutrition gardens. Another was Gutu where a larger number of pumps are situated within a household plot and are therefore easily used for gardening. These different types of garden watering in very different districts merely show us what a variety of environments the pumps are situated in. The average breakdown rate for pumps used for garden watering is similar at 52% to the overall breakdown rate of our sample. If usage is related to breakdowns this indicates that garden watering puts little extra pressure on the pump.

In contrast, pumps used for livestock watering generally broke down more frequently than the overall average (65% as opposed to 53%).

In most places, pumps are only used for livestock watering when there are no alternative sources. We can therefore assume that high livestock usage also indicates a high level of human consumption. This enhanced level of use could explain the higher breakdown rate. However, it should also be said that these pumps tend to occur in districts characterised by very old, deep pumps situated in remote places. These factors may also contribute to the higher breakdown rate. Despite a high breakdown rate, it is possible that such pumps are cared for more conscientiously than others, because the users depend on them for all purposes.

5.4.5 Homogeneity

One factor which appeared critical to the good use and efficient maintenance of the pump was the profile of the user community. The more homogeneous such a community, the more likely they were to cooperate in maintenance. This is easiest to prove by looking at heterogeneous user communities. These include those places where households share a pump with schools, clinics and so on. Such pumps have a higher than average breakdown rate (at 63%) although there is little evidence that the actual level of usage was very high. The explanation may therefore be that such pumps break down more often because the user community is disunited and no one sees it as their specific responsibility to look after the pump. It should be noted here that 'homogeneity' may have little to do with the geographic cohesiveness of a user community. We recorded cases of large and scattered communities well organised for maintenance (Charter I, Gutu 5, Chegutu 5), as well as small ones in which constant conflict arose (Shamva 4). 'Homogeneity' for our



purposes is more likely to be determined by the type of users rather than their location.

5.4.6 Availability of water

These ideas about usage give rise to another, associated issue. This is the theory that the community is far more likely to participate willingly and meaningfully in pump maintenance where it depends on the protected source. Where alternative sources exist it is likely to be apathetic towards the maintenance of the protected water supply. From the evidence of the case studies, this appeared to be partly true, the driest districts showing evidence of the highest degree of community maintenance. However exceptions were found in other districts where despite the existence of household wells, contributions to the maintenance of the communal supply were expected and received, for example Charter 1. Many older people in particular believed in maintaining the communal supply as a back-up in case of drought.

5.4.7 Peripherality

According to some development theories, the more peripheral a community is from the centre, the more likely it is to be neglected by centralized agencies (Chambers 1983). In this study it was only possible to get a very rough idea of peripherality by measuring the distance of the pump from the second and third tier maintainers.

It would be logical to assume that those located furthest from the maintaining agencies, receive the worst maintenance service. This may be generally true in relation to Pump Minders whose scope is severely limited by their lack of transport. There were many reports that Pump Minders did not generally make routine visits to distant pumps. One Pump Minder was reported as waiting until several pumps in one area had broken before going there. Peripherality from the DMT did not seem to make a substantial difference to their response to reports of breakdowns, although the reporting itself often took longer.

However, there is another aspect of peripherality to consider. Are communities distant from the centre likely to receive fewer inputs in terms of mobilization, training and supervision? If so does this have an adverse effect on the level of their participation and motivation? Whilst there was plenty of evidence that there are less formal maintenance inputs for such communities, there was little to suggest that this resulted in less participation. There were notable cases of well motivated and self sufficient communities which had been almost totally neglected by 'the system' (eg. Tsholotsho). Other examples were of those pumps situated close to their menders but with the user community displaying a high level of dependency (Gutu). This could be explained by arguing that people are only self sufficient through necessity, not choice. It could also suggest that the second and third tier maintainers do little to promote the concept of community self reliance. Evidence to support this argument may be seen in areas which have intensive high input water programmes (Gutu) or in places where the central maintenance agency does most

of the repair work (Shamva). In Gwanda where there is a great need for water and pumps are often situated at considerable distance from the maintainers, corrective maintenance is relatively good but there is little community participation. It would seem then that communities are more likely to be self reliant if they know they will receive few inputs from outside. However, the picture is more complicated than this because even the most well-motivated communities are generally dependent on others for corrective maintenance. For example, a well organised community, Buhera 3, suffered pump failure for two months because their Pump Minder was out of the district on a course.

The theory of peripherality then is not entirely proved by our evidence. We seem to be left with a dilemma. This is that the more efficient the corrective maintenance system is, the less likely the community are to be self reliant. Is good community participation therefore incompatible with efficient second and third tier maintainers? It is worth noting here that in general older pumps, whether peripheral or not, were maintained with a higher degree of community involvement than newer ones.

5.4.8 Community learning

There is one idea which helps to bring together some of the issues examined above. This is the concept of community learning. If we go back to the scatterplot of age and breakdowns we see that breakdowns are relatively high in the first few years of a pump's life and decline thereafter until the pump becomes very old. It is possible that this is illustrating that the community and the menders take some time to learn how to maintain their pumps.

The concept of 'learning by doing' is a familiar one and many people are required to serve some practical apprenticeship before they are considered competent in their job. It would therefore be reasonable to assume that a pump must break down one or more times before those responsible become competent in preventing further breakdowns (and in mending them quickly). In other words the community, the Pump Minder and others learn maintenance from pump breakdowns. In the early 'settling in' years of the pump's life, the community is not aware of all the possibilities of technological failure. It may not be until the pump seizes up that they realise the need for regular greasing and organize a collection for the purchase of grease (e.g. Mutoko 5). It may only be when a pump has previously broken down that the community learn to recognise the warning signs and take remedial action before a fault becomes a breakdown. The pump minder (or other maintenance agent) may have no reason to include a new pump in his mental map of his area of responsibility, until it has broken down. By doing so it may be more likely to become part of any routine checking schedule he undertakes. This factor could be particularly relevant where the coverage of an area by maintenance personnel is thin. They cannot possibly devote time to every pump so do so only to those which are known problems.

The whole pattern would be reinforced where pumps were installed under an intensive programme. Once the implementing agency withdraws, much knowledge and expertise goes with it and people



and menders are left to learn about their pumps together. As we saw from the case studies, many Waterpoint Committees had received no training. It is highly likely that those who were trained watched demonstrations on working pumps. The usefulness of their training may therefore be questionable.

This theory is speculative - an attempt to explain a pattern which may or may not be representative. However, if valid it has significant implications for the organisation of the maintenance system. According to this theory, if all other factors are equal, a new pump with no previous breakdowns is at greater risk of breakdown than one which has broken and been mended before with the full participation of the community. (Of course the theory becomes invalid if the DMT do all the maintenance with no community participation).

The implications of this are that more support, supervision and monitoring should be given to communities in the first few years after implementation. However, this must be done in a way which encourages maximum community involvement in all aspects of maintenance. After a few years, the community and local menders should be competent to shoulder the burden of maintenance themselves. When the pump becomes very old and technologically unreliable, they may require additional support again, primarily in terms of extra resources.

Maintenance agencies should therefore be aware of the critical importance of the first few years of a pumps life. If the community does not learn maintenance during this time, the pump is likely to be a severe and continuing burden on the system. To help the community learn from breakdown, maintenance agents could carefully monitor the first few, picking out what the community could do to avoid similar ones and then educate them in this. Too often the process of mending a pump is considered a purely technical task, with the social and educational aspect almost totally ignored.

CHAPTER 6. CONCLUSIONS AND RECOMMENDATIONS

The organisation for maintenance in the eight districts studied is diverse and it is difficult to evaluate a system with so many local variations. However, generally maintenance as currently undertaken fulfills few of the theoretical aims of the Three Tier System. Whilst corrective maintenance is sometimes relatively efficient there is little evidence that the best use is made of available resources. In particular the potential for community level involvement is substantially under-utilised. Despite the existence of some well motivated and organised communities, participation in it's current form does little to improve the maintenance of pumps. This is because the users have little or no control over the resources required. Specifically they have;

- No technical control (lack of skills, tools, etc).
- No financial control (lack of budgets).
- No organizational control (dependent on inputs from others).
- No inputs into decision making.

There are a number of reasons why these deficiencies should be redressed; cost reduction, efficiency, promotion of pump usage, empowerment of the community. If any or all of these are real aims then alternatives to the current system need to be considered. Here is one of them.

6.1 Alternative system

To start at the beginning, the basis for the maintenance system should be well-established before implementation. At this stage the community would be required to demonstrate their commitment by raising a certain amount of money for a Community Maintenance fund. This would be matched by a sum of money from government (or other implementing agency) and the total amount would be placed in a savings account locally.

At this stage, community representation would be set up. The guidelines for this would specify tasks to be done rather than a particular form of organisation. Thus the community could choose to have a standard waterpoint committee, or simply to nominate two people as 'responsible officers'. It would be strongly emphasized here that the people chosen would be accountable to the community as a whole and to the VIDCO for pump maintenance. Tasks to be fulfilled would be :

- Financial
- Technical
- Secretarial/organisational
- Regulatory (hygiene/water use)

The person undertaking financial duties would be responsible,



jointly with one other, for operating the Community Maintenance Fund account.

The community, with the maintenance agency would together draw up a Statement of Understanding. This should not be a blueprint document but the result of discussion with each individual community. The statement would however include the following:

- The tasks to be fulfilled by specific members of the community.
- Rules and regulations relating to the pump usage.
- A 'contract' between the maintenance agency and the user community.

Tasks to be fulfilled by the people would include cleanliness and routine preventative and corrective maintenance. They would be required to submit an annual report to the implementing agency. Provision would be made here for annual subscriptions for spare parts, etc.

The 'contract' would include the rights and duties of both parties. Some of the duties of the community are specified above. Their rights would include an undertaking by the maintenance agency to guarantee the pump for one year, during which time the community would be assisted in maintenance at no cost to themselves. Rights would also include the technical training by the maintenance agency of at least one person. This person should receive training in corrective as well as preventative maintenance. It would not be necessary to train one such person for every pump if waterpoints are situated close together but the 'technical person' should be based at village, or in certain circumstances, ward level. Ward level representation may be appropriate, for example, where there are small wards and the maintenance workload is low. On no account should such a person cover more than one ward.

Such technical people would effectively become an expanded group of Pump Minders with the difference that they would be trained and equipped, but not employed by government.

The maintenance agency would undertake to provide support through a modified DDF Maintenance Team. This would contain no casuals as casual labour can be done by the community - increasing their expertise and improving communication with the DMT. In larger districts the DMT would be decentralized to substations, so minimizing the transport constraints.

Most maintenance would be undertaken by local level menders, whether they be the users of a particular waterpoint or the local 'technician'. Support would be provided by the district level organisation. This system could then loosely be referred to as a two tier one. The modified 'two tier' system would work like this. The initial contributions made by the government and community are the basis of the Community Maintenance Fund. This may be 'topped up' every year by contributions from the community. Expenditure over a certain level (due to age of pump or a particular technical

problem) would be met by government. This level would be decided district by district according to the risk of pump breakdowns through age, location, usage, etc. Bonuses may be made available to communities who demonstrate conscientious maintenance over a year. For Bush Pumps, the government would continue to make a nominal contribution to the budget for five years (say \$100 per annum). For Bucket Pumps only an initial contribution would be made.

The community use their fund to buy maintenance services from 'approved dealers'. There would be guidelines for the price of spare parts and for the cost of particular jobs but the community would be free to choose their supply. For routine maintenance they can call in their local government trained Pump Minder or employ someone else with the appropriate technical skills as they see fit. The fee for the local technician would be slightly less than for an outsider.

The Maintenance Team may be called in at a fixed price to undertake specified specialist jobs, or if the local technician advises it. The role of the Maintenance Team is to undertake specialist repairs and to provide advisory and monitoring services. To this end they do routine checking (free of charge) and advise on preventative or remedial action. They also play a major role in the ongoing training of local technicians and in checking the standard of work carried out. The Team would be rewarded with bonus payments for achieving targets in terms of pumps checked and specialized repairs performed within a certain time. Records of these activities would be verified by a member of the community who must have been present when the work was done.

If the community had surplus funds in its account at the end of the year, and its record of maintenance was good, it would be allowed to spend the money on approved development or water related activities. These might include:

- Establishment of a nutrition garden.
- Building of headworks.
- Building of toilets.
- Fencing, etc.

It should be emphasized that good maintenance should not exclusively be judged by number of breakdowns. Communities which did little towards maintenance would not be allowed to use their funds and would risk being penalized through the suspension of the annual government topping up.

Record keeping would be based at waterpoint level. All visits, payments, faults, parts, disputes and problems would be recorded in the Pump Record Book.

It would be the specific responsibility of a literate member of the community to do this, possibly assisted by the VCW or other development workers. All maintenance jobs would be signed for both



by maintainer and book-keeper. The information contained in the book would be extracted periodically and incorporated into the DDF Pump Record Card System. One of the duties of the DMT would be in checking at waterpoint level that records are up to date. This could be done quarterly.

In summary, there would be a change in emphasis from an institution-led maintenance system to a community-led one. The community would have considerable freedom to determine how they secure good maintenance, but also substantial responsibilities. The institutionalized maintenance agency would provide support in the form of technical advisory and monitoring services.

This system assumes that all maintenance is the responsibility of one agency. Therefore the MOH would no longer play a significant part.

Potential shortcomings of this system are that it requires significant resources for initial training and the establishment of community capacity for maintenance. Secondly, that regular and effective monitoring is required on an on-going basis. Areas which would require checking include :

- The community's use of funds.
- Technical competence of Pump Minder.
- Costs and standards of jobs and parts.
- Record keeping.

Moreover, it may be difficult to implement in the sense that it would require a substantial change of outlook by government staff. It would only work if management and educational tasks were seen as equally as important as technical ones.

However, the advantages would be that the government would directly employ far fewer people in a technical capacity and as time goes on government inputs for any particular pump should decrease, not increase. The greatest benefit is that the community develops the resources to assume responsibility for its own water supply and to adapt the system to suit its own circumstances.

6.2 Recommendations

This alternative maintenance proposal incorporates many of the major recommendations of the report. However, it is worth listing these individually as some of them are applicable to the current maintenance system, and if implemented could help to make it more efficient.

1. One single agency should be responsible for maintenance. It must be made very clear to the users which agency this is. The maintenance agency must accept responsibility for the pumps within its area of operation.

2. There should be a far greater emphasis on training all concerned on an ongoing basis. Training should not be perceived as a one-off activity. Training should include technical and organizational aspects. At the community level it should be primarily practical and must teach the users more about how to cope when things go wrong. VIDCO's generally require more training in their role in the water programme and Councillors must be very aware of their responsibilities and the aims of community participation. At all levels of the system, monitoring and recording skills need to be substantially enhanced.
3. A greater degree of flexibility about the way in which the community organizes itself for maintenance should be advocated. It should be made very clear what is expected of the community and for what they will be held accountable. However, within such guidelines they should be free to devise their own form of organisation.
4. Where a pump has usage shared between institutions and households, responsibility of maintenance must be clarified at the implementation stage. Parties should be asked to formally accept their responsibilities.
5. There should be a very clear delineation of roles between tiers and strong education of all in this. In a Three Tier system this would mean that the Pump Minder and DMT do not undertake similar tasks. If there is no specific role for a particular tier then that layer of organisation should be abolished.
6. The lowest tier of maintenance (ie the users) must have some inputs into decision making at district level, even if only on a very limited basis. This could be achieved by asking waterpoint representatives along to district Water and Sanitation Subcommittee meetings occasionally. Additional 'informal' meetings of the subcommittee could be held to facilitate this form of consultation.
7. The lower tier(s) of maintenance should be well trained and equipped to carry out basic preventative and corrective maintenance. To do this, organisation of resources and the distribution of technical skills should be highly decentralized.
8. The top tier of maintenance should operate as a specialized unit, only undertaking repairs when other tiers cannot. As such the top tier should not involve a large number of people. Members of the DMT should be trained to perform an educational and advisory role as well as a technical one.
9. Specific targets should be set, monitored and rewarded for all maintainers. At the moment the definition of a maintainer doing a good job is very vague. Targets would be set at district level and might include such requirements as 90% of pumps must be mended within two weeks. This could not only improve the efficiency of the maintainers but make it easier to monitor what they actually do.



10. In different districts, a varying emphasis on the maintenance system might be appropriate. For example in a district of old deep boreholes at great distance from each other, more attention would need to be paid to developing strong 'specialist' services. In a district in which Bucket Pumps predominate, the DMT may have a very minor role to play and the structure of maintenance should reflect this.
11. Record keeping needs to be improved at all levels. At the waterpoint the community should be encouraged to record all activities relating to the pump. At other levels it is important to emphasize the need to record all maintenance activities not just those where spare parts were fitted etc. The improved information collected should then be used by the managers of the system to help plan for resources and the focus of training monitoring and support.
12. Budgeting should more closely reflect the needs of the district and should be as decentralized as possible. Expecting institutions to function efficiently with grossly inadequate budgets is demoralizing in the extreme. Therefore targets should be linked to the availability of resources. An improved information system could aid realistic budgeting by ensuring that districts with particularly difficult technological or organizational conditions are not unfairly penalized
13. Some form of Two Tier System (as outlined above), incorporating greatly expanded community maintenance, should be implemented on a trial basis in pilot districts. A comparison should be made between two districts with a modified two tier system and two districts with a fully resourced three tier system. the districts should be matched as far as possible for relevant conditions such as rainfall, technology, pattern of settlement etc.
14. Care should be taken to ensure that when donor/NGO funds are available, they are not used to promote a high level of institutionalized maintenance. This is likely to be both unsustainable and counter productive as it will foster an attitude of dependency amongst the users. Such funds should rather be used for enhanced training and education which could improve the community capacity for maintenance.
15. Further studies are required in thee main areas which were not substantially tackled in this report. These are:

a. Finance

Detailed information should be gathered on current maintenance costs, cost of any possible alternative system, estimates of the level of community contributions, and the viability of expecting the community to raise money on a sustained basis.

b. Institutions

An assessment should be made of which is the best institution

to undertake the expanded training required to make community participation work. It would be useful to compare those currently involved (eg DDF, MCCD and NGOs) and assess their areas of strength and weakness. This analysis could be extended to other elements of the maintenance system if it is thought that there is more than one agency which could be considered the lead institution.

c. Technology

More sophisticated indicators of pump usage and the causes of high breakdown rates should be developed. These could lead to the drawing up of profiles of a 'risky pump'. these would be the pumps at highest risk of breakdowns because of a combination of factors relating to their functioning and environment. We have briefly considered some of these contributing factors such as age and usage but some indicators could be substantially extended and refined. the development of the concept of the 'risky pump' could have significant implications both for budgeting and for the allocation and management of resources.



ENGINES - A CASE STUDY

In the course of undertaking this survey, eight engine pumps were also visited, all situated in Tsholotsho District. Whilst these are obviously not a central concern of this survey, not being handpumps, it is worthwhile just briefly considering them for a couple of reasons. Being a highly technological form of water supply, they require substantial maintenance inputs and the ability of the system to deal with this can highlight its shortcomings. Secondly, users often state that they would prefer an engine pump to their current hand pump and this they assert, they would be able to maintain.

The advantage of engine pumps from the users point of view is that they can pump plentiful water from very deep boreholes, thus easily supplying large numbers of people in dry areas.

However, this gives rise to certain problems. Firstly, because of the capacity of the engines, large numbers of people tend to depend on these pumps. These include the immediate users but those with hand pumps who also regard the engine as a backup to be used for livestock watering for example (eg Tsholotsho 4 where people used engine pumps at business centres, but encountered a certain amount of hostility in doing this). Thus an increase in technology leads to higher levels of usage and therefore greater dependency on one source.

Secondly, the pumps are not clearly integrated into the maintenance structure. Whilst some are looked after by council paid Engine Operators, others are solely in the care of the DDF. The DDF usually provides fuel and assists in repairs. However, there is no budgetary allocation for spare parts for engine pumps, so if an essential part breaks or goes missing the DDF takes the whole pump away for safekeeping until a part can be found. Another case was found where ORAP (a NGO) had installed a pump but this had been out of action for four months. The council employed engine operator was still there every day cleaning the pump.

There was no evidence in any case seen of the community contributing anything to the maintenance of the engine pump. Also, general rules which seemed to apply to most hand pumps did not appear to be in operation for engine pumps (eg prohibitions against children collecting water and drums being filled). It could be speculated that the 'higher' a technology the less subject it is to any form of community control or management.

Of the eight engine pumps seen during this research, four were functioning and four were not. The non functioning pumps mostly had been out of order for some time. Of the functioning pumps, only one had not broken down at all in the previous year. Downtimes ranged from three days (for the one situated at Dhlamini business centre) to three months. All were repaired by the District Maintenance Team.

In conclusion, it would seem that the greater the degree of technological complication, the less inputs the community has both over the maintenance and the use of the pump.

Cairncross S et al; Evaluation for Village Water Supply Planning, Wiley, Chichester, 1980.

Chambers R; Rural Development, Longman, UK, 1983.

Cleaver F; 'Maintenance of Rural Water Supply, a Case Study from Makoni District', Postgraduate Diploma in Rural Development planning dissertation, University of Zimbabwe, 1987.

Cohen J M and Uphoff N T; 'Rural development Participation: concepts and measures for Project Design, Implementation and Evaluation', Rural Development Monograph No.2, Cornell University, 1977.

District Development Fund; Pumpminder Evaluation. First Preliminary Report, DDF Water Division, 1989.

Erickson B H and Nosanchuk T A; Understanding Data, OUP, Milton Keynes, 1979.

Feachem R G et al; Water, Health and Development: An Interdisciplinary Evaluation, Tri-Med, London, 1978.

Glennie C; Village Water Supply in the Decade, Wiley, Chichester, 1983.

IRC; Handpumps, Technical Paper No 25, IRC, The Hague, 1988.

Korten D; 'Learn from Error', Unicef News, Issue 124, 1986.

Lutheran World Federation; Annual Reports, Zimbabwe, 1986-87.

Midgely J; Community Participation, Social Development and the State, Methuen, London, 1986.

Mutizwa-Mangiza N D ; 'Rural Water Supply and Sanitation in Zimbabwe: Recent Policy Developments.', RUP Occasional Paper No 14, University of Zimbabwe, 1988.

NORAD; 'Evaluation Study: Rural Water Supply. Support to Zimbabwe's Water Sector', NORAD/HIFAB/ Zimconsult, 1989.

Roy S; 'A One-Tier System: The Tilonia Approach to Handpump Maintenance' Waterlines, Vol.2, No 1, 1984.

Saugestad S; 'Patterns in Water Use. Observations from the Manicaland Integrated Project' 1989.

Wijk-Sibesma C van; 'Participation of Women in Water Supply and Sanitation', IRC Technical Paper 22.

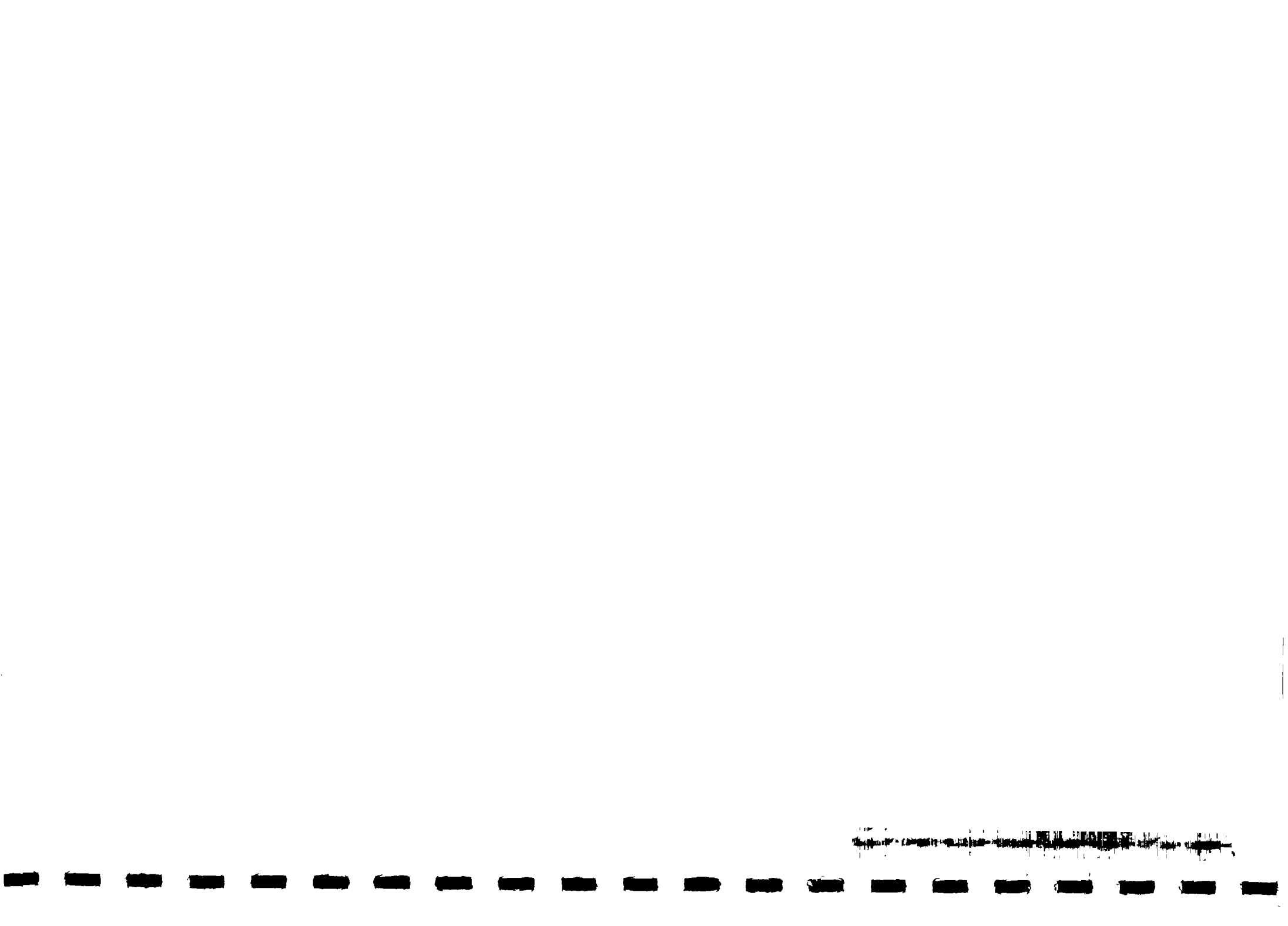


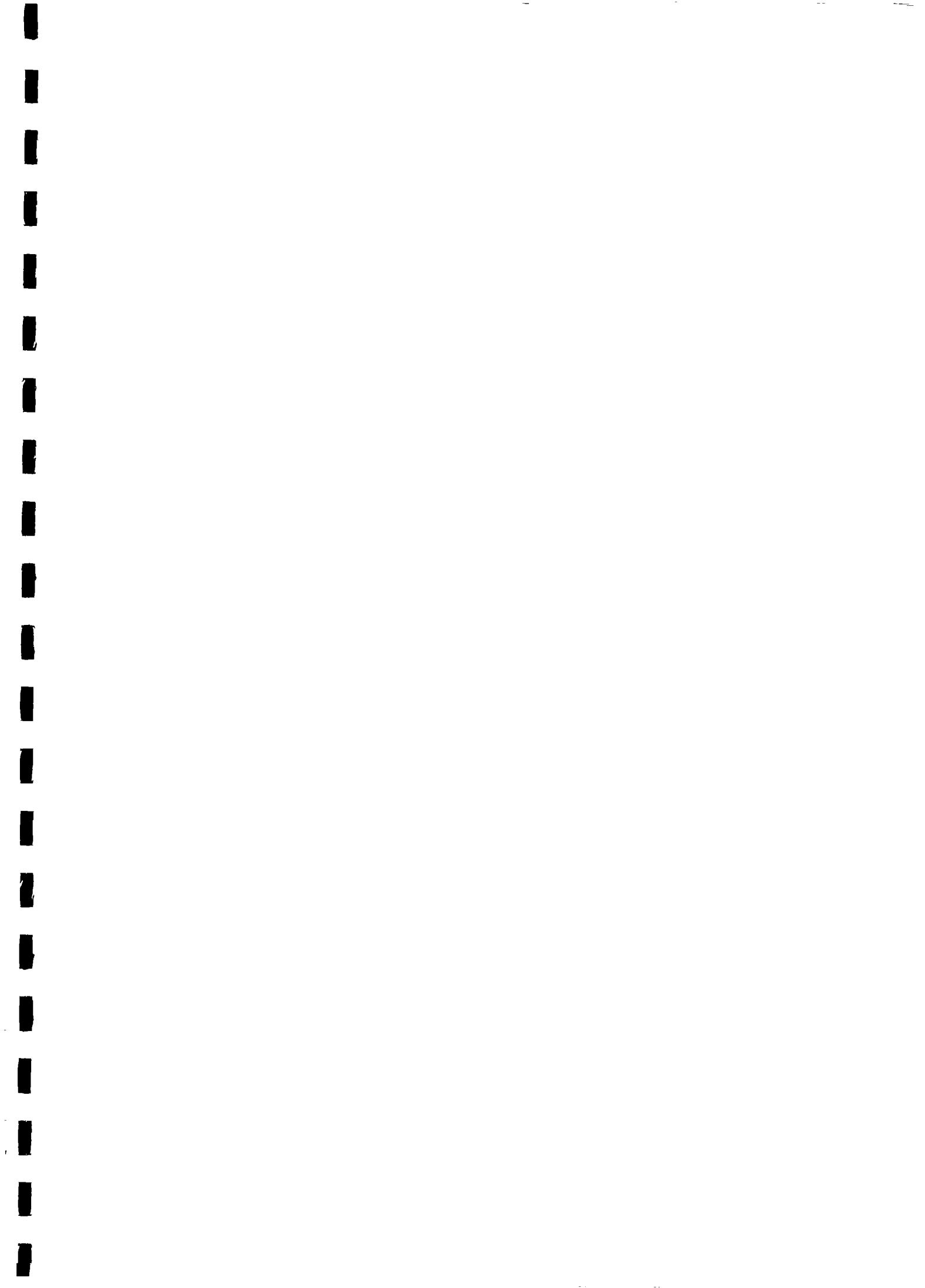
Yin R K; 'Case Study Research, Design and Methods', Applied Social Research Methods Series Vol.5, Sage Publications Inc., Beverly Hills, 1984.

Zimbabwe Government; National Master Plan for Rural Water Supply and Sanitation, 18 volumes, 1985.

Zimbabwe Government; Draft Guidelines on Mobilisation for Water and Sanitation Programmes: Water Committees, Ministry of Community and Cooperative Development, 1989.

Zimbabwe Government; Draft guidelines on Training for Water and Sanitation, Ministry of Community and Cooperative Development, 1989.





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