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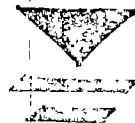
STATUS OF MONITORING
and
EVALUATION

ZPM 007 Water Supply and Sanitation

WASHE PROGRAMME

FEBRUARY 1990

S. Sutton
SWL Consultants
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LIST OF ABBREVIATIONS USED IN REPORT.

CEP Community Education and Participation
 DO District Officer (for Department of Water Affairs)
 DWA Department of Water Affairs
 DWASHE District WASHE committee
 GRZ Government of Zambia
 HA Health Assistant
 HE Health Education
 LWF Lutheran World Federation
 MEP Minimum Evaluation Procedure (for water and Sanitation Projects)
 ORS/T Oral rehydration solution/treatment
 PTA Parent/ Teacher Association
 PWASHE Provincial WASHE Committee
 PWE Provincial Water Engineer
 PROWESS Promotion of Women in Water and Environmental Sanitation Services
 RHC Rural Health Centre
 RWE Rural Water Engineer
 RWS Rural Water Supply
 TS Traditional Source
 UNDP United Nations development programme
 VLOM Village level Operation and Maintenance
 VMT Village maintenance team
 VWC Village Water Committee
 WC Water closet
 WHO World Health Organisation.

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. REPORT SUMMARY

1 Introduction

Monitoring has become an integral part of the project, and is evolving as the form of the project changes. It is designed to assess progress in levels of provision, functioning, effective utilisation, sustainability, and impact, and also to provide information for planning and for further development of Health Education. At present it is more effective in some of these spheres than in others.

2 Functioning

Total number. By the end of 1989 around 850 wells had been constructed of the 1000 planned.

Type Of the total, two-thirds will be boreholes or wellpoints with handpumps, and one third shallow wells with windlasses.

Yield Amount of water which can be abstracted does not limit consumption except from peri-urban wells which are over-used, and some 15-20% of shallow wells which need re-deepening.

Water quality is unacceptable for drinking (according to consumers) in about 2% of wells. Water quality does not deteriorate as a result of carriage to, and storage in, the house, so that any benefit of better water at the source does reach the consumer.

Reliability Handpumps are being very well maintained, and are inherently reliable. More than 95% were operational in sample surveys in 1988 and 1989. Shallow wells are still more prone to non-operation, due to drying up, and water quality deterioration. Despite large inputs in community participation for maintenance, the situation is only slightly better than when the programme began.

Convenience More information is needed on savings in distance/time for water collection, and also on ease of use of different water lifting devices.

Conclusion Good information is available on functioning, but there is a need to make sure that monitoring is kept up-to-date, and that results are put on the data base without delay, so that they can be used in RWS planning and assessment of progress. Degree of functioning is a primary indicator of how well the infrastructure is working and how much communities value their supply.

3. Effective utilisation.

Proportion of houses using new supply. Almost all households within reach of new (DWA) supplies use them for drinking water at least. Indications are that gradually, those who do not, or those who use other sources for washing water, are beginning to increase their use of the DWA source, and decrease their use of traditional sources. Surveys of school children suggest that by the end of this phase approximately 50% of the rural population will be using DWA sources, except perhaps in Senanga district.

Volumes of water used. Again there are signs, from monitoring of plain edge villages, that amounts of water carried home are gradually increasing, and the uses of such water are expanding. In communities where the DWA supply replaces a very distant source, the changes are more immediate and more noticeable.



Conclusion It is encouraging to find behaviour changes even in communities with alternative sources nearby. These changes require further monitoring, but in fewer places. Uptake of DWA sources is increasing, and has reached high levels within most communities surveyed.

4 Sustainability

Community involvement This is now high, from the start. Analysis of attendance at meetings, and continued record keeping, would help show how well early interest is sustained by different groups.

Maintenance is being devolved more to community level, but this needs considerable input, as few communities are self-sufficient at present. Most communities seem to have set up good routines for keeping the well area clean, and collecting funds.

Cost recovery So far no community has left a well unrepaired through lack of funds. Costs need regular up-dating if true costs are to be covered, and decisions need to be made as to how much of transport costs can be charged. This might wait till VMT training programme is complete. Further experiments in communal cultivation to provide funds might be explored.

Individual skills A good problem solving capacity has grown up within the whole infrastructure. However each level still needs some support from the level above, and it may be that the skill of communicating is still the one most needed to develop in all sectors.

Organisation/communications. The infrastructure to support rural water supply in the future, has evolved into a well-defined system. The main weaknesses still lie in a) those committees which are not active and do not know how to set about re-election and b) DWASHE links to councillors and co-ordination of district level organisations to support community efforts. More information is needed on these weak areas, so that solutions can be found before 1993.

5. Impact

Health

Health benefits are complicated to measure, especially where only referring to 50% or less of the population. Existing health statistics involve too many other variables to provide a reliable basis for monitoring impact (especially because of the parallel traditional healing system). It might be possible to set up a case-control study with the Ministry of Health, but this would be a major task, so would not be feasible unless both organisations feel it merits high priority.

Perceived health benefit relates mainly to diarrhoea, and secondarily to eyes, and then body sores and rashes.

Distance. Time saved seldom leads to greater productivity, but may lead to less tiredness, and more time on child care. Further monitoring on this aspect is necessary.

Health Education. At community level the impact of this still needs assessing. No differentiation has been made between changes brought about by HA's, and that by the WASHE education programme. In schools impact has begun to be assessed, and further monitoring would help clarify some points which arise from the last survey. Schools appear to be very keen to become more involved, and have used their own initiative to develop new ideas in several instances.

Other impacts. The project has also done much to develop the role of women



instances.

Other impacts. The project has also done much to develop the role of women at several levels, and to heighten the felt need for water. The setting up of community decision making and problem solving has also helped in the growth of community identity, and the development of the WASHE philosophy is strengthening DWA ties with other government organisations, especially Ministry of Health.

Conclusion There are plenty of examples of the above aspects, but no picture of how widespread they are, and in which areas they need better promotion. Monitoring of attitudes, and of behaviour in areas covered by the project, and also of some which are not, would help both to clarify the areas needing most attention, and the impact the programme has had.

6. Surveys

Surveys offer an opportunity both to gain information and to impart it. The main omission has been in the lack of feedback to fieldworkers and communities which were involved. There has, however, been more feedback than might be thought, because much information has been used in problem solving, and other ways than purely presenting basic data. Surveys have been carried out at three main levels, community, household, and schools.

Community level surveys. Selection criteria are still applicable, and have been very valuable in formalising the selection of communities. Slight modifications might be needed in the next phase.

Annual monitoring of supplies provides basic information on operational status and problems encountered by communities. It is useful for planning, and as an indicator of how the community based system is working. It is important that they continue but perhaps with some devolution to extension workers for data collection.

Village water committee surveys monitor the strength of committees, and offer opportunity for them to suggest how their role might develop. Existing questionnaires should not be repeated, but should be replaced to help assess the impact which previous education programmes have had.

Household utilisation Despite early results which were discouraging, and the fears of bias, and influence of other variables, it would seem worthwhile to continue monitoring at some (perhaps five) communities, as change appears to be gradual. Household questions should now change to reflect the new emphasis of the project in this phase.

Household water quality surveys are completed, and do not need repeating.

School water use surveys provide a good indication of coverage and should be repeated, especially in areas where few new wells have been constructed, and should be extended to cover urban schools and those where the HE programme has not yet reached. Questions related to the transmission of ideas from school to communities should be added.

Other surveys have usually been of small samples to gain information on variations in attitude or behaviour often to form the basis of problem solving and education programmes. New surveys of this type have been planned as a basis for the development of new washing slab and water storage designs, and the planning of the VMT training course.

New survey construction Most surveys are now redundant or in need of modification, and new ones need to be constructed. CEP need to apply guidelines of survey construction, pooling their expertise in this and making sure that they pre-test all questionnaires. This means not just seeing if questions are being misunderstood, but also that answers are to the point and contribute towards the objectives of the survey.



1 INTRODUCTION.

1.1 Monitoring

1.1.1 Few projects continue from start to finish as they are planned. The form of each needs to be flexible to fit new conditions as they arise, and so each needs to evolve and grow, and develop its own problem solving capacity, so that the infrastructure set up becomes increasingly capable of making decisions and defining objectives. As a part of this, there is a need to be able to see how far objectives are being fulfilled, what still needs to be done.

This is partly achieved by monitoring indicators of objectives. These, for a water supply project would include indicators of degree of functioning, effective use, sustainability, and impact. The information collected can then be used in discussion and decision making at all levels, from household/community, to national/international funding agencies.

1.1.2 In addition, monitoring often improves the moral of those involved in a project, when they have a clear idea of the progress they are making, and the targets they are aiming for. It can also help in the identification of common problems which require changes in project approach, and the same process frequently uncovers various solutions which different communities have found effective, and this experience can then be 're-cycled' and discussed with others who have so far found no solution.

1.1.3 This report has taken as a basis the WHO and UNDP Guidelines for monitoring of water and sanitation projects (1+2). These are the WHO Minimum Evaluation Procedure, and the UNDP/PROWESS Goals and Indicators. The former concentrates on indicators of functioning and utilisation as the main aspects for monitoring and evaluation, while the Goals and Indicators of UNDP/PROWESS relate more to those for effective utilisation, sustainability and replicability. There appear to be no equivalent guidelines on impacts as such.

1.2 Historical background

1.2.1 Monitoring for the ZAM 007 rural water supply project originally started up in 1985/86, in an attempt to improve definition of project progress, at a time when there was little information on what was being achieved, or on considerations which could aid effective project planning. Since the water supply programme was set up, and particularly since 1985, its Terms of Reference have changed significantly to reflect the changing philosophies of rural water supply implementation in general. Monitoring has needed to evolve continuously to reflect, and in some cases help predict the form of these changes.

1.2.2 At the start of the project in the late 1970's, the target of ZAM 007 was expressed simply as the construction of 700 jetted wellpoints. By 1980 it had changed to 800 wells/boreholes, and during the next four years this remained the target, with no mention of operational status or infrastructure or expected benefits. In 1985 the project began to be integrated within DWA/GRZ and at the same time, the Phase 4 objectives were enlarged to emphasise -:



- improvement to health and social conditions
- improvement to the situation of women and children
- promotion of self-reliance in terms of organisation, manpower and financing.

This turned the project from an essentially engineering programme towards a community based approach, as far as was possible within the policies of GRZ at that time. This was promoted by the setting up of the WASHE programme and its acceptance at provincial level.

Phase 5, starting in 1990 concentrates particularly on the last of the three objectives above, and emphasises maintenance and re-habilitation aspects of water supply, and reflects the decline in funding available to the project. Sanitation is also given a prominence which was previously less acceptable to DWA, and so was largely lacking from earlier phases.

1.2.3 The form of the project has evolved also, moving through phases, which although not planned as such, closely resemble the stages of setting up replicable systems in water and sanitation which are outlined in the 1989 paper on Goals and Indicators produced by UNDP/PROWESS (1). They may be expressed as follows to fit the project's continuing evolution -:

Established institutional framework

- (Semi)-autonomous organization
- Less by-passing, more integration with government agencies
- No by-passing, all through government agencies

Proportion and role of specialised personnel.

- High input of (outside) specialised personnel
- Mostly regular (local) staff, decline in specialists
- Existing (local) staff, further decline in specialists

Budget size and sheltering

- Generous and sheltered
- Medium sized and partially sheltered
- Average size and regular budget item

In most aspects the project is in transition to the last stage.

1.2.4 As the project has evolved and changed its horizons, so the monitoring is beginning to do so. Initially, because of scarcity of information, low and poorly recorded rate of construction, the inheritance of a large number on non-operational systems, and limited resources for monitoring and evaluation, the project concentrated on -:

Stage 1. Definition of degree to which project has reached its physical targets. No. of wells completed, no. operational, no. in need of maintenance, diagnosis of faults, no. in need of VWC strengthening. This equates to the functional status which the MEP (Minimum Evaluation Procedure (2)) suggest should be addressed first.

While this was being established, and the number of operational facilities was being increased, the project moved on to consider utilisation and problems of non-use -:

Stage 2. Proportion of rural population with access to, and proportion choosing to use, new sources. Role of women active in water sector at



community and DWA level. Utilisation studies of volumes used, and water collection practices with and without new source/ health education. This equates to the utilisation status as in the MEP, which recommends that this aspect should only be looked at once functional status has reached acceptable levels.

Functional status continues to be monitored, and utilization status is planned to be reviewed at intervals, mainly through school surveys, which seem to give a reliable view with relatively low inputs.

The next stage has mainly been preparatory to the change of emphasis of the project in Phase 5, with some consideration of the perceived impact to date from key people within the community level infrastructure.

Stage 3. Monitoring of the attitudes of VWC's, HA's, school teachers to the WASHE programme, and what they require of it in the future. Survey of the effects of the school Health Education Programme. Data collection to aid in planning phase 5, and particularly in formulating CEP developments. This has therefore been a phase of both research surveys, and the beginning of impact assessment.

Stage 4. Indicators of sustainability and of impact to assess how far project is leading to changes in way of life, attitudes to health and sanitation and the way they are promoted by the project. (starting 1990). Research surveys of community requirements for a) pump maintenance training b) water storage and c) washing slabs, bath houses and sanitation.

Stages 3 and 4 only become relevant once Stages 1 and 2 have shown that systems are both functioning and utilised.

1.2.5 Monitoring has become an integral part of the project. As far as possible it is designed to take place without disrupting the other activities of the rural water supply programme, and to continue at a level which is compatible with the resources available. The aim is to continue the evolution of monitoring systems which those involved in the project can understand, develop and take part in, and use for their own purposes. This will enable them to be effective in their jobs, and yet also provide information for others to evaluate progress and form the basis for policy decisions at various levels.

1.3 Existing situation

1.3.1 The information available to date has had some far reaching effects. The project had received bad publicity on its poor performance, low productivity, few operating facilities etc. Some of this was unfounded, but irrefutable because of lack of data to prove otherwise, and as the project performance did improve there was a real need to provide information to show that things were changing significantly, and to allow for improved planning.

The monitoring systems set up did have a significant impact both on the workforce, and on local and national government. Those within the project began to feel that what they were doing was worthwhile, and began to make prodigious efforts to carry out their work, often in difficult field conditions. Local government became involved in the WASHE concept, and



stopped regarding NORAD's role in Western Province as simply that of providing Land Cruisers for expatriates, and the situation has now been reached where other provinces, hearing of the positive results of the WASHE approach, have sent people to see how it works, and invited speakers from DWA to explain it. At the national level, the concept that community responsibility and payment for spare parts improve reliability of supplies, as has been shown by the monitoring, is also beginning to be acknowledged and is leading to discussions over changes in policy. In a general evaluation in 1985/6, of Norwegian Development assistance to Zambia, Chr. Michelsen's Institute recommended withdrawal of support for the project. However a subsequent project evaluation in 1986/7 recommended continued support and was helped in its findings by the increasing availability of information on project progress.

Thus monitoring information has not simply been used within certain groups of the project for planning, but has been spread wide, being used by different levels of administration to help in reaching a variety of decisions. It has also been used in international conferences and journals to allow other projects to share some of the experience gained.

1.3.2 Over the past four years, the project has collected a great deal of information to help in the assessment of progress, planning, and perception of the project by users. In the latter half of 1989, there has been an attempt by all concerned to re-assess this information, and to look for objectives of, and need for, data collection for the next phase. This has involved the examination of existing surveys, the degree to which they are still of use or need reformulation or are redundant. It also required re-consideration of indicators of impact, and how these could best be qualified/quantified, and what needs there are for further study of people's attitudes and behaviour patterns to assist the CEP team and others in their work.

1.3.3 For the information collected to date, all the first stage collation, data processing and analysis has been carried out by the project. Compilation of these results has been done with the help of those involved in collecting it, but the reports summarising the results and the conclusions that may be drawn from them, have been mostly written by consultants associated with, but no longer within the project, after discussions with RWE and the Health Co-ordinator. This level of administration has therefore been both involved in and aware of the results of monitoring carried out to date. However, those who have collected and undertaken first stage analysis, have not always been involved in further analysis nor received the feed-back on the work they have done, and so therefore neither have those people and communities which were involved. This problem is now being addressed.

1.3.4 In order that the planning, design, and analysis of monitoring data should involve more levels of the project, workshops have been carried out with field staff a) on designing and presenting surveys/questionnaires (Sept 1988) and b) on the use of survey data, simple analysis and presenting of results back to communities and other interested bodies (Nov 1989). These workshops have been short, but have led field staff to begin to identify survey objectives, think up suitable questions and understand the structure of surveys, and to recognise some of the factors which affect the validity



of results and the form in which they can be presented to different audiences. They have therefore begun to set up surveys for themselves, but have had little opportunity to discuss their ideas and problems with someone more familiar with monitoring. They therefore require more practice, especially in pre-testing and subsequent adjustment of questionnaires, in development of materials for feed-back of information to communities and opportunities to discuss the results among themselves and with others.

1.3.5 Those involved in monitoring have also not always been aware of the different uses to which the data collected have been put, apart from the purposes for which they themselves required it. This was also addressed in November 1989, so that the personnel are more aware that different levels of administration (funding and national agencies, PWE, DWASHE, RWS/CEP, District Officers, Village Water Committees) require differing levels of detail, data analysis, and presentation of results to carry out their work effectively. It is hoped that there is therefore now greater awareness of the variety of purposes and uses of the monitoring which has been carried out to date, and so of the positive contribution which this has provided to the project as a whole. In addition, project personnel are starting to make their own assessments of monitoring needs, and to develop and manage the associated surveys and analyses.



2. FUNCTIONING

2.1 Introduction.

Results of general monitoring have been presented in two previous reports, "Preliminary Results of Monitoring Surveys", April 1988 (3), and "Monitoring Update" 1989 (4). These were aimed particularly at funding and national agencies, and it is perhaps time to summarise these results, which have been discussed only with some of the provincial and field staff, and could be used further with WASHE committees to help them see aims, achievements and limitations of the project. Results are updated where new information has been obtained, but apart from several utilisation surveys, and a full survey of school teachers response to Health Education, the project has chiefly been concentrating on other aspects of the programme in 1989.

2.2 Water quantity.

2.2.1 Target population. The main aim of the project was to cover some 50% of the rural population of Western Province, which is assumed to be around 450,000 by 1990. One of the other objectives was to cover government institutions such as schools and rural health centres. The latter tend to serve a lower number of permanent users, so lowering the average numbers of potential users per well.

2.2.2 Number of wells constructed.

By November 1989, approximately the following number of wells had been completed (or in some cases re-habilitated) in each district -:

Table 2.1 Planned Distribution of wells

	Total constructed	Total planned	%age completed	Estimated Rural Population
Mongu	251	245	102	89,100
Senanga	187	212	88	94,500 (Part covered by LWF)
Kaoma	122	161	76	63,400
Kalabo	129	144	90	90,200
Lukulu	90	130	69	41,500
Sesheke	47	115	41	51,600 (Part covered by Oxfam)
TOTAL	826	1007	82	

The division of wells per district has been agreed with the PWASHE and DWASHE committees and relates also to the level of provision of other services within each district. The number of wells being constructed exceeds the number originally planned (800), partly because of districts requests and the fact that early wells did not tend to target the communities with the largest populations in need of better water supply.

For communities scoring more than 60 in the selection criteria, the average number of households is 45. With just over 1000 wells, and if all were for such communities, the total number of people with access to protected



sources (at 5.5/ household) would be about 248,000, which is just over 50% of the rural population. In fact it is expected that the proportion may be slightly lower, because around 40% of wells are for institutions, where the population permanently served will be lower than 45 households. However at these points good quality and quantity of water will be supplied to school children and patients at Health Centres.

2.2.3 Well yields.

In terms of quantity, all boreholes, all new wellpoints and most (85%) shallow wells have more than sufficient water to cover present demands. Rates of abstraction by handpump or bucket do not exceed 0.25 l/s, and all wells exceed this capacity on construction. Thus limitations of well yield are seldom a significant characteristic of wells now constructed, although some shallow wells, and pre-1985 boreholes, because of their design, may suffer some (irreversible) decline in yield.

2.2.4 Abstraction capacity.

Other limitations of quantity available to each user are mainly as a result of pump breakdown, discussed under reliability of the water supply (Section 2.4). Some limitations do occur, however, where users exceed the optimum number per wellpoint, and where depth to water is so great that pumping effort and efficiency limit the amount of water people are prepared to lift. In a few road-side or peri-urban communities the number of users is higher than desirable (over 250-300), and so queuing is common throughout much of the day. This is true for Mandanga (peri-urban Mongu) and Katongo (peri-urban, roadside, and with a lift of over 60 metres). At these places systems for queuing, and for leaving a vessel in the queue but not having to remain with it, have become established, but the situation does limit quantity available to each household. Users generally have said that the queuing is still less than for the nearest standpipes, and the distance is very much less (about one tenth for most houses).

Elsewhere queues may develop briefly at peak collection times (early morning and just before dusk), but then there will often be little or no use of the well outside these times. In this case, queuing may be regarded partly as a social phenomenon which users enjoy and promote, rather than regarding it as a disadvantage. This is borne out by the fact that very few village water committees or users (less than 5%) complain about queuing or quantity of water available when asked for the disbenefits that arise from the new source. However of the few non-users within easy access of a protected source, 25% gave queuing as the reason for non-use.

It appears that it is really only in peri-urban areas such as Mandanga and Katongo that the quantity of water a household uses may be limited by the amount available at the source. It is here that more wells are needed to satisfy suppressed demand. Limitations to water collected are more closely linked to availability of collection and storage vessels, and this is an aspect being investigated under proposed surveys for 1990, for which CEP are designing data collection systems.



2.3 Water quality. (see also Section 5 Ref 3, and Ref 5)

2.3.1 Chemical/physical quality

The groundwater of Western Province generally contains very few dissolved solids, and most therefore falls within WHO desirable limits. People are therefore very sensitive to the taste of water. Chief causes of poor water quality for domestic use are -:

- a) high iron content
- b) turbidity in the rainy season
- c) ingress of debris in open shallow wells
- d) saline water, especially in Sesheke district.

Wells at which water quality is irretrievably bad, to the extent that people will either not use it at all, or only for washing, are few, being about 4% of the total for shallow wells or boreholes. This is mainly due to high iron content, leading to unacceptable taste. The main area where water chemistry may lead to unacceptable water is in Sesheke district. Here there are still several wells which have a high total dissolved solids content, probably because of evaporites. The Rural Water Supply team have collected information to try and make it easier to predict, in new areas, where poor water quality may occur, but this has not yet been used to re-site wells for communities which already have this problem.

Shallow wells are more prone to quality problems from dirt and debris entering the well, especially when there is little water in the well, and so at any one time a higher proportion of shallow wells may suffer from low, or non-, use as a result of unacceptable quality. This is partly because communities often do not respond immediately to the need for cleaning, urgency not being regarded as great for the majority of shallow wells which tend to be near traditional sources, which can be used if the new source becomes unusable.

2.3.2 Bacteriological quality at source

Little further work has been done on source types and bacteriological quality, since 1987. This is mainly because the laboratory has concentrated its resources on traditional sources for the microproject. Thus the 1985/87 results (see Table 2.2 and Fig 2.1.) are mainly still the most up-to-date findings of the project.

Table 2.2 Bacteriological quality of source water.

Source Type	RANGE OF FAECAL COLIFORM IN 100ml SAMPLE				TOTAL
	0	1-10	11-50	>50	
Handpump on borehole	100%	0%	0%	0%	40
Standpipes on piped supply (groundwater sources)	100%	0%	0%	0%	35
Handpump on wellpoint	93%	0%	7%	0%	14
Shallow well with windlass	74%	15%	5%	6%	304
Traditional source	42%	18%	18%	22%	141
Stream or canal	27%	27%	19%	27%	15



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Fig 2.1 WATER QUALITY FROM DIFFERENT SOURCES

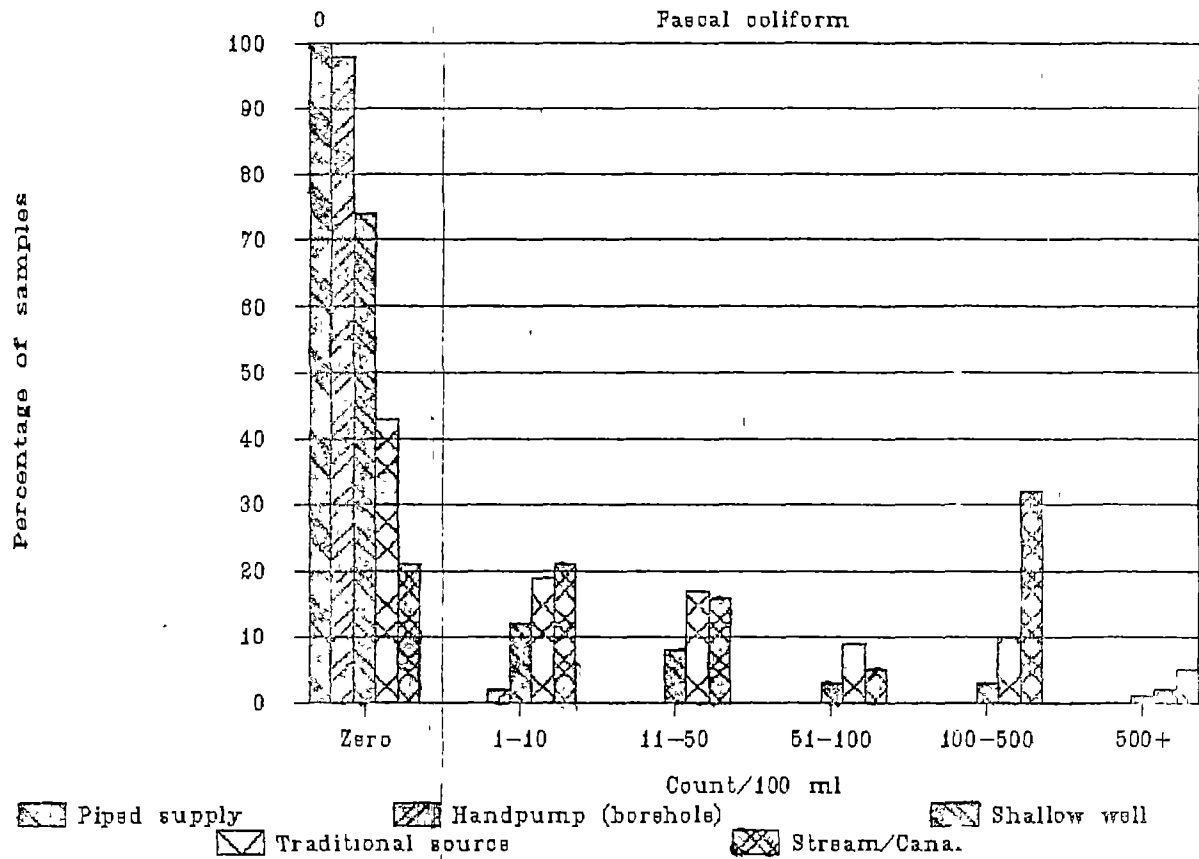
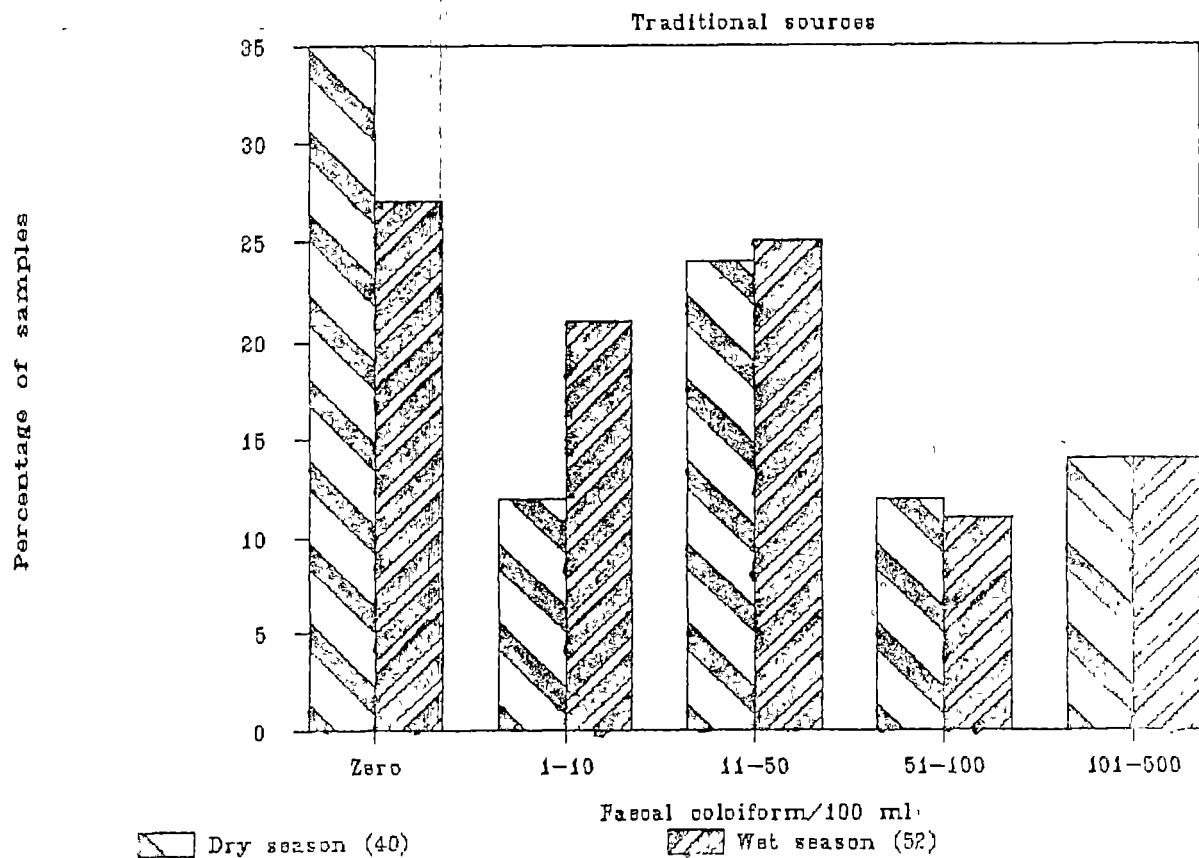


Fig 2.2 SEASONAL QUALITY VARIATION





As can be seen, the information indicates that piped systems and boreholes provide a very safe supply, and three quarters of shallow wells with windlasses do likewise. However less than half of traditional sources offer no risk, and over one in five may be regarded as badly contaminated.

It appears that there is no significant difference in water quality for the most vulnerable source type at different times of year (see Fig 2.2), and so it may be deduced that the improvements to water quality which the new sources provide are both significant and consistent.

2.3.3 Water quality in the house.

Household water quality is discussed in some detail in the report of April 1988 (3) and also in Ref 6. Samples were taken with householders own drinking cups and scoops from storage vessels, and questions asked on collection and storage practices. In order to allow easy identification of contamination on the way to the house, communities were chosen with drinking water sources which contained few or no E. Coli. The results showed extremely low self-contamination of water between source and use. Of 200 samples, 96% contained less than 10 faecal coliform/100ml, and 81% had none. This suggested that the methods people are using to collect and store water are effective in maintaining quality, and that any improvements to bacteriological quality made at the source will reach the consumer. With such a high level of good traditional practice, and no easily identifiable causes for the few bad samples found, no further study has been done of this aspect.

2.3.4 It seems that the project has been successful in efforts to improve water quality so that this is seldom a major consideration in the success of supplies in providing potable water in sufficient quantity to rural communities in Western Province. Where it has been so, some efforts are still needed to find alternative locations which are convenient to users, but which offer a more acceptable supply. However this applies to a very small proportion of new sources (< 5%).

2.4 Reliability of the water supply.

2.4.1 Well maintenance.

Whilst wells may be constructed with adequate yield, and with methods of abstraction which can lift sufficient water for consumers' demand, this situation can only be sustained with regular maintenance. In the case of the well itself, most shallow wells require at least annual maintenance, whilst for wellpoints maintenance may be necessary every 7 years or so, and for post-1985 boreholes every 20 years or so, as capacity was purposely oversized to reduce well maintenance needs. Even the two boreholes (in Lukulu) with the worst sanding problems have not achieved silting of as much as 2% of the screened depth in two years.

2.4.2 Handpumps on wellpoints and boreholes

Reliability refers both to water quality and quantity. Unfortunately there is not a full compilation of monitoring of functional status available for 1988, and 1989 monitoring was still in progress in November 1989. In 1988, the 124 pumps in Senanga, Mongu, Lukulu, and Kalabo for which information



is available (see Table 2.3), seem to indicate that maintenance of handpumps is being satisfactorily carried out, as 98% of facilities were in operation. 80% required no maintenance, with 10% indicating a need for some mechanical repair (mostly poor foot valve closure or worn piston seal in NORAD/Uganda pumps) and 10% with surrounding slabs which required some attention (mostly minor cracks).

Table 2.3 Monitoring of handpumps 1988

District	Total visited	Operational	Minor maint. needed	Slab repair needed	Quality not OK	Admin problem
MONGU	14	14	4	0	0	1
LUKULU	17	17	1	0	0	2
SENANGA	75	75	17	11	2	4
KALABO	18	16	4	2	0	0
%age total		98%	21%	10%	2%	6%

Sampling of the first wells to be visited during the 1989 monitoring suggest the high level of functioning has been continued. All 77 wells sampled at random in Mongu, Sesheke, Kaoma and Kalabo districts were working, and over 90% had no apparent need for repairs either to pumps or slabs. Three Blair pumps had leakage under the base plate, which suggests that extra care is needed to ensure the casing is cut well above slab level, so that no return of water to the well is possible.

In both years, less than 2% of boreholes/wellpoints had quality of which consumers complained.

2.4.3 Shallow wells with windlasses/ pulleys

Compiled information is also not available for many shallow wells in 1988 and 1989, but monitoring in 1988 was carried out for most wards, and had been undertaken again for four wards in Mongu district and one in Kaoma by November 1989.

In 1988, results for 34 wells in Mongu and 28 wells in Lukulu district, indicated quite similar situations.

Table 2.4 MAINTENANCE MEASURES NEEDED, SHALLOW WELLS 1988/89

DISTRICT (Sample)	No. with no repair need	Slabs/ drainage	Deepening	Poles/windlass chain/bucket	Quality/ Bailing
1988					
MONGU (38)	36%	21%	7%	21%	14%
LUKULU (28)	41%	48%	9%	17%	13%
1989					
MONGU (25)	40%	16%	20%	None mentioned	32%

In both districts in 1988 over 30% of wells monitored had been rehabilitated



with communities during the latter part of the previous year.

In 1989 the situation had improved slightly, but the effects of having made chlorination with bleach freely available in 1988, seem to have worn off (or people are just more aware of the importance of water quality), and more people were asking for help in improving water quality. (For most of 1989, bleach was not available in shops in Mongu). It also appears that, despite the good rainy season preceding the 1989 monitoring, wells are going dry in certain areas. 20% of wells were almost out of use because of little water. Those that are doing so are generally decreasing in total depth (by as much as 0.5m in a year), suggesting that sand is still boiling up. This is also indicated by the larger number of cracked slabs than with handpumps, reflecting the movement of rings when shallow wells are cleaned out/deepened, rather than any particular design fault in slab construction. This is occurring more as communities provide more regular maintenance, but is a factor which may discourage their future efforts. The need for gravel pack has been discussed, and all wells have had some installed, but it is not easy for communities to maintain the layer if deepening is needed.

These figures compare with 1986, when community involvement in maintenance had not started. At that time around 80% of shallow wells were operational (not including Kaoma where less than 30% were), around 20% were in need of deepening, and almost all (over 90%) needed repairs. 80% of handpumps were operating, but most were in need of minor repairs. This is particularly true for the old handpumps on wellpoints and early boreholes, which have leather footvalves and piston seals, which are not used on the newer pumps. Thus it appears that, so far, community involvement may have improved the situation significantly for handpump supplies, but has not greatly altered the situation for shallow wells, although their general condition has been improved.

2.4.4 Reliability and maintenance.

In Mongu district, apart from the overworked pumps in Mandanga, almost all faults were diagnosed and repaired before total breakdown occurred. Of 70 purchases of spare parts, just under half (43%) were on the community's own initiative, the rest being carried out during the district team's follow-up. What is not clear is what percentage of the latter are as a result of the team diagnosing faults, and how many were simply the village water committee using the opportunity of their visit to buy spares which they knew were necessary but not immediately so.

From the Mongu receipt book, it is apparent that during 1989 (Jan-Nov) some 78 purchases, and/or call-out fees were paid by communities to DWA, amounting to over 4,500 Zk. Of these approximately half were for shallow wells and half for handpumps, reflecting almost exactly the actual proportion of each source type (130 and about 116 respectively).

Of the shallow wells, 60% of payments were for buying grease, buckets, or bringing buckets for welding. The rest were mainly for slab repairs, for which DWA provided some input. Of 21 Blair pump repairs, a third were carried out by the community coming to buy the spare part, and installing it themselves. Otherwise the call-out fee generally reflects that the repair was done at the time of follow-up visits, and the DWA team were asked to help during this, once spares had been purchased. The majority of the rest



of pump repairs were for the old NORAD and Uganda pumps, which are being phased out when possible, as VLOM is not possible with them. Of the four Consallen repairs, three were for the same Mandanga pump, and one for Mutwiwambwa, the pump which has been installed longest (4 years) and has a high lift.

In order to monitor pump performance, and community strength/weakness in responding to the needs for maintenance/repair, records might be kept with the receipts which give more detail of what was done, and who initiated and took part in the repairs.

At present the indications are that -:

- a) pumps are operating well, with few breakdowns, and usually only cheap spares being needed.
- b) Shallow wells are being better looked after, people bringing leaking buckets for repair, but still needing some encouragement to consider and guidance in, the repair of slabs
- c) Even for Blair pumps there is quite a high input from district teams, which suggests that for most places more training is needed. Perhaps a major increase in the call-out fee could follow on the training scheme for Village Maintenance teams, to encourage lesser dependence on outside inputs, and the transport this needs.

2.5 Convenience of water points

2.5.1 Measured changes in distance

Distance to water has not been a major constraint to water use for most communities in Western Province. The pressure on land is low, and therefore communities have tended to grow up where water is not too far from the house. Thirty minute return walk, corresponding to one kilometre approximately, is an average distance. The main exceptions to this are where other pull factors, such as good soil, free land ownership, or trading advantages are operative. Therefore areas such as the farmlands East of Kaoma tend to have the longest journeys (more than 30 minutes per return trip). Communities along the tarred road, and where the Litunga has given land also have long journeys to water, but they also tend to be poorly nucleated, and so seldom to qualify for a supply under the present criteria. Peri-urban areas, growing up for trading, and immigrant labour also fall into the category of long distance to water, but are well nucleated, and could still be better served with handpumps.

Whilst information is available for the distance to water of villages as a whole before the new source was established, this is not done for individual houses. As sources tend to be quite near, the provision of a new supply is unlikely to lead to major improvements in distance for every house. For most the difference will be small, except where distances to water used to be more than 30 mins for the return trip, and a borehole allows a source to be put close to the nucleus of the village. Little information is available unfortunately for the districts where the changes in distance are expected to be at their greatest.

Data for schools are more easily comparable before and after the DWA source,



because schools tend to be very nucleated settlements, and distances are consistently measured from the school flag pole. It is an exercise in which pupils have been involved and gave the following results for 23 schools and 8000 pupils -:

Decrease in distance Proportion

< 200m	32%
200-500m	40%
500-1000m	13%
> 1 km	15%

2.5.2 Perceived changes in distance

In terms of perception, the proportion of people who regard reduction of distance as a major benefit seems to be consistently around 22-25% within the earlier communities, schools and the more recent communities served in Mongu and Senanga, most of which are along the plain edge or on dambos. For later communities, served in the past three years, this proportion rises to 80%. More information on this aspect needs collecting for those wells constructed in the past three years, which often tend to be places where water collection was previously a more time-consuming activity, both in terms of distance and queuing at traditional sources with insufficient water. This is particularly important if reduction in time and energy for water collection is to be properly judged. Any such investigation should also seek to establish what such a benefit means to those who collect water, in terms of what may be done with the time, reduction in tiredness etc. (see Section 5.4)

2.5.3 Ease of water lifting.

Although the MEP consider convenience only in terms of distance, ease of abstraction/lifting of water should also be considered. Scooping water from traditional sources is often regarded as the easiest way to obtain water, especially by the elderly and the very young. Approximately one third of all water collection trips are carried out by children, who sometimes find windlasses and stiff or heavy handpump handles difficult to operate (especially where water is at great depth).

No work has been done on peoples preference for lifting method. This should be looked into, and if there is an indication that people with buckets and windlasses are keen to change to handpumps and are prepared to pay the full price for a pump, a full survey should be undertaken. Since the source type constructed depends chiefly on groundwater conditions, in order to give people maximum flexibility in choosing the site, there is generally little opportunity to react to preferences for a given method of abstraction where boreholes are concerned. Under 5% of users complain about the method of abstraction provided.

2.6 Sanitation (See also ref 3, section 8)

Sanitary facilities in rural areas are mostly confined to pit latrines. In urban areas, planned housing groups, such as those for government workers,



tend to have communal water closets and wash houses, and schools also have WC's or more permanent latrines. The state of such toilet facilities has often be cited as a cause for non-use. If the council accept the project working in the urban areas, much more can be done on this topic through the schools. In particular it seems that the provision of permanent pit latrines, and no maintenance provides especially unacceptable conditions.

In contrast, the rural school latrines are the responsibility of the school, and tend to be constructed every term by and for every class. All schools carry this out, and the Ministry of Health will close any school which does not provide satisfactory facilities.

Initially surveys of household latrines was carried out through the schools, but the results may not be very reliable, possibly through a misunderstanding by some of the concept of 'accessible to'. It may also reflect a greater sharing facilities between households. Surveys are carried out also as part of utilisation studies, and health assistants, who do most promotion of sanitation keep some records of latrines in their area.

The project has done little to promote sanitation in rural areas, because of the belief that the rural population is so scattered, hookworm is relatively rare, and the impact of sanitation would therefore be low. Improvements in hygiene and excreta disposal would have more effect.

In peri-urban areas, however, the density of population is high, and greater impact could be made. A pilot sanitation project was planned, and a consultant, Dr Nyumbu drew up a proposal, but Mongu District council were not in favour, and DWA (Lusaka) did not feel that sanitation came within their brief or budget. So, unfortunately, action in the area most at risk, has so far not been taken, and will prove difficult unless the opposition dies down.

2.7 Health Education

Health education programmes have been established at community and school levels, and training programmes with teachers, health assistants and other extension workers carried out. Every community with a protected source has now received some health education, even where these were constructed before the health education programme was started. Approximately 60% of schools have also received some coverage, and this is being expanded.

Materials used have been extensively pre-tested, and CEP staff trained in their use. What remains to be done is to train CEP in training others, which they at present have to do on their own initiative, using their own ideas. Aspects covered as standard with each community include -: household hygiene, personal hygiene, good water use, and care of facilities, co-operation, sharing of labour to reduce tiredness, diarrhoea and ORS, eye infections, malaria, AIDS and bilharzia. These aspects are not covered by conventional teacher-pupil teaching, but by participation, where the community suggest causes and reasons for situations/ diseases, from their own experience, aided by untitled posters. In this way good practice is identified by the community, and the behaviour which leads to better health can be re-inforced without apparent interference from outsiders.

The CEP part of the project is functioning well, and keeps records of its



activities, which villages still have not had follow-up meetings etc, and where special visits are necessary to help in problem solving which the community has indicated they are unable to achieve on their own.

2.8 Conclusion

It appears that the information available from monitoring is sufficient for the consideration of most aspects of System Functioning. In that this provides indications of how successfully infrastructure, technology and human resources development are combining to provide operational water supplies, it is basic both to the planning and evaluation of the project, and needs to be continued, and kept up to date, both in collection, storage and analysis. In most cases it can be done as a part of the normal course of work, by district and provincial staff, and could be devolved also to Health Assistants and possibly Ward Chairmen. Schools and Health Assistants could also help to provide new information on sanitation, where relevant.



3 UTILISATION

3.1 Introduction.

Whilst the new rural water supplies seem now to be achieving a high operational status, it is also necessary to be able to monitor the degree to which the water available is used by those for whom it is designed. The MEP proposes two indicators, proportion of households using the facilities, and the volumes of water used and for what purposes. The first of these has previously been referred to as 'uptake' and this was mainly discussed in Ref 3, while the second, under the title of 'utilisation' has been addressed in Ref 4. Some more information is now available on the latter, but little more on the former, which is therefore just summarised briefly.

3.2 Proportion of houses using the new water sources.

3.2.1 There are three issues involved in establishing the proportion of houses using the new sources -:

- 1) in communities with a new source, what proportion of people use it regularly?
- 2) what proportion of the total rural population have access to protected sources?
- 3) for what purposes is the water used, and is the pattern consistent throughout the seasons?

Information on the first of these has been collected on a community by community basis, by observation and household survey. The last two issues have mostly been addressed by collecting information from schools, which give the broader picture including families not living in communities where new sources have been constructed.

3.2.2 It is to be expected that once a new source is constructed, not everyone will change the practices of a lifetime overnight. The decision to try the new water is gradual, as is its adoption for a wider variety of purposes. Surveys have now been carried out at Katembo village (Senanga) in four consecutive years, and may show a typical pattern of uptake.

Table 3.1 Source utilisation Katembo village

Year	No. of Houses	DWA source only	Trad source only	Both
1986	27	17	5	5
1987	32	24	3*	8*
1988	34	28	0	6
1989	34	34	0	0

* Wrongly entered in Ref 4

This shows a pattern which might be used as an illustration with communities, tied in with discussion of people's reasons for use or non-use, to explain that it is common for people to take their time to adopt new ideas, and what made people eventually change their behaviour. It is perhaps a little idealised, since there is felt by CEP to be some bias in the last year's result. The traditional source still showed some signs of use, and those households nearer to it may still use it for purposes for which they regard quality as of little importance (eg. clothes and body washing), when



observers are not present. (Considerable efforts are made to try and avoid such bias, but as discussed in Section 6.3.1, it is one of several reasons for reducing the input to utilisation studies, and improving community understanding of their purpose).

A similar pattern is apparent in Sikuyu, where in 1988 ten households still used the traditional source as well as the handpump (the latter for drinking water), but none used only the traditional source. In 1989 no-one was using the traditional source at all and it showed no sign of having been used for a long time. This suggests that all households collect drinking and cooking water only from the pump now, but as a canal runs nearby, they take all their washing to the canal, and total consumption remains low.

3.2.3 An up-dating of Table 3.3 in Ref 4 now becomes an even more positive indicator that once a protected source is established, and can offer a reliable supply, it tends to be used by most people for most of the time, unless distance is a deterrent.

Table 3.2 Update on "Water Uptake derived from Village Utilisation Studies"

VILLAGE	No of HOUSEHOLDS	SOLELY DWA SOURCE (1)	SOLELY TRAD SOURCE (2)	BOTH (1+2)	COMMENTS
Kahonono (1989)	28	28 (100%)	0	0	Plain edge village, use SW just for drinking when well begins to dry up (can't be deepened). New well being constructed
Katenbo (1989)	34	34 (100%)	0	0	Plain edge, TS users far from handpump and decreasing
Sikuyu (1989)	55	55 (100%)	0	0	Plain edge, now all use pump
Nalongo (1988)	56	28 (50%)	7 (12%)	21 (38%)	Plain edge, big village, TS nearer for many
Luatenbo Lima (1989)	45	45 (100%)	0	0	Stream edge
Luatenbo Muzauli (1988)	31	31 (100%)	0	0	Stream edge
Luatenbo Mange (1989)	34	34 (100%)	0	0	Stream edge
Chinoya (1988)	70	70 (100%)	0	0	Forest, far to alternative
Kasima (1988)	43	43 (100%)	0	0	Forest
Mandanga (1988)	15	15 (100%)	0	0	Forest/peri-urban, not full sample
Ilundu (1989)	18	18 (100%)	0	0	Forest, far to alternative, also for travellers
Bukwandi	17	17 (100%)	0	0	

These are the observed practices of where water is carried from to the home.

Throughout all surveys, the wish to use protected sources for drinking water was consistently voiced, even if they are further away than the old source. It appears that in most communities where the source can be sited with the community in a position where it is not markedly less convenient than the



old source, a high proportion of households will decide to use it. How much 'less convenient' it may be and still be used has not been established. A new survey in Nalongo might help to define this better (see Section 6).

3.2.4 The schools' survey which provided information on overall coverage/uptake, has not been repeated or been expanded since the last report. The original survey carried out in 1988 covered some 15,500 children in rural and urban areas in four districts. The results were as follows -:

Table 3.3 Drinking Water Sources in different districts.

DISTRICT	Dry s	Wet s	Dry s	Wet s	Dry s	Wet s
	%age PWS	%age PWS	%age TS	%age TS	%age ST	%age ST
MONGU	45.7	44.0	43.1	42.2	11.2	13.8
SENANGA	26.5	25.7	32.2	40.3	41.2	33.9
LUKULU	50.0	49.8	44.0	45.6	5.1	4.5
KAOMA	27.8	27.8	70.0	69.6	2.2	2.6

PWS = Protected water supply (handpump or shallow well)
 TS = Traditional source
 ST = Stream, river or canal

These surveys were carried out in Kaoma and Senanga districts before all planned wells were constructed or rehabilitated. It would seem that when these proportions are multiplied by a the proportion of wells still to be constructed, all districts except perhaps Senanga, indicated approximately 50% coverage. In Lukulu the West bank has not yet been covered, but the schools were not represented in the survey either. Mongu district had less than 10% of wells remaining to be constructed. Since it seems from utilisation studies that most people will use the new source for drinking, even if for no other purpose when they are far from it, the figures for drinking water are used to indicate the proportion of people who have access to protected sources.

It is hoped that this survey may be repeated in 1990, as part of the new schools' questionnaire (see Section 6.4). It does not need to be labour intensive and should provide useful indicators of the patterns in different physical environments and how these are changing as new protected sources are introduced, or people become more accustomed to those which have been constructed for some time. Maps such as Fig 3.0 help to emphasise which areas are poorly covered with acceptable (or in most cases, any) protected source, and where health education should concentrate particularly on the health aspects of traditional sources or surface water. They can be used in DWASHE meetings to show councillors the coverage and utilisation achieved in their area, and to encourage them to promote utilisation and maintenance of water installations.

There is also a need to investigate the difference between-:

- a) numbers of households identified during application of the selection criteria as being part of communities to be served by new supplies
- b) numbers of households found using the source during utilisation studies
- c) numbers of households registered as using the source by VWC listings.

It would seem that the selection criteria counting of households often



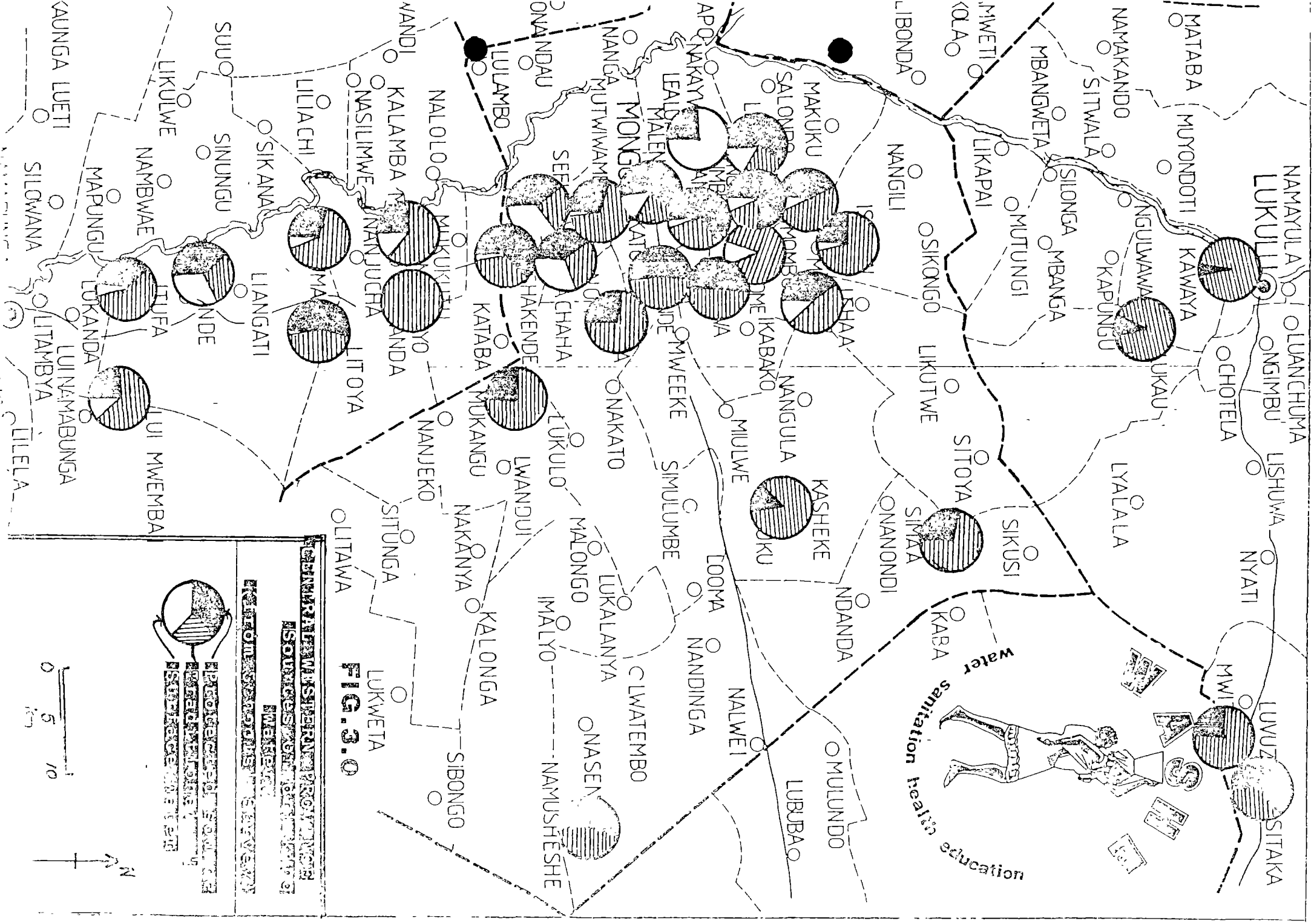


FIG. 3.0

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PROJEKCIJA IŠKUPNINE IŠKUPNINE IŠKUPNINE
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provides a marked over-estimate of households occupied and likely to use the source. Surveys show that nearly all households with access use the new source, but this is often a much lower number than the selection survey predicts. Similarly the school survey and utilisation studies suggest larger numbers of people using the source than the VWC listing indicates. If VWC listings are under-recording numbers it is important to know why, a) so that more reliable data can be obtained by this method and b) so that cost recovery through subscription can be more effective.

3.2.5 Purpose of utilisation.

As mentioned previously, people use a protected supply to obtain drinking water even when they do not collect water for other purposes from it. The proportion who do this tends to reflect the ease with which alternative sources can be reached. In Kaoma and Lukulu districts, where distance to water is greater, 85% use the protected source for both drinking and washing, but only 63% of traditional source users do likewise, as these tend to be shallow, and so nearer to surface water. In Senanga and Mongu districts, about 62% use the same (protected) source for drinking and washing, but a lesser proportion (56%) do so with a traditional source. Washing in streams and rivers is often preferred where these are within walking distance, even if this is far beyond a groundwater source. The advantages of surface water to users need to be considered (see Ref 4.2.2.3) to identify what, if any, aspects could equally well be allowed for at protected sources. The health aspect need also to be assessed in areas of differing health risks, so that health education can target those areas where a change in practice most needs encouragement.

3.3 Volumes of water used.

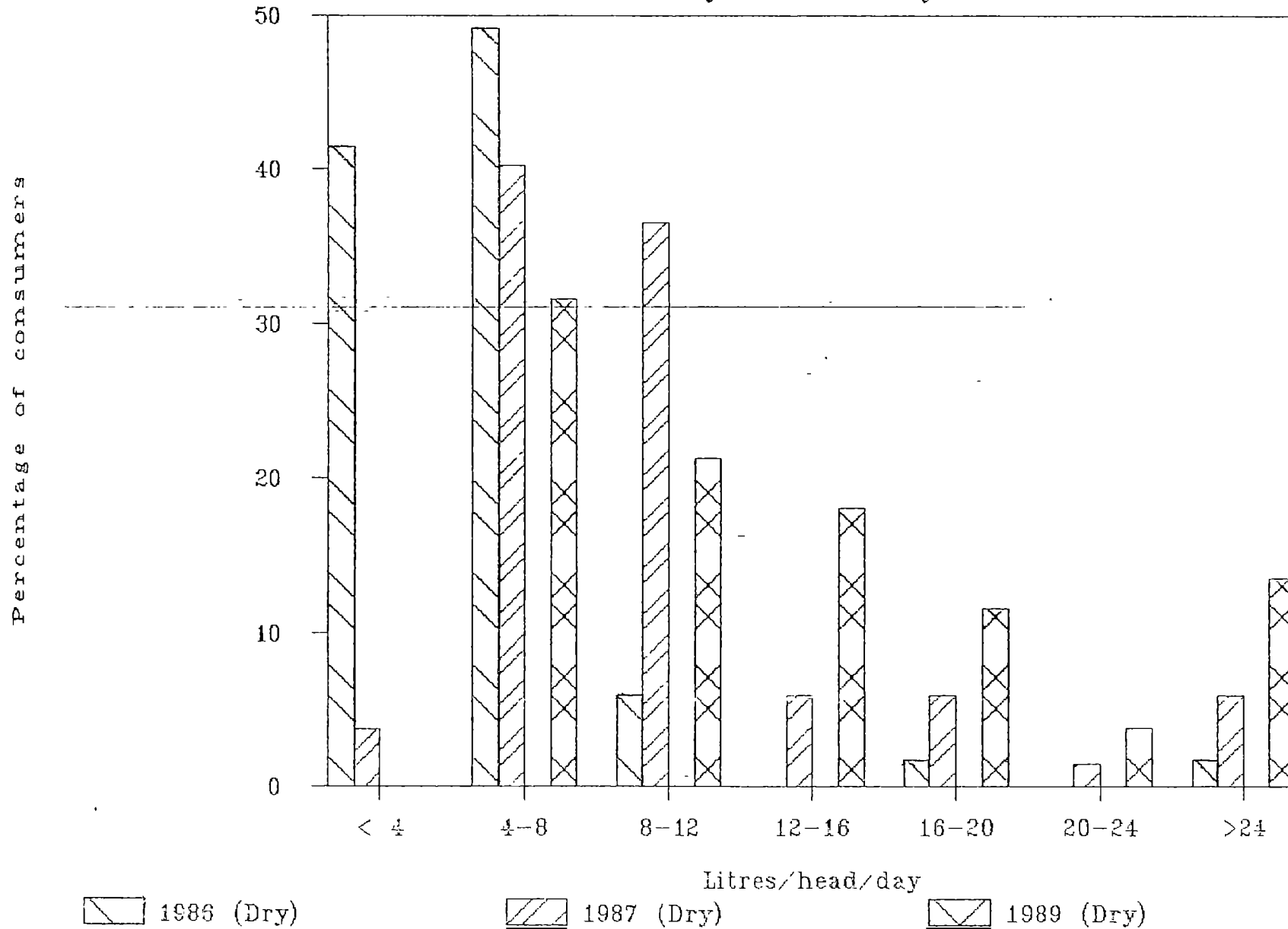
With some activities using surface water which is not abstracted and brought back to the house, the figures of water use cannot give the complete picture of what is happening. During utilisation surveys, every source from which people carry water away is monitored. The purposes for which the last two storage vessels of water have been used is also ascertained at the same time as householders are asked about the problems and benefits of the new source, and any changes they would like to make.

As mentioned above, changes in practice take time to develop. In the case of Katembo village, those changes have been monitored for some time, and can be linked to other factors (see Fig 3.1). Here it is possible to see how the dry season collection of water from the protected source is increasing bit by bit. It is noticeable that while the number of people collecting the least water declined dramatically once the pump was installed, few people collected more than 12 litres/head/day, so that the overall average only moved from 7.1 to 11.1 l/hd/day. In 1989 however, the average had increased to 19.9 l/hd/day, and the shift towards people using more than 12 l/hd/day was more pronounced. The reason for this, according to CEP observations, was that prior to 1989 almost all families were poor and had only small cooking oil containers (2.5 or 5 litre) to carry water in, while in 1989, a major change to the use of large buckets was noticed. This is reflected in the average amount of water carried per trip, which rose from just under 5 litres/trip, to just over 10 litres/trip. The number of bath houses is now increasing, having remained static for the first three years, but at present



Fig 3.1 HOUSEHOLD WATER CONSUMPTION, KATEMBO

Dry Season Surveys





the whole village still uses one communal latrine.

Katembo is a village where alternative sources of water are not far away, with over one quarter of houses nearer the traditional source than the new one. Even so, it does appear that the patterns of water collection behaviour are slowly changing towards those advocated by the WASHE programme. Users reasons for this, and for changing type of collecting vessel (what motivated/enabled them to do so) should be established, and could be used in discussion with other communities. It is of special interest since the trend in use goes against the often quoted assumption that where the water source is less than one kilometre away, a new source, even if nearer, will not lead to an increase in water use.

At Katembo the amounts of water used per head have grown only slowly, and this may have masked some of the changes taking place. In a family of six, if per capita use rises from 7 to 10 l/hd/day then just over one extra bucketful of water is available for use in the house. This bucketful can have significant effect if used to wash babies or children's eyes more often, or to improve the cleaning of dishes and cooking utensils. Its use may be difficult to isolate by questioning, and measurement of each use is intrusive, labour intensive, and likely to lead to unrealistic results.

In many places alternative sources are not so accessible, and changes in practice happen more quickly, and more dramatically. At Ilundu Bus Stop (Mongu district) for instance, the nearest source of water was about one kilometre away (30 mins return trip). Before pump installation the average consumption was 5.4 l/hd/day. In the rainy season after installation, consumption rose to 20.8 l/hd/day, and by the dry season of 1989 it had reached 32.2 l/hd/day (see Fig 3.2). Almost all houses (87%) showed an increase of more than two times as much water collected after the pump became operational. Before hand, people only mentioned drinking, cooking and washing cooking utensils as the purposes for which they had collected water. By 1989 collected water was also stated to be used for washing clothes and selves, and three households had set up gardens which they watered from the pump. Fourteen households had set up bath shelters since the installation of the pump, illustrating that utilisation is truly on the increase.

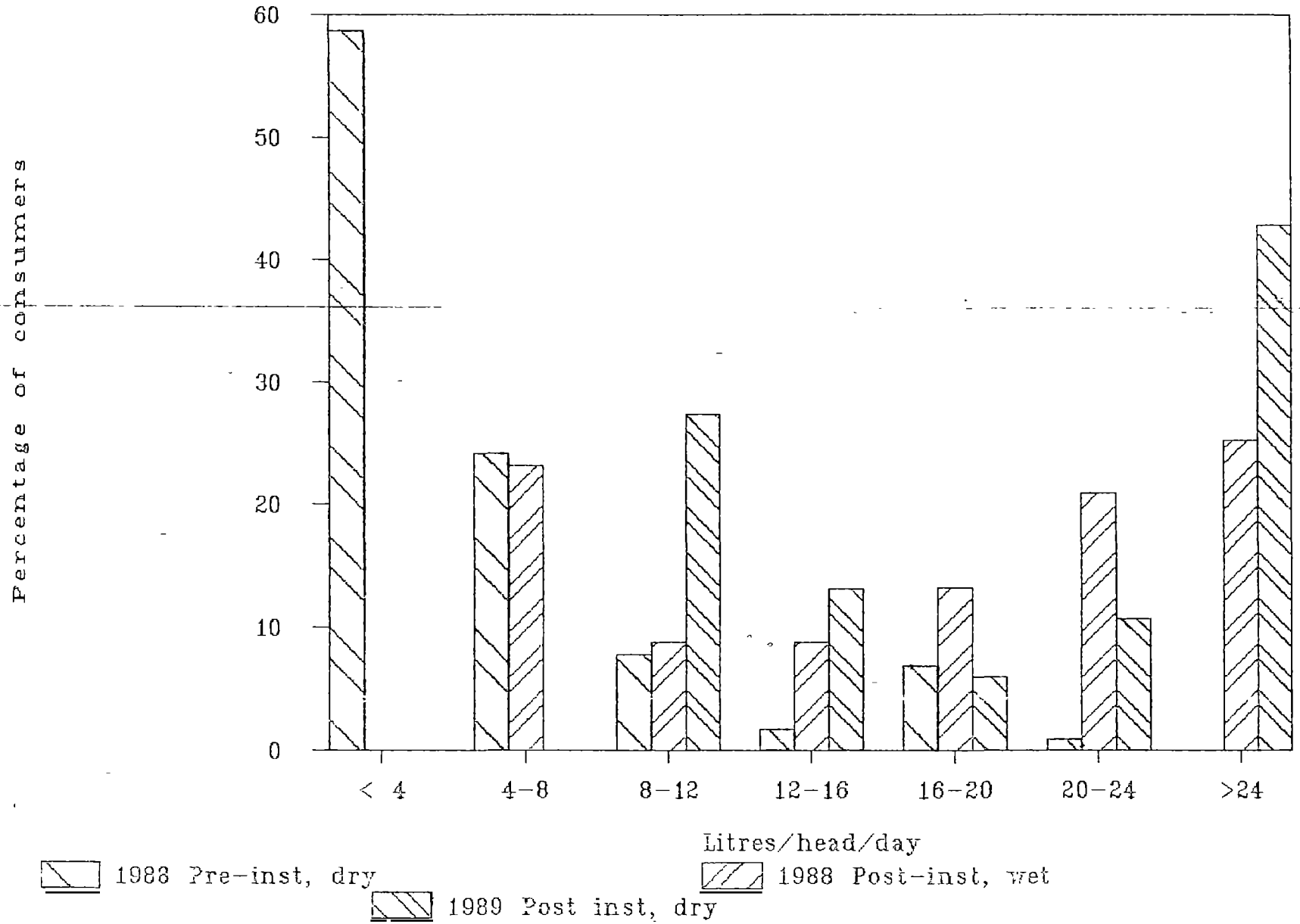
The two villages described may be regarded as typical of the two ends of the spectrum of communities being served by the project. At one extreme are those which are truly water short, and where collection of water caused considerable hardship, and limited the purposes to which it could be put. At the other extreme are places with large populations, but with water nearby, both traditional sources, and usually a little further away (a kilometre or so), streams. In the former the results of providing a protected source which is closer and more reliable has brought fairly instant changes. In the latter, the changes are slower to develop, but are nevertheless of great significance when viewed over a sufficient time span.

Several other examples have been monitored and show similar results. The value and disadvantages of continuing such surveys is discussed further in Section 6.4. One thing which is apparent from the surveys is that amounts of water used will not change by much where people can bathe and wash clothes in a nearby stream. If there is only a low health risk attached to this, but the water there is of high risk for drinking, then the provision of a protected source may still be justified, although changes in the amount of



Fig 3.2 HOUSEHOLD WATER CONSUMPTION, ILUNDU

Pre- and Post- Installation





water carried home may be hard to measure. However it would obviously be desirable for the project to concentrate as far as possible on those communities at the other end of the spectrum in the future. This might require a re-assessment of the selection criteria.

3.4 Sanitation and Health Education.

3.4.1 The provision of latrines in villages is normally low, not exceeding 30% of the population, and usually much lower than this. Utilisation of these facilities has not been properly studied, but questions to children at school show that they seldom use these facilities. This is because -:

- a) the size of the pit entrance is big, and children are frightened of falling in
- b) dirtiness
- c) parents not letting children use it
- d) preference for bush, not a communal facility (privacy)

3.4.2 The school survey also showed that where girls and boys have separate latrines, the girls' one is kept very much cleaner. Every school noticed the same thing. When asked for reasons, it was suggested that girls tend to go as a group, and therefore would be ashamed to leave the place dirty for their friend following after. Boys, however, tend to go individually, not liking to make public where they are going, and therefore leaving quickly, rather than cleaning up for the next person. This information could be built into hygiene teaching, to focus on the difference in behaviour, and to stop the worst latrines from being so bad that it encourage non-use.

3.4.3 Where school latrines were semi-permanent (brick superstructure), pupils were very reluctant to use the latrines because they were totally unmaintained, overfull, and a breeding ground for maggots. In this case it would be more healthy to provide temporary latrines, as in most schools, or even to go in the bush.

3.4.4 For schools and peri-urban areas, where concentration of people makes disposal of faeces a problem, it is important to identify the magnitude of non-use, and ways in which this can be improved. The reasons for it are mostly known, but solutions have still to be found.

3.4.5 Health education is designed to improve effective utilisation of water and sanitation. Hygiene measures which it promotes, such as hand washing after defecation, or before eating are being monitored to see if behaviour is changing. Further work can be done on these and similar indicators of people using health education ideas, and are discussed more in sections 6 and 7.

3.5 Conclusion

In general, the data collected on utilisation is adequate, but the situation continues to need monitoring. Utilisation of sanitary facilities requires some further attention, but this should mainly be confined to areas of high population density. elsewhere, intervention is unlikely to lead to major health improvements or other benefits.



4. SUSTAINABILITY

4.1 Introduction

4.1.1 The information considered in the previous two sections indicates that at a specific point in time the new supplies are working, and that they are being increasingly used. In addition it is necessary to look at indicators that the systems being built up are developing into self-sustaining entities, which can continue to operate once aid is decreased, and eventually withdrawn. This requires financial, organisational and technical sustainability, which if appropriate and strong, may eventually be adopted in other areas.

4.1.2 So far the project has moved towards sustainability by the devolution of all responsibilities to local personnel. Outside expertise has been reduced to a minimum, and is only provided when local staff feel that discussion with others would help them clarify their plans or help solve problems which they have not encountered before, and so find some difficulty in solving. At the same time, more of those working on the project are now on the GRZ payroll and will be able to continue their work after NORAD withdraws (assuming GRZ can itself continue to sustain the present workforce on its books). This means that continuity of personnel at Provincial, and district level, who are familiar with WASHE concepts, is as secure as it is possible to make it during Zambia's present economic difficulties.

4.2 Community involvement.

4.2.1 The first element in ensuring that systems will continue to function in the future is the early participation of communities in discussing needs for and siting of a water source. Since late 1985, this has been part of the WASHE approach. Examination of the records of numbers attending meetings, suggests that on average at least half the households are represented at early meetings, and the proportion may actually be higher, since this conclusion is based on the assumption that where twenty men and twenty women are present, they only represent twenty households, which may well be an underestimate.

4.2.2 The numbers of males, females and children at meetings is constantly monitored, and it has been suggested to CEP that it would be a useful exercise in statistics for the trends in attendance to be analysed. This would allow them to see whether the methods being used are retaining the interest of all members of the community, or whether some become bored, or feel that other activities are more important. The reasons for trends observed could then be investigated, if necessary.

The community is consulted at all stages of the building up of the new water supply. This ranges from the early election of a committee and choosing of the site, to the follow-up meetings where problems are discussed, and methods for raising and saving funds are worked out. Wider roles for the VWC and improvements the village would like to make to the supply or to the WASHE inputs in health education and technical back-up may also be debated.



4.3 Operation and Maintenance

4.3.1 Maintenance includes both regular routines for ensuring that the well functions properly, and emergency measures and repairs if there is a breakdown. The present level of functioning suggests that these are adequate for the project as it has been constituted so far. However as the aim is to reduce outside inputs further, there is a need to be prepared for such changes, and to have developed systems which can survive when this happens. This has been discussed also in section 2.4.

At present, operation and maintenance is designed to be carried out primarily at community level. However it is apparent that considerable reliance is still placed on the support (moral as much as technical, perhaps) of district maintenance teams. This involves a high cost in transport which may not be sustainable once overseas funding is removed. As an intermediate step, a call-out fee was established to try and encourage greater community efforts to solve problems at their own level. It seems that communities are quite prepared to pay this charge, and so it has not been very effective in its aim, and although it has now been raised to 40 k this may still not have the desired effect.

4.3.2 At the same time, efforts are being made to establish the degree to which communities are capable of carrying out their own repairs, as the preparatory phase to the Village Maintenance Team (VMT) training programme. This will help identify the need for further training, and monitor the situation before and afterwards, to help assess improvements in community ability to maintain the water source. The more formalised training of selected (by the community) personnel is an important step towards lesser dependence on the mobility and expertise of the district teams, and once completed, the call-out fee could then be raised again to re-inforce the advantages of problem solving at village level.

4.3.3 In terms of regular maintenance, most communities have set up rotas for the cleaning of pump/well slabs, and the degree to which this is working is one indicator of the strength of the VWC. At schools there is often an arrangement for children to clean the well during the week and villagers/staff at week-ends and holidays (although the second part of this arrangement is not always so well organised). Over 90% of communities have set up a cleaning routine, and by observation most well surroundings are kept clean. During monitoring less than one in twenty was observed to require better regular maintenance.

4.4 Cost recovery.

4.4.1 In the early stages, charges for spare parts, for welding and for call-out were introduced purely to heighten community awareness and responsibility for the water source. The system had to be set up at low levels to avoid opposition, as, at that time, it was against government policy to charge for such items and services. Indeed, it has been the results of the WASHE programme which have done much to change the attitude to such charges.

4.4.2 Spare parts for both pumps and shallow wells require materials from outside the country. This makes the systems vulnerable both to inflation and exchange rates, but communities seem so far to be prepared to pay



accordingly. Rates are now set to cover the costs of purchase, and in some cases transport, of spares to Mongu. However these prices need regular review in the light of the present economic climate, and the changing degree of subsidy to the project. Prices were up-dated in November 1989, and should be reviewed at least annually. (More often than this and it will be difficult and expensive to inform communities of the rates which are in operation.) Some attempt should be made to work out the real cost of spare parts, and to see whether any could be made in the workshop at competitive prices (eg. Blair handle guides). Also consideration needs to be given to the costs of district teams and their mobility, the degree to which GRZ will cover these costs in the future, and what capacity can then be afforded at this level, and what its role should be. It should be noted that materials for shallow wells generally require much higher transport provision than do those for handpumps.

4.4.3 The change in target from no cost recovery (1985) to partial cost recovery (1987) to complete cost recovery (early 1990's) is occurring over a very short time span, and at a time of rapidly increasing economic pressures on rural communities. So far the project has been successful in creating an environment where people have put clean water as a high enough priority that no community has yet failed to raise money for repairs.

In order for this to continue, most (over 70%) of communities now have some funds (target 100k) set aside to allow purchase of spare parts at short notice. This makes sure, that even in seasons with little possibility of income generation money is available when it is needed. At present this money is usually kept by the treasurer, or one of the committee. It has usually only been collected on one occasion, because of the lack of breakdown and low maintenance costs so far. The rate should, however be collected on a regular basis, so that if large items are needed, such as cylinders or pump heads, money is available. These parts very rarely require replacement, perhaps 20% needing replacement in 20 years, for Consallen pumps, but the risk is there and the costs very high for raising funds all at one time. Thus regular payments need to become a standard procedure. An aspect related to this, which requires further consideration is whether some of this money should be invested to make a return which might keep pace with inflation and devaluation of the kwacha. Perhaps the only way to do this in a rural environment, far from banks, is to use it to purchase seeds/seedlings whose fruit may be sold to buy spare parts.

4.4.4 As an experiment, 44 communities, with proven willingness to maintain their water supply properly, were given cashew seedlings. After one year 90% of these trees are still alive and nearing fruit-bearing age. The fruit can then be sold to provide communal funds. Most of the trees which died were in a peri-urban area, where other forms of investment might be more appropriate. A follow-up survey should be done, to assess people's views of and inputs to this way of developing community ability to cover rising costs. Cashew is ideal because of the low need for care of trees after the watering of seedlings, and because the fruit is durable and of high value, but mangoes have also increased in value almost 100 times in the past two years. Neither are suitable for all areas, and other similar ideas could be discussed with committees, along with other uses for any communal funds so generated. Schemes such as this, and problems of payment for spare parts will need careful monitoring, as competing pressures upon available capital becomes greater.



4.5 Individual skills

4.5.1 At community level, the sustainability of systems depends to a large extent on the skill of local people to organise themselves, to administer funds, to set good examples, spread experiences and retain respect/popularity in the village. The only way in which these attributes are measured at the moment is to monitor the impacts of these skills in terms of how well users view the system, and are familiar with the water committee and its role, and how well the supply functions. The only times where such individual skills (or lack of them) are looked into in further detail are where the system appears to be breaking down, either in that users are unhappy with organisational aspects, or physical systems are breaking down through lack of technical expertise in maintenance.

4.5.2 Some of the skills necessary are inborn, and are recognised as necessary by the community. For instance over half the treasurers of water committees are female, because the community recognises that women are generally more careful with money and more able to work to a fixed budget, even though most will never have had any accounting experience as such. The voting of the community to form the water committees also will reflect the regard in which candidates are held for being able to organise others and relate to people from outside the community itself. Where members have turned out to be unable to fulfil this role, there has usually been pressure from within to form a new committee to make sure that the water supply is not put at risk.

4.5.3 The degree to which technical skills are available or have developed as needed within communities has still to be established (see 4.3). In some communities people have been found with exceptional skills in pump maintenance, without any training. It was hoped initially that it might be possible for some people to make a living out of repairing pumps as they do in other countries, but the distance between pumps, and the infrequency of breakdown make it difficult for anyone to make much money out of this. As call-out fees rise, and spare parts become more expensive, and perhaps pumps break down a little more often with age, (not the experience of the main high lift pump used); then it may be that such a trade may grow. Likely candidates should be encouraged, and perhaps offered special training.

4.5.4 Within DWA /WASHE skills have also developed to fit the needs of the programme. Initially individuals were selected from the existing work force, and some new recruitment of females, and a provincial team trained in various aspects of rural water supply. With the formation of the CEP team, more emphasis has been put on developing mutual understanding between the technical and 'soft' sectors of the project, so that each is able to help the other.

4.5.5 As skills developed at provincial level, staff were sent out, usually in pairs, to work with the district teams and help them to learn the new approach and new technology. These people became part of the district teams in most cases, and the need for provincial teams in pump installation and maintenance declined, as the district teams became stronger. Within CEP, although each district team has a CEP member, they are not as fully trained and experienced as the provincial personnel, and there is still a need for a provincial level team to develop new materials, and monitor the impact of the project. From this, and from the planning by Rural Water



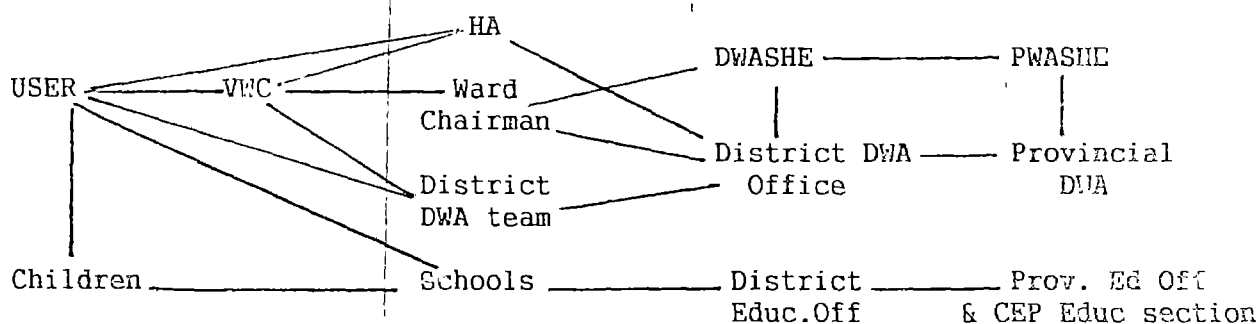
Supply, there needs to be a constant feed-back to the rural teams, and this is done to some extent by twice yearly workshops, and by working together during some period of each year. There is still a need though to do more to promote the skills of the district teams, if some or all are to continue in operation.

4.5.6 In terms of problem solving, the WASHE programme now has within it people capable of solving all day to day problems, whether technical or social. Perhaps the only expertise which still needs some further development in all levels, is the ability to plan and co-ordinate, so that each person knows what is expected of him/her, and what s/he hopes to achieve.

4.6 Organisation and paths of communication

4.6.1 The project has several levels of organisation and various paths of communication between them (See Table 4.1)

Table 4.1 Levels of organisation



4.6.2 So far efforts have been made to gather the views of users, VWC's, and some Health Assistants (HA's) on the programme. At community level the response has generally been favourable, with few complaints, and several ideas on how the WASHE programme could help further improve quality of life (see Ref 4 Section 4.4). These ideas have usually been on further health education, and the promoting of co-operatives to make buying and selling of produce easier in rural areas.

Within Mongu district, where the most follow-up activity has been undertaken, village water committees now have much more confidence, and appear to be making more decisions on their own. Three out of four now appear active, having organised their own meetings (up to once a month) without DWA intervention, and having devised methods for revenue collection. Decisions have also been made on aspects such as locking the pump to avoid damage during the night, making requests and raising funds for washing slabs. This compared with around 50% the previous year.

Communities undertake an increasing degree of problem solving for themselves, but are prepared to call in outside help if they feel it is necessary. CEP keeps some records of the topics which come up requiring their help, and use some of these to develop dramas for use among other communities. Commonest problems are what to do a) with people who will not help or pay for the supply b) cannot afford to pay but would like to use it c) damage the installation or make it dirty.



The one thing which committees do not yet seem well set up to do is to assess their own performance, and for the community to know how and when they should ask to elect a new committee. Using Kaande ward, Mongu, as an example, it appears that VWC members may change frequently, someone standing in for another who has moved away. In this area only one in ten VWC's had the same members as two years before. In many of the weak committees which had called no meetings, it was found that members moving away or passing away had weakened the structure, and no-one knew how to put this right. To avoid the necessity of district or provincial level inputs every time this happens, such issues should be discussed more during the setting up, or following-up of VWC's.

The community level organisation is generally operating well, and most users are aware of their role and happy with their actions (93%). Committees appear now to be organising their own meetings and fund collection, and approaching DWA for spares and help when they feel it is necessary. Few users (less than 10%) felt that the VWC was operating badly, and in those communities where such feelings were registered during monitoring, district teams or CEP have gone to try and help identify the problems with the community, and have meetings to sort out conflicts or elect new committees. There are, however still weak committees especially along the plain edge in Mongu and in Senanga districts and possibly also in Kaoma, where old shallow wells were re-habilitated and committees formed for supplies which were not sited by the community and therefore have some inherited problems which new committees may find difficult to resolve. Problems are also thought to exist in Sesheke communities where CEP coverage has been lower, and it is important to assess whether a major effort needs to be made to strengthen the overall structure in Sesheke during the present phase.

4.6.3 From limited discussion with the other groups in the structure, it seems that their attitudes need to be more carefully explored. This is because Ward and District level organisations may feel that they are being by-passed, and this may often be true. The situation may have been a little improved by the incorporation in 1989 of all DWASHE chairmen into the PWASHE committee, so that they are more involved in and aware of decision making at this level. Previously, as in most sectors, district level administration has felt that policies have been imposed upon it by provincial level administration with insufficient dialogue.

4.6.4 There is still certainly a need for information to flow more freely in both directions. Many ward chairmen are unaware of the overall constraints of the project, and even of its objectives. Others are fully involved and make positive contributions in providing paths of communication between communities and DWA. If District level transport becomes more limited in its availability for rural supplies, as seems likely, then ward chairmen and Health Assistants will be increasingly important as paths of communication to and from communities and DWA. There therefore needs to be an assessment of how far they are now involved, what changes they would like to see, how much they understand of the project objectives and limitations, and how both groups can be better incorporated into the structure.

4.6.5 Health Assistants have become more fully involved in the programme in most areas, since the production of the Health Education file, and the workshop which introduced them to it. They are the people most in contact



with the communities who also have technical knowledge of water sources. Some feel still very peripheral to the programme, and some do not feel they have time for it. Efforts need to be made to involve them wherever possible, and to explore how this can best be done without adding significantly to their already fairly onerous duties.

4.6.6 School teachers are also a major line of communication which has been being developed by the project. Almost half the schools in the province have been involved in WASHE Health Education programmes. These schools have proved to be both useful sources as well as disseminators of information, but they may also have more of a role to play in strengthening the community-to-district level structure than has so far been envisaged. Certainly the results of surveys on the impact of health education training of school teachers has shown a surprising number who are willing to take HE concepts to villages, and who might therefore also be able to help solve committee problems, organise village surveys, or receive maintenance training, to reduce the load on district teams.

4.6.7 All lines of communication are supposed to meet at some points, and the most critical point which does not yet seem to be functioning consistently well, is the DWASHE. Now that construction is being reduced, it is important to know whether the DWASHE is aware of its co-ordinating role. How many DWASHE committees have tried to co-ordinate the activities of the Party, health, education, social development and agriculture sectors in follow-up activities, and indeed how many of them know that that is now their most important function? It seems that at present, inter-agency co-operation is developing reasonably well at provincial level, but may need some encouragement at district level. It may be that RWS/CEP should consider developing some sample ideas of programmes the DWASHE committees could set up with their member organisations. The links to the DWASHE are still sometimes quite weak, and the need for and methods of improvement should be investigated.

4.6.8 Similarly perhaps the role of the PWASHE should slowly be changing, and it should discuss this and identify what objectives it would aim for, as the project turns more towards maintenance and less to construction. The PWASHE is not always very active, but it is the major entry point for information to be gained from and spread among the government organisations less directly involved in the project than DWA and Ministry of Health. At present there is no clear picture of how the PWASHE members view the project, and, as with the DWASHE this should be ascertained to ensure no misunderstandings arise, and that as funding by NORAD decreases, the committee understand what is happening, and may help to keep the structure strong, even when construction is stopped, so that the investment of the past few years is not lost to the province.

4.7 Health Education and Sanitation.

The provincial structure set up to promote Health Education is strong and has developed a long way since its formation in 1985/86. Its role initially was to develop materials and programmes for community education and participation and it has been very successful in this. It has moved on to training district level teams in this, and the schools programme has also moved on from developing materials, to teaching pupils, and then to teaching teachers. For the CEP structure to continue to flourish after funding



ceases requires greater links to be forged with extension staff to continue to follow up on the programme. CEP have recognised this, but have been held up in the production of materials to make this possible.

The district level of CEP is generally still in need of considerable strengthening, and this refers both to the district DWA team and the links with health Assistants and teachers. It seems unlikely that either would continue to provide inputs on the strengthening of water committees, continuation of WASHE-style water and health education or purchase of spare parts without some support from the provincial CEP. Similarly the district administration, which will be expected to co-ordinate such work in the future still requires considerable stimulus to get it to be active in this sphere.

4.8 Conclusion

A reasonable structure is evolving for the establishment of a sustainable system. This takes time to evolve as it must make use of the strong parts of the local government structure, and strengthen, or duplicate those parts which do not function so well. At present the information available to assess the sustainability of the project is relatively full for Mongu district, but needs expanding in the other districts. In particular, the attitudes of DWASHE members needs to be investigated, to see how support could best be assured from this level. In most districts there is a need to analyse the infrastructure, and to pin-point those areas/ levels which most need attention to ensure the completion of a strong structure before the end of 1993.



5. IMPACT

5.1 Introduction.

5.1.1 The impacts which need assessing are related to water, health education and sanitation interventions, but effectively this can be reduced to the first two. This is because the effects of sanitation will be almost impossible to isolate. Levels of latrine use, apart from schools, is low, and those households which use latrines tend to be those which are better off and with better understanding of hygiene issues in general. Thus if a survey shows that those with a latrine have better health, it is not necessarily correct to conclude that the better health is because of the latrine. Wealth, education, diet, better hygiene practices in the home are all associated with a lower incidence of disease, and so those using sanitation facilities may well tend to have less disease, whether or not the facilities have any protective effect (7).

5.1.2 The main aspects of impact which the water supply may have are in relation to health and time taken to collect water. It is possible that these could both combine to be expressed as a reduction in the level of tiredness. Good Health has been defined by some as "Not being tired at the end of the day", and similarly several people have described the disadvantage of distant sources in terms of tiredness rather than time wasted.

5.1.3 For health education, it is the behavioural aspects of home and personal hygiene which may be affected, if the messages being conveyed are being understood and acted upon. There are, however also peripheral effects of the whole programme which may have an impact on the area, some of which are more easily measured than others. These include greater community awareness, and better links forged between isolated communities and local government, the growth of the role of women, and of awareness among communities not served of the value of good water supplies. Institution building is a major pre-requisite of sustainability, but it is also a measure of impact which can be employed as a spring-board for other developments.

5.1.4 The impacts which the project may be having have so far mainly been explored in terms of the changes perceived by users, rather than measured. These have included benefits and problems, and have been asked of source users and village representatives. Direct observations have been made of indicators of health education impact such as number of latrines, bath shelters, and rubbish pits constructed, but from discussion with members of the project in Mongu, it is acknowledged that impact and behavioural change is perhaps the area of monitoring which most requires attention during the next phase.

5.2 Health Impact

5.2.1 It has become increasingly clear over the past few years that health impact is not easily or cheaply measured (8), and more often than not leads to misleading results or ones of low statistical significance (9). It would appear that no definitive method has yet been found to provide information which is reliable for the evaluation of water supply investment impact. All that is claimed is that in general an improvement in water supply may



reasonably be expected to lead to a 20-25% decrease in diarrhoeal diseases (7). If this decrease is to be related to only 50% of the rural population, the effect on rural health centre statistics of incidence would be of only 10-12% which may take many years to identify. This is because other trends, such as seasonality, drug availability, variations in clinical recording can easily mask such a small change.

The longer the period over which such an impact is assessed, the greater the chance of interference (confounding) by other factors such as national economic climate, changes in attitude to traditional medicine etc.. On the other hand, as has been shown in Katembo, a significant change in behaviour may take several years to evolve. Thus health impact measured using existing health records is unlikely to prove fruitful, as was concluded with the information available in 1988 (Ref 3).

5.2.2 What should perhaps be considered, is combining with the Ministry of Health to select certain health centres to undertake case-control studies. In these, rather than taking communities without water supplies as controls, people without diarrhoea at RHC's are taken, and their water supply type, economic and nutritional status, and hygiene practices are compared with those for people who are being treated for diarrhoea. This will also provide information on those with skin and eye diseases, which may be linked to water supply also, as many respondents have noted a reduction in sore eyes especially, with use of the new source (see Section 5.3). Such a survey would require careful design, and would need to cover a large number of people, but it would not require a major increase in workload for Clinical Officers or Health Assistants, apart from a slight expansion of the record taken for each patient. This is an approach advocated as a result of the Cox's Bazaar workshop (8), but unfortunately still not fully developed into a standard procedure.

5.3 Perceived health benefits.

5.3.1 At present people are not asked to define what they mean by 'less disease' as a benefit of new supplies, but are given the opportunity to enlarge on the idea if they wish. In a sample of 70 village water committees, of which 70% quoted less disease, around 50% mention reduction in diarrhoea, and 20% reduction in sore eyes. A few also mention fewer skin rashes and body sores since installation of the new supply. What cannot be ascertained is the degree to which respondents genuinely notice such differences or to which they mention these as expected changes as a result of health education.

5.4 Time/distance

5.4.1 Reduction in distance may be translated into a variety of effects. The most obvious of which is the reduction in time taken per trip for water. Although reduction in distance where already less than one kilometre may have little effect (10) on the quantity carried for domestic use, users in Western Province cite several other benefits from shorter distances, even where the original source was less than one kilometre away:-

- a) less time taken in total to collect water
- b) less tiredness
- c) ability to cook, keep an eye on children, even at the same time as going



- to collect water
- d) easier to take small children to the source to wash them
 - e) easier to carry sufficient quantities to water vegetables
 - f) easier for schools to make bricks on site

Most of these are likely to have impacts on the health status of children, and also of the mothers. This is partly because of the greater attention the mother can give to their needs, but also because approximately one third of water collectors are children (taking a sample of 1439 water trips in six villages). Thus it may be that questions on the benefits of shorter distances should be asked of children (perhaps in school) as well as of women in general. It also may be that the nutritional status of children from protected sources may be better, not just because of health but because of these additional benefits which may accrue when the mother has more time to collect and prepare food and spend time with the children. This could be developed as an exercise in schools with Home Economics teachers (see Section 7).

5.4.2 It should perhaps be remembered that most studies which have looked at use of time saved from water collection identify that the extra time is mainly used in social and leisure activities (10), although housework may also increase. Generally agricultural activity has remained much the same, often because of constraints of land tenure, but also perhaps because of the normal objective being subsistence, rather than production farming. This does not negate the advantage of time saved, but suggests that it is mainly converted to energy saved rather than increased production, and so contributes mainly to the well-being of the water carrier, rather than to anything more directly measurable. During utilisation studies, time that people spend at the well is measured, but no analysis of the information has yet been done.

5.4.3 At present no attempt has been made to investigate the degree to which people have noticed that they have more time, or what they use it for, but this is partly because it is quite difficult for people to identify this, unless the change is very marked (several hours). It is an exercise which could be asked of communities in Sesheke and parts of Lukulu and Kaoma. These might also be areas where provision of nearer, protected sources may offer sufficiently large and rapid changes to way of life that case-control studies would be likely to show significant results. As mentioned in 2.5.1 they are also areas for which good information on actual reduction in distances is badly needed, and could be collected during follow-up work.

5.5 Health Education.

5.5.1 Health education and community motivation have been key aspects of the project since late 1985. It is they which have played the major part in aiming the project successfully towards effective utilisation. However, until now there has been no attempt to try and measure the effects that health education is having at community level, nor to see whether the methods being used are being effective in the way they are designed to be. No-one really knows whether the use of posters and discussion is leaving a message with participants which is retained and relevant. Much that is being seen of changes in behaviour suggests that this may be so (see Section 2.6 and 2.7, 3.4 and 3.5) but it is important to check whether ideas such as oral



rehydration have been properly understood, and whether people can remember the necessary details a month or a year after it was discussed. Some surveying of response to health education is needed, and may help in the formulation of new materials which is about to commence.

5.5.2 The one area of health education where some work has begun to be done on impacts is in the schools programme. Here there has been some follow-up on the workshops carried out with Home Economics teachers in each district. These surveys have included questions on the changes which teachers have noticed and the work they have started to do (both inside the school and in villages) since attending the seminar. The schools' programme designed and constructed a questionnaire, and learnt much about the ambiguities and assumptions which need to be avoided, and the additional questions which they would like to include in the next survey they carry out. This would clarify some of the answers they obtained this time and allow them to build on the experience they are obtaining, but could perhaps have been done more quickly if they had pre-tested and adjusted the survey at the start.

Unfortunately the original answer sheets from the survey were not available in November, but only district by district summaries, which made it difficult to discuss some of the misunderstandings which may have arisen with respondents, and to gain details of the ideas promoted and the problems encountered by individual teachers. It was apparent that a great deal of effort had been made both to obtain and check the information from the 112 schools selected. The main aspect explored, and which could be developed further, was that of how much children pass on what they have learnt to their parents. It was apparent that there were several instances where children had initiated changes in the village, such as helping to build pit latrines, and one case where the neighbouring village had wanted the same and the child offered to do it, if paid. Latrine building has also been done by pupils with their teacher, especially in Lukau. All schools stated that children pass on Health Education to parents, but this was not often illustrated with examples. It is a field which could offer useful opportunities to explore ways of spreading HE messages, and which ones might be acceptable to parents and elders.

5.5.3 It is one of the puzzles about sanitation that every school has a latrine for every class, and every class builds its own latrine every term. This has been going on since schools opened, sometimes for fifty or more years, but despite this very few households have bothered to build pit latrines at home. Nor do schools teach how to build pit latrines in Health Education lessons. This could easily be changed in those areas where latrines should be a priority (peri-urban areas), by parents being invited to come and see latrine construction, and classes making demonstration latrines in villages. The only problem may be that the schools such children go to are generally within the town, where more permanent latrines, or even water closets may be established for the school. However many children complain at the state of these, and so there may well be scope to make demonstration latrines on the school site, despite provision of other sanitation facilities.

5.5.4 All schools had adopted the materials given them during the workshop, and used them within the six months which followed. Many had also developed their own materials, such as songs, pictures and dramas. Mahilu Primary School in Kaoma had gone as far as to set up its own theatre club, and HE



leaflets for taking to villages. Namachaha PS has formed a Health Committee which met twice a term and decide on objectives for the next term. The last term they had done a survey on pit latrines by dividing pupils up into the sections where they lived, and sending each group to survey the neighbouring section. It is ideas like these which come from the surveys and can then be used as examples in other schools.

5.5.5 The amount of education material available to most schools is very small, and innovations are welcome, so that there is large scope for incorporating health education into a wide variety of subjects (See section 6), and including data collection within this. It is also apparent from the survey that some materials are being fully used and others very little. Personal hygiene, care of latrines and of water points is taken up and taught at most schools, but few use the materials on diarrhoea/ORS or on bilharzia. The Child to Child Reader is used, but is in danger of being simply read out for notemaking, rather than being used as originally planned, as examples which should be developed by the teacher. It would be useful for the next survey to explore the reasons why teachers are only adopting some of the topics covered, and how they could best be helped to use the Child to Child Reader differently.

5.5.6 Using children to collect information on village sanitation is making them more aware of the issues involved, of the attitudes of their parents, and so improving the link between the school and the community. This is also done by the inclusion of members of the PTA on the Water Committee for schools' water sources and many schools require children to contribute to the water fund. A few schools (eg Lukulanya and Sikusi) have set up bath shelters for the use of pupils, so that they can wash before or after school. Several have bought extra buckets to make water use easier, and the demand for this is large. Money has been saved by schools making bricks for their own construction on site, and possibly also for sale. Over 40% of schools have started brick-making since the new source was installed, a direct result of water being nearer. 60% now have gardens near the school growing vegetables for teachers and for sale. These activities can all be spread to villages, to improve diet, living conditions and income generation, and can be promoted through HE lessons.

5.5.7 The only other area which should be looked at within the HE monitoring, as has been discussed with CEP, is the situation among schools which have so far not been covered by the programme. What topics do they cover, if any, and what is the best way to reach them? These schools are mostly those which have no home economics teachers, part of whose role is to provide health education, and they are therefore likely to provide minimal coverage on this subject. The input by health assistants in these cases should be investigated with the aim of seeing whether HA's have yet passed on any of the WASHE teaching, or whether, with specific training on the schools' programme approach and materials, they could provide the link which the project has so far been unable to provide.

5.6 Other impacts

5.6.1 Sanitation The development of rural sanitation has been at a very low level, and more connected to the initiative of specific HA's, than to the activities of the WASHE programme. Whilst the provision of water facilities



depends on community efforts, the construction of sanitary facilities depends on individual/household motivation. It would not be possible to establish any health effects of sanitation for two main reasons -:

- a) the number of latrines for homes is low compared to those without,
- b) households which decide to build latrines tend to be better educated and better off than others, and this will confound analysis, because the same factors, even without latrines, would tend to be associated with better health. The impact of sanitation cannot easily be measured, therefore, only the aspects of utilisation as in 3.4 will be monitored.

5.6.2 The role of women. An impact less closely related to the water and health education sectors is that of the developing role of women both within the community and within the project, which was a specific objective of the 4th Phase. This has been fairly fully covered in "Integration of Women in Rural Water Supply in Western Province" (Ref 11), and memos by J. Harnmeijer in Mongu. Some work on attitudes of men and women to the changes taking place would help in any evaluation of how whether these changes are likely to be adopted by any other organisations, and how long they are likely to last after NORAD withdraws.

5.6.3 Felt need for water. In the mid-1980's the demand for rural water supplies in Western Province was not high for three main reasons,

- 1) the only experience of such supplies were that they were unreliable and seldom repaired
- 2) there had been no health education on the values of good water.
- 3) they were often installed at inconvenient sites, without consultation with those for whom they were designed.

Many protected sources (over 100) had therefore been abandoned, and few people petitioned to be considered for new supplies, and the idea of actually buying a supply was not contemplated.

Since then attitudes have changed, and there are large numbers of requests for protected sources, and also for commercially constructed wells. DWASHE committees have several hundred outstanding requests which they have received in the past two years, and there are also outstanding requests to 'buy' wells. Around thirty wells have been commercially constructed, and have more than covered their costs.

Indicators of attitudes to new wells have been varied. Health assistants connected to the project have been threatened with physical damage if they don't manage to organise that certain villages get wells. Ward chairmen have used the promise of wells as an incentive to voters, and in one area a decree was made that pump users must register for voting in order to use the pump. These examples show that wells are now regarded as a valuable asset, rather than a useless mill-stone.

5.6.4 Community identity The linking of communities or of parents and teachers at schools to manage a new water supply draws them closer together. It also leads to the development of skills within the community which can be used for other purposes. This means that committees have begun to want to take on other roles to encourage community development. There is suddenly an administrative body within the community, with recognised powers for administering communal funds and organising people to carry out maintenance routines. They have been asked to discuss what else they feel



they could do, and several have suggested clubs for income generation or for purchasing commodities which remote villages find difficult to obtain, and some are keen to combine these two into the formation of a co-operative. Unfortunately it is beyond the scope of the project to help establish such organisations, especially as funding declines, and so far efforts to interest other organisations who are setting up co-operatives and agricultural production units (ARPT) have failed. This is a pity, as such a development would do much to ensure the continued strength of the most active committees, who have already indicated a willingness to contribute their efforts to further community development. The views of members of the community other than the committee should also be sought.

5.6.5 Inter-agency co-operation Whilst the agencies included in the WASHE committees are supposed anyway to form dialogues through the Council Development Committees, the project has led to better communications between them all with respect to the water sector. In particular the links with the Ministry of Health have been strengthened, and so have those with the Ministry of Education. There is, however, still room for improvement, and the views of agencies should be collected to see where gaps in communication are particularly bad. This is important as the form of the project changes, and more follow-up work is planned to devolve to extension staff from other ministries, whose superiors may not yet even be aware of the assumptions that are being made.

5.7 Conclusions

The impact of rural water supply has not been much quantified. Some aspects, such as health, may remain that way, although use of case-control studies may improve the situation. Better assessment of aspects of health education impact, both in schools and communities would help in the design of future HE materials, and adjustment of that which is being used already. Section 6 on further surveys outlines how information might also be obtained through extension staff as well as those directly involved in the WASHE programme.

In that there are assumptions that future water supply construction may be limited to shallow wells or traditional source improvement, there is a real need to evaluate the degree to which these can have any effect on quality of life, health, time-saving etc. in conjunction with sustained utilisation. This should be compared with similar information for the sources which have been constructed through the drilling programme, to give some measure of their relative impact.



6. SURVEYS

6.1 Introduction.

6.1.1 The surveys planned during 1987 and carried out in 1987/88 mostly reflected the approach of the MEP (2) which focus on functioning and effective utilisation. In 1989 little further survey work has been done, but that which has has been particularly geared to

- a) assessing the impact of schools health education, and
- b) research to allow planning for specific projects eg. Microproject, new HE material (plans have also been made for surveys for washing slab, school water storage, and village maintenance team training projects in 1990)
- c) a continuation of some utilisation studies

6.1.2 Surveys are labour intensive both in the collecting and the analysing of the information. As funding declines, there is a need to make sure that whatever activities are undertaken are necessary to the project, and will contribute sufficiently to it to justify the outlay in time, energy and cost. Whilst this is not measured in absolute terms, it is something that should be considered in each proposal, and emphasises the crucial role of pre-testing, to ensure that the information collected is as reliable and relevant as possible. It also suggests that methods should be devised -:

- a) to collect data indirectly where possible (i.e. use of extension staff)
- b) to make sure that there is adequate feed-back of the results so that maximum effective use is made of the data obtained.

6.1.3 Monitoring and questionnaires have been used to obtain information relevant to the project, but have also been used to plant ideas with respondents. For instance, it became apparent that few children wash at school, and that this is partly because no buckets are available for them to take water away from the well. When a survey was put out asking teachers if buckets were available, several wrote to say they had not thought of this, and more than ten schools came and bought buckets immediately afterwards. Many more have now expressed interest, and teachers are still coming to buy them. Similarly, when questions were asked about pupils personal hygiene, several teachers wrote and said that they had enjoyed doing the survey, because they had learnt so much from doing it, and been made aware of problems which they had not noticed before.

6.1.4 The main omission has been the lack of methods devised to provide feedback to field workers and the communities themselves. Nevertheless this has been done in ways which are not immediately identified as such. For instance surveys showed that non-payment to the village water fund had caused problems in several cases, and that different solutions had been found by different committees. One had arranged that where someone could not afford to pay, he worked for a richer member of the village for a few hours and the latter then paid the due. Other alternatives, such as payment per household, rather than by individuals, or deferment of payment till harvest have been tried, and CEP, knowing these solutions and which ones have worked, can offer them as suggestions to other communities with the same problems, and build them into their training of new committees, who will then be in a better position to cope should they encounter a similar problem. Feedback is often of this type, and is often more valuable, if less



identifiable than the production of graphs or picturegraphs, unless these are simply used for discussion purposes.

6.2 community level surveys

6.2.1 The main surveys undertaken by the project are summarised in Table 5.1. These have all been fairly widely used and most, but not all, have been adequately pre-tested. Community level surveys relate to the water source, its management, general views on adequacy and difficulties associated with it.

6.2.2 Selection criteria. Prior to installation of an improved source, this is associated with a scoring system to provide a framework for selecting priority communities. This system could be modified, perhaps in particular to put more emphasis on distance to water, but it has been successful in several ways -:

- 1) It has formalised the selection of communities and so removed political pressure to favour communities which are not necessarily in great need of water
- 2) It has favoured those communities which have shown some initiative already and so have been better set up to maintain the organisational and operational systems.
- 3) It has allowed greater forward planning, and given each district a better view of the problems other districts are facing
- 4) It produced a number of qualifying communities which fairly closely approximated the estimated population distribution of the province. This made it easily acceptable to the provincial authorities, and so to the districts.

Now that funding and construction are being reduced, the criteria might need to help focus on the areas most constrained by lack of water. Development is being held back, and people are moving out from some areas because of lack of water, and it may be that these are the areas which should be focused upon in the next stage, if the PWASHE agrees. This would mean few new wells in Mongu, Senanga and Kalabo districts, and most in Sesheke and Kaoma. This would need to be discussed, and, if acceptable, the weighting of distance be increased. This would ensure that the few wells to be constructed would be for communities where the impact would be at its greatest, and other simpler technologies could not be applied to the same effect.

The other aspect requiring attention in this survey is the question of distance to service centre. It seems that this is perhaps no longer relevant in that the systems evolving are geared to minimum availability of transport, and this aspect could therefore be removed.

6.2.3 Monitoring of condition.

This survey was first established for four reasons. Firstly to provide information on the amount of maintenance needed at a time when not even the district offices had any information on how many wells were in their area, and how many were operational. Secondly it encouraged the involvement of the Health Assistant and/or Ward chairman in the area, who are asked to join the DWA team visiting the wells. Thirdly, it provided an annual contact with each community, at a specific time of year, when spares could be bought (especially grease and bleach for chlorination), and problems brought up.



Lastly information on water levels and total depths for shallow wells, gives invaluable information on whether problems of drying out are due to falling water levels, or rising base of the well. For handpumps, information on yield and number of strokes to produce water, give early warning signals of piston and foot valve problems, which can be conveyed to VWC's, giving them time to organise funds and repairs before breakdown occurs.

Visits are short, and it may be regarded that now that maintenance is devolving further to communities, this monitoring is less necessary. It does, however, provide an effective early warning system of the degree to which the whole community based system is working, and whether problems encountered are leading to deterioration of reliability and risks to health. It does not require a large number of people to be involved, and could be carried out by one person on a Honda, although the middle two benefits mentioned above would then be excluded.

If possible it is felt that these surveys should continue, although they might be re-formulated to become more health-risk orientated (as in the WHO/UNEP Review of the Project on Control of Drinking Water Quality in rural areas (12), p 56,57), and then could also be used by Health Assistants, or even by village water committees, reporting when water quality seems to be changing.

6.2.3 Village Water Committee Surveys.

This survey is carried out once, during the follow-up meeting (meeting 5) in each community. It is designed to assess how active the committee is, and how it has organised fund collection and maintenance. More details should be asked for on the purpose and outcome of meetings organised by the VWC. The request for details of committee members is partly to allow assessment of the permanence of members, and partly to help remind committees to fill posts which have fallen vacant. Training of VWC's needs to bear in mind the degree to which members of committees tend to change over fairly short periods of time.

The survey also provides an opportunity to discuss problems and benefits of the well, but does not promote discussion of other improvements which could be made. The views expressed have been used in the design of further problem-solving dramas and poster stories, and it may be that enough examples now exist. It is, however, a useful reminder of topics to discuss during the follow-up meeting, and for this reason might still be retained.

The questionnaire is accompanied by a page for the VWC to list water users, and an addendum which was for pre-testing, but never adjusted, on health education and the requirements of the VWC for further help/education. On the latter the early questions need re-formulating and the later ones have now provided sufficient information for the design of new HE material, and may be regarded as redundant.

The listing of users, which the VWC fills in, is partly to encourage them to formalise their own records, and provide a basis for fund collection. However the number of people recorded would seem to be low compared with scored and observed numbers using the source, and the reasons for this need



exploring. The same list might be asked for again after three years or so, to see if the number of registered users grows or diminishes.'

New aspects which might be considered for inclusion are as follows -:

- 1) Assessment of degree to which individuals nominated by the community are able to understand the workings and repair of their water facilities
- 2) Degree to which pump/well and surroundings look well cared for, (use of grease, protection of drainage ditch etc.)
- 3) Assessment of understanding of hygiene concepts introduced at time of installation. To what degree do they and their neighbours follow them, and what indicators could be used? (eg. measures for fly control, burial of faeces, washing children's' eyes, etc.)
- 4) Attitudes to communal gardens, both to use drainage water and to raise funds for spares.
- 5) Village activity in measures to reduce disease... latrines, drying racks, refuse pits, bath houses, reasons for use/ non-use and for construction or not wishing to do so in peri-urban communities.

6.3 Household surveys

6.3.1 Household utilisation studies.

The impact of water supply projects on water use behaviour, especially on the volumes used, is a well established indicator of effective utilisation. In an area such as Western Province, where numerous alternative sources of water exist for many consumers, doubts arise as to whether such an impact will be measurable. The utilisation studies were set up to try and identify changes, and initial results were disappointing. Changes appeared to be small among those communities along the plain edge, suggesting that there was little justification in providing protected supplies to them. Continued monitoring of a few places, however, suggests that changes are gradually occurring, and similar surveys have shown immediate and major changes in communities far from alternative sources.

As a result of early surveys, and because they are labour-intensive, there is a wish to remove these surveys from the programme. However the last set of results suggest that selected communities should be retained for monitoring, but that where changes are expected to be gradual, they should be monitored only every two or three years.

There is a danger of bias in the surveys, people acting uncharacteristically because observers are present. It may be that thought should be given to how much explanation is given to villages before the survey, and that a standard explanation should be devised, so that this does not introduce a further variable. This should also be done for any villages before installation of a pump, because they are particularly likely to act out of character if they feel this will ensure that they then obtain a new supply (eg. Bukwandi?).

Villages are usually small and the number of households which are the same size, or have the same number (or any) members present for two consecutive surveys often makes comparison difficult. Thus the house numbering system is important, and needs to be well understood from the sketch map, so that different observers can still identify which household is which. It is noticeable that confusion would seem to have crept into the last Katembu survey, which does not negate the results, but limits the conclusions which



can be drawn.

The utilisation study consists of two parts, one the observation at sources of people collecting water, and secondly a house to house survey on water collection practice. At some times the latter has been linked with a household water quality survey (see below). It is felt that some utilisation studies should continue. The information to date is unique, with few if any projects collecting such details, and doing so in consecutive years. The results at Kátembo, if sustained, suggest that impacts can be large even where alternative sources are near. This monitoring should therefore continue, and possibly another similar site, which gave discouraging results early on, should be monitored again. Nalongo, near Mongu, might be a suitable place, since a large proportion of people continued to use the traditional sources nearer to them, after pump installation. Care should be taken to carry out repeat surveys under similar weather conditions each time, and therefore the dry season is preferable.

Household surveys provide some insight into the reasons for specific observed behaviour, but it cannot replace observation at sources. People's view of how often they collect water are seldom borne out by observation, or by cross-checking with others, and information on quantities of water collected is very unreliable if obtained in this way. The present household survey questionnaire should now be replaced in part, by a new one which reflects more the aims of the next stage of the project.

New aspects which might be covered to identify changes in behaviour and attitude to water and sanitation, and to assess the understanding of health issues covered in community HE meetings might include -:

- 1) types, volumes and numbers of collecting vessels, has this changed since this time last year, or do you plan to change and why would you do so?
- 2) washing/bathing of small children (where, how, how often, why wash its face and/ or hands?)
- 3) disposal of faeces, reasons for, or reasons for not doing so, and how
- 4) benefits of pump water... why is each a benefit to the user? eg clean water, distance, what difference do they make.
- 5) attitudes to sanitation and latrine building/use and other measures of improved hygiene.

Other questions related to specific surveys might be added, but the survey should not try to cover too many objectives in one questionnaire. Reference might be made to the guidelines discussed in the last two workshops in constructing the questionnaire (see Appendix 1) and also to "Partners in Evaluation" (13).

6.3.2 Household water quality

This survey was designed to examine how people collect and store water, and whether specific practices increased or decreased the risk of contamination. Fortunately, or unfortunately, the main result after sampling 200 households was that levels of contamination were so very low that no specific causes of contamination could be identified. All that could be said was that any improvement of water at the source reached the consumer, which was encouraging. Further sampling was not justified, because the results were so consistently good. The survey should therefore not be repeated at present.



6.4 School surveys

6.4.1 Schools water use surveys and HE Follow-ups.

Schools offer the opportunity to gain information on a large cross-section of the population, including those who live in towns and those who live in small isolated groups of houses. They include families living far from any improved source and those who live near. It is therefore possible to see what proportion of the population is making use of new water facilities, and also how behaviour is changing. Whilst this was partly done through teachers, as with the early stages of health education teaching, the early surveys were all done by the CEP team, to ensure consistency of approach and response, and opportunity for first stage pre-testing.

The surveys carried out within schools have turned out to be very rewarding. There is a lack of teaching materials, and both teachers and pupils welcomed the chance to try something new. The results on coverage are very consistent for schools in similar environments and would seem to form a reasonable baseline from which changes can be assessed over time. This is particularly true for places where the number of operating wells remains constant, and so any change in the proportion of users is likely to reflect trends in use or non-use whose causes would then need further investigation.

The first part of the survey focused on conditions at the school, and the use of the school source by pupils and teachers. Several, on their own initiative measured how much water was abstracted in a day, and many went to great lengths in the presentation of the information collected through the questionnaire. There would appear to be great scope both to gain information from schools, and to introduce new ideas, partly through surveys, but mainly through new HE material.

Sanitation and hygiene were also touched upon by the survey, getting the school to indicate its attitude to promoting personal hygiene, and in particular hand washing. In the early surveys, schools were asked about latrine construction, and routines for cleaning, and in later ones, observations on latrine condition were noted. Children indicated whether they used latrines at school and home, and the reasons for non-use.

In addition, income from irrigated cultivation was detailed, giving both an indication of the possible return from water, and the affordability of spare parts or other facilities to improve hygiene and water use.

6.4.2 Home water use.

The school survey looked at both practice at school and at home. In general, methods used to get children to identify the source type used for different purposes in different seasons seem to have proved reliable. For schools in Kaoma, however, it seems that those attending the workshop which introduced the questionnaire were not so clear on how to summarise information, and this would need to be clarified if the survey were repeated.

The main confusion, which was not apparent during pre-testing, was that in asking about sanitary facilities at home, results seemed inconsistent with observation, and therefore of questionable reliability in many cases. Care should be taken in re-formulating and testing questions on this (sensitive)



aspect before another major survey is undertaken.

The survey on water use and sanitation was carried out during early 1988. In late 1988 and 1989, the focus moved to the impact of health education, to assess the values and drawbacks of the Workshops for Home Economics teachers carried out in each district. A trial survey was carried out in some 20 schools to get an idea of topics which could be covered, and this was then developed into a new questionnaire by CEP in early 1989. These surveys have now been completed, and some of the information gained has been presented in this report. The results lead on to other questions which would help the development of new materials, and the results of all the school surveys show that much could be done by schools themselves to collect and analyse data.

6.4.3 Development of surveys in schools

It would seem that during the next year -:

- 1) the survey of water use/ source type might be modified, repeated and extended to include urban schools (where taps will need to be included in source type), some of whom responded before, also with questions on personal hygiene, and latrines re-phrased, and in all cases to be clearer and more standardised to whom the questions refer. Urban sanitation will need to differentiate between WC's and pit latrines.
- 2) schools not previously covered by the HE programme should also be covered to see if there are any significant differences in attitude and behaviour.
- 3) more should be found out about how and if children pass on ideas to their parents, and whether it is better for children or teachers, or both together to carry such ideas on into the villages. What methods are most effective?
- 4) the reasons why teachers have not taken up some of the topics put forward in the workshop should be ascertained, so that solutions can be found.
- 5) teachers should be encouraged to include water and sanitation themes in subjects other than health education (see section 6.4.1)

6.5 Other surveys.

Other surveys have been carried out on limited samples, for specific purposes. These have included surveys of Health assistants' attitudes to the WASHE programme, their contact with it and the amount of health education work they have been carrying out before the programme began. This was a baseline study to help in the formulation of the microproject, and to allow later re-survey to see if there were significant changes after HA's received the WASHE file of HE materials. This should be followed up with those HA's surveyed, during the next year.

Progress of the Microproject has also been assessed through surveys of each source improved, and the project made up its own scoring system for this, on which bonuses for HA's were based. This is being re-applied, in a slightly modified form, for the next year's activities.

Early surveys were also done by CEP on people's beliefs in causes and cures of specific diseases, to help in the development of health education materials. It covered very few people, and so cannot be used as a baseline survey to assess the impact of health education, but then this was not its



original purpose.

This underlines the difference between surveys in general and monitoring in particular. A survey to provide information on topics such as reasons for non-use of latrines, or types of storage vessel, does not need to cover a large number of people to identify all the main variations likely to occur in a larger population. This can then be used to illustrate problems which may arise, and solutions which may be relevant. To judge whether an intervention has had a significant effect, however, monitoring (i.e. repeated survey) of a large sample coverage is required to provide statistically significant results. Thus the ultimate use of survey material needs to be clearly defined during planning of sample size, resource allocation etc.

6.6 New survey construction.

Most of the surveys which have been undertaken have now completed their purpose, or are in need of modification. Some new aspects now also need covering. Early surveys were pre-tested, and adjusted, later ones perhaps less so. For the setting up of new surveys and modification of previous ones, those involved should bear in mind guidelines for survey construction (ref 1, 13 and appendix 1), and should discuss each questionnaire on several occasions. Pre-testing is essential, and no survey is likely to maintain exactly the same form from inception to its final use. This does not imply failure of the designers, but sensible modification to avoid misunderstandings and appropriate changes where a third party may be asking the questions. Such changes reflect not only concepts or questions which can be misunderstood, but also answers which after all turn out not to provide information which contributes significantly to the objectives of the survey.

Questions should not be changed for the sake of it. There are many ways of saying the same thing, and change is only necessary if the answers are unclear or insufficiently precise, biased by the form of the question, or do not express the ideas which the question was designed to investigate.

Some members of CEP have more experience than others in survey construction, and in the absence of further training, experience should be pooled to make the best use of the expertise already available within the team. The need is perhaps less for further training than for more practice and discussion.



7. FUTURE DEVELOPMENTS

7.1 Introduction

Modifications to existing surveys have already been outlined, but there is also a need to establish new monitoring of certain impacts, which is associated with developing new materials in schools and data presentation and feed-back.

Future monitoring should also look more at combining the experience of CEP with that of teachers and health assistants in data collection, on site analytical methods, and preparation of feedback to communities. There is scope for developing programmes with schools and also on different themes with Health Assistants.

7.2 Schools' programme

Aspects which could be suitably monitored in schools have been outlined in Section 6.4. There is, however, also a need to develop materials with teachers, and to encourage them to use health information in other ways than simply as direct teaching. Some possible ideas are given below -:

7.2.1) Bilharzia study in high risk areas. Take children to river banks where they wash, or their family wash clothes. Float broad leaves (esp banana) on the water overnight. Next day collect any snails that have moved onto the underside of the leaves. What do they look like? Find two bits of broken glass if possible, and squash a snail between them. If the innards are red, the snail is a bilharzia carrier. How many of the snails were of the red type? With as many pupils as possible, clear the water weeds around the washing place. A few days later repeat the experiment with the leaves. Are there as many snails? Do the same thing after a month. How long does it take for the snails to come back?

Suggestions. Make a graph of the number of snails found each month or so. Draw snail types found, and label the one which carries bilharzia. Do you find them at all in traditional sources used for washing? Would the same experiment work there? How often would you need to clear weeds, to keep the snails away?

7.2.2 Clean water. First take some clean river sand, which has had the very fine (silty) particles washed out of it. Find an old bucket with a hole in it, and put some dry grass over the hole. Fill the bucket about half full with the sand. In another bucket take some water and make it dirty with some mud. Pour the dirty water into the bucket of sand, and collect the water that comes out underneath. Is it cleaner?

Reason. Water that is dirty but passes through the ground is cleaned by the sand on the way. The sand takes out bacteria, chemicals and dirt you can see. Water for drinking is better if it comes from the ground and not from the river. Handpumps and shallow wells are best, and rivers are worst.

Suggestion Give some data on bacteria in different types of water (see 2.3.2) and get children to make graphs which show which water is best. Can they now explain why?



7.2.3 Maths and science. Maths offers lots of opportunities to transmit health education messages, from basic picturegraphs to correlations, including simple sums and advanced graphs. Maths teachers should be asked to think up examples.

Example 1) If my mother goes to collect water from the traditional source, it takes her 12 minutes to reach it, and 15 minutes to come back. She goes three times a day. How long does she spend collecting water?

A new source is being built. It will take my mother 5 minutes to reach it and 7 minutes to return. If she makes as many journeys, how much time will it take? How much time will she save? Could she make an extra journey for more water but still not take more time than before?

2) Go to a well. Who collects water? Lower classes make a picturegraph, higher ones a bar graph with categories. Old, adult, child, each divided into male and female. Do the very old and very young find it difficult to lift the water or use the pump. Ask them if they make them collect less water. How could water collection be made easier for them?

3) A follow-on to no 1) and 2). Get children to collect information on distance to water. Firstly get them to practice pacing a set distance so they know how many of their paces make ten metres. When they go home, get each child to pace how far the mother goes to draw water. What type of source is it? Does she go to the same source for washing water? How far is it to that source? If the source used at present is a handpump or shallow well, ask the child to pace the distance to the old source used before. How many journeys does the mother make in a day? If it takes 15 minutes to walk 1000 metres, how long does the mother spend collecting water?

(Information on distances, especially the difference between old and new, should be tabulated, and given to the WASHE programme, if it is thought to be reliable). It is important also to notice where people are prepared to walk further to use the new source. What makes them do this?

All this information can be used in a variety of ways... no. of families living nearer than 100, 200, 300, 400, 500m from the source, no. of families who saved time with new source, number where it is the same, number who use it even though it takes more time etc..

4) Life cycles of mosquito and water snail. Life cycle of malaria and bilharzia. How can we best interrupt these to reduce disease? See also 7.1.1

5) Flies. Do a survey of where you see flies around your house. Does this mean that dirt is being passed from one object to another, and onto you and your brothers and sisters. What can be in this dirt? What could you do, or encourage your parents to do to stop the flies being able to pick up dirt and pass on diseases?

6) ORS/ORT Children have been taught about this, or have they? What does the fluid do? Where do you normally get salt and sugar from in your diet? How is the solution made? Has anyone in your family ever been given it?

7) Nutrition. Children's height and age. Make graphs. Could the school have a project to make a balance which could weigh children? How could they make the weights? (would the HA let them calibrate their balance with his



weighing machine?) Could information be correlated with source of drinking water? Is there any correlation?

The above ideas would need testing, and it would be much better for the programme to think up its own, more appropriate ones. This is a field with great potential, but little existing material to guide those who wish to develop school-based activities which both teach and collect information of use to the water and sanitation sector.

7.3 Health Impact studies

It has been shown in 5.2 that health impact can probably not be accurately assessed with the health data at present produced by health centres. For many the coverage by the WASHE programme is less than 50%, so requiring major changes in disease incidence before any statistically significant variation can be observed. Up to date RHC records should, however, be collected, for those centres with high improved water supply coverage, and long records from reliable HA's (eg. Itufa, Chitwa, and some in areas where distance to water has been markedly reduced).

An alternative way, which might be explored with the Ministry of Health, would be to undertake a case-control study. This is however no small task, and might require information from as many as 8000 individuals before impact could be reliably identified. This would involve major data processing, and some increase in the workload of personnel at Health Centres. It would therefore need careful discussion with the Ministry of Health at provincial level, before any plans could be made. It might require specific inputs from the funding agency or existing budgets.

Case-control studies are probably the easiest and cheapest way of identifying whether a particular intervention has any impact on a disease. For instance it can be used to estimate the relative risk of diarrhoea among users of unimproved sources, and compare this with users of improved sources. The number of cases required is ten or more times lower than for other types of study (cohort or cross-sectional), because the investigator fixes the ratio of cases to non-cases.

Table 7.1 Required number of cases in case control studies.
(from Ref 8)

%age population using improved facilities	Relative risk reduction.					
	1.1 (9%)	1.2 (17%)	1.4 (29%)	1.5 (33%)	1.7 (42%)	2.0 (50%)
10	22,000	6,000	1,900	1,400	850	540
20	12,000	3,400	1,100	740	450	280
30	9,000	2,600	780	540	330	200
40	8,000	2,200	660	460	270	170
50	8,000	2,100	610	420	250	150
60	8,000	2,100	620	420	250	140
70	9,000	2,400	680	460	270	140

Care would need to be taken in deciding on indicators for economic and nutritional status, and hygiene practices. Often possession within the direct family of items such as shoes, or a watch has been used. Nutritional



status would need establishing, possibly by height/ weight measurement.

Case control studies are not always successful in identifying risk level reduction, however well carried out, and it may be that it should not be considered at this stage of the project, unless the Ministry of Health are also prepared to be much involved, and feel that the results would be of importance to them as well. However, the idea should be discussed before the end of outside funding, if further justification is required.

7.4 Other impacts.

7.4.1 Distance/time. As mentioned in 5.4.1, there is a need to try and get better information on savings in time and distance. This could well be tied up with the schools programme as suggested in 7.2.3, which could provide province-wide information on the level of benefit of new sources in different areas. It should be related both to those children whose families still use traditional sources and those who also have access to an alternative new source. This would need careful pre-testing.

In areas where major changes are noted, attempts could be made to see how women feel their life has been improved.

7.4.2 Health education

Some aspects of health education follow-up are outlined in sections 5.5.5 and 6.4.3. Several schools have shown considerable initiative in developing their own health education materials. The same might be suggested for exercises as in 7.2, and that for both there should be a small prize for the five best schools, so that they could obtain paper and colours to develop more ideas. Could the next district workshops look at the ideas developed during the last year?

7.4.3 Infrastructure/sustainability

The impression that the infrastructure may be less well developed in other districts than Mongu needs investigating. This would require some monitoring of the views of VWC's, ward chairmen and DWASHE members in each district to see how they see the project working after funding ceases, and what they see as their role both now and in the future. Are DWA district officers all equally well-informed as to the changes occurring, and the lesser provincial level support which will be available to them in the future?

Similarly there is a need to establish how much HA's feel involved, and to discuss with them and define better the support that will be required from them, both in the present stage, and in the future. Some HA's are already very committed to the project, and have shown how invaluable their support can be. Others are still very little involved, and need to see the effects their input could have, to encourage them to commit themselves more fully. Thus the number of active HA's and some measure of their impact within the water and sanitation sector needs to be established, to encourage the others.

7.4.4. Other surveys

As part of the research for improving washing slab design and school water



storage, it is planned to carry out surveys of demand, local design preferences/ideas, reasons for non-use etc. For the VMT training programme it is also planned to make an assessment of the degree to which previous training in pump maintenance has been absorbed, and whether this has been more successful with some pumps than others. Community attitudes to taking one or two people for further training, rather than training within the community will be investigated to see what the preferred form of maintenance team is among the communities concerned.

7.5 Feedback and Presentation of data

7.5.1 There is a need for the project to consider how it can best feed back some of the information it has collected, to communities, schools and local administration. The workshop in November 1989 looked at this briefly, and established the importance of selecting appropriate levels of presentation for various types of audience.

What is very apparent is that while much data collection and analysis has been done by the project, and by different parts of it, there has been a gap in communications which has stopped much of the relevant information filtering back to the people who originally collected the data. They have therefore been limited in what they have fed back to respondents.

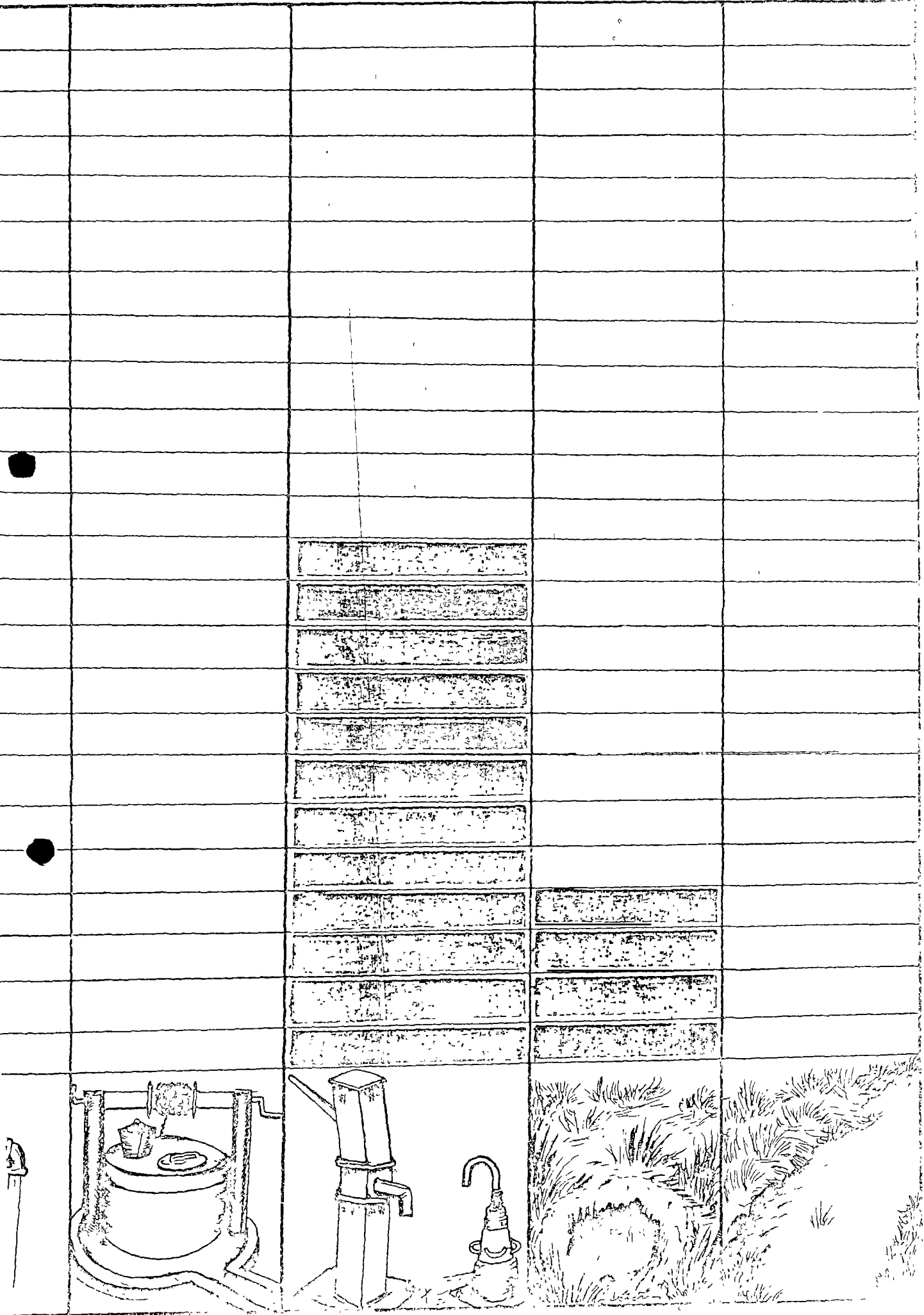
There is some feeling in Mongu that data analysis is complicated, despite 90% of it being done by the resident staff. What should be recognised is that the data has been collected for specific purposes. The collated information only requires questions to be asked of it (how many people do...., is this more than previously recorded?.... what reasons did they give for preferring ...? What had made people change..? How can we use this to persuade others?) to be of use to everyone, and the sort of information collected is specifically not at a level which requires very high level analysis. There is no mystique involved, only a need to identify what is required from the data, and to decide whether it is reliable enough for any conclusions drawn to be used.

7.5.2 As already mentioned, a certain amount of information is already fed back to communities through the posters, discussions of problem solving etc., but this often relates to anecdotal information (events described in a particular instance, with no indication of whether this is common and relevant to others). Some exercises can be done in the use of picturegraphs, so that people see some of the results at the same time as the information is collected. The project artist made a sample picturegraph so that people could see how they work (see fig 7.1) and in the workshop experiments were done with ones depicting "Are you satisfied with..." "Are you unsatisfied with..." and "Does it not affect you either way", being related to the state of Mongu township water supply.

More could be done with survey data, but care should be taken not to revert to a teaching role, and materials developed should be geared to discussion, rather than explanation, and often related to other villages not their own. This may help people give reasons for certain behaviour without it being related to known individuals, which may cause offence, and allows people to voice ideas which they themselves hold, but do not like to attribute to themselves.



Fig 7.1 Sample Picturegraph





Also, in feeding back information, thought must be given as to whether the way in which this is done may affect response to later questions. If a minority of people adopt a particular practice or attitude, and are laughed at for it, they will be unlikely to admit to it again, even if their behaviour has not changed. This would bias subsequent monitoring.

7.5.3 While with communities information should be kept to non-numerical forms, for schools the numbers derived from monitoring can be useful, and since it is an environment for direct teaching, the messages can be clearer. More could also be done with information from other projects which have worked on specific water related diseases and benefits. The most interesting information for schools however would probably be that which they collect and analyse themselves, linking together many of the different subjects they cover, and providing teachers with new ideas which they can develop themselves, as outlined above.

The reports each year written by Mr Rønningen, containing rural water supply details and the previous monitoring up-dates contain much information which can be used as a basis for feedback. CEP have also done much analysis, which only needs have questions asked of it, and to be set in graphical form and looked at to see what it means. It is suggested that there should be a competition for all those working on the WASHE programme to develop an example of feed-back (to any specific group, village, school etc) or an exercise for school children, and that after testing the best ideas, the designers of those which worked best, should be rewarded.

7.5.4 For district and provincial administrators there is a need to produce information, at least in tabular and preferably in graphical form. These are people who need to get a good picture of what is being achieved, without looking at every detail. To do this clearly requires -:

- a) the identification of the message which needs to be conveyed
- b) the filtering of data to include only what is relevant (this does not mean introducing bias, but simply not including the number of washing slabs completed, if what you want to show is that pumps are operating more reliably)
- c) the selection of the clearest method to represent the information and deliver the message.

If graphs are being used, make them simple, and mark what the vertical and horizontal axes represent very clearly. Bar graphs are probably more easily understood, even by those who are very numerate, than XY graphs. The bar can be a block, or be represented by an appropriate number of buckets, pumps, stack of coins or whatever is relevant, in a line.

7.6 Conclusions

Future developments need to focus on methods of data collection which involve extension staff and respondents more. They also need to include better lines of communication for discussing the results of data analysis, and the development of methods of presentation for different audiences.



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APPENDIX ONE

BASIC GUIDELINES FOR SURVEYS AND QUESTIONNAIRES. (as discussed in November 1989)

1. Aims. Identify objectives, and limit them as much as possible. Check that information required cannot be derived from existing records.
2. Interviewers and respondents. Who will they be ? Does this affect the form of questionnaire? Will all those filling in answers have been instructed in the aims, pitfalls and purpose of questions?
3. Timing. Fix a schedule for each survey. Formulation - Pre-Test - Adjustment - Full Survey - Analysis - Discussion and presentation of results.
4. Survey type. Qualitative or quantitative aims, and the level of sampling required.
5. Length. Keep it as short as possible while fulfilling aims. This way respondents will not lose interest.
6. Structure.
 - a) Leave sensitive questions to the end.
 - b) Try to make one question lead on logically from the last.
 - c) Set it out so that recording of answers is easy and form is easily understood.
 - d) Try to avoid questions which may bias subsequent answers.
 - e) Include some check questions which may test validity of earlier answers, if this can be done discreetly and without making survey too long.
7. Language Consider the language in which the questions will be asked. Does this lead to misunderstandings, offence, or involve concepts which are not recognised in that language ?
8. Questions.
 - a) on behaviour should relate to a specific period of time (yesterday, in the past three months..). Do not use phrases such as "normally", "Usually" etc.
 - b) should be as short and simple as possible. Answers should be recorded as shortly and clearly as possible, so that respondents do not get worried/impatient.
9. Preparation of interviewers. Make explanatory check list, or hold workshop to discuss purpose, aims of specific questions. Consider what analyses will result and leave time to develop methods for passing on information.
10. Pre-Test. Use several interviewers and types of respondent representative of those likely to be involved in the full survey..
11. Data produced. Tie down data by defining conditions under which it was collected, characteristics of the sample population and anything which may have affected results



ASKING QUESTIONS.

1. Attitude. You only have the questions, THEY have the answers. The value/quality of these answers depends a lot on how the respondents (the ones who answer) react to you, which in turn depends on how you approach them.

2. Approach . Don't be timid, but remember that they, not you, know all the answers which you need (even if it's a "don't know"), and should therefore be treated with a friendly respect.

- Try to retain their interest and talk around the question as long as this can be done in a way which puts them at their ease but does not otherwise influence the answer they will give. Different people may require different degrees and ways of explanation.

3. Forming questions. For open-ended questions try NOT to prompt them with examples, only clarify the question if this can be done without giving specifics.

- Don't make people feel guilty or inadequate for providing a "don't know" answer.

- Where you are asking why something has not been done, do not imply too strongly that it should have been done. Try to phrase the question so that the respondent can admit it was not done without losing face.

- Where you want to ask people if they will do some task, phrase it with a 'let-out clause' such as "Would you have time to " so that they can say "No" without having to say simply that they don't want to do it. Otherwise you may get many "Yes" answers which will not be fulfilled.

4. Filling out questionnaires.

4.1. Step one. Introduce yourself and explain why you are there. Include the fact that similar questions are being asked all over the province, and that household names are only being used to check that the same house is not covered more than once. Any information used will be anonymous. We only want to see how project is going, what people think of it and so how we can improve it, and encourage people to better water use and health.

4.2. Step two. Usually try to ask questions within a discussion, not just reading out word-for-word what is on the paper, and moving straight on to the next question.

4.3. Step three. Record the answers as fully as possible. If you are with another member of the team, get them to record the answers while you lead the discussion.

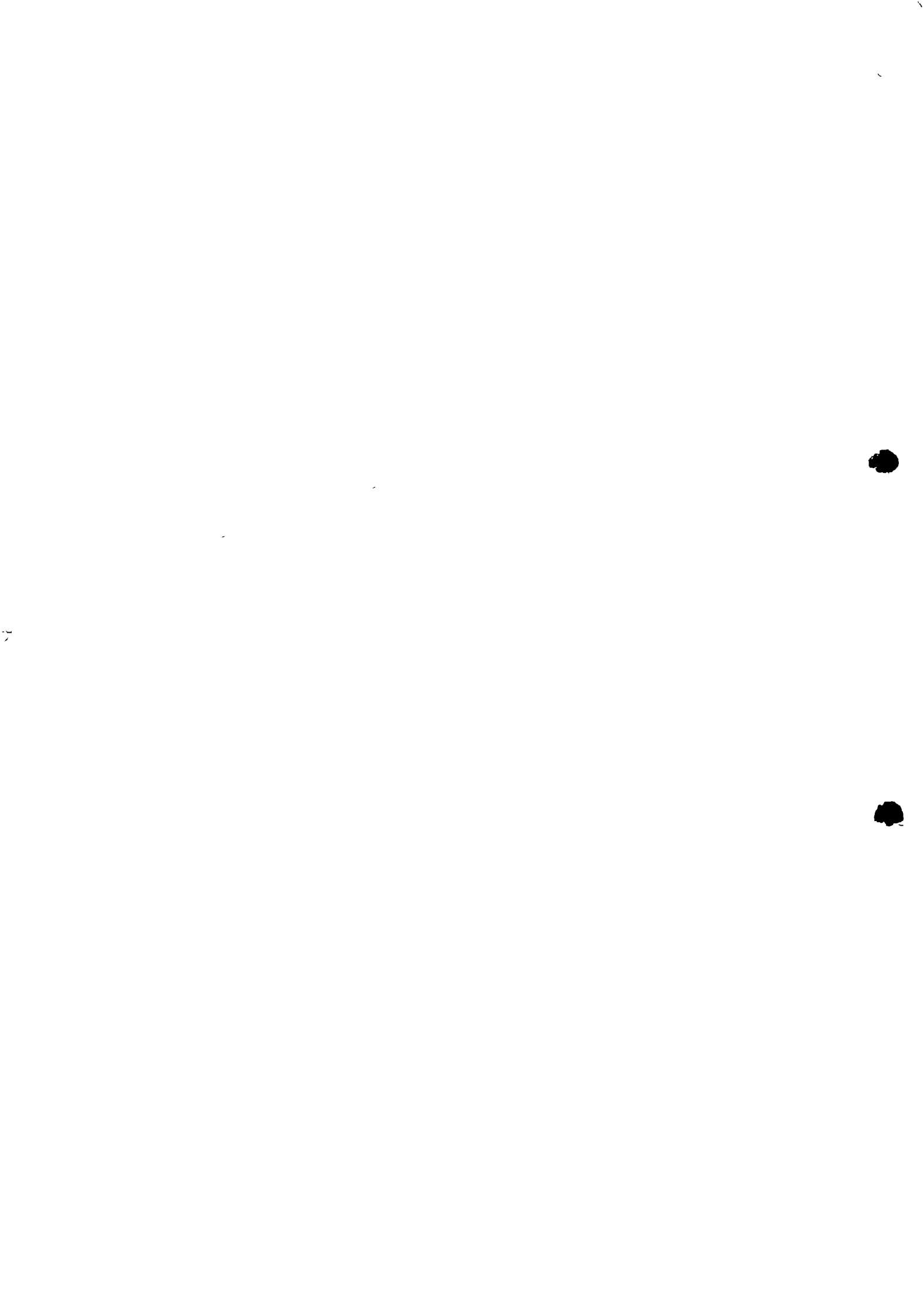
4.4. Step four. A "Yes" or "No" is seldom a sufficient answer. Get the respondent to enlarge on what this means, unless later questions are



going to be able to cover all the reasons/variations that the "Yes" or "no" implies.

4.5. Step five. Look at the answers as a whole at the end of the questionnaire. Do they suggest some factors which are not covered, but which would make the answers logical? Write additional remarks on the back where this is the case. Do they indicate some inconsistencies or misunderstandings in the answers? which should be checked before moving on to another respondent. It is seldom possible to go back and check answers with a respondent at a later date. In both cases discuss with the Health Co-ordinator whether changes to the questionnaire might be useful.

4.6. Step six. Thank the respondent for his/her help, and ask if there are any remarks they would like relayed to DWA which are relevant to the programme.



		Issues expressing need.	Let the best procedure for selection, funding procedure of DWA and local government	All villages requested by Ward Chairmen or WA's through DASHZ (over 4000)	CEP DWA/RWS PWE/WASHE DIST/PROV NORAD	Find out co. limit of each ward to be served, deal with local government Plan materials and logistics for construction, plus commercial wells for non-chairmen WA's sufficient felt need and funds Explain plans to districts, and prov. govt, + resulting distribution DASHZ meetings use results to stop unpressurable demands from Ward Chairmen Illustrate size of problem, demand, and felt need
2 Well inventory monitoring	Community	To see how systems are functioning	Collect views on systems Assess activity of VWC's	All protected wells, annually (around 300)	CEP DWA/RWS PWE/WASHE DIST/PROV NORAD	Plan follow-up esp strengthening of VWC's, and maint with RWS + communities Plan maint. schedules with district, assess rel performance of source Illustrate DWA progress in providing RWS, + in improving functioning/ maint. No. of wells provided by GRZ to rural areas and their increased reliability Fulfillment of original targets, WASHE approach on O + M
3 VWC Follow-up Care of wells/ VWC activity	Community	Indicators of activity initiative, problem solving	Stability of VWC's, awareness of present prices, funds available Benefits and problems of new well Existing of those using source Requirements of VWC for further HE and other sectors in which they cd become active	All committees once, but programme slowed down, transport problem	VWC CEP DWA/RWS PWE/WASHE DIST/PROV NORAD	To plan meetings and identify houses for fund collection Strengthening VWC's, developing relevant problem solving + new HE materials Update VWC contact names for maint refresh course meetings Areas of possible co-operation with other rural devt sectors Community acceptance of payment, co-ordination, esp with EA's in HE prog Community activity in water sector, programme changing to suit new demands
4 Household water use	Household	Water collection practice source, volumes used and purposes	Problems of water use. Perceived benefits involvement in maint. Sanitation facilities. Cost of water, attitude to VWC	Some 15 villages where poss before and after surveys	All levels	Impact of programme on water use, and its limitations Aspects of reduced uptake which require problem solving Gearing HE to conditions and behaviour
5 Household water quality	Household	Water collection and storage practices		200 household in 6 villages	All levels	To show that improvements to source reach the consumer To identify practices which improve or reduce water quality
6 Schools water use survey 1	School	Sources of water and type of use	Hygiene practices school promotes Health ed received, from whom? Production unit water use and income Resident teachers water use School projects using well, and funds	Approx 60 schools in 1988	CEP All levels	Co-ordinate HE with WA's in schools Assess adequacy of schools water supply, and other needs eg buckets Affordability of spares and improvements to storage and washing facilities
7 School survey 2	Public	Source of water and type of use at home	Hygiene practices of children Sanitation facilities at home and at school Reasons for non-use of latrines	Approx 280 classes of 12,000 pupils	CEP DWA/RWS PWE/WASHE NORAD	Baseline data of hygiene practices before HE input Identify areas where surface water use dominant, and health risk high. Areas where coverage low and more sources needed. Project progress, rural water supply coverage related to national targets Baseline data for impact studies
8 Teacher training Follow-up 1 + 2	HE teachers	Impact of HE workshop on teaching about water use and sanitation and health.	Suggest move HE into villages too Gather ideas for future workshops	(1) Approx 20 schools (2) 112 schools	CEP	To design new HE materials Encourage greater HA input to schools Assess progress in teaching teachers, rather than directly to pupils

