

REVIEW OF RURAL WATER FOR HEALTH PROJECT  
NORTH-WESTERN PROVINCE  
ZAMBIA

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Members of the Review Team

Dr. Soneka, PMO North-Western Province  
Mr Mwanamwange PWE Copper Belt Province  
Dr S. Sutton SWL Consultants, UK.

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## SUMMARY OF REVIEW FINDINGS.

1. RWHP has been running since 1988, preceded by the Drought Contingency programme. Its primary objectives have been the assistance to communities in establishing their own water supplies, ensuring that these are as sustainable as possible, and that potential health benefits are maximised. An additional objective is the strengthening of DWA capacity.
2. With much increased rates of progress, using less than the budgeted funds, and a slightly increased period of operation, RWHP reached the Phase II target of 150 wells, and even slightly exceeded it (finishing 153 wells by the close of the phase in June 1996). The result is that project cost per well in the phase has fallen from around US\$ 16,000 per well to just under \$10,500. Coverage for the districts has risen to around 40% in Solwezi, and 15% in Mwinilunga, with a total of over 400 wells constructed since the project began.
3. Wells are generally of high quality construction and at almost all of them communities have bought buckets, and appear aware of the support systems which are available to assist them, and regard the wells as their own. Motivation during construction is generally high, and maintenance needs generally low.
4. Of the more than 50 recommendations drawn up jointly with the project in the mid-term review, a high proportion have received some attention which has led to positive changes, especially in terms of production/cost reduction, management structure, establishment of water quality testing and to some degree moves to decrease project support to extension workers. The last, however seems to have resulted in some confusion over responsibilities and has not led to the planned reduction in CHA activity at community level or a higher profile for extension workers.
5. Phasing out processes are difficult to design while institutional structures at provincial and district levels are in such a state of flux, in local government, health and water. All that can be done is to try and build intersectoral bodies which can gain experience in management and planning and which spread responsibilities in a way that any expertise gained will not be lost to the district whenever re-organisation is eventually initiated. In addition the project is looking at how to improve the sustainability of elements of its activities, and which parts could be commercially viable or integrated fully into GRZ systems. In all areas, the dangers of asset stripping are high, unless integration is far advanced before the project withdraws, or sections are bought by commercial organisations.
6. Delays in sector re-organisation, (including freezing of government recruitment) combined with poor to non-existent development of bodies proposed in the de-centralisation policy (especially District Development Co-ordination Committees), have hindered project moves to reduce dependency and increase integration. That is combined, perhaps, with somewhat low project commitment to this aspect so far, mainly with respect to DWA.
7. RWHP has made major inputs to the development of CMMU policies and guidelines, and it is unfortunate that there have, so far, been few outputs from CMMU to reflect this effort. In addition the project has put much emphasis on gender issues, and has adopted a policy of positive discrimination in employment, both of which initiatives are showing good results.
8. The Third Phase shares two of the objectives of the Second, in terms of supply service and sustainability, although with qualitative as well as quantitative aims. Two other objectives of changes in hygiene and sanitation behaviour and integration in institutional frameworks, highlighted in the mid-term review, remain to be addressed as does the last objective of phasing out, for which few, but significant preparatory steps have yet been taken in project plans.

9. Early attempts at elements of phasing out and integration have not been entirely successful. They show the need for setting out clear agreements with concerned parties, tracking of progress, and withdrawing management and planning support more gradually, after a period of training, combined operation and well-defined responsibilities. Handing over to date, both of USP in Kasempa, and of Extension Worker support to Ministry of Health, have both ended up with limited success through lack of these elements, despite good relations with both district and especially sub-district level personnel.

10. Three pilot projects have been undertaken in response to aspects identified during the Mid-term Review. These are -:

- Institutional water supplies (especially schools and rural health centres)
- Improvement of traditional sources and
- Sanitation

Separate programmes have been drawn up for each. Assessment of results to date by the project suggests that the approaches taken have provided valuable experience and that the assumptions made in initial pilot project design can now be tested and any necessary modifications be made. Aspects considered in workshop discussions included -:

- More attention to the specific management problems of institutional supplies where combined with communities,
- Feasibility of traditional source improvement with lower level interventions and a more community driven approach
- Increased emphasis on the behavioural aspects of sanitation and hygiene, rather than on the purely technical
- the drawing up of baseline information to improve ability to judge impacts.

11. PEP is also starting to co-ordinate the establishment of a district hygiene education plan by an intersectoral group, with care being taken that it is not too 'project' driven'. Alongside this, a project hygiene education programme will be developed. This needs to be a priority since it is a vital element which is now lacking. There appears to be little discussion with communities to highlight advantages of greater water use, and changes in practice such as hand-washing, which would encourage greater value attached to safe water supplies, and higher impact from the protected wells. The lack of this programme has unfortunately coincided with the handing over of responsibility for extension worker support and training, leaving a gap in health and hygiene education.

12. Between 45 and 50% of project wells in Kasempa go dry for some months of the year, and this needs attention before 'phasing out' can be considered as being completed in this district. Overall, consideration of depths to water and its variability, construction problems and costs has led to more people on the project beginning to favour hand-augering and drilling over hand-dug wells. This should be considered if construction capacity is to be increased. It may also be considered whether replacement by boreholes, or drilling in the base of dry hand-dug wells could provide a solution in Kasempa, possibly at less cost than re-deepening, and would require new sources of funding.

13. The provision of an IDA is geared to the formation of the CU, and to assist in phasing out, and in these it may be invaluable. It is hoped, however that the increase in technical assistance will not reduce the opportunity to increase the responsibilities of the Zambian APMs, and allow the PM more time for the institutional support and development of inter-sectoral bodies for RWS planning and management. This would have indicated a phasing out, rather than a building up of more technical assistance, which would now appear to continue till the end of the project.

14. It appears that the project has increased productivity remarkably, and so has achieved its numerical objectives in the second phase, and has responded positively to the recommendations of the mid-term review, in terms of those actions which were well-defined and within the control of the project itself. However the latter still acts with a degree of isolation which has made it difficult to bring about the necessary changes in its relationship to GRZ institutions, and these are essential if phasing out is to proceed smoothly.

## ABBREVIATIONS.

AMS	Assistant Mechanical Supervisor
APM	Assistant Project Manager
APS	Assistant Project Supervisor
B+W	Bucket and windlass
CDW	Community Development Worker
CF	Construction foreman
CHA	Community Health Advisor
CHW	Community Health Worker
CMMU	Community Management and Monitoring Unit
CU	Commercial Utility
DANIDA	Danish International Development Agency
DCP	Drought Contingency Programme
DDCC	District Development Co-ordination Committee
DGIS	Directorate General for International Co-operation (Netherlands)
DHEP	District Hygiene Education Programme
DHI	District Health Inspector
DDH	District Director for Health
D FI	Dutch guilder
DCD	Department of Community Development
DHMB	District Health Management Board
D..O	District Officer
DWA	Department of Water Affairs (MEWD)
D-WASHE	District WASHE committee
EA	Engineering Assistant
EHT	Environmental Health Technician (formerly Health Assistant)
EU	European Union
FC	Faecal coliform
FOREX	Foreign Exchange
GRZ	Government of the Republic of Zambia
GTZ	Gesellschaft fur Technische Zusammenarbeit.
HA	Hand-augered well
HDW	Hand-dug well
HO	Host Organisation
IDA	Institutional Development Advisor
ITS	Improvement of traditional source
IWSD	Institute of Water and Sanitation Development (Harare)
KAP	Knowledge, attitude and practice
k or Zk	Zambian kwacha
MAFF	Ministry of Agriculture, Fisheries and Food.
MEWD	Ministry of Energy and Water Development
MLGH	Ministry of Local Government and Housing
MOE	Ministry of Education
MOH	Ministry of Health
MTR	Mid-term review
MWS	Mechanical Workshop Supervisor
NGO	Non-government Organisation
NWASCO	National Council for Water and Sanitation
NWP	North-western Province
NPW	Non-project well
OIC	Officer-in-charge (District DWA)
PCU	Project Co-ordination Unit
PEA	Participatory Education Adviser
PEP	Participatory Education Programme
PEM	Popular Education Method



PRWE	Provincial Rural Water Engineer
PTA	Parent Teacher Association
PWE	Provincial Water Engineer
RHC	Rural Health Centre
RWE	Rural Water Engineer
RWHP	Rural Water for Health Programme
RWSS	Rural water supply and sanitation
SI	Sanitary Inspection
SNV	Netherlands Development Organisation
TOR	Terms of Reference
UNICEF	United Nations Childrens' Fund
USP	User Support Programme
USPCC	User Support Programme Co-ordination Committee
VAT	Value added tax
VWC	Village Water Committee
WASH	Water Sanitation and Hygiene
WASHE	Water Sanitation and Health Education
WDO	Water Development Officer
WSDG	Water Sector Development Group

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R.B. Khuti,	Acting Director, DWA, Lusaka
P. Chola	Acting Deputy Director DWA Lusaka
B. Chiwala	Water Engineer (planning), DWA Lusaka.
A. Dellevoet,	Royal Netherlands Embassy, Lusaka
P. van Ommeren	Director SNV, Lusaka
S. Matur	Water and Sanitation Programme Officer, UNICEF Lusaka
D. Mwanza	Head, WSDG, Lusaka
J. Kalbermatten	Consultant to WSDG
D. Carty	Head CMMU, Lusaka
I.J. Mbewe	Head N-WASHE Training Group, Lusaka
A. Richards	Head of water sector projects, GTZ, Lusaka
P. Koren	First Secretary, NORAD, Lusaka
Mr Kasono	Provincial Secretary, North-western Province, Solwezi
J. Wesselink	Project manager, SNV Solwezi
I. v.d. Honing	Regional manager SNV Northwestern Province
G. Hazuza	Assistant Project Manager, RWHP, Solwezi
O. Chilekwa	Assistant Project Manager, RWHP, Solwezi
K. Lagrand	SMS, RWHP, Solwezi
G Ndhlovu	AMS, RWHP, Solwezi
D. Nyirenda	Project supervisor, RWHP Solwezi
B.K. Malambo	Participatory Education Advisor, (PEA) RWHP Solwezi
M. Hazenberg	PEA, RWHP Solwezi
Mr Shindaile	Director Engineering Services, Solwezi Municipal Council
J. Namonda	PWE, DWA Solwezi
Y Kalenga	CHA/ Lab technician RWHP Solwezi
F.S Nguluwe	DO, DWA, Kasempa
I. Mwinga	CHA, USP, Kasempa
B.E Mwanza	Council Secretary, Kasempa
Mr Isambwe	DPO, Kasempa
I. Mwetela	DCDO, Kasempa
Mr Kajimu	DHI Planning, Kasempa
S. Lutango	Team Leader, MOH, Kasempa
Mr Kangwa	Deputy team leader, administration, MOH, Kasempa
M. Mubita	OIC, Meteorology, Kasempa
Mr Chansa	DO, DWA Mwinilunga (PS RWHP schools, RHC's, and ITS)
Mr Mwamba	PS (HDW and hand-augered), RWHP, Mwinilunga
Ms A Kalelemba	CHA, RWHP, Mwinilunga
Mr Sichone	CHA, RWHP, Mwinilunga
M. Sibeta	DHI, Mwinilunga
Mr Siame	Deputy Director Planning, MOH Mwinilunga
Mr Kawele	MOH Malaria prog. Mwinilunga
B.E. Mapulanga	Council Secretary, Mwinilunga
Mr Mwale	OIC Police
L. Tauseni	DCDO, Mwinilunga
Mr Bwalya	DPO, Mwinilunga

# 1. INTRODUCTION

## 1.1 Background to the review

1.1.1 The Rural Water for Health Project has been operating in the three districts of Solwezi, Kasempa and Mwinilunga with most of the present operational objectives since 1988. This was preceded by a Drought Contingency Programme in Kasempa and Solwezi districts, which started in 1985. There has therefore been a history of rural water supply intervention in the area with Dutch funding, and the build up of considerable experience and relevant expertise. The Rural Water for Health Project (RWHP) is the main implementer of well construction and maintenance back-up in this area, and the main provider of relevant training in water supply and community education related to water and sanitation/hygiene issues. It has also built up a well-equipped and efficiently managed mechanical workshop upon which many of the provincial and local enterprises and government organisations depend. It has become an institution which is well-regarded by provincial and district authorities, and upon which they put significant dependence.

1.1.2 The other districts of North-western Province (Kabompo, Zambezi, Chavuma and Mfumbwe) are mostly covered by the Village Water Supply Project, based in Kabompo and funded by GTZ, although some of Mfumbwe is covered from Kasempa district. GTZ are phasing out this project at the end of the year, but plan to start up again with RWS under the CU when it is formed.

1.1.3 Whilst the Project has maintained much the same objectives since 1988, it has reviewed the effectiveness of aspects of its approach on several occasions. These have included -:

J. Harnmeijer, D. Carty, I.J. Mbewe Evaluation Report May 1990.

F. Renkema Financial and Economic Appraisal Project Document. Phase II Aug 1991

S. Nduna. Gender Impact Assessment Report on RWHP. 1994

The Project has shown considerable flexibility in responding to recommendations, and to the changing national and international perspectives on rural water supply, but changes to a programme necessarily take some time to establish, and even longer to see their impact.

1.1.4 In late 1994 a Mid-Term Review (MTR) was carried out with the Project<sup>1</sup>, to assess whether the Project was meeting its objectives, and to consider whether a Third Phase was needed. This was undertaken partly to avoid a hiatus in funding between the two phases and partly to promote awareness within the Project of the changing environment in which the Project would be operating in the future, due to the changes in policies and sector organisation which were taking place. This led to some alterations to Project approach which were defined in the Third Phase Project Proposal<sup>2</sup> upon which present activities are based and which are discussed in Section 2.4 and following chapters.

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<sup>1</sup> RWHP, NWP. Mid-Term Review. Oct 1994 A. Hussen & S. Sutton

<sup>2</sup> Project Proposal for the Third Phase of the RWHP covering mid 1996-nd 1999. RWHP March 1995

1.1.5 The Second Phase of RWHP finished in July 1996, by which time some 381 wells had been constructed; a further 47 have since been completed as part of Phase 3.. This review has been initiated to provide a post-evaluation of Phase II and also to look at future policies and implementation procedures for Phase III.

## 1.2 Terms of reference

1.2.1 The annual plan and budget for 1996 catered for a post evaluation at the end of Phase II. However, since approval of the third phase was received at the end of June 1996 the review team are required not only to evaluate Phase II but also to look at future policies and implementation procedures of Phase III. The additional proposal for an institutional development advisor is also to be taken into consideration. During the month of June the Rural Water for Health Project received a team of monitoring consultants. Their recommendations and findings will form an extra input to the Review team.

1.2.1 The aim of the review is to

- (1) review the existing activities of the Project and to assess whether these are in line with the recommendations made by the Mid-Term Review and;
- (2) review the existing activities to:
  - (a) assess whether these activities have sufficiently contributed towards reaching the objectives of phase II and;
  - (b) to assess whether these need to be adjusted to meet the objectives set for the current phase.

1.2.3 The review team will look into the following themes:

- a. Project activities;
- b. Sustainability of the water supply facilities;
- c. Participation and Education Programme;
- d. Other agencies in the Water Sector;
- e. Phasing out of the project.

(In addition it was subsequently proposed that sanitation should also be included in the review).

The full Terms of Reference is presented in Appendix 1.

1.2.4 The process of reviewing activities and impact is required to be carried out as far as possible in a participatory fashion, involving Project personnel in all aspects. In this way, the conclusions drawn are the product of everyone's thinking. The points raised in this report are as far as possible a product of discussion with those concerned and it is therefore hoped that there should be few conclusions and recommendations with which the Project, SNV and GRZ are not now already familiar.

1.2.5 The team carrying out the review in conjunction with the Project staff, were as follows -:

Mr P Mwanamwange. Provincial Water Engineer, Copper Belt Province

Dr. Soneka. Provincial Medical Officer North-western Province

Dr S.E Sutton, SWL Consultants.

## 1.3 Programme

1.3.1 The review took place from Nov 21 to Dec 12<sup>th</sup>, with Mr Mwanamwange and Dr Sutton available for the full period, including discussions in Lusaka, and Dr Soneka available for the period in North-western Province from Nov 25<sup>th</sup> to Dec 6<sup>th</sup>. The programme was dictated partly by the availability of the Project Manager (out of station Nov 27 to Dec 10) and one of the two Assistant Project Managers who was away on study leave until Dec 5<sup>th</sup>. Despite this they played their part fully in the review and provided invaluable information and ideas.

1.3.2 For one day before travelling to Solwezi and for the last week of the review, discussions were held in Lusaka, with those involved at national level in water supply and sector reform and also with SNV and the Dutch Embassy. A list of those consulted at national, provincial and district levels is given under Acknowledgements.

1.3.3 During the period in the province, visits were made to each of the three districts. District administration, project staff and communities were consulted about their views on rural water supply, sanitation and health education, and on the interventions the project has made and any others which people would like to see it make. Two days were spent in the field in each district.

## 1.4 Project workshop and recommendations.

1.4.1 As a part of the participatory process of the review, a two day workshop was held in Solwezi on Dec 5+6<sup>th</sup>. This included district members of the project and USP Kasempa, plus provincial representatives from MOH, MOE, DCD, DWA and MAFF.

1.4.2 The topics discussed included -:

- What things is RWHP trying to change?
- Roles and responsibilities of CHAs and EHTs
- Traditional source improvement
- Schools and rural health centre (institutional) programme
- Sanitation
- Appropriateness of various rural water source technologies
- Social, economic and health indicators of impact
- Alternative future roles of mechanical workshop to raise issues of phasing out

1.4.3 Whilst the objectives of the workshop were similar to those for the Mid-Term Review, in December 1996 not all sessions followed a structure which provided clear outputs which could constitute recommendations. This means that some recommendations have only been discussed in a more limited forum and will need further development (eg. programme for devolving more responsibility to EHTs and changing role of CHAs). Other recommendations, such as those on phasing out, will be very dependent on factors outside the control of the Project, such as the timing of the formation of the Commercial Utility, and the new programme of GTZ, and so will require continuous review by the Project. For this reason, detailed recommendations on most institutional aspects are inappropriate at this time, as related organisational structures are changing in an unpredictable fashion. For instance fundamental changes occurred even during

the one week in Lusaka in December, when the government placed the water supply regulatory body (NWASCO) under MLGH, thus renegeing on the first principle of the sector re-organisation which was that regulation and supply should be separated.

## 2. CONTEXT OF PROJECT OPERATION

### 2.1 National policies

2.1.1 Since the new government came to power in October 1991, there have been several changes in policy which affect the water and sanitation sector. The emphasis has moved towards increasing the influence and contribution of service users, devolution of management to lower levels, particularly district level, a general reduction in the involvement of government in industrial interests, especially through the privatisation of parastatals, and the encouragement of private enterprise. The acknowledgement of the very limited funds which government can offer for service provision has led to major moves to provide more sustainable services, and to support them at least partially, through the contribution of users.

2.1.2 GRZ has therefore adopted seven sector principles which are relevant to the design of any project in the sector. These are -:

1. Separation of water resources functions from water supply and sanitation
2. Separation of regulatory and executive functions within the water supply and sanitation sector.
3. Devolution of authority to local authorities and private enterprise
4. Achievement of full cost recovery for water supply and sanitation services (capital recovery and operation and maintenance) in the long run
5. Human resources development leading to more effective institutions
6. Technology appropriate to local conditions
7. Increased GRZ spending priority and budget spending to the sector.

2.1.3 As a result, government policy has been to re-organise the water sector so that responsibility for water supply and sanitation should pass to Ministry of Local Government (MLGH), and water resource management be the responsibility of Ministry of Energy and Water Development (Department of Water Affairs). In addition there is a major initiative to make all water supply systems more efficient and to institute a more realistic level of cost recovery, through the establishment of commercial utilities (CUs)<sup>3</sup> (in which district councils will be major share-holders) to manage water supplies and put them on a commercial footing. Whilst all these aspects lead to the same goal, they are not necessarily progressing in a very co-ordinated fashion, which means that transition phases are not well defined. The Water and Sanitation Bill (final draft Dec 1995) has not so far been presented to parliament, and although North-western Province is the first province in which a Commercial Utility is to be formed, this has been delayed for over a year so far, and is unlikely to happen before late 1997.

2.1.4 The CU for North-western was planned to be formed at the end of 1995, but as a result of -:

- a) a legal dispute between the main supporting donor, GTZ and the Zambian Co-operative Union and

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<sup>3</sup> Proposed Water Sector Reforms. Establishment of the National Water Supply and Sanitation Council. WSDG. Dec 1995.

b) the lack of ratification by parliament of the Water and Sanitation Act this has been delayed. Most recent estimates are that the company will be formed towards the end of 1997. It is planned to have two rural water engineers at headquarters and stores for the sale of buckets and chain. However, any major maintenance works or construction would be carried out at cost, and this would be achieved by letting contracts rather than building up capacity within the CU. Plans are still very much orientated towards urban water supplies for the 15% of the population<sup>4</sup>, with much relating to policies tariffs, funding, equipment, relationship to D-WASHE etc for rural water operations remaining to be defined after the CU is formed. Detailed breakdown of urban WS costs have not been accompanied by a similar analysis for rural point supplies (eg. depreciation is assessed for boreholes, but not for hand-dug wells which is an aspect presenting the greatest problem for RWS.) GTZ are in favour of the CU headquarters being in Kabompo, as that is where their activities are based, but to date the councils are split 3/3 as to whether it should be in Solwezi or Kabompo, with a secondary centre in the other town. Policy changes may also follow on the review of the WSDG and CMMU being carried out in Jan/Feb 1997. The recent strategy paper<sup>5</sup> suggests that these two bodies and N-WASHE should amalgamate to form NWASCO but may then have little political influence to ensure sector policies are adopted, as they have found in the past.

2.1.5 These moves for re-organisation in the sector are occurring simultaneously with de-centralisation. This is designed to provide district councils with powers at present held at national or provincial level, for planning, and implementing and managing services in their district. The water policy is geared to fit in with this, but health, education, and agriculture have all de-centralised autonomously, with minimal powers devolved to MLGH and district councils. SNV is also assisting the de-centralisation initiative by supporting district planning officers in each district, having previously provided support to the PPU.

2.1.6 Health reforms are leading to changes in the structure of the health service and greater focus on community/neighbourhood health service provision, and phasing out of provincial concentration of services and administration. This is also a system in a state of flux, with district team structure still to be defined, and provincial personnel unsure of their future. This is therefore a good time for the Project to work with MOH to ensure that due emphasis is put on water and sanitation within the environmental section of the district team, and in rural health centre and district budgets and work plans.

2.1.7 As far as knowledge of policies is concerned RWHP has tried to keep abreast of developments and has taken an active part in provincial discussions on the CU. However there is still great confusion even at national level, DWA, MLGH, WSDG and GTZ all with different pictures of how the transition to the final organisational structure will be achieved, and how long it will take. Within the province, district administration is aware of the sector re-organisation but is bemused by the lack of any action taken by government over the past year, to establish the long-promised CU.

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<sup>4</sup> Establishment of commercially viable water supply and sanitation utilities. North-western Province July 1995. WSDG

<sup>5</sup> Water supply and sanitation, sector strategy. J. Kalbermatten/WSDG Nov 1996



## 2.2 **Zambian rural water supply policy.**

2.2.1 The policy for rural water and sanitation, whose overall objective is the "universal access to safe, adequate and reliable water supply and sanitation services" is set out in the policy paper drawn up by the DWA in 1994<sup>6</sup>. The strategies proposed to meet this objective are -:

- i) ensuring that RWSS programmes are community based
- ii) developing a well-defined investment programme for sustainable RWSS
- iii) promoting appropriate technology and research activities
- iv) developing an emergency and contingency plan to mitigate impacts of droughts and floods in rural areas
- v) developing a cost recovery approach as an integral part of RWSS which will ensure sustainability
- vi) developing and implementing a well articulated training programme

2.2.2 The provision of rural services has always posed a problem in the lack of resources in most sectors at anything other than provincial/district level. This is particularly true for water supply, and it is partly for this reason that government policy related to de-centralisation is to maximise the involvement of all sectors in rural service planning and support. Those sectors with workers at sub-district and community level, which include health, education, community development, and agriculture, and also NGOs are now included in the new District Development Co-ordination Committees (DDCCs) which are responsible for the planning of resource allocation within the district.

2.2.3 The same representatives have already, in some provinces been formed into WASHE (Water Sanitation and Health Education Committees) to advise DDCCs on water issues, and to plan how the scarce transport and extension staff resources can best be used to improve the situation of rural water supply. The plan for the CU in North-western emphasises the importance of the D-WASHE in promoting rural interests with the CU. There is now a national training team to help councils set up D-WASHE committees and to be aware of all the social and economic factors which might influence their decisions. Such committees already exist in Western, Luapula and parts of Southern, Eastern and Central Province, and have proved successful in drawing up district plans and soliciting donor funding. These committees are considerably more involved in the co-ordination of different donor and NGO activities than district councils previously have been. It is noted however, that the councils in North-western appear at present to be unsupportive of initiatives to set up DDCC's and their associated sub-committees, being aware of the reduction in their powers that this might bring. Council secretaries voiced their disapproval that such committees had no financing and so were dependent on council funding which is insufficient for its present commitments.

2.2.4 According to CMMU rural water guidelines<sup>7</sup> access to water is regarded as having a source within one kilometre of the house, and adequate volume

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<sup>6</sup> National Water Policy, Ministry of Energy and Water Resources, Lusaka, Nov 1994.

<sup>7</sup> Coverage parameters for Rural Water Supply in Zambia. Supplementary Module 1a CMMU 1996

being the provision of 20 l/c/d. In terms of quality the guidelines indicate 'de facto' levels, rather than what might be termed national standards. They indicate that supplies where water sometimes exceeds 10 FC/100ml, although not on a regular basis, should be regarded as acceptable. Otherwise a source is regarded as acceptable if it is free from -:

- visible suspended matter
- excessive colour
- taste and odour
- objectionable dissolved matter
- aggressive constituents

## 2.3 RWHP objectives

2.3.1 The main objective of the Project is 'to provide safe and adequate drinking water and sanitation facilities with the aim to improve the health and living conditions of the rural population of the Kasempa, Mwinilunga, and Solwezi Districts of NWP, in a manner which will allow the recurrent cost for operation and maintenance to be afforded by the community'<sup>8</sup>.

2.3.2 This is to be achieved through five operational objectives -:

- assisting communities in the establishment of their own improved water supply facilities (in such a manner that the facilities are used by a minimum of 80% of men, women and children for drinking purposes)
- ensuring completed facilities have maximum potential of being sustainable in the long run ( in such a manner that 80% of facilities will be functioning at the end of the phase).
- maximising potential health benefits, sanitary conditions and living standards through the improved facilities (by enhancing the health knowledge and sanitary behaviour of men, women and children).
- assisting DWA and other involved ministries in strengthening their institutional capacities and integrate the Project within GRZ systems
- beginning the phasing out of the Project

2.3.3 Except for the last of these, the objectives remain almost the same as those for the previous two phases, except that it is now recognised that MEWD/DWA will no longer be the lead ministry in rural water supply (nevertheless DWA remains the Host Organisation). The additions in brackets are those developed in the proposal for the Third Phase.. The proportion of the population at which such interventions are to be aimed is not defined, which may cause some problems in deciding what size of community to accept and how many wells to construct in any one area before moving on to the next. It also does not encourage the project to integrate planning with others constructing wells, nor to consider those non-project wells already in existence and in operation (see also Chapter 4.2).

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<sup>8</sup> Project Proposal for the Thrid Phase of RWHP covering mid 1996 to end 1999. RWHP 1995

## 2.4 Recent changes in approach

2.4.1 The analysis undertaken with the Project in September 1994 concluded that there were certain actions to be taken during the second phase in order to reach its immediate objectives, and others which would contribute to long term objective of the overall improvement of health and living conditions. These changes were built into the design of the Third Phase Proposal, and included -:

- increasing productivity in well construction
- improving linkages with all government organisations involved in the sector and explore options for closer integration into GRZ systems for Phase 3
- examining ways to strengthen village management systems so that they require less long-term support
- carrying out preparatory research into low cost options in water and sanitation

2.4.2 Impact and coverage were planned to be maximised by -:

- rehabilitation of existing (non-project) improved sources to bring them up to a standard where they could be incorporated into USP maintenance systems
- development of low cost water supply options for smaller communities, to increase coverage with capital and recurrent costs affordable to rural communities
- inclusion of a sanitation component to maximise health benefits
- greater involvement of institutions, especially schools.

2.4.3 As a result the Project has made many changes to its programme since Oct 1994, in an effort to improve effectiveness. Table 2.1 provides a summary of recommendations and actions taken -:

Table 2.1 RWHP actions in relation to Mid-term Recommendations

Aspect	Recommendation	Action taken
Project philosophy and organisation (see Chapters 2 and 7)	<ul style="list-style-type: none"> <li>• Higher level representation of MOH in project</li> <li>• More involvement of Local Government</li> <li>• Involvement of GRZ in decision-making and planning, not just informing them of progress</li> <li>• Consideration of relevance of chosen technologies to wider coverage of unserved population</li> <li>• Inclusion of priorities of GRZ organisations in Project policies</li> </ul>	<ul style="list-style-type: none"> <li>• Appointment of APM from MOH</li> <li>• Limited development except for PR visits</li> <li>• MOH and MOE recently involved in DHEP, schools and RHC projects</li> <li>• Establishment of traditional source improvement programme &amp; introduction of drilling to improve progress and reduce cost</li> <li>• MOH policies having more effect</li> </ul>
Project effectiveness in well construction (see Chapter 3+4)	<ul style="list-style-type: none"> <li>• Order spare de-watering pumps</li> <li>• Materials delivered to site in advance of needs</li> <li>• Standardising of procedures (Esp surface works)</li> <li>• Minimise time from reaching water to arrival of CF</li> <li>• Better forward planning and performance of CF</li> <li>• Incentives for community effort</li> <li>• Ongoing analysis of progress</li> </ul>	<ul style="list-style-type: none"> <li>• 3 extra purchased, one for extra deep wells</li> <li>• Improving (see Section 3.3)</li> <li>• Surface &amp; underground works done simultaneously</li> <li>• Improving</li> <li>• Fewer project related delays, refresher courses for CFs</li> <li>• Refund of deposit</li> <li>• Quarterly process matrix &amp; research studies</li> </ul>

Aspect	Recommendation	Action taken
	<ul style="list-style-type: none"> <li>• Organisation of community long-term inputs</li> <li>• Higher profile for extension staff</li> <li>• More pre-construction health education</li> </ul>	<ul style="list-style-type: none"> <li>• Community contract, inputs improved, delays reduced</li> <li>• Not developed</li> <li>• Not developed</li> </ul>
<p><b>Sustainability at community level (see Ch5)</b></p>	<ul style="list-style-type: none"> <li>• Include settlement size in selection procedure</li> <li>• Involve DDCCs in application and selection system</li> <li>• Investigate options for community management</li> <li>• Discuss forms of saving and income generation</li> <li>• Emphasise low cost alternatives</li> <li>• Offer services &amp; spare parts at real cost to all well users</li> <li>• Review priority and management problems of institutional water supplies</li> <li>• Consider different systems for payment for maintenance</li> <li>• assess effectiveness of site visits and reduce number</li> </ul>	<ul style="list-style-type: none"> <li>• Done but all communities qualify, regardless of size</li> <li>• DDCCs not formed, no WASHE committee established, but PS et al given familiarisation tour</li> <li>• Done and communities now free to choose own system</li> <li>• Limited, income generation not included</li> <li>• Improved traditional sources (see 6.6)</li> <li>• Limited development, overheads not included</li> <li>• Greater priority given, specific programme see section 6.5</li> <li>• Not developed</li> <li>• Visits appear to have increased rather than decreased</li> </ul>
<p><b>Sustainability , centralised support systems (See Ch 5)</b></p>	<ul style="list-style-type: none"> <li>• Alternative 2 with district level m/bikes, and provincial 4 wheel vehicles</li> <li>• Full cost charges for spares, etc , allow competition from private sector</li> <li>• DWA to take over USP in all districts as soon as possible</li> <li>• Keep up to date on institutional changes affecting USP</li> <li>• Payment systems for major repairs to be discussed with DWA, WSDG etc</li> <li>• Monitoring of Kasempa well condition</li> </ul>	<ul style="list-style-type: none"> <li>• Toyota pick-up and motor bike given to Kasempa DWA</li> <li>• Rates increased but VAT and overheads not included. Charges for re-deepening instituted, not at real cost</li> <li>• Not developed</li> <li>• Formation of CU delayed, but Project much involved in discussions/workshops</li> <li>• Not developed</li> <li>• Carried out annually by USP CHA</li> </ul>
<p><b>Health benefits (see Ch 8)</b></p>	<ul style="list-style-type: none"> <li>• MOH and MOE to be taking leading role in planning RWHP activities, joint development of HE materials</li> <li>• Incorporation of laboratory technician and programme to identify aspects for HE</li> <li>• MOH to monitor condition of facilities</li> <li>• Development of sanitation component</li> <li>• Establishment of monitoring of behavioural change and impact</li> </ul>	<p>Secondment from MOH of APM. Recent initiation of district hygiene education programme in Solwezi CHA trained as technician, but results not yet analysed systematically for HE programme design EHTs visit most wells regularly. Sanitary inspection system not regularised Started. See section 6.7</p> <p>IWSD Harare assisting in development of process and impact monitoring</p>
<p><b>DWA strengthening (see Ch 7)</b></p>	<ul style="list-style-type: none"> <li>• Need for AMS from DWA and Project accountant</li> <li>• Transference of Project staff to GRZ payroll</li> <li>• DWA budgets to include RWS maintenance to establish precedent</li> <li>• DWA to look at replication of project activities elsewhere</li> <li>• Project/DWA co-operation to be closer in planning and management</li> <li>• Project and DWA to carry out joint</li> </ul>	<ul style="list-style-type: none"> <li>• DWA AMS appointed, accountant appointed</li> <li>• Not possible, all DWA recruitment frozen for -re-organisation</li> <li>• Budgets made but no releases made until Dec 1996</li> <li>• RWHP worked closely with CMMU in formation of national guidelines</li> <li>• Limited development</li> <li>• Not developed except for RWHP assistance</li> </ul>

Aspect	Recommendation	Action taken
PEP (see Ch 6)	<ul style="list-style-type: none"> <li>Increased involvement of other organisations in education material and programme development</li> <li>Consideration of policy to confine most community training to committees</li> <li>Flexibility in systems for community management</li> <li>Review of gender roles in participation and management, including traditional sources</li> <li>CHAs monitoring of impact of education sessions</li> <li>Devolution of CHAs role at community level to extension workers</li> <li>Specific post for monitoring impact and indirect monitoring of well condition</li> </ul>	<p>in completion of one DWA well</p> <ul style="list-style-type: none"> <li>Recent initiation of district hygiene education programme. to establish co-ordinated programme. Materials not developed</li> <li>Expansion of training to all interested in community or in PTA</li> <li>Some study of VWC constitution, and causes of non-functioning, communities free to choose form of committee</li> <li>Quantitative analysis of gender split of committee posts for improved sources</li> <li>Not developed</li> <li>Not developed, presently greater dependence on CHAs than before</li> <li>Appointment of APM, monitoring indicators and system still to be developed for impact (see Ch. 8)</li> </ul>

2.4.4 The effects of the actions taken are analysed in the rest of the report, as are the effects of the lack of some changes where actions have had to be delayed sometimes for reasons beyond RWHP control. It seems that much effort has been put into the changes which could be made totally within RWHP but less progress has been made in those which reduce project dependency and require greater co-operation and inputs from other organisations. In that many changes have already made, as is apparent from Table 2.1 recommendations drawn up with the RWHP involve as few further changes as possible, but tend to build on those initiated in the past two years.

#### CONCLUSIONS

1. The national context for RWSS remains confused. Delays and uncertainties over CU establishment mean that RWHP cannot undertake integration of water supply construction and maintenance activities with this organisation.
2. Health reforms mean that district level management has now been restructured and close liaison is necessary to ensure adequate provision for RWSS support is built in.
3. RWHP has made many changes in the past two years to improve efficiency and effectiveness.
4. Government policy and sectoral uncertainties make the formation of D-WASHE committees an urgent priority which RWHP plans now to address through the IDA.

#### RECOMMENDED ACTIONS.

1. Close liaison with GTZ and WSDG to ensure that decisions over the CU take into account RWHP 'modus operandi', agreement with HO, and available resources.
2. Strengthening all links beyond RWHP and consideration of district opinion on existing distribution of supplies, and resulting priority areas where secure.

#### RISKS

1. CU continues to be delayed.
2. CU gives low priority to RWSS.

### 3. TECHNICAL OUTPUT

#### 3.1 Areas of activity

3.1.1 The Project has been operating in three districts. Well construction in Kasempa ceased in 1990, and started in Mwinilunga in 1994, and has proceeded continuously in Solwezi, the district with the highest rural population, since 1985. Phasing out of construction and setting up of the User Support Programme in Kasempa has been regarded as the pilot project for the phasing out of project activities in all three districts. However this is the district with the highest vulnerability to drought, and this has presented problems to phasing out which may not be typical of the other districts.

3.1.2 North-western Province lies on the borders of Angola and Zaire. The anarchic situation in Zaire has tended to lead to instability along the border, and security in northern Mwinilunga and Solwezi has frequently been a problem. While the situation has improved in the last three years there are still some areas where the Project feels it is unsafe to operate, and where equipment and lives could be jeopardised. So far, the Project has not operated in Chikola and Musaka wards of Solwezi district, and has yet to start work in eight of the twenty wards in Mwinilunga district, some of which are not secure. For instance there is considerable pressure from district administration to work in Kakoma ward, Mwinilunga, but it is felt that the risks are still too great, vehicles having been taken recently in this area, and the police saying that their full-time protection would be necessary.

3.1.3 The Project has used hand-augering in some lower risk wards (such as Mulumbi) where access is possible, but the risk is high enough that only light vehicles and equipment for which there is little market, are used, and teams can be mobilised to move out at short notice. In this way some wards are being covered which have previously been regarded as not accessible for well construction activities.

#### 3.2 Well types

3.2.1 Until 1995 the Project concentrated mainly on hand-dug well construction, with bucket and windlass for water abstraction. Since this time progress with hand-augering has improved and has become a more significant component of Project activities. Also in 1996 the resuscitation of an old percussion rig temporarily allowed rapid construction with lower community inputs and greater depths<sup>9</sup>. Boreholes have therefore become more numerous, and are combined with water abstraction using bucket pumps.

3.2.2 In addition to the supply facility, the Project constructs a double-basin washing slab, whose drainage water also flows into the soak-away at the end of the well drainage channel. There has been some dispute over how much the washing slab is used, and a small survey was therefore carried out during the review to establish the degree of use and women's opinions on its design.

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<sup>9</sup> It then suffered a breakdown which has kept it out of operation until 1997, when it is hoped drilling will re-commence.

3.2.3 The type of well constructed has generally depended upon the following factors -:

Number of houses to be served  
 Potential for community involvement  
 Security risks

Community preference appears to be greater for hand-dug wells, for the greater volume of water they offer, despite the greater inputs needed for their construction.

**Table 3.1 Summary of basis for technology selection**

Aspect	High	Low
Number of houses	(>35) Hand-digging	(<35) Hand augering
Potential for community involvement	Hand-digging	Hand augering or drilling (esp institutions)
Security risk	Hand augering	Hand-digging
Community preference	Hand-digging	Hand-augering

Depth to water has not been a major factor in technology selection to date (see Table 3.1)

3.2.4 Siting of wells is generally carried out by communities, there being few places where water is not found. However water may not be encountered until depths of greater than 20m and in the case of hand-augering, boulders may lead to abandonment of several sites before drilling reaches sufficient depth to obtain a reliable supply of water.

3.2.5 Project guidelines are that wells should reach at least six metres below static water level if constructed during November to May and at least four metres if constructed during the months of lower water levels. The Project provides two workers (a construction foreman and his/her assistant) to assist communities with construction below the water level. Until water is reached the community works on its own, with tools provided. The incentive for rapid completion to water level is the initial payment by the community is refundable if water is reached within six weeks of payment. Hand-augering usually continues until no 'cuttings' are returned to the surface.

3.2.6 Workmanship, design and materials are all generally of very high quality leading to an impressive finished product (for example see cover photo). In the past two years attention has been paid to further improving construction of aprons and drainage channels to reduce problems of cracking which began to develop in earlier wells. The cause of the problem has not been isolated, but better compaction, selection of sand and thicker screeding are thought to have resolved the problem. Sources of good quality sand and aggregate are a problem, there being no nearby sources of good sand identified for Solwezi and no aggregate source for Mwinilunga. The additional cost that this incurs would make a survey of nearer sources worthwhile, perhaps in conjunction with the Roads Department.

3.2.7 Discussion of well design with users suggests that in general users are happy with design and the windlass technology selected. The most frequently

voiced doubt was over the height of the windlass, as the cover slab of the well is set at 0.5 or more metres above ground level. The result is that those drawing water need the step which has been provided to reach the windlass handle, and children cannot draw water ( a mixed blessing if it leads to a greater burden on women who can usually expect children to draw at least one third of water taken to the house). The step is only on one side of the windlass, but women frequently prefer to work both handles together, especially on deep wells, and requested on several occasions that RWHP should consider putting a step on both sides, or lowering the height of the windlass.

### **3.3 Rates of progress and total well costs**

**3.3.1** Discussions at the mid-term review focused much on the problems of rates of progress. The low rate of well production had been leading to high per capita costs, because overheads had to be spread between so few communities served. Much effort has been expended on improving rates of progress and have shown positive results in 1995+6 (see Fig 3.1). The annual rate of production in 1996 is more than double that of 1994, and more than five times that of the average rate for the three years 1991-93 ( the period when funding was irregular). Project staff feel that there is still room to improve rates without jeopardising quality or the vital aspects of community involvement and education.

**3.3.2** In each of the two districts with well construction there are four hand-digging teams and one hand-augering team. Both sets of hand-digging teams completed thirty wells in 1996, or on average one well per 7.5 weeks per team. This compares with eleven weeks per well in 1994. Hand-augering rates have increased from 1-2 per rig per year to 9-12 per rig per year.

**3.3.3** The major advances in production rate result from

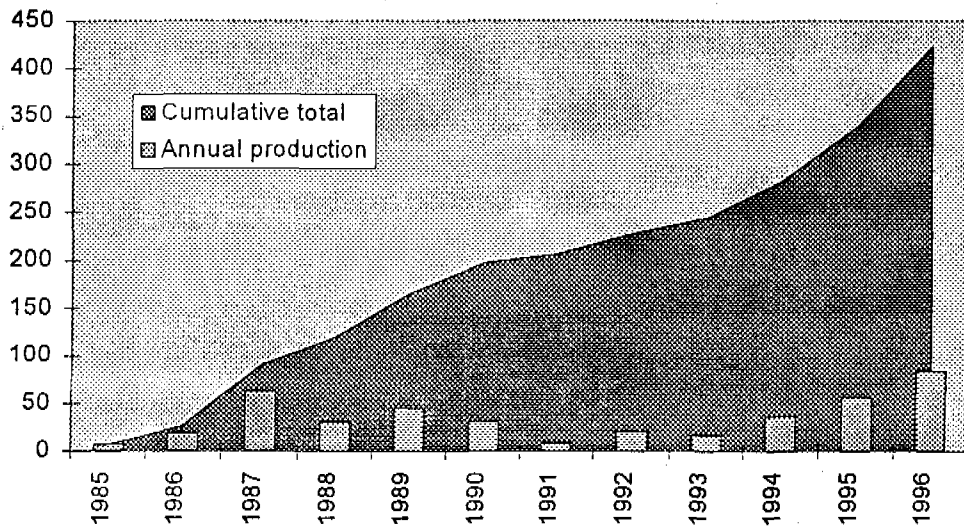
- better planning and co-ordination between field teams and site supervisors,
- advanced delivery of most materials
- two additional de-watering pumps, one of which is a stand-by
- better information to communities and joint organising of labour contribution
- incentives to communities and construction teams for speedy completion (as long as quality is not compromised)
- surface works carried out simultaneously with underground work

**3.3.4** Hand-augering would appear to still have major potential for increased rates of production, many wells being completed within two weeks but the average being one to 1.3 months. Actual excavation (augering) and construction (placement of casing) seldom now take more than two to three days, except where boulders or cemented layers are encountered. Most boulders are small (diameter less than 300mm) and could be broken up or pushed aside by a small chisel. Cemented layers could also be broken up, where they are thin. Adaptation of a bailer into a chisel ( existing bailers anyway being of too small a diameter for effective bailing for well cleaning/development at completion of excavation) could be tried to see if this would reduce the number of times holes have to be abandoned before total depth. Analysis of reasons for 'down-time' would suggest that other improvements would include -:



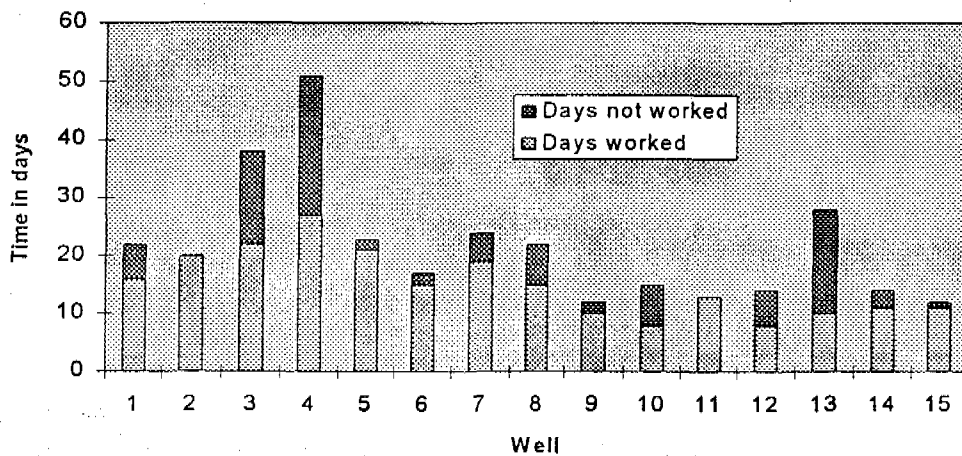
- provision of spare T-bolts to each team (delays often exceed ten days and at one site added up to over one month)
- better prediction of when team will need transport to move to new site combined with
- stream-lining production by separating slab/topworks from drilling as already done to some degree in hand-digging and being considered by the Project for augering teams.

**Fig 3.1 RWHP well construction progress, 1985-1996**



3.3.5 So far there seems to have been little consideration of physiographic and geomorphological aspects of well siting. There appear to be several quite specific sets of ground conditions, indicated by different types of vegetation, soil and ant heaps, which might imply the presence or absence of cemented layers, or might suggest depth to water, or boulder-bearing weathered zones. Some correlation of geomorphology with groundwater conditions may be helpful in improving well siting and so reducing construction time, so could be considered for a small research project.

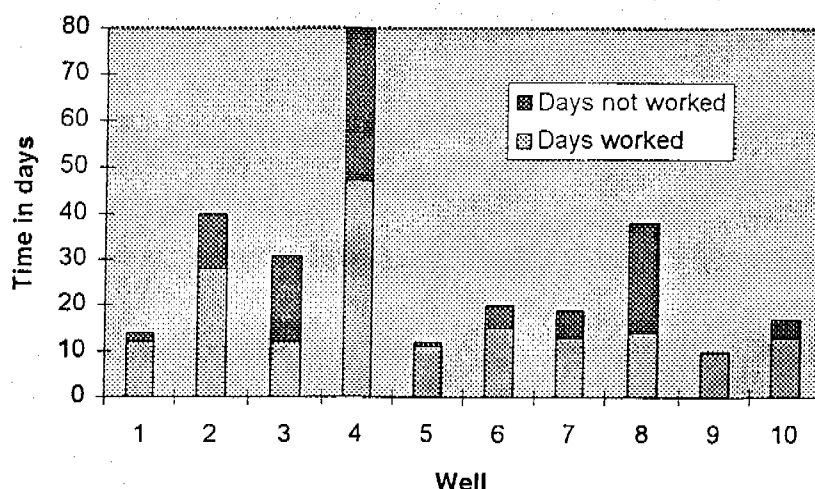
**Fig 3.2 Time taken to complete surface works, 1995, Solwezi**



3.3.6 For hand-dug wells, delays were analysed within Solwezi for 1995 by Anje Doorn<sup>10</sup>. The working time covered was 921 days. Of these 35% were spent on surface works, 38% on underground works and 26% were unproductive. Surface works are expected to be fairly standard. Work days to complete apron, drainage, soak-away and washing slab ranged from 12 to 51 (see Fig 3.2), appearing to improve considerably as the year progressed. It appears that two weeks per well is a reasonable target time for surface works.

3.3.7 The time taken for underground works is more variable, depending on ground conditions (see Fig 3.3), but in two-thirds of cases also appears to take two weeks or less, where delays are not encountered. Delays in this field might be reduced by initial siting investigations using a Toyota-mounted coring machine/auger or a slim hand-auger. This would also help communities and the project to plan their works, as depth to water would be established before work began.

Fig 3.3 Time taken for underground work, hand-digging in Solwezi



3.3.8 In 1995 approximately 40% of delays were due to project non-delivery of materials or spare parts, but the spare parts requirement (15%) may not be so easily improved upon, as it is not a predictable element. Lack of community support in labour contributed 25% of delays. In 1996 communities appeared better prepared, and causing few delays which could be avoided (funerals being the main cause, when work at site would be unacceptable anyway), but materials delivery still leaving room for some improvement.

3.3.9 The actions taken over the past two years have led to considerable increase in effectiveness of RWHP in terms of output for the funds provided. The average cost per well (see Table 3.2) has fallen from around \$16,000 per well to just under \$US10,500, by the end of the second phase and is a function of the larger number of communities covered for approximately the same overheads. Similar costs are envisaged in the plans for Phase 3<sup>11</sup>, where average costs

<sup>10</sup> Covering up, improving shallow hand-dug wells. Anje Doorn, RWHP Aug 1996

<sup>11</sup> Project Proposal for the Third Phase of RWHP covering mid-1996 to end of 1999. RWHP March 1995

appear to be around \$10,800 per well. Calculations assume traditional source improvement costs half (or less) than new wells, and re-deepening constitutes the bringing in of additional (DWA) wells into operation.

**Table 3.2 RWHP total well costs**

Phase	Source	Funds (Million US Dollars)	Planned number of wells	Completed number of wells	Cost per well in phase	Costs per well accumulated
Phase 1 (& Interim)	DGIS	2.6	126	139	18,820	15,311
	GRZ	0.016				
Phase 2	DGIS	1.54	150	153	10,458	13,362
	GRZ	0.06				
Phase 3 (plan)	DGIS	2.54	224 new 56 TSI 12 rehab DWA wells		10,777	
	GRZ	0.280				
Third	Phase	Agreement	US\$			
	D FI	4,350,700	2,544,269			
	Zk	279,424,200	279,424			
IDA	not	included	2,823,693	TOTAL		

3.3.10 These project well costs can be compared with ones derived in a similar fashion for other provinces in Zambia<sup>12</sup> -:

Irish Aid Northern Province US\$10,000  
 GTZ, North-western US\$ 13,000 planned, 25,000 actual  
 KfW/JBG Central US\$16,000  
 LWF mainly re-deepening US\$1,000

**CONCLUSIONS ON PROJECT TECHNICAL OUTPUTS**

1. RWHP has begun to put more emphasis on quicker methods of well construction (hand-augering and drilling) and has also made major improvements to rates of hand-dug well construction
2. As a result average well costs have fallen from around \$16,000 to some \$10,500, without any apparent reduction in quality of construction
3. So far physical siting of wells seems to have received little attention for its potential in reducing construction time and increasing well reliability.

<sup>12</sup> Rural Water and Sanitation, Eastern Province Feasibility Study. Gauff Ing. May 1996

#### **RECOMMENDED ACTIONS**

1. Continued analysis of site reports with causes of delay so that improvements continue to be made, eg. on-site provision of low cost spares, improvisation of additional hand-augering equipment, consideration of purchase of another HA rig
2. Study of hydrogeological prediction so that appropriate technology and timing can be planned.

#### **RISKS.**

1. Rates of progress may exceed PEP capacity
2. Hand-dug wells may be terminated above recommended levels through pressure from communities or construction teams to finish quickly.

## 4. COVERAGE AND TECHNICAL OPTIONS.

### 4.1 Source reliability.

4.1.1 Whilst over 400 wells have already been constructed by RWHP some of these are now ten years old, and were constructed at a time when water levels were probably higher than they are now. There appears to be no long-term monitoring of water levels in the area, and while rainfall levels have always been higher in this part of Zambia than to the South, there do appear to be changes taking place. Water levels in many areas seem to be falling gradually, partly as a result of changes in patterns of rainfall and partly because of increasing deforestation which is leading to more run-off and less infiltration and recharge of aquifers. In Northern Province monitoring for 8-10 years<sup>13</sup> shows long term decline in water levels of 1 metre every 4-5 years, which appear not to be reversed by years of good rainfall.

4.1.2 A survey of well condition was carried out by CHAs in 1995 and during the review, to see how new wells were operating/ being used, and also to see how wells were ageing. This gave particular indication of whether any one type of well gave rise to less maintenance problems than another, and prompted discussion on well technologies.

4.1.3 In terms of vulnerability to falling water levels project wells showed different reliability depending on the district. This may partly be due to changing policy of the Project with time<sup>14</sup>, but are also due to greater seasonal variations in water levels in some areas, as a result of recent rainfall variation (see Fig 4.1). District rainfall statistics are presented in Appendix 2. Wells with less than 0.5m are regarded as drying. Even with more water than this some wells dry if many people draw water, and water quality deteriorates when only a little water is stored in the well.

Table 4.1 Wells drying up.

District	Hand-dug wells going dry (proportion of total HDWS)	Hand-augered wells going dry (proportion of total HAs)
Kasempa(93)	49%	N/A
Mwinilunga (47)	15%	7%
Solwezi (72)	22%	10%

The above refers to wells which go dry for at least a part of the year. Numbers in parenthesis are the sample number.

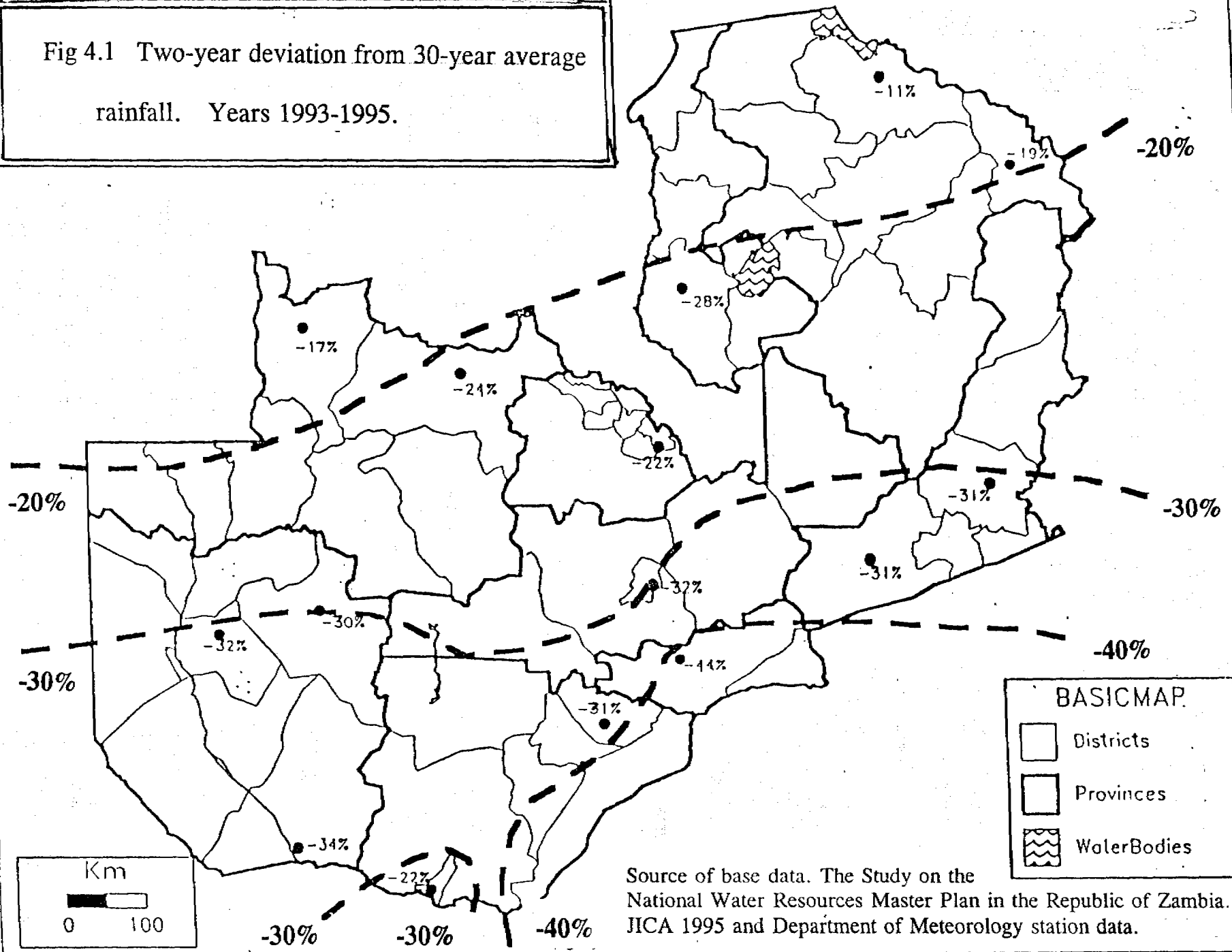
The CMMU survey indicates some 46% of all wells going dry in Kasempa, 64% in Mwinilunga and 18% in Solwezi. This suggests that in Kasempa and in Solwezi Project wells exhibit average or just above average performance, and in Mwinilunga significantly above average, compared with wells not constructed or rehabilitated by RWHP.

<sup>13</sup> Northern Province Development Programme Water and Sanitation Study. M Kaluba, S. Sutton for Irish Aid. July 1995.

<sup>14</sup> newer wells are found mainly in Mwinilunga, and the oldest in Kasempa, and depths excavated below water level have been formalised since Kasempa well construction

41  
84

Fig 4.1 Two-year deviation from 30-year average rainfall. Years 1993-1995.



Source of base data. The Study on the National Water Resources Master Plan in the Republic of Zambia. JICA 1995 and Department of Meteorology station data.

4.1.4 It appears that hand-augered wells are half as likely to go dry as hand-dug wells, although most hand-dug wells sampled were constructed over the same period as the hand-augered wells. Other aspects of well condition and sustainability are discussed in the next chapter.

4.1.6 In Solwezi only 9% of RWHP wells were found to go dry in 1994, compared with 21% now (see Table 5.1). This suggests that water levels are continuing to fall. In Kasempa the proportion has remained almost constant (48-49%) despite DWA deepening of 9 wells in 1995-6 and 5 in 1994.

## 4.2 Resultant rural water supply coverage

4.2.1 The level of coverage aimed for in the Third Phase Agreement is around 41%. However this does not consider either wells constructed by other programmes or whether a district like Kasempa may have greater problems in the development of alternative reliable supplies than perhaps Mwinilunga where rainfall tends to be less variable. In previous Zambian Development plans and the UNICEF National Plan for Action targets of 50% are given for rural areas, but because this was felt to be difficult to achieve on a national basis, it has been omitted so far from present national policy which simply talks of 'provision of water supply and sanitation services to all consumers in the service area'.

4.2.2 Estimated coverage depends to a large degree on the reliability of assumptions on number of people using the well and whether they use it for all purposes (see also section 5.2). However in the last 12 communities in Kanongesha ward, Mwinilunga, the numbers of households range from 21-90. Of the eleven places qualifying for one well, the average population was 159 which is approximately in line with the household counts done in 1994 for 50 communities. Surveys of present populations served can be time consuming and have not as yet been carried out by the Project, or in association with CMMU to see whether the number of people expected to use the well during assessment agrees/ exceeds/is less than those found to be using the well after a few years. On average in Zambia, estimates tend to use 150-200 people/well.

4.2.3 At the end of 1996 the coverage in the three districts by RWHP wells was approximately as follows -:

District	Total no. RWHP wells	Rural pop	%age served @150/well	%age served @200/well
Kasempa	96	36,626	39%	52%
Mwinilunga	73	83,159	13%	18%
Solwezi	248	115,699	32%	43%
TOTAL	417	235,484	27%	35%

4.2.4 The decision to stop further construction in Kasempa and the Third Phase targets have been based on this approach to coverage calculations. However a slightly different picture emerges if well reliability is included and also operating wells constructed under other programmes. This suggests that other

wells provide a significant proportion of reliable water supplies, especially in Solwezi district and that such coverage is significantly higher than suggested when only RWHP wells are considered. It also emphasises the large number of non-project wells which are operating, but which are at present covered by no effective maintenance system.

	Total no.	Rural pop	Project		Reliability		Total estimated reliable wells	%age served @150/well	%age served @200/well
			wells	NPW	RWHP	NPW			
Kasempa	168	36,626	96	72	0.5	0.5	84	34%	46%
Mwinilunga	234	83,159	73	161	0.75	0.3	103	19%	25%
Solwezi	386	115,699	248	138	0.87	0.7	312	40%	54%
	<b>Popn for</b>	<b>No. of wells</b>							
	<b>50% reliable coverage</b>	<b>to construct for 50% coverage</b>			<b>NPW=</b>	<b>Non-project wells</b>			
Kasempa	1,513	8							
Mwinilunga	20,970	105							
Solwezi	4,623	-23							

NPW = Non-project wells

4.2.5 In the light of the other existing operating wells and the large number of unreliable wells especially in Kasempa and Mwinilunga there might be further consideration by the project of whether more emphasis, or a special section, could look at and give priority to bringing existing wells into the USPs as they are formed. The Project has tended to shift towards assisting all communities who ask for new wells, these generally being communities with over 30 houses, who are targeted during ward meetings and are responding in increasing numbers. This does tend to lead to somewhat inequitable distribution as wards covered previously have had fewer wells constructed, partly due to project policy and partly perhaps through lower motivation of community leaders at that time. Little attention appears to be given to working with, or following up on wells constructed by, others, which may favour certain areas over others. This aspect is proposed in the Third Phase, but has so far received little attention.

4.2.6 Looking at the districts in the national context, it would appear that the three districts covered by RWHP have above average rural water supply provision (see Table 4.4) and are very significantly better off than the other three districts of the province. This aspect could be discussed when rural water programmes are discussed with GTZ/ CU.

### 4.3 Appropriate technology

4.3.1 At the beginning of the review visit project staff were asked whether, if they were to expand construction, which well type did they feel was the most desirable. All said that they favoured hand-dug wells. During the workshop in December a session was held looking at the advantages and disadvantages of different well technologies. This partly arose from greater awareness of wells going dry, the problems communities are having to replace hand-dug well buckets and partly from the much improved progress of hand-augering and the repair of the drilling rig. Table 4.5 provides a summary of the conclusions drawn -



Table 4.4 RWS Coverage in Zambia

PROVINCE/ DISTRICT	TOTAL NO. COMMUNAL WELLS	WELLS IN USE	RELIABLE WELLS	PRIVATE WELLS IN USE	RURAL POPUL -ATION	POPn COVERED @200/WELL	COVERAGE @200/well IN USE	ATION WITH RELIABLE WELLS	RELIABLE COVERAGE @200/WELL
Kabwe/Chibombo	668	476	381	1	251,679	133,820	53	100,556	40
Kapiri	254	193	122	0					
Mkushi	323	262	174	0	122,614	52,400	43	34,884	28
Mumbwa	774	548	387	0	142,000	109,600	77	77,400	55
Serenje	250	154	118	9	112,867	30,980	27	23,680	21
Central Total	2,269	1,633	1,182	10	629,160	326,800	52	236,520	38
Masaiti	617	487	222	82	189,926	99,040	52	46,064	24
(Copper Belt Total)	617	487	222	82	189,926	99,040	52	22,658	24
Chadiza	372	244	126	0	70,961	48,800	69	25,296	36
Chama	357	209	111	2	57,717	41,840	72	22,240	39
Chipata/Mambwe	593	460	320	0	277,545	92,000	33	64,000	23
Katete	321	215	113	0	161,572	43,000	27	22,600	14
Lundazi	626	416	313	0	195,059	83,200	43	62,600	32
Petauke/Nyimba	899	608	425	5	302,660	121,700	40	85,100	28
Eastern Total	3,168	2,152	1,408	7	1,065,514	430,540	40	281,836	26
Kawambwa	213	80	85	742	82,481	30,840	37	31,880	39
Mansa	271	159	100	2,725	121,781	86,300	71	74,554	61
Mwense	113	70	40	325	86,065	20,500	24	14,410	17
Nchelenge	125	84	50	252	115,660	21,840	14	15,040	13
Samfya	431	293	237	1,056	97,264	79,720	82	68,530	70
Luapula Total	1,153	686	512	5,100	503,251	239,200	48	204,414	41
Luangwa	125	63	56	0	17,680	12,600	71	11,200	63
Lusaka/Chongwe	336	225	155	0	165,752	74,800	45	30,912	19
Kafue	222	149	111	0				22,200	
Lusaka Total	683	437	322	0	183,432	87,400	48	64,312	35
Chilubi	42	24	5	17	42,227	5,140	12	1,300	3
Chinsali	129	37	16	349	83,547	14,380	17	10,088	12
Isoka/Nakonde	363	233	163	575	124,457	58,100	47	44,170	35
Kaputa	85	31	19	2	45,598	6,240	14	3,780	8
Kasama	462	278	231	1,266	163,572	80,920	49	71,520	44
Luwingu	83	27	16	102	69,539	7,440	11	5,194	7
Mbala	214	121	73	162	139,305	27,440	20	17,792	13
Mpika	231	91	81	144	122,679	21,080	17	19,050	16
Mporokosa	59	27	17	106	53,902	7,520	14	5,542	10
Northern Total	1,668	889	620	2,723	844,826	228,260	27	178,436	21
Mufumbwe	77	50	33	0	19,545	10,000	51	6,600	34
Kabompo	117	57	38	0	56,399	11,400	21	7,600	14
Kasempa	168	155	84	0	36,626	31,000	85	16,800	46
Mwinilunga	234	126	103	0	83,159	25,200	30	20,600	25
Solwezi	386	263	312	0	115,699	52,600	45	62,400	54
Zambezi	108	34	21	0	69,176	6,800	10	4,200	6
N-Western Total	1,090	685	591	0	379,604	137,000	36	118,200	31
Choma	302	225	137	0	141,105	45,000	32	27,400	19
Gwembe	72	50	40	0	41,326	10,000	24	8,000	19
Kalomo	299	189	144	0	197,219	37,800	19	28,800	15
Mazabuka	399	240	138	0	138,398	48,000	35	27,600	20
Monze	600	405	227	0	111,112	81,000	73	45,400	41
Namwala	391	264	100	0	88,277	52,800	60	20,064	23
Siavonga	88	28	11	0	30,399	5,600	18	2,200	7
Sinazongwe	164	83	42	0	63,796	16,600	26	8,400	13
Southern Total	2,315	1,484	839	0	811,632	296,800	37	167,864	21
Kalabo	320	225	198	0	87,429	45,000	51	39,680	45
Kaoma	178	124	110	0	131,044	24,800	19	22,072	17
Lukulu	118	101	100	0	52,962	20,200	38	20,060	38
Mongu	402	294	241	0	114,775	58,800	51	48,240	42
Senanga	582	430	221	0	149,776	86,000	57	44,160	29
Sesheke	111	93	89	0	58,853	18,600	32	17,800	30
Western Total	1,681	1,267	960	0	594,839	253,400	43	192,012	32

Population figures are for 1995 except for N-W prov, and are approximate. CSO figures for Northern Province especially have varied greatly for 1990 Census

After consideration of these points, 10/21 participants favoured hand-augering, 7/21 hand-dug wells, and 4/21 boreholes.

4.3.2 The conclusion drawn is that the Project might put less emphasis on hand-dug wells, and begin to look at the appropriateness of any given technology in the light of advantages and disadvantages identified. In particular, use of the drilling rig should perhaps be concentrated in areas of depths to water greater

than 15m, or fluctuations known to be great, rather than where community labour contributions may be limited (eg. institutions), where wells could be dug on a contract basis if necessary ( see also Section 6.5).

4.3.3 It is noted that in Kasempa some hand-dug wells are more than 35m deep and that boreholes are being drilled by contractors at some \$3,500 each, for a depth of 60m. These are completed within two days. in Zambia as a whole (CMMU inventory) less than 2% of boreholes have been found to go dry, and sense of ownership has not been significantly lower through lack of direct inputs to construction. The UNICEF programme in Eastern and Southern Provinces has been exploring the drilling of boreholes in the base of hand-dug wells. These tap lower artesian aquifers which are more reliable, and the water pressure allows water to flow up into the larger diameter concrete lined well which offers more storage and allows the bucket and windlass system still to be used for abstraction. This system appears to have been successful in around 80% of wells at a cost of some \$1,600 per well. Possibly RWHP could link up with UNICEF in North-western to see if a similar solution would be possible in this hydrogeological environment.

Table 4.5 Alternative sources and their advantages

Source type	Advantages	Disadvantages
Hand-auger with bucket pump	<ul style="list-style-type: none"> <li>• Easy to construct</li> <li>• Low contamination</li> <li>• Reliable in quantity</li> <li>• Stronger buckets</li> <li>• Few moving parts</li> <li>• Fast to construct</li> <li>• Simple technology</li> <li>• User friendly</li> <li>• Can be done by small communities</li> <li>• Cheap</li> </ul>	<ul style="list-style-type: none"> <li>• Unsuccessful in many ground conditions</li> <li>• Not familiar</li> <li>• Water not visible</li> <li>• Impossible to re-deepen</li> <li>• Limited volumes of water</li> </ul>
Borehole with handpump	<ul style="list-style-type: none"> <li>• Safer water</li> <li>• Goes deeper. more reliable</li> <li>• Labour reduced</li> <li>• Less technical problems underground</li> <li>• Fast to complete</li> <li>• Can site near houses</li> </ul>	<ul style="list-style-type: none"> <li>• Expensive</li> <li>• Difficult to clean</li> <li>• Not familiar/ user friendly</li> <li>• Can't use if broken down</li> <li>• Dependent on handpump spare parts</li> </ul>
Hand-dug well with bucket & windlass	<ul style="list-style-type: none"> <li>• Large storage capacity</li> <li>• Water visible</li> <li>• Familiar technology</li> <li>• Possible to re-deepen</li> <li>• Community participation fosters ownership</li> <li>• Available water even when lifting device broken</li> <li>• Can easily retrieve bucket</li> </ul>	<ul style="list-style-type: none"> <li>• Expensive to construct</li> <li>• Risk of drying</li> <li>• Needs much labour in construction</li> <li>• Difficult to site</li> <li>• Takes long to construct</li> <li>• Takes long to draw water</li> <li>• Expensive to clean</li> <li>• Things can fall in</li> <li>• High risk of contamination</li> <li>• Contamination during construction</li> <li>• Needs regular replacement of buckets</li> </ul>

4.3.4 Hand -augering might be more fully developed, if suitable areas can be more easily identified, not least because it offers a level of technology which would be more feasible when project support phases out.

#### 4.4 Washing slabs

4.4.1 At all the Kasempa wells asked, and all except two of the Solwezi wells visited, washing slabs were used at some times. The exceptions were where women felt that the slab was too near the well, or people complained at the accumulation of dirty water. Slabs do not always look used, because women do not use them every day, but tend to meet up and use them for larger washes especially before week-ends. Almost all women said that they used the slab at some time..

4.4.2 The principle advantages of the slab were said to be that -:

- clothes could be washed without having a large bowl
- slab basins are big enough to do the whole wash
- it is near the well
- can wash and rinse clothes easily
- clothes don't get muddy, as they do by river
- it is nearer the houses than the river is

4.4.3 The disadvantages which were voiced, and might be considered in future design or discussion with communities included -:

- height for shorter people
- discomfort of standing on the crushed stones surrounding slab
- siting in full sunlight
- difficulty of sluicing out soap suds before rinsing lack of sufficient surface for rubbing clothes clean
- nearness to well meant lack of privacy, and interference by children

Most of these are aspects which the community could easily solve if they are discussed with village water committees, who should be aware of their role in making improvements they identify and can implement. For example brick platforms on one or two sides of washing slabs, and shading if required, could be easily undertaken by communities, but most seemed unaware that they could make some alterations to facilities to suit their own convenience. Such alterations, along with consultation of aspects of design, might increase the frequency with which slabs are used. An option to provide more such slabs, at cost, was also requested by some communities where women found that two basins limited their opportunity to make washing a social occasion, which it tended to be when carried out at the river.

4.4.4 In general users seemed to appreciate the washing slabs and approve of most aspects of the design. All women asked had ideas on how they could be improved, and became animated at being consulted as to their ideas. It appeared a good topic for getting women more involved in aspects of planning, design and management of the facility.

#### CONCLUSIONS. ON RWS COVERAGE

1. There appears to be a problem of falling water levels, with an increasing proportion of even relatively new wells which cannot provide a year-round safe supply.
2. RWHP coverage has reached between 27 and 35% if all wells constructed are assumed to have 150-200 users.
3. If reliability and non-project wells are also considered, coverage for the 3 districts has reached 31-42% with Solwezi district with the highest proportion of rural population served by reliable protected water supplies.
4. The three districts' coverage compares favourably with the other parts of the province, and with other districts in most of Zambia.
5. Problems of supply reliability (especially since this is worst at times when alternative supplies are most likely to be dry) suggest that drilling may be necessary in certain areas for a reliable supply, and that RWHP might review technical strategy for well construction.
6. Despite appearances, washing slabs appear to be used and appreciated.

#### RECOMMENDED ACTIONS

1. More consideration be given to source reliability in relation to long-term trends, not just seasonal water level fluctuations. Monitoring of sample water levels is needed.
2. District planning of RWS should include the distribution of wells already constructed or planned for construction, so stronger links should be developed as soon as possible, and more use made of CMMU inventory (including keeping it up to date)
3. Contract drilling for new wells and re-deepening should be considered in specific areas
4. Washing slab design could have higher community input and awareness of what modifications they can make subsequently.

#### RISKS.

1. Water levels will begin to drop more rapidly

## 5. SUSTAINABILITY

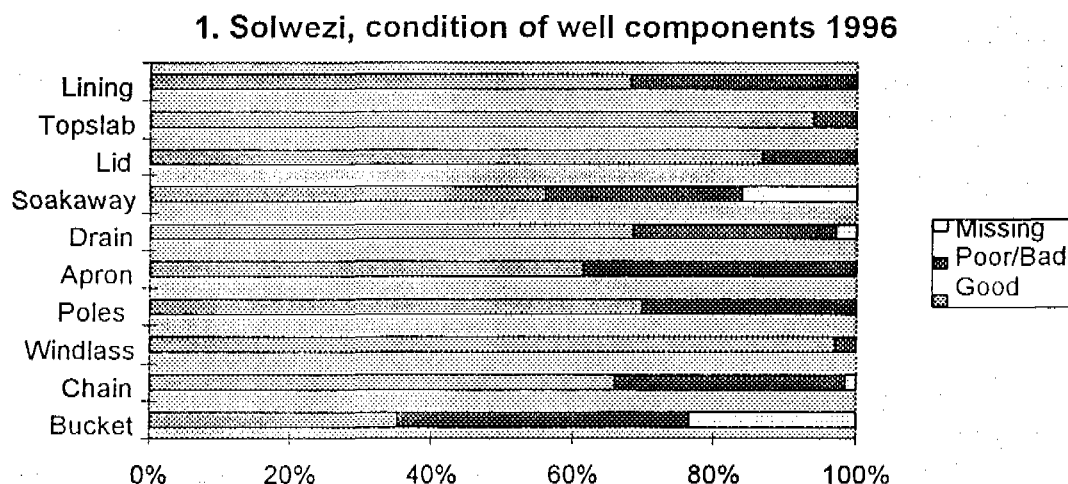
### 5.1 Well condition as an indicator of sustainability

5.1.1 The condition of a well indicates both the degree to which users are able to keep it operational and the priority which they attach to it. It provides a practical indicator of combined effects of the standard of well construction, community education programmes, user capacity to maintain the system directly or to raise funds and arrange for its maintenance, and of the centralised back-up system to support community initiatives; all of which are difficult aspects to measure directly. Since problems generally take time to develop, trends in well condition may provide pointers to those aspects of building up sustainability which require further attention.

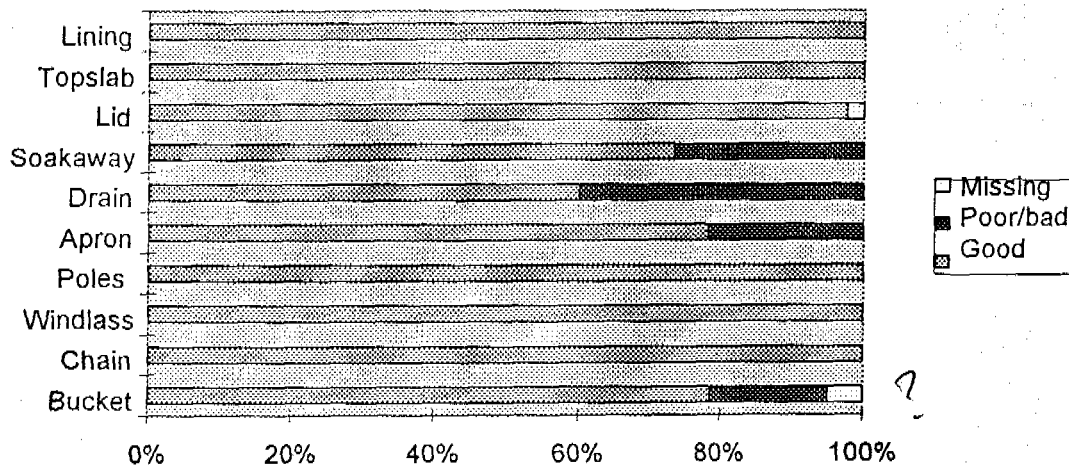
5.1.2 In Zambia as a whole, emphasis has been placed on the sustainability of the abstracting mechanism more than on the complete well. Although RWHP has started a USP in Kasempa, no system has yet been worked out which guarantees the costs of this are covered and that it will be able to fulfil its function in terms of major works such as well deepening and cleaning. This aspect is covered in more detail in sections 5.4 and 5.5. The number of wells going dry, outlined in Section 4.1 suggest that sustainability of the source is still a long way from being achieved and that the problems this raises should be included in any re-assessment of source technologies.

5.1.3 Analysis of present well condition in the three districts (see Figure 5.1) shows some contrasts, mainly related to the difference in age of the wells. Where lining is said to be in poor condition this mainly refers simply to algal growths, and indicates that water is leaking back into the well, because the seal between rings near the surface, and between the apron and the well rings has cracked. The sample size was 72 in Solwezi, 46 in Mwinilunga and 15 in Kasempa. However the results of the small sample in Kasempa was backed up by the field notes taken at some 74 sites by the CHA during 1996.

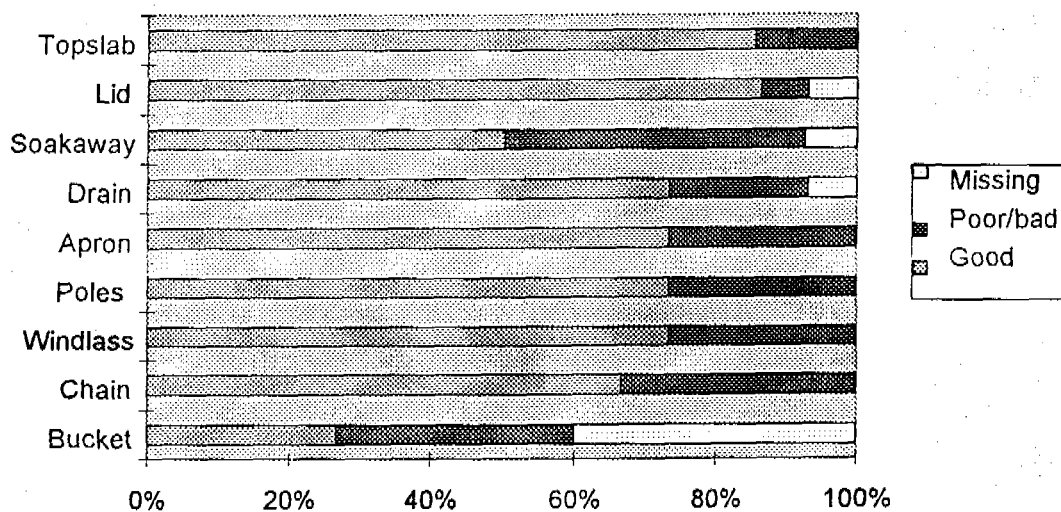
Figure 5.1 Comparative well condition in the three districts



## 2. Mwinilunga Condition of well components 1996



## 3. Kasempa. Condition of well components 1996



5.1.4 A major problem for bucket and windlass systems is that buckets manufactured in Zambia are not strong and tend to be easily damaged when they come into contact with well walls or the edges of the top slab. Various solutions to this have been tried, including the bucket cage (Northern Province), square welded buckets (Western) and the import of moulded buckets from Botswana/ South Africa. As can be seen in the above graphs, the state of buckets quickly becomes a problem, despite the fact that almost all communities have organised themselves to buy buckets on several occasions. The Project is now establishing its own bucket manufacture which could improve this situation considerably, as long as buckets are sold at real cost, manufacture is not dependent on RWHP resources in the long term and can continue after RWHP phases out.

5.1.5 Considering changes in condition over time, it appears that in Solwezi there has been an increase in community willingness to purchase buckets and chains, and to maintain drainage systems (see Table 5.1). Most problems with

aprons and drainage channels relate to cracking of concrete, but in the case of channels some are only in poor condition because dirt has not been cleared out. In Kasempa the 1996 figures relate to only a small sample compared with the previous two surveys. The CHA attached to USP is very active, but has little support, and is dealing with many communities who are away in their fields for a considerable part of the year.

5.1.6 A survey in 1995<sup>15</sup> found that wells constructed before 1990 were much less well looked after than those from 1990-92, which in turn were less well maintained than those constructed since 1992. What is not clear is whether this is purely a function of age, or whether it also reflects the increasing emphasis being put on community education and involvement. In order to get a reliable picture of trends, the characteristics of components in good, poor and bad condition need to be better defined so that surveys carried out at different times and/or by different people can be accurately compared.

Table 5.1 Comparative condition RWHP wells						
Well features observed in good condition.						
SOLWEZI				KASEMPA		
Item	1994	1995	1996	1992	1994	1996
Bucket	22%	43%	35%	63%	44%	27%
Chain	40%	80%	66%	95%	83%	67%
Windlass	99%	94%	97%	98%	90%	73%
Poles	81%	76%	70%	86%	67%	73%
Apron	87%	65%	61%	63%	54%	73%
Drain	61%	65%	69%	87%	63%	73%
Soakaway	52%	57%	56%	65%	21%	50%
Lid	87%	87%	87%	89%	92%	87%
Top slab	95%		94%		90%	86%
Water levels.						
Goes dry	9%		21%		47%	49%
					(despite	14 re-deepened
NB Features of 'good condition' not defined, may vary.					since	1994)

## 5.2 Well use

5.2.1 In 1994 all wells surveyed were in use. The picture is slightly different in 1996, mainly because it would appear that more wells are dry, but the number of wells in use is still high. Out of 72 wells in Solwezi, four are abandoned because they have no water in them, and three are not used for drinking because the water quality is not acceptable to users. Another well is not used because a snake fell in it. These last four wells could probably be brought back into action with minimum cost, if communities were more aware of ways of well cleaning and could combine with EHTs for well chlorination. Most wells exhibit poor quality when water levels are low and cleaning can most easily be carried out. Few

<sup>15</sup>Survey on well use carried out in Solwezi District in November 1995

communities are willing to pay the costs of well cleaning, so alternatives must be found (both alternative sources of funding and methods of cleaning not involving the use of de-watering pumps).

5.2.2 In Kasempa 10% of wells are not in use because they are dry all the time, and a further 5% have been abandoned, in the case of two, being replaced by an IFAD windmill nearby and a third replaced by a DWA borehole. One was found abandoned because of a goat having fallen in and 10% were temporarily not used because whole communities had moved to the fields for the season. Many others had reduced numbers of users as a large proportion of the community had moved temporarily, or water was insufficient to cover the demand of all the community. Similar information was not available for Mwinilunga.

5.2.3 The 1995 survey in Solwezi district correlated age of wells with those in use and found that, as might be expected the more recently a well has been constructed, the more likely it is to be in use. Of wells constructed before 1990 80% were in use, 89% of Interim Phase wells, and 98% of those constructed since 1992. These are high proportions compared with other wells in the area and within Zambia as a whole, and reflects, to some extent, the wells which seasonally have insufficient water to serve all or some users. However having been carried out in August, when water levels are still high, the picture might be expected to differ slightly in November/ December.

5.2.4 Within communities it would seem that an increasing proportion of people are choosing use the protected source for drinking water. Water use practices may not change over night when the new source is introduced, but are evolving gradually and require monitoring to see what aspects need re-enforcing through community education. Where people use the project well, 90% use it for at least some domestic purposes, but it is still rare for people to have moved to using the protected well exclusively (less than 25%)<sup>16</sup>. Many people still appear to prefer to use more than one source for their domestic needs. This reduces the health benefit of the protected source and also means that there may be fewer advantages in terms of reduced time taken for water collection.

### 5.3 Community maintenance of wells

5.3.1 In Solwezi district almost three-quarters of all communities surveyed had taken some action to maintain their well, in terms of buying or repairing buckets, in the past two years. A small number had taken actions such as unblocking soak-aways. In Kasempa 14/15 communities had taken action to raise funds and had repaired or replaced the bucket at least once. Four communities have raised or begun to raise the 40,000 kwacha pre-payment for re-deepening. In Mwinilunga almost all have raised funds and most have replaced their buckets.

5.3.2 In almost all communities people knew where to go for assistance or for spare parts. In Kasempa they knew to go to DWA and in the other two districts to RWHP. There appeared to be no problem in knowing where to buy buckets, and in most cases to raise the money once the community took the decision to replace or repair a bucket. Some had taken the initiative to buy local buckets (5 communities /72 in Solwezi). Problems arose more in getting around to making

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<sup>16</sup> Survey findings in Solwezi and Kasempa, 25/07/95 PEP. RWHP.



the decision, and in the growing conflicts between those who pay and those who don't. Conflicts between households as a result of disputes of matters related to the new source was one of the commonest disadvantages given for the new source.

**5.3.3** It would appear that messages about responsibility and back-up services have been well absorbed by communities. What may still require further attention is aspects of problem solving such as well cleaning, bucket fishing<sup>17</sup> and possibilities of using local expertise for small amounts of deepening and cleaning to keep wells in operation through the dry season. There are a number of private wells in the province, indicating the availability of local expertise in well digging which might provide cheap deepening services following water levels as they drop. While this is not an ideal solution, the present lack of an alternative (DWA and RWHP capacity for this being much less than the demand), and the large number of wells which only go dry for short periods, suggests that lower technology solutions should be discussed with communities.

**5.3.4** In terms of sub-district back-up to communities it was noticeable that whereas in Mwinilunga there is much assistance given by health extension workers, who have organised regular follow up meetings, encouraging community co-operation and fund-raising in more than 80% of communities, this is missing from the programme in Solwezi. Even for more recently constructed wells in Solwezi only 15% of communities had received any follow-up support from health extension workers. The CHA in Kasempa provides as much back-up to communities as he can, but less than 15% of communities had had any health education on water and sanitation in the past couple of years. This does not necessarily reflect apathy on the part of extension workers, but more a lack of definition of the roles of Ministry of Health and RWHP at different stages of the programme (see also Section 7.2).

## **5.4 User Support Programme (USP) Kasempa**

**5.4.1** The USP is designed to provide technical and organisational support to communities in the continued operation and good use of their water supplies, and to co-ordinate the necessary inputs of various government departments at district and sub-district level, chiefly for communities served by RWHP wells. It is managed by a co-ordinating committee of MOH, DWA, DCD, Council and RWHP (see Fig 5.2). RWHP have provided one Toyota pick-up, a motor bike, and still pays the allowances and CSA of the CHA and the CSA of the DO of DWA. It also provided one de-watering pump, but this has often broken down. USP has a further three trained CFs it can call upon, but no equipment for them to use, so they remain at present unemployed. Project PEP personnel pay quarterly visits to Kasempa to support the CHA, but there is little technical or management back-up at present, and little response to DWA management limitations to undertake USP and other activities when annual targets for USP have been planned and funding agreed. RWHP purchases all spare parts for the USP, using funds raised

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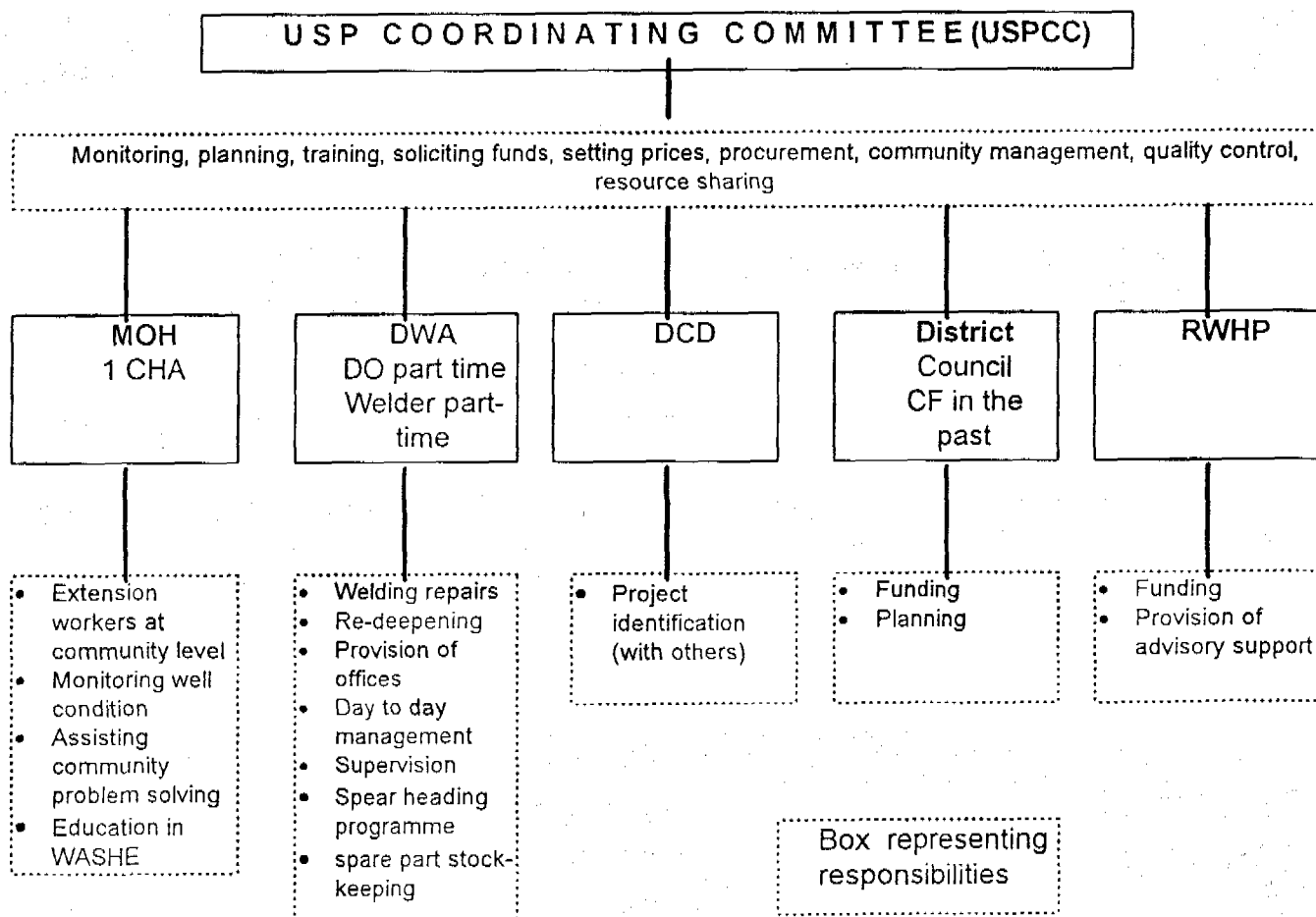
<sup>17</sup> most communities tending to buy a new bucket rather than fish for the old one, and to revert to the traditional source for drinking water rather than to clean out the well when it became contaminated

by spare parts sales, and re-deepening pre-payments. It also sets prices for spare parts at present.

5.4.2 The USP has been running for several years, being formally set up in 1995, but operating in a more or less autonomous fashion since 1991. It has a separate account and in 1996 was funded by the district council (2 million kwacha) and RWHP (2 million kwacha). DWA also undertook construction of three new wells for EEC Microprojects which used the same accounting system, but retained the Microprojects payments as petty cash so they do not appear on bank statements (but probably total some 4-5 million kwacha). Total USP income in 1996 (from the bank statement) came to around 4,300,000 kwacha, including around 260,000 kwacha interest, but not apparently including income from repairs, sales and re-deepening prepayments which totalled 703,350 kwacha. In 1996 USP welded 31 buckets and sold 20 more, so serving around half the project wells in the district. Income grew by 26% from 557.635 kwacha in 1995.

5.4.3 The contribution from council funds shows some commitment and priority given to rural water supply, but it should be noted that this contribution was from constituency funds and is unlikely to be available in future years. In 1996 the council did put rural water supply in its budget (60 million kwacha), but did not receive any part of this. DWA provided no capital funds to the district office until the end of 1996, at which time 400 million kwacha was released centrally for nation-wide rehabilitation of wells and boreholes. At the time of the review DWA headquarters had not split this sum into provincial or district allocations.

Fig 5.2 USP organisation



5.4.4 USP funds would appear to subsidise other DWA activities. DWA have been unable to pay their electricity bills and send all income from township supplies to provincial level, of which insufficient is returned. Therefore the district officer's vehicle, stationery and other office costs have mainly to be paid using USP funds, but in other ways USP activities appear to be regarded as being separate from other rural water supply activities in the district. The lack of DWA funds to support district offices combined with the present management capacity also affects operational efficiency.

5.4.5 The USPCC members do realise the high theoretical coverage which the district has if all wells are operating. However they face a major problem in that with only 50% operational all year, there is considerable pressure upon them to improve on the situation, and water was the main discussion point in the last council meeting. The poor reliability of RWHP wells in the district does not give the Project a good reputation, especially since other funds to re-deepen wells are totally insufficient to redress the situation, and there are many other non-project wells which also require re-deepening.

5.4.6 The present running of USP faces major management problems. There is little attempt to rationalise logistics and concentrate operations in one area at a time, which is essential with limited transport, supervisory resources and only one de-watering pump and one tripod and chain block. (At present four wells are being re-deepened all in different directions from Kasempa.) There appears to be little direction provided by the Co-ordinating Committee to ensure Microproject and USP activities are planned together, and the Co-ordinating Committee does not therefore appear yet to act as a true WASHE committee which would plan district activities as a whole including those of all NGOs. USP was expected to carry out eight re-deepenings in 1996, and had almost completed four by mid-December, with 2.7 million kwacha (67% of total budget) remaining in the bank account. The same team had also carried out three well construction/rehabs for Microprojects in the same period. Since over 40 RWHP wells are in need of re-deepening, (and a further 35 or so non-project wells) and more are added to the list each year, it would seem that USP is unlikely to solve the problems in Kasempa in its present form and with its present resources. DWA also has responsibility for handpump maintenance, of which there are over 20 in the district.

5.4.7 The CHA carrying out monitoring has identified several problems which could be solved at community level. However his own mobility is limited by funds for fuel, and MOH links appear not to have led to sufficient joint planning of extension workers inputs in response to the problems identified during monitoring visits. This appears to be one of a number of mis-understandings between RWHP/USP and MOH during devolution of field and training responsibilities from the former to the latter. Others relate to the move towards MOH planning and implementing extension worker training in community support and WASHE education. RWHP are still prepared to fund the latter, at least in part, but it has come to a halt for lack of information on RWHP conditions of assistance, and other possible sources of funding. Links between the CHA and DWA are also weak, and the development of USP as a team would appear to need some further RWHP support, as would concepts of including USP funding in various ministry budgets. Some of the mis-understandings might be reduced if the CHA

had closer links to MOH or even operated from within their district offices, but MOH are keen to avoid having to cover his recurrent costs.

5.4.8 Overall the present performance of the Kasempa USP suggests that both the form of USP management and the way in which responsibilities are handed over need further consideration before the same process is carried out in the other districts.

## 5.5 USP in other districts

5.5.1 In Solwezi and Mwinilunga RWHP acts as the USP and there are no Co-ordination Committees yet in the form that Kasempa has been established. Links with the council and with MOH are strong, however, especially in Mwinilunga, where MOH feel involved in community motivation, site selection and post-construction support to communities. Links in Solwezi appear to have been weaker, despite the Director of Engineering Services being an ex DWA water engineer. MOH links are now being strengthened and it is hoped that this will lead to more active community support from extension workers. In both districts DCD have been less involved in the recent past than formerly.

5.5.2 USP in these districts is still RWHP orientated. It has no identifiable structure within the Project, has no separate stores, or account, and there are no separate plans for re-deepening. USP cannot, therefore, really be said to exist at all yet, and is simply the capacity within the Project to sell buckets and chain, or provide welding services when people with RWHP wells request it. In Mwinilunga, this is linked to the fact that there is little DWA capacity outside that which is already fully involved in RWHP construction programmes.

5.5.3 The establishment of USP offers the opportunity to begin reducing project dependence, and the building up of D-WASHE management capacity. Where USP will eventually be sited, and the form it takes, depends on the speed with which the CU is set up and whether it will use council facilities in towns where it does not have a regional office. Meanwhile RWHP can help establish the USPCC (which should be synonymous with and of the same constitution as the D-WASHE ( see section 2.2.3). Independent accounts and separate stock-keeping could also be established, but may need modification when incorporated into the CU.

5.5.4 For the USP to be sustainable it needs to be supported as far as possible by funding from users. The greater the number of contributors the overheads are spread among the more chance of sustainability. The aspect of incorporating more wells into the USP system therefore needs planning and implementing as soon as a USPCC is formed, and can then be continued with the CU. Fund management issues and sources of additional funding can then be discussed outside RWHP, albeit perhaps with assistance of the IDA.

#### CONCLUSIONS ON SUSTAINABILITY

1. Wells with water are generally in fair to good condition. Over 90% of those with water are in use.
2. There are signs of deterioration with age, and that the support system to be provided through extension workers is therefore not yet operating successfully.
3. The majority of communities have taken some action to improve their wells, involving expenditure. Almost all regard the well as theirs and know where to go for assistance.
4. Frequent failures of buckets result from poor manufacture and materials.
5. Kasempa USP has provided basic service of stores and sale of buckets & chain, but suffers from low effectiveness & poor management, requiring continued (additional) RWHP advisory support.
6. With 50% of RWHP Kasempa wells going dry, project image is damaged and there is some understandable reluctance to take RWHP advice. This situation needs urgent discussion with district, RWHP, and perhaps SNV.
7. Other district USPs are not yet established.
8. There are low numbers of wells to cover USP overheads unless more wells are brought into the system, including those with handpumps.

#### RECOMMENDED ACTIONS.

1. Manufacture of new buckets by RWHP (sheet metal roller already purchased).
2. Intersectoral review by USPCC Kasempa, of USP capacity, roles, and support needed, in relation to district needs. RWHP assistance to be strengthened in the short term.
3. USPCC/RWHP to draw up plan to seek new funding sources and programme for well re-deepening +/- or drilling
4. Explore possibility with USPCC (D-WASHE) for CHA Kasempa to be re-integrated into MOH, but to retain role of monitoring and liaising with RHCs on RWSS
5. Other USPs to be established alongside development of D-WASHEs, and made more autonomous from RWHP.
6. Consideration of how more wells could be brought under USP at minimum cost.

#### RISKS

1. No GRZ funds released for well maintenance
2. No other implementation capacity than RWHP under CU.

## 6. PEP

### 6.1 Response to mid-term recommendations

6.1.1 Mid-term recommendations drawn up with PEP and taken up in the Third Phase Proposal suggest that -:

- More responsibility and activities would be devolved to extension workers and their status would be promoted prior to and during construction
- MOH/DCD would begin to take a more leading role in planning and co-ordination
- community management systems would be re-assessed
- lack of priority to institutions would be re-considered
- number of site visits would be reduced
- the benefits of disease or behaviour orientated health education would be assessed
- health education materials would be more geared to existing practices,
- a sanitation component would be introduced.

6.1.2 As a result of the 1994 workshop discussions which led to the above recommendations certain changes have been made to PEP and others are in the process of being changed. In particular RWHP has -:

- encouraged CHAs to be more flexible in their guidance on the formation of village water committees
- stopped the support visits for extension worker supervision phased out didactic health education sessions
- reduced the number of meetings with communities from 14 to ten, after assessment of purpose, content and impact

In addition pilot programmes have been set up in traditional source improvement, institutional water supplies (schools and rural health centres), and sanitation, which have meant that PEP capacity has been fully stretched.

6.1.3 In addition much effort has been put into training in and development of participatory tools and methods with CHAs in the past two years. This has included workshops and field supervision on a regular (weekly) basis by PEAs, plus a formalising of CHAs planning each community session and reporting on the outcomes. This combined with further training on gender issues has meant that CHAs notice a major change in community response in meetings and have obviously built up a good rapport with communities in which they are operating.

6.1.4 These very positive changes result from focusing on the development of a higher level of expertise in participatory methods for the extension staff seconded to RWHP, but PEAs still have reservations as to CHAs understanding of participatory concepts. This points to a dilemma for the Project. The conclusions drawn in 1994 were that RWHP should reduce its work at community level and devolve more responsibilities to extension workers already working at sub-district level. Even at the time CHAs were sceptical that extension workers were capable of carrying out meetings with communities in a participatory fashion. Concentrating further training and supervision on CHAs has widened the gap. If extension workers are to take an increasing role in community education for water, sanitation and hygiene, then the methods and materials used need to be ones which they can understand and utilise

successfully and their training is essential. If CHAs, after often as much as eight years with RWHP are not thought able to do this, then perhaps the targets relating to participatory concepts are being set too high.

6.1.5 The cessation of support visits to extension workers arose because CHAs were already fully committed on work relating to the construction programme, and support to disease orientated education was being replaced by emphasis on behavioural change. Stopping CHA support to extension workers was also associated with the passing of responsibility for extension worker training over to MOH/DCD. The simultaneous abolishing of field visits and training sessions appears to have left non-project fieldworkers feeling somewhat abandoned, as the bi-annual planning/ training meetings had been very popular and contact with CHAs in the field had provided considerable motivation. EHTs met with in December appeared uninformed of the changes in responsibility and the reasons for them. Similarly the MOH personnel at district level in all districts were not clear on the shift of responsibilities, for which they were ill-prepared, and there seemed to be considerable confusion as to what RWHP support now could be provided. It would appear that such fundamental changes in responsibilities may need to be phased, and the stages clearly defined in agreement with all the organisations concerned. Such agreements should be on paper since, especially at present, district level staff seem to change quite frequently which may have led to some of the mis-understandings (see also Section 7.2).

6.1.6 CHAs have been very busy partly as a result of the increased rates of productivity from construction teams. They appear to feel a bit over-burdened with community visits and the accompanying paper work which now precedes and follows such visits. This was introduced to get them to focus more on designing sessions which were tailored to individual communities, and to improve the structure of their meetings. This they have mostly done their best to achieve. It could be that the purpose of increasing the planning and recording of sessions has now been fulfilled to a great extent, and the justification for its continued application could now be re-assessed.

6.1.7 Discussions in 1994 included consideration of income generation associated with village water committees and the wells they manage. In Kasempa one community was found to have collected maize to raise funds for spare parts in 1996, and one in Solwezi had established a field of beans for the same purpose. However neither knew what to do with the produce and the idea died. Such initiatives should be encouraged, and perhaps this is an area in which PEP could explore further as it gives the potential for communities to cover larger less frequent items of maintenance than simply the bucket and chain (eg well cleaning by RWHP/DWA), and is an aspect to which RWHP has, as yet, paid little attention.

## 6.2 Gender issues

6.2.1 RWHP has paid a great deal of attention to gender attitudes both within communities and among those who are working with them. It has spent time on analysing gender issues inherent to the different stages and activities of well planning, construction and use, and how to allow for these. Technical, as well as PEP staff have been involved in this exercise. A gender consultant has also

been assisting the Project, and CHAs have developed techniques for bringing forward women's views in meetings. Some have also adopted a policy of cancelling meetings if not enough women are present, to ensure that communities are aware of the significance of women's contributions to discussions.

6.2.2 In order both to 'practice what they preach' and to promote greater female representation within the Project, RWHP has practised a policy of positive discrimination. This has led to the employment of six female construction assistants which provides both RWHP staff and communities with direct evidence on women's capacity to understand practical issues and to work successfully alongside men in salaried work. A qualified female accountant was also recently employed.

6.2.3 DCD support the formation of women's groups, and although many of these are quite moribund, some are active. DCD suggest that RWHP could link up with these where they exist, to strengthen the impact of both programmes. DAPP and church organisations may also have some women-orientated programmes to which RWHP could link up.

6.2.4 A survey by PEP of 84 village water committees in Kasempa found that 29% had more women than men, 58% more men than women and 13% equal numbers of both. Only 6 % had no women at all on them. Of the major posts, 14% of chairpersons were women and 23% of committee secretaries. As is found in other parts of Zambia over 50% of treasurers were female, but the high level of female secretaries elected is less common as men often cite women's illiteracy as a reason why they cannot be decision-makers. It seems as though RWHP is creating an environment in which women are being more recognised by the community as having other than the traditional roles to play, and their expertise in managing resources is gradually being more respected and made use of.

6.2.5 There are few other projects or government initiatives in the area which are gender sensitive, compared with other provinces in Zambia. RWHP is therefore acting somewhat in isolation and has made significant progress, within the context of the lifespan of a water project. It seems to have achieved a balance where it is acting as a stimulus in the creation of awareness of women's issues as an integral part of the programme.

### 6.3 District hygiene education planning

6.3.1 In an attempt both to encourage the MOH and others to take a more leading role in WASH education development and planning, and to move from a disease orientated programme to one aimed at changing attitudes and behaviour, a pilot hygiene education programme has been started in Solwezi. This is in its very earliest stages, with RWHP providing the initiative for the first meeting, but making it clear that other organisations should take on the arrangement of future workshops, and that in future RWHP would regard themselves more as a catalyst than an organiser. In this way project dependency will be reduced, the picture being more one of district plans into which RWHP activities would fit, rather than vice versa.



6.3.2 Emphasis has also been put on all organisations sharing their resources and making some contribution to the overall requirements of the programme, rather than RWHP providing all resources. Thus, for instance, the Ministry of Health would provide education materials, and Ministry of Agriculture would reproduce posters since it has the equipment and materials to do this.

6.3.3 So far all organisations have described what activities they have undertaken and what materials, plans and personnel they have. It is then planned to carry out a baseline survey of existing practices at community level, followed by an evaluation of what behavioural changes should be targeted. Such a base line study, if undertaken by health centre staff will need careful design and provision of relevant training and pre-testing to avoid the bias of people giving answers they feel they should give, rather than ones which reflect their real practice. Both MOH and RWHP staff seem unfamiliar with survey methods which avoid asking direct questions.

6.3.4 Potentially this programme ties together several of the developments RWHP were aiming for in the present phase, including:-

- GRZ taking a more leading role
- Greater involvement of district personnel will make division of responsibilities with RWHP easier to agree
- The programme promoting intersectoral co-operation and resource sharing

RWHP can help link such initiatives with CMMU materials and training to set the national context, which may also include the development of WASHE committees

6.3.5 This programme should lead to a lower profile for RWHP, integrated plans and greater continuity for health and hygiene education, plus long-term community support. It will, however take some time to develop, and there is meanwhile a hiatus in support and health education to communities, since extension staff are no longer encouraged to give water/sanitation a high priority and have been discouraged from the disease-related sessions before any alternative is in place. District Health Management Boards were found to be unaware of their responsibilities in relation to RWHP activities, and the required support and motivation to field workers. In 1996, therefore, most wells have been constructed without any accompanying health education programme, and there has been little follow-up for any wells constructed previously, except where this has formed part of a health centre routine programme, which may refer to immunisation, iodine deficiencies or other non-water related health issues. A slightly different message seems to have reached Mwinilunga where extension workers appear still to be providing some follow-up community support, but mainly on fund-raising and community co-operation.

6.3.6 Some interim strategy would seem necessary to cover the period until any new hygiene education programme is in place. In this way well construction is not divorced from heightened awareness of the value (benefits) of good water, and the re-reinforcement of good practice in relation to water collection and storage (should water quality sampling identify this as a problem).

## **6.4 Pilot projects**

6.4.1 In order to give priority to three specific issues in the Third Phase, pilot projects have been set up in -:

- institutional water supply
- traditional source improvement
- sanitation

These were started in the Second Phase as research projects to furnish data to design low cost increases to water supply coverage and the maximising of health benefits from safe water.

## **6.5 Institutional water supplies. Schools and rural health centres.**

6.5.1 This programme has so far concentrated on schools as this is where demand has been highest, most RHCs being adequately served. Previously schools and RHCs seldom qualified for water supplies on the prioritising system used, unless a nearby community was large enough to qualify in its own right. This led to low coverage of schools and also frequent management problems associated with conflicts between the interests of the school and the community. The aim of the present pilot programme is to treat schools as focal points for people, especially children as a vulnerable group among which disease may spread rapidly where water supply and hygiene practices are poor. Thus the supply is primarily for the school itself, but may also serve neighbouring communities.

6.5.2 Project input has been minimised and MOE are involved as much as possible. So far nine schools (and one RHC) have been visited in Solwezi and two in Mwinilunga. One CHA is responsible for this programme in each district. The approach is slightly different in the two districts, Solwezi having confined meetings to -:

- First meeting with PTA/RHC/ management committee
- Second construction planning meeting
- Third well completion /handing over ceremony

Efforts are made to deal first with schools which are in the wards in which the well construction programme is already operating. Construction is generally by hand-augering where ground conditions are suitable, otherwise by drilling.

6.5.3 In Mwinilunga the idea of more meetings to solve the problems which arise between schools and adjoining communities is being explored, but here the programme is only just beginning. Schools in any part of the district are considered, even where there is no construction being carried out at present. The breakdown of the drilling rig has meant that the programme has been delayed, since sources are scheduled to be drilled boreholes .

6.5.4 In both districts it has been decided to auger or drill wells because of the problems of getting sufficient people to assist in well construction. There is no hygiene education attached to the programme, but schools are encouraged to set up a drama group to act out water related topics, which are viewed after well completion.

6.5.5 Schools have the capacity to raise considerable sums of money through PTAs. For school rehabilitation programmes (under EU Microprojects) they have to collect 750,000 kwacha, and can certainly raise sums sufficient to pay for private contracted labour for shallow well digging, to supplement or replace community labour contributions where the potential for the latter is low.

6.5.6 In Mwinilunga it was also discussed whether the institutional programme should be quite so separate from the rest of the work in the district. Operating in other districts than those where community wells were being constructed and relying solely on the drilling rig has created logistical problems and led to long delays between preparation of schools and implementation of water supply plans. Those allocated to the schools programme have been restricted in the work they could do with no capacity to construct, in contrast to those working with communities whose capacity was more than fully stretched.

#### **CONCLUSIONS ON INSTITUTIONAL WATER SUPPLIES PROGRAMME.**

Discussions in the review workshop came to the following conclusions -:

1. The inclusion of other institutions should be considered (eg community development centres, local courts, agricultural training centres)
2. An institutional policy should be developed to assist in prioritising, decisions over what costs ministries should cover, relationship to surrounding communities etc
3. Schools should be considered as the first point of intervention in new areas, to raise awareness of WASHE issues
4. Where community labour contribution is difficult to organise, institutions could be offered the alternative of paying for contracted labour, through user fees or funds from relevant ministries.
5. The opportunity to use schools as centres from which to disseminate knowledge and good practice is not being fully exploited. Schools should act as demonstration points for operation and maintenance training as well as linking with school's training on hygiene issues (as done in Northern and Western Provinces)
6. Institutions have the highest incidence of management problems, but the planned training provides only three sessions compared with ten for communities where problems are usually less. More attention needs to be paid to preparing management committees for the problems which may arise, and clarification of the roles and responsibilities of each institution and neighbouring communities.

#### **RECOMMENDED ACTIONS.**

1. An intersectoral committee should be formed to formulate district policy on institutional supplies, including budgeting
2. MOE could be requested to provide a teacher to be a CHA on this programme and build up associated activities with school staff and pupils
3. RWHP/ MOH should link more closely with EU Microprojects to attempt consistency of approach and integrated planning in relation to school rehabilitations which include the water supply (and sanitation.)

## 6.6 Improvement of traditional sources (ITS)

6.6.1 In order to try and reduce per capita costs and explore alternatives whose capital costs might be more affordable to communities which could benefit smaller communities which might otherwise not be covered which would extend the coverage of safe water supplies at lower cost and which minimised RWHP inputs

6.6.2 RWHP has been investigating traditional sources and has worked with several communities to improve existing sources rather than to construct new ones. In 1995 three sources were improved in Kampijimpanga as a pilot project, and a further four in 1996. Another one is in the process of being improved and four more have expressed an interest in the programme, but have yet to raise the prepayment. In Mwinilunga the first improvement is about to start.

In 1996 a manual for traditional source improvement was drawn up<sup>18</sup>, based on providing a coverplate, windlass, bucket, and chain, cement and grease at 10% of market cost. to communities who had applied for a new well, but did not qualify, usually on grounds of low number of houses. The Project would supply technical assistance and design but there appears to have been little research into local practices and existing understanding of needs for and methods of improvement. The system ruled out applications from smaller communities interested in improving their supplies.

6.6.3 As part of the pilot programme water quality analyses have been carried out, but systematic analysis and sampling remains to be undertaken, to ascertain :-

- an annual pattern of water quality before and after improvement the impact of different types of improvement
- the overall risk from existing sources and the features which appear to cause highest risk

So far only traditional sources which are being considered for improvement have been sampled. Of fifteen samples, only one showed faecal coliform at more than 50 FC/100ml. Samples are still too few for statistically significant conclusions to be drawn, but the sampling programme is only just starting. It is suggested that information collected in association with samples should include the following :-

Does access to water involve stepping in it?

Can rainwater/ run-off flow into it?

How far is the water level from the ground surface?

Is the water flowing?

Is the hole covered?

Is the top access lined?

Is more than one scoop used to collect water?

Is water emptied from the source before drinking water is collected?

Depth of water

Number of households using source

What improvements have been made?

Preferred uses of water

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<sup>18</sup> Traditional Source Improvement Manual RWHP May 1996.

6.6.4 The approach to ITS so far has been primarily project-driven. The manual lays down specific procedures and technical solutions. CHAs are the prime motivators of communities, rather than health extension staff at RHCs who have also received some training in ITS as part of their course at Chainama. Discussions with communities follow on non-qualification for a new well and usually refer to sites near where construction of conventional project wells is taking place. Project staff have been concerned that the resulting improvements are a function of communities wanting a well as near as possible to the standard of a fully improved new source, and the approach which the manual outlines leads to a high level of intervention. The result is a solution which requires major RWHP inputs and whose costs reach around 500,000 kwacha if all visits and deliveries are included, plus full materials costs and 20% overheads.

6.6.5 The technical and social feasibility check list<sup>19</sup> asks relevant questions such as whether the well can easily be re-deepened, who owns it, who may use it, and what the water is used for. However the sources visited seem to have been selected without these points having been considered. Three were effectively private wells, two within 50m of each other, and were used only for washing and other non-potable purposes. Houses took their drinking water from a spring around 500m away which was in great need of improvement and served several communities. This was recognised by users, but because it was more truly communal they had not organised themselves to plan improvements. Similar sources were seen during the visit to Kasempa and would seem particularly suitable as targets for low cost improvements which have the potential for greater impact. Two improved sources had gone dry and had not been re-deepened, although this had been done several times prior to the RWHP intervention. It seems quite a common pattern for those households with sufficient resources to walk far for drinking water but to try and establish a supply for higher volume uses, such as washing, nearer the house.

6.6.6 Ingenious improvements to sources were noted during the review visit. These included one traditional source of some 8 metres depth, with a double lining at the top, of two open ended drums, each with a lid, and the inner one with a bucket attached to it in the same way as the RWHP wells, so that the rope could be stored hanging into the well and be kept out of the dirt. The area around had been carefully cleared, the well surround compacted and a drainage channel diverted run-off away from the well opening. Other sources were covered, and/or had tin drums sunk into the top to keep out run-off and stabilise the shaft. These features, combined with the fact that 40-50% of unimproved sources contain no faecal coliform suggests that there does seem to be some awareness of sources of contamination and of low level solutions which could be built upon.

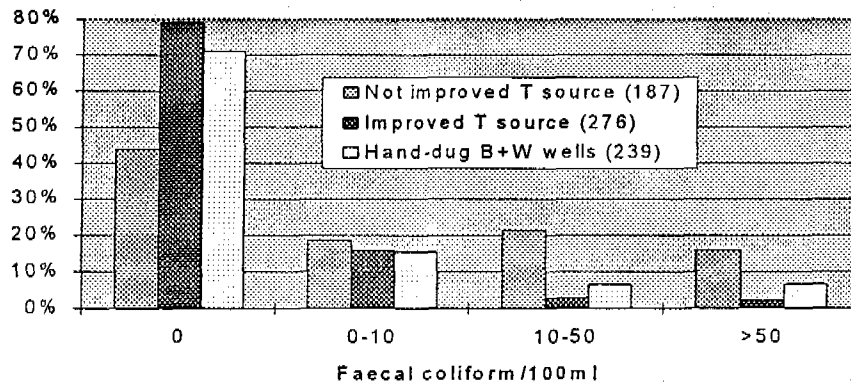
6.6.7 Traditional source improvements have been carried out elsewhere in Zambia, particularly in Western Province, in conjunction with the NORAD rural water supply project and the Dutch Primary Health Care initiatives. These started in 1987 and have continued sporadically since that time, and concentrate on small communities not associated with construction programmes. The various projects have tended to approach the problem somewhat differently, in a more catalytic capacity, encouraging community discussion of problems and solutions,

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<sup>19</sup> Covering up. Improving shallow hand-dug wells starting with a cover plate. A. Doorn RWHP Aug 1996

rather than presenting a fixed solution which detracts from community initiative to provide lower cost alternatives which they can implement without much or any outside assistance. Communities have identified solutions according to their physical environment and their financial and technical resources. The result has been improvements in water quality in small communities which are similar to those brought about by conventional bucket and windlass wells for larger communities<sup>20</sup> (see Fig 6.1). Recently some communities have begun to make

Fig 6.1 Water quality in ITS, Hand-dug protected wells and traditional sources, Western Province 1989



(number of samples in brackets)

their own windlasses and concrete rings in Kalabo district but generally interventions have been more minor, mostly including capping the source, ensuring good water drawing practice, and avoiding run-off into the well. These aspects have been tackled with considerable ingenuity and suggest that it may be the participatory education and opportunity for the community to discuss and decide on strategies and acceptable practices which are as effective as (or more important than) the materials and outside technology which may be provided. The training of extension staff in facilitating such activities has meant that minimum project inputs have led to the potential for covering many communities in a short time.

6.6.9 Experience elsewhere suggests that this programme should become more community driven. The accent would then be on communities being encouraged by extension workers to identify and solve problems, not RWHP defining the solution. Physical improvements to the source could be considerably simpler unless it can be proved that the technical solution tried so far -:

- a) provides a significant improvement in water quality and
- b) that no similar level of improvement can be achieved by more sustainable means.

<sup>20</sup> Microbiological quality of groundwater supplies in rural Zambia. S.E. Sutton Groundwater Quality Ed. H. Nash and G. McCall, Chapman Hall 1995 p139-144

## CONCLUSIONS ON TRADITIONAL SOURCE IMPROVEMENT.

The workshop concluded that -:

- The target should be non-qualifying communities, with priority to drinking water sources
- The objective should be an increase in the coverage of safe water supply
- The programme should be separated more from the construction programme for conventional hand-dug wells
- Activities should involve extension workers and include relevant training in motivation, so that they become the prime movers
- They should be consulted on disease prevalence in their catchments

## RECOMMENDED ACTIONS

1. Baseline information should be collected on -:

- Numbers and types of traditional sources in pilot areas, along with source reliability, ownership and uses
- The correlation between water quality and different improvements made by communities to improve sources
- Existing measures for preventive maintenance

2. There should be a preparatory research programme to gain experience on what level of interventions are necessary to make a significant difference to water quality, and to establish what level of risks traditional sources actually present. It should select areas with several traditional sources in both areas of high and low population density

3. Other areas of Zambia should be visited to see what progress has been made in this field already, and how the results of the pilot project compare with them.

Pilot projects for research and demonstration purposes should then be set up, if results indicate their justification, followed by district programmes planned with extension workers and district authorities

## RISKS

1. Extension workers will have too many other commitments to become involved
2. Politicians (and possibly communities) will not accept the value of lower level interventions

## 6.7 Sanitation

6.7.1 As with the district hygiene education, the sanitation project has started off based in Solwezi district, and the two could perhaps become more closely linked, since hygiene practice is an integral part of sanitation. An early survey<sup>21</sup> was carried out in 23 villages to assess the existing situation in terms of indicators of present practice at communal and individual levels. The survey included spot checks on community hygiene habits (eg. signs of faecal contamination and rubbish indiscriminately abandoned), combined with

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<sup>21</sup> Preliminary findings for sanitation survey, RWHP June 1995

examination of all latrines and a household questionnaire. The CMMU sanitation ladder was also used but not with the participatory methods for which it is devised to reduce commonly encountered sensitivity to discussion of topics related to faecal disposal. This may have led to underreporting of aspects such as use of the bush for defecation, and times of handwashing.

6.7.2 As a result of the survey and definition of options by L. Tong RWHP and MOH jointly decided to promote use of the small Sanplat, rather than stick to the mainly software approach proposed in the Third Phase plan. MOH were provided with funds and moulds, but changes in Ministry personnel have interrupted the programme somewhat, and apart from the manufacture of 32 Sanplats, (16 for sale and 16 for demonstration/ trial) there has been little progress in the past eighteen months.

6.7.3 Discussions were held during the workshop to see what direction the sanitation programme might take to become more active again, and who might become more involved in order to increase the impact. The reviewer of the health element of the project proposed that intervention should use a similar approach to the traditional source improvement (i.e. the use as far as possible, of local materials, local knowledge and local finance backed up by extension workers as motivators). About half participants felt that sanitation and hygiene should be regarded as individual/ family concerns and half that it should be taken on more as a community responsibility.

6.7.4 Extension staff will require specific training, especially in software aspects, which could take place alongside the traditional source improvement training, and could form part of the overall hygiene education programme. Interviews at health centres and with district health officers tended to show that many still put highest priority on latrine construction, although some are already aware that education on hygiene practices, especially hand-washing, are equally if not more important. Any programme along the above lines would need to start off by convincing district health management boards that this approach was worthwhile, before moving on to the extension workers and neighbourhood health committees.

6.7.5 UNICEF have been experimenting with Sanplats made at community level with EHT supervision, which reduces distribution costs and involves people from the start. RWHP should see whether this lower level technical approach could be better combined with education for behavioural change, than the present methods of construction.



### CONCLUSIONS ON SANITATION PROGRAMME

1. The sanitation programme needs a new stimulus. This can partly be provided through DHEP.

2. The concentration on the central manufacture of Sanplats makes any improvements transport dependent. Links to the UNICEF Sanplat programme might indicate alternative approaches.

3. The workshop concluded that efforts should be concentrated on improving -:

- personal hygiene (especially hand-washing, water storage and collection practices)
- community management structure and awareness to re-inforce and disseminate hygiene information
- sanitation facilities which could be for demonstration purposes at institutions
- support to local leaders, extension workers, church, et al in the promotion of health and sanitation messages
- awareness of routes of contamination
- faecal disposal practices
- effective water usage

### RECOMMENDED ACTIONS.

1. Working closely with MOH to -:

- undertake KAP surveys (also part of DHEP programme)
- link with UNICEF initiatives in other provinces (mainly Southern & Eastern)
- motivate extension workers
  - to build on local knowledge
  - discuss local practice
  - re-inforce good practice
  - work out how to deal with bad practice
  - assist communities to establish sanitation norms and personal levels of acceptable hygiene practice

### RISKS

1. MOH will have other priorities during this stage of health reforms

2. Budget for sanitation will not receive priority

3. Responsibility for rural sanitation is not clearly defined in sector re-organisation

#### **CONCLUSIONS ON GENERAL PEP PROGRAMME.**

1. Much effort has been put into developing CHA expertise in participatory concepts and collection of basic data on water use and community management.
2. Awareness of gender issues has been increased both within and outside the Project. Recruitment to skilled levels, and through training has given RWHP a more balanced profile and gives communities an example of the wider variety of roles that women have the capacity to perform.
3. Responsibility for extension worker training has been handed over to parent ministries. The timing of this coincided with insufficient agreement on roles, and limited capacity of MOH for field supervision and withdrawal of RWHP support to existing WSS health education.
4. DHEP is a first step by RWHP to stimulate decision making by intersectoral district administration, where the Project acts as a catalyst in district planning. This could lead to a change in project approach, starting the reduced dependency which Phase 3 was planned to achieve..
5. DHEP will take some time (minimum a year) to produce, test, & train in integrated hygiene education. Meanwhile RWHP has no health education programme and its guidance and support to EWs on WASHE has ceased, so there appears to be a hiatus in an essential part of the programme.
6. CHA roles should be discussed with them and parent ministries, with the idea of their becoming more trainers of trainers, working with PEAs rather than RWHP contact with communities.
7. Links with other PEP and community based initiatives in Zambia could be further developed.

#### **RECOMMENDED ACTIONS.**

1. Discussion with MOH on interim policies on hygiene education.
2. Re-definition with MOH on roles and responsibilities of EWs (see also next chapter)
3. Awareness of and testing of CMMU guidelines, plus suggested collaboration over KAP studies to develop use of indirect information gathering rather than direct questioning.
4. PEP should visit or invite others in the same field (especially in relation to schools and ITS programmes) to become familiar with developments taking place elsewhere in the country.

#### **RISKS**

1. CMMU guidelines will be too resource intensive.
2. KAP surveys require a higher level of training field staff & pre-testing than can be given in the time.

## **7. PROJECT ORGANISATION AND LINKS TO OTHER ORGANISATIONS.**

### **7.1 Internal organisation**

7.1.1 In organisational terms the Third Phase is designed to improve linkages between RWHP and GRZ institutions ( a pre-requisite to phasing out), to increase project efforts in monitoring and evaluation of impact and to improve productivity through better supervision and management. As a result several changes have occurred in the past year and more are planned for the coming year.

7.1.2 The planned management structure is approximately as set out in Fig 7.1. The introduction of an Assistant Project Manager seconded from MOH has helped increase the influence of the social aspects of RWHP activities, and allowed this part to have a separate management, alongside, rather than beneath Project supervisors. It is also creating better links with MOH at district/ provincial level, the latter also being promoted by the inclusion of the PMO on the review team. The APM is also responsible for monitoring and project self-evaluation, which will be built up over the next year. However the retention of CHAs being responsible to PSs and the supervisory role of PEAs does still seem to create a somewhat uneasy organisational structure. The Kasempa USP CHA does not fit into this structure, and although the links with the project are stronger than any other, they cannot provide the support which is needed within the district, which the USPCC should provide, if responsibilities were clearly defined.

7.1.3 The training of PSs and monitoring of progress has helped to improve productivity and general management capacity. The APM for well construction has received additional management training in the Netherlands. However the additional training raises some problems when key officers are away on courses for extended periods of time, as is expected to happen in 1997/8.

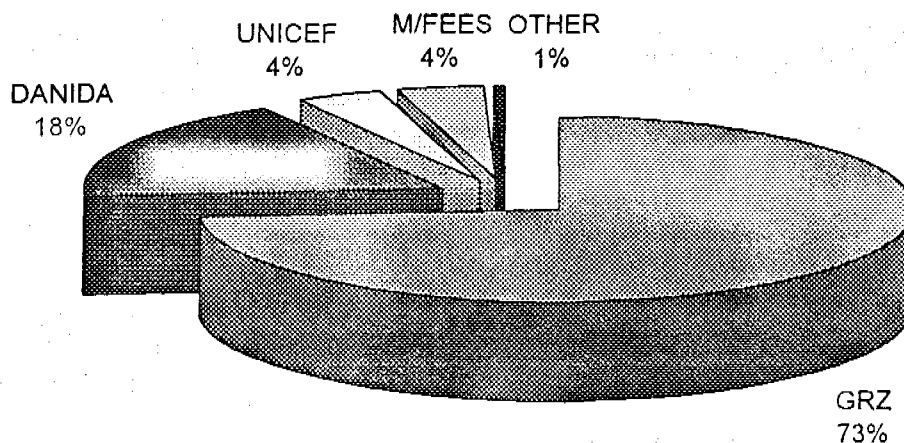
7.1.4 The Third Phase plan envisaged one PEA being moved to Mwinilunga to help support operations there, but at present both remain as a provincial resource.

### **7.2 Links to Ministry of Health at provincial, district and extension level.**

7.2.1 The long term support to communities and provision of health education has always relied heavily on the sub-district staff and community health workers of the Ministry of Health, which also provides some seven members of staff seconded to RWHP. Links with MOH are therefore vital, particularly in the fast changing environment of health reform. Interviews at district and RHC level tend to show that project links have always tended to be strongest at extension level, rather than at district health management level despite this being the level at which extension staff programmes are approved and activities monitored. District level also has a specific environmental health section which is responsible for health initiatives relating to water and sanitation.

7.2.2 MOH is undergoing reform as mentioned in 2.1.6. These reforms are designed to bring more decision-making to district and community level, and to structure treatment facilities so that as much responsibility as possible is held as at low a level as possible. These reforms mean that personnel are moving from one post to another, making the build up of familiarity with the Project and devolution of responsibilities more difficult in the short term. GRZ gives some priority to the health services and provides almost three quarters of all funds (see Fig 7.2) which is in direct contrast to water where around 90% of funds come from donors. Links to MOH would therefore tend to indicate longer-term continuity of support and GRZ input, as long as districts feel that this element is a priority in their budget.

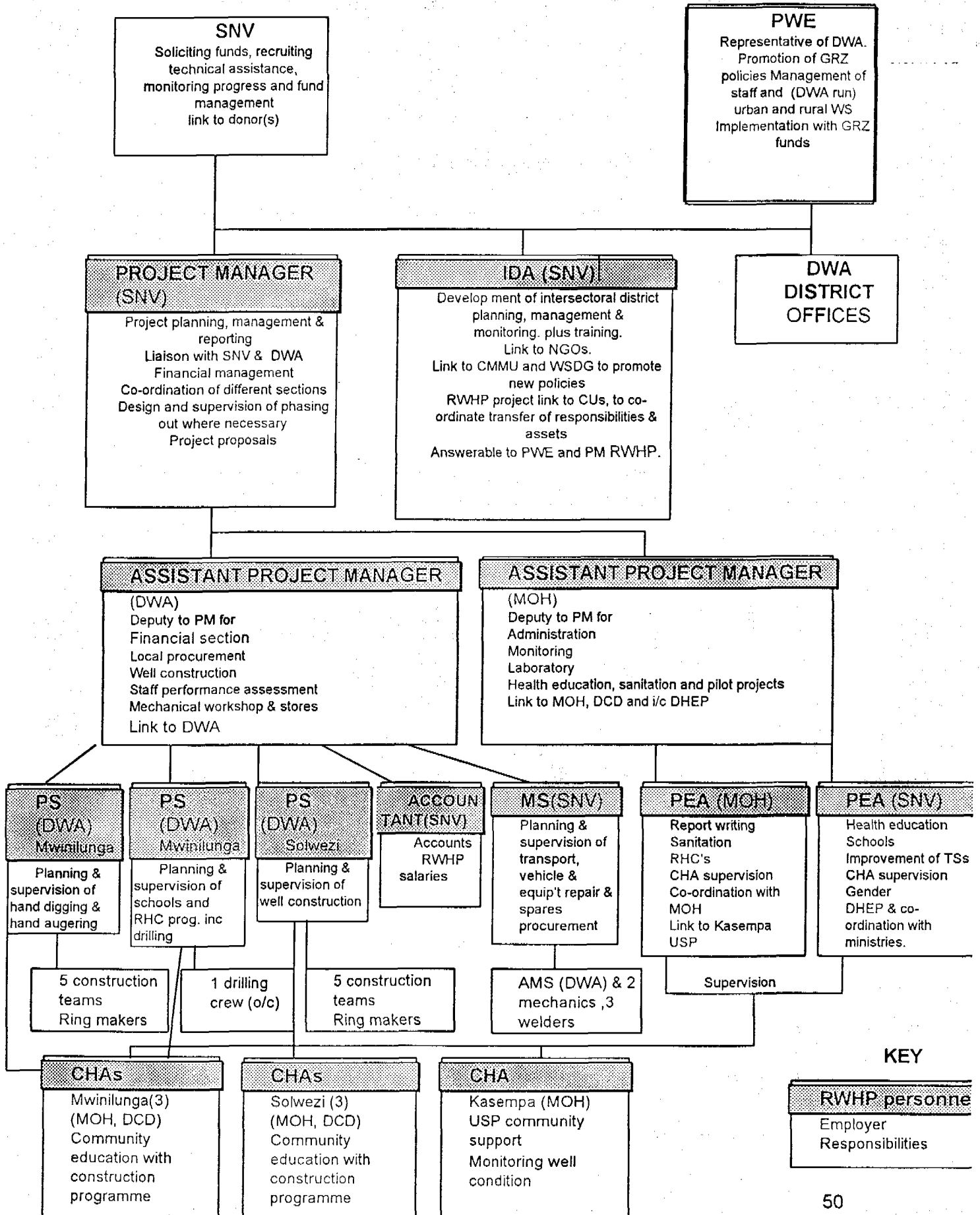
**Fig 7.2 Sources of funding to MOH 1995( Solwezi, Kasempa, and Mwinilunga districts).**



7.2.3 During the second phase RWHP held quarterly (and finally bi-annual) planning and training meetings with extension staff. Interviews at RHCs tend to show that these meetings were regarded as very useful by extension staff, providing a forum for discussing problems and strengthening links between RWHP and GRZ activities. Such meetings were also used by RWHP and MOH for training sessions. Their sudden cessation in 1996 has de-moralised extension staff and arises from lack of clarity in handing over responsibilities from RWHP to MOH. It highlights the need for stronger links at district level and encouraging district administration to give higher priority and support to water and sanitation initiatives than has been available in the past.

7.2.3 The review workshop sought to identify the root causes of why there have been mis-understandings in the handing over of training and supervision responsibilities to the Ministry of Health. It also looked at why so little responsibility has yet been passed from CHAs to health extension workers and why aspects of health education and community support appear poorly developed, i.e. it analysed the existing links and expectations of the two organisations. However some of the conclusions drawn are also applicable to RWHP relationships with other organisations.

**Fig 7.1 ORGANISATION AND RESPONSIBILITIES RWHP**



## CONCLUSIONS ON LINKS WITH MOH (also applicable in part to DCD and DWA)

The limited effectiveness of links to MOH to date were concluded to arise from -:

1. Lack of agreement between MOH and RWHP as to what responsibility each has and will have
2. Poor links between CHAs and mother departments
3. Low involvement of MOH in planning stages
4. Low level of dialogue, RWHP informs rather than consults
5. Little involvement of extension workers in Project activities
6. Inadequate orientation in water and sanitation issues
- 7 CHAs after assessment concentrate only on new sources
8. Monitoring through community support visits by CHAs has ceased
9. EW inputs confined to making introductions at community meetings, so little practice in participatory methods
10. Responsibility for training EWs handed over to MOH before they received adequate training to take over from CHAs
11. EWs lack confidence to take over and have no detailed agreement with DMB of what activities and inputs are required in relation to RWHP so have to give other health programmes priority
12. EWs present experience in teaching on diseases is purely didactic
13. EWs change frequently and are not necessarily known in communities, and they are still thought to be untrained
14. MOH would like PEP and WASHE training to be provided to all rural health centre staff, not just EHTs
15. Nobody in RWHP previously being responsible for relationship to MOH.

## RECOMMENDED ACTIONS.

a) Formation of a team to set policies and targets at provincial level, with district level variations and training needs identified by district teams. These teams should include MOH, RWHP, DCD and DWA. Policies need defining on extension worker relationship and answerability to project and mother institution.

b) Establishment of forum to discuss RWHP and other water sector progress, plans and quarterly reports (eg. D-WASHE, which may also fulfil the role outlined in a)

c) Plans of extension workers training programmes with MOH (and DCD) plus on-the-job training sessions. Combine with fixed programme for reduction in CHAs inputs at community level, and well designed shift in CHA responsibility for training and monitoring (including baseline data collection and impact monitoring).

d) PEAs completion with CHAs of the design and testing of hygiene education programme, probably based on CMMU guidelines. Followed by training of EWs in its use, and distribution of education materials to RHCs and schools.

e) MOH/DCD exploration of where /if CHAs might fit into their district establishment in the future.

f) Monitoring of CHAs should concentrate on their abilities to act as trainers of trainers not of communities.

## RISKS

1. District administration may not give programme high priority
2. Education level of extension workers may limit effectiveness (not found to be a problem on other similar projects)

### 7.3 Links and capacity building with DWA

7.3.1 This has previously been a specific project objective, which has perhaps been overtaken by events. DWA now theoretically no longer has responsibility for rural water supply, although it retains this *'de facto'*, in that no other ministry yet has capacity to take it over. RWHP has to a large extent depended upon seconded staff, particularly from DWA and the co-operation of the Department has done much to make the Project a success. The latter has also invested in training of DWA seconded staff both by sending people on courses and through on-the-job training. However motivation within DWA is now at a particularly low ebb because of job insecurity and uncertainty over future sector developments.

7.3.2 At provincial level relationships with DWA have not been strengthened significantly, this being to a large extent due to the frequent changes in DWA personnel (three PWEs in two years and three officers responsible for Solwezi district). However there has also been limited effort from RWHP to explore ways in which co-operation could be established between the two organisations and training be of benefit to DWA staff other than those seconded to the Project. DWA remains the Host Organisation in terms of the SNV agreement with GRZ<sup>22</sup>.

7.3.3 Many of those at present in DWA are likely to seek posts in the CUs and so some co-operative actions would be of eventual benefit to GRZ. However there is little guarantee that, in the major shake-up of water sector employees which will occur, those DWA staff at present working in DWA North-western Province, will obtain posts within the CU, or with any responsibility for rural water supply management.

7.3.4 The provision of limited funding to DWA should be linked to the resources they have available for well-deepening which are un-utilised through lack of funds. In 1996 DWA provided no capital releases until the end of the year, and RWHP had no spare capacity to bring non-Project wells up to a standard for USP. As mentioned in 5.5.4 the introduction of more wells to USP would improve its sustainability. Any such support might best be channelled through the D-WASHE committee, to develop their intersectoral management and planning capacity which will still be required even when the CU is formed. At present DWA Solwezi has no construction foreman, but has the establishment for one, and the equipment and transport to support it. At the end of 1996 DWA has received limited funds, which will at present be managed by the PWE, but efforts should be made to encourage the introduction of D-WASHE influence on such decision-making. Appendix 3 lists the equipment available in DWA Solwezi.

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<sup>22</sup> Agreement between Ministry of Energy and Water Development DWA and SNV Netherlands Development Organisation, concerning the Third Phase of the Rural Water for Health Project. May 1995

#### CONCLUSIONS ON LINKS TO DWA

1. Any further attempts at institutional capacity building should now await the formation of the CU or concentrate at intersectoral levels (WASHE committees) which will still be involved after re-organisation has taken place.

2. Any joint operations with DWA should be justified for their ability to assist DWA and RWHP to better achieve their objectives in the short term rather than for their institutional capacity building.

#### RECOMMENDED ACTIONS.

1. Involvement of EAs as well as PWE in meetings so that they become more familiar with RWS planning concepts and RWHP objectives

2. On-the-job training of DWA staff in PEP concepts and quality control for construction, when requested by the PWE

3. Limited funding for USP/DWA for re-deepening and management esp in Kasempa, with joint provincial DWA/ RWHP support

4. Training and utilisation of DWA siting team, if warranted

#### RISKS.

1. Uncertainty of when and how DWA will relinquish responsibility for rural water

2. Re-location of DWA personnel will accelerate as re-organisation progresses

3. Most able DWA personnel will seek transference or new jobs first

supply

## 7.4 Intersectoral links and IDA.

7.4.1 There is at present a nation-wide campaign for the establishment and training of D-WASHE committees. Their purpose is

a) to make maximum use of the limited resources available to different ministries seeking to provide rural services

b) to co-ordinate activities in different sectors such as -:

- well construction with health education programmes undertaken by teachers, community health workers, community development workers, and rural health centres,
- or well breakdown, with support in problem solving, fund-raising, communication with district authorities
- or one ministry with a vehicle and no funds for fuel, with another with some recurrent funds and no operating vehicle and a third with no funds for allowances for a fieldworker

c) act as a sub-committee of DDC and advise DDCC on the water and sanitation situation in their district

d) build up ability to plan, manage and monitor implementation for RWSS in the district, and to write proposals to seek funding

e) to involve all NGOs active in the sector and ensure that their activities are included in district plans, monitoring of standards, and in USPs. f) to promote rural interests when CUs are formed

7.4.2 This approach has been adopted by most RWSS projects in Zambia in the last two years, and would allow building of capacity to take over some of the



planning and management roles which RWHP and the GTZ Village Water Supply Programme at present fulfil in the province. It will be a primary role of the IDA to develop the D-WASHE in each district, and familiarise D-WASHE members with developments elsewhere in Zambia and with evolving government policy. He will also train them in planning concepts, and water, sanitation and health education technical, social aspects and costing using participatory techniques, which as far as possible employ and build on their existing corporate knowledge. The degree to which this is assisted by the N-WASHE training teams to ensure countrywide standardisation would need discussion with district councils, RWHP, and N-WASHE at an early stage of the IDA's input.

7.4.3 At the same time, it is hoped that by the end of 1997 the CU will be established and the IDA will have a major role in helping RWHP to become integrated with the CU RWS section. He will also be needed to assist in the definition of the relationship between D-WASHE, RWHP and CU since GTZ will also be starting a new RWS programme within the CU as part of their support to the establishment of the CU in North-western. This will probably cover the other three districts and so close co-operation will be necessary to ensure that the CU has one policy and '*modus operandi*' with reference to RWSS throughout its area. Since GTZ is supporting the CU itself and is unfamiliar with RWHP work and organisation, the IDA will be in a good position to ensure that RWHP resources are not neglected in consideration of how RWSS will develop within the CU.

7.4.4 At present the IDA is planned to be within DWA. Since DWA will shortly no longer be answerable for rural water supply, and will have strong interest in the movement of responsibility and personnel from DWA to the CU, an interest which the PWE is likely to want to present himself on behalf of his department, this arrangement may encounter difficulties. At an early stage discussions should be held with GTZ, district councils and DWA as to where the IDA will be most able to function effectively. The PWE has already, perhaps justifiably, expressed his surprise that the IDA's first task is to 'act as the main contact point for the institutional development in the water sector' (later clarified as for rural water).

7.4.5 As outlined by RWHP the IDA's main tasks relate to the integration and phasing out of the project. They are therefore crucial to the long-term impact of the project particularly since re-organisation is not predictable in its rate of progress, and even perhaps as to its final form. His tasks<sup>23</sup> include -:

- supporting intersectoral co-ordination (D-WASHE, DDCC, PDCC)
- transferring responsibilities to participating institutions
- training GRZ staff
- supporting CMMU in the development, testing and implementation of national guidelines
- supporting the water sector re-organisation (especially RWS section of the CU)
- liaison with the N-WASHE training co-ordinator and ensuring that D-WASHEs reflect the structures and expertise being set up elsewhere in Zambia
- facilitating the transfer of staff to other institutions

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<sup>23</sup> Functional task description and additional budget. Institutional Development Adviser. RWHP Undated

- guiding RWHP in disseminating project expertise proposing options for transferring of project resources
- training of project staff to continue sector activities

7.4.6 Many of these roles would seem to be, to some extent, ones which the PM or APMs would already regard as their responsibility and are not easily undertaken by someone supposedly situated outside RWHP. The definition of RWHP responsibilities, and in particular PM and APM (and IDA) job description may need early and careful definition to avoid duplication of efforts, and to ensure team strength once all personnel have taken up their posts. It would be a pity if the provision of two high level technical assistance posts at this point reduced the opportunity for the APMs to develop their management skills and play a major role in the integration of the project.

#### **CONCLUSIONS ON RWHP ORGANISATION**

1. Internal organisational changes have been constructive in improving project efficiency
2. Links to other organisations perhaps remain the weakest aspect of the project despite efforts to improve the situation. They reflect limitations of capacity and resources outside the Project as well as a somewhat limited commitment to the concept within it.
3. Efforts in the short term should concentrate on intersectoral links, MOH and keeping in close contact with policy-making bodies preparing the establishment of the CU.
4. The positioning of the IDA within DWA should be re-assessed in a few months time
5. The job descriptions of all senior management should be re-defined once the PM and IDA are in place, and the roles of IDA defined in relation to DWA, council and later CU responsibilities for sector re-organisation at provincial and district level.

#### **RECOMMENDED ACTIONS.**

1. Regular discussions should be held with WSDG and GTZ prior to CU formation, and links to councils (as major share-holders in CUs) strengthened
2. IDA should become familiar with operation and outputs of D-WASHE committees elsewhere in the country
3. N-WASHE should make joint programme with RWHP for D-WASHE establishment and training. There should be agreement with GTZ how the province as a whole will be covered.

#### **RISKS**

1. National policy on rural water supply may change
2. CU may not give RWSS a high priority
3. Organisations involved in sector re-organisation may not all accept position of IDA
4. New structure of district level administration in various sectors may not have the capacity, interest or resources to give priority to water and sanitation.

## 8. PROJECT IMPACT AND MONITORING

### 8.1 Process monitoring.

8.1.1 In order to maintain a continuous evaluation of progress RWHP has instigated the use of a logical framework to analyse outputs over the past two years. This focuses on the numerical aspects of project activities and requires periodic analysis of trends, to check that procedures instituted are having the desired effect in terms of productivity. It will later be combined with an impact monitoring system which will allow evaluation of the qualitative effects of the activities undertaken.

8.1.2 The matrix proposed in the Third Phase Proposal was further developed during a workshop held by IWSD in June 1996. This has helped to identify the individual elements necessary to achieve the stated objectives and the indicators which may be used to judge progress with specific activities. Project staff found the exercise helpful in clarifying component activities and indicators. As pointed out by one APM this system might have even more effect on project productivity if it were drawn up for different levels and type of activity against which team or individuals could judge changes in their outputs, rather than being used simply as a form of reporting overall RWHP achievements in quarterly reports. The same workshop, and that in December also looked at some aspects of monitoring impact.

### 8.2 Potential for Impact.

8.2.1 In order to fulfil the objectives of the Project, there is a need not just to look at the quantitative targets and outputs, but their quality and the degree to which they have caused changes which were intended in the definition of objectives, particularly as they relate to quality of living conditions. The impacts of improved water supply may be social, economic or health related, or a combination of all three, as was concluded by the workshop in December. Monitoring impact requires the definition of aspects the project wishes to change and identification of measurable indicators of the degree to which such change has been effected. It provides a qualitative dimension to the more quantitative approach of process monitoring and may be carried out in a few sample communities rather than everywhere the project intervenes. It is understood that this aspect will be developed more by RWHP in the coming year, and will include perceived as well as physically measurable changes.

8.2.2 Evaluation of impact is usually considerably easier where there is good baseline data of how things were before project intervention, and in that this is largely lacking for North-western Province, baseline information may require some attention before a long-term monitoring system can be developed. This also draws attention to the difficulties of project design where such information is missing. (eg do we need to educate people on how to store water or is existing practice generally good? or more fundamentally do the changes to water quality and accessibility proposed provide significant improvement to existing conditions in all/ most/ a few/ no cases?).

The main changes expected for rural water supply, with a limited component are those associated with lesser distance to water and improved water quality. Most communities in Zambia have a water source within 10-15 minutes of the houses, in which case reduction in distance may not much affect volumes of water used<sup>24</sup> unless combined with considerable education on behavioural change. In addition the greatest volumes of water abstracted are for washing and cooking, and the smallest for drinking. Thus if high emphasis is put only on changing people's habits in relation to drinking, original sources may still be used for most water abstracted, and the benefit in terms of reduced time and energy spent on water collection may not be maximised. The potential for greatest benefit would therefore be where reduction in distance for water carried is combined with improved water quality, health/ hygiene education leading to increased water use and good water collecting practices.

8.2.4 The impact of improved water supply is also affected by other aspects over which any rural water supply project may have little control. For instance reduction in water borne disease incidence and certainly intensity (morbidity vs. mortality) is also affected by aspects such as the economic climate, availability of drugs and staff at rural health centres, links to relations living, earning and learning in more major centres of population and the general living conditions of well users. Where for instance, diets are poor, animals share the house, and/or the economic status of householders is low, the potential for significant improvements to health are less than where these factors are absent.

8.2.4 Not all impact may be regarded as a positive change and any accumulated disadvantages need to be weighed against the positive benefits. Since such negative aspects are not usually part of the objectives they may sometimes be ignored or not discovered. Most disadvantages tend to be primarily social, such as conflict between users, less opportunity for socialising and less privacy for washing, all of which may discourage potential users despite the source appearing perfectly acceptable in physical terms. The effects of these can only be measured by observing or ascertaining in an unbiased way, the preferences and practices of users and non-users of protected sources, and their reasons for changing or not changing their water use practices. Such studies require considerable pre-testing and expertise in order to reflect real conditions. Many influences, such as driving up in RWHP vehicles, or the person asking questions being the same one who previously instructed the community on what was good or bad practice, can affect the outcome, but several methods have been devised to reduce these influences, especially for KAP surveys (see CMMU Ladders).

### 8.3 Indicators and necessary baseline information

8.3.1 The purpose within the Project of impact assessment is to identify where project assumptions may be incorrect or where methods used may not be having the desired effect. Additionally such an assessment provides information

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<sup>24</sup> A. Cairncross. Domestic Water Supply in rural Africa. in Rural Transformation in Tropical Africa, ed D. Rimmer Bellhaven Press 1988. Used also in CMMU guidelines.1996.

to justify donor funding at various levels and may affect the formulation of national policies, or provide useful examples for other projects. However it tends to use resources which are not then available for the main purpose of the project, and therefore the benefits of any surveys, data collation and analysis need to be balanced against the demands on finite Project resources of other activities being undertaken. Those collecting data should be aware of its uses and effect on decision-making, and communities should be involved in analysing and discussing the meaning of results. Sample surveys should be established which may use the same communities several times (this also reducing the bias arising from wanting to 'give the right answer', and the suspicions attached to direct observations such as of water collection), and indirect systems set up for aspects such as monitoring of well functioning. The uses of any data collected need to be justified to avoid an accumulation of inapplicable information and wasted effort.

8.3.2 Areas targeted for change were identified by participants in the December workshop. They are listed below with some possible indicators so that project effectiveness to date can be considered in the light of data available so far.

Table 8.1 Expected areas of impact

Areas of impact	Indicators	Possible methods of measurement	Remarks
1. Reliability of supply Sustainability	Functioning or not functioning Trends in the above.	Direct observation of well condition including state of components Signs of use, and questioning of community Reporting by extension workers and changes over time	May be seasonal variation Also indicates -: willingness and ability to pay technical capacity to repair management capacity quality and appropriateness of construction all of which are difficult to measure directly. **Reasons for non-functioning indicate aspects of project approach. needing modification
2. Source water quality	Bacteriological (& chemical) quality	Laboratory testing User view of acceptability for drinking Sanitary inspection	May be seasonal variation Need control measurement from unimproved sources and training of extension workers in SI related to lab measurements
3. Adoption as drinking water source and also for other domestic purposes	Previous drinking/ washing water sources abandoned Proportion of community using new source for different purposes	Blind voting on sources used Inspection of previous sources Household question on origin and purpose of water stored.	Surveys in schools can rapidly provide good comparative data on coverage and use of sources for different purposes.
4. Water quality at point of consumption	Water quality of water stored in house	Sampling of water from storage vessel or scoop if used Observation on collection and storage practices and correlation with quality	Control measurements from communities not covered by project, &/ or prior to intervention to indicate impact of hygiene/ health education

Areas of impact	Indicators	Possible methods of measurement	Remarks
		changes	
<b>5. Distance to water</b>	Distance to previous and present source.	Direct measurement	User perception of distance/time often poor School surveys where pupils pace distances can provide good data and do initial processing
<b>6. Time available</b>	Usually difficult to identify except as perceived change by users	Non quantitative community discussion (esp. women) (including aspects such as feeling tired, childcare, household hygiene, multi-tasking etc	Difficult to establish changes in behaviour which may evolve slowly and may not include any significant change in productivity, and so may not have any measurable output.
<b>7. Use of water</b>	Number trips to well Purchase of more/larger vessels for storage or collection Increased hand washing at appropriate times and washing of small children (esp faces?)	Direct observation over time in sample communities Community discussion Hand-washing surveys of practice (inc blind voting), and teachers inspections in schools	Water collection survey very labour intensive. Requires one observer at each source, for c. 14 hours a day for at least two days Hand washing and other advice on water use at present little developed by RWHP
<b>8. Incidence of water related diseases</b>	C. impossible to identify from health records because of no. of variables and variation in record quality. Seasonal/annual patterns in child diarrhoeal morbidity	Possibility for CHW or EHT to do household surveys of recent diarrhoea incidence in successive years for sample communities (will probably not identify changes in intensity of disease)	Not usually possible to prove any positive changes due to project interventions alone. Intensive if to provide reliable data Need MOH co-operation and identification of survey as a priority
<b>9. Demand for water supply improvement</b>	Number of requests to council/ CU/ project. Growth of private contractors Community led initiatives in source improvement	Recorded applications to councillors, D-WASHE, RWHP., MOH etc. No./ amount of community payments for source improvements obtained from VWC treasurers /EW. EW reports on improvements made	Most easily achieved if systems for application are centralised with D-WASHE as forum for registering and discussion EW reports needed on local initiatives and contractors for well-deepening etc.
<b>10. Sense of ownership/ awareness of self-help, of benefits</b>	Measures taken to maintain well Operating communal systems for fund raising. and well maintenance Community view of to whom well belongs. Community opinions on whether they would 'do the same again'	Records of buckets bought from USP or VWC Annual income generation or funds raised for specific occasion Condition of well surroundings, grease on windlass Community discussion of to whom well belongs Communities with RWHP wells discuss pros and cons with others considering applying for a well	Requests for advice, education from EW also indicate growing sense of ownership and wish to improve  Inter-community discussion gives opportunity for people to discuss the balance between advantages and disadvantages with those who are dis-interested
<b>11. Skills in the community</b>	Well established & effective water committee Ability to fish for buckets,/ clean out well	Community knowledge of VWC members and their activities, Water supply problems solved and people called upon for assistance all identified	May also discuss if management structure used for other purposes too. Potential for using WS funds for other purposes Other self-help projects

Areas of impact	Indicators	Possible methods of measurement	Remarks
	Knowledge of sources of assistance Manufacture of local buckets	through community discussion. EW / community identification of bucket-makers, + purchases	triggered by RWS work. More contact with EW, DWA , schools etc.
12 Skills among project staff	New qualifications Promotion/re-grading New technologies introduced	Courses undertaken, certificates /diplomas Number re-graded, and increase in people for whom each is responsible, obtained from RWHP PM	Also from personal assessments, perception of resource management and problem solving skills
13. Intersectoral co-operation	D-WASHE formed and formulating policies Intersectoral district plans/ policies / budgets/ search for donors for RWSS Joint implementation /resource sharing	D-WASHE committee can provide information on activities & outputs, funds raised towards interventions, sources of funding/ co-operation, NGO involvement and response to district plans and policies.	Indicators may change as CU formed and sector re-organisation takes shape.
14 Capacity building of GRZ institutions	Reduction in decision-making for RWSS by RWHP Transference of RWHP trained personnel (inc seconded staff) to GRZ Transference of RWHP assets to GRZ	RWHP outputs prompted by non-RWHP decisions' RWHP staff operating from established posts in GRZ, assets passed over to GRZ all identifiable and documented by PM RWHP.	Speed with which this is undertaken very dependent on rate of re-organisation, and GRZ/CU/GTZ/ RWHP policies
15. Number/status of female staff	Variations in number level of female staff Comparative rates of pay. Absorption into GRZ payroll	RWHP staff profile, and salaries obtainable from PM/ accountant	Absorption of females into GRZ payroll dependent on national recruitment policies, and CU funding/ priorities for RWSS
16. Community gender development	Proportion of women in community meetings Proportion of women expressing opinions in meetings Committee structure uninfluenced by RWHP	CHA /EW records of meetings and direct observations for a sample of meetings. Community discussions on women's role and influence.	Water project life short for major impact.

8.3.3 In order to provide a measure of change, it is necessary to know the situation before the interventions being considered. The existing application and assessment forms for communities provides considerable background information, which was originally drawn up for prioritising communities. It gives an outline of the physical situation on sanitation and water supply in the community, backed up by community maps, against which later changes (eg number of latrines, rubbish pits etc.) can be measured. It also concentrates on the potential for community participation.

8.3.4 In the last year the system for community selection has changed and now all communities applying are qualifying for some level of intervention. (This has been as a result of increased construction capacity combined with increased applications and the response of communities being in line with RWHP guidelines as set out in the ward meetings). The value of the assessment is no longer so much as a method of selection but more for the initial contact it makes with the community and the information which can be gathered as base data. This means that the design of the assessment visit could perhaps be modified, to include more on existing KAP relating to water use, hygiene and sanitation, and perhaps disease prevalence and income generation. Without this the degree of behavioural change and its effect over time, from RWHP and other interventions, cannot be assessed.

8.3.5 Information can also be collected indirectly through schools and communities. In other programmes schools have proved very keen to be involved in information collection which can then also be used in other parts of the curriculum. With care this can provide reliable data, and a small outlay on materials allows the schools to make use of the information too and develop some of their own teaching methods for the school and sometimes also the surrounding communities (as RWHP has done with the encouragement for plays in association with school well construction/ rehabilitation). Baseline data on distance to water, sources used (and reasons), distribution of bilharzia snails, hygiene practices can be collected for a cross-section of the rural population, both those involved in RWHP and those who are not. Arranging discussions between communities who have already benefited from a new well and those which haven't also helps to identify people's priorities and attitudes with minimum outside influence. Thus participatory evaluation can slowly be developed.

## 8.4 Preliminary indications of impact

8.4.1 Results of surveys have been used throughout the report so far to provide indicators of how effective the Project is being in reaching its objectives. Aspects of reliability and functioning as an indicator of sustainability, ownership etc. are examined in Sections 4.3 and 5.1 and of well use for different purposes and the degree to which protected sources are used exclusively in Section 5.2. Otherwise, except for water quality, most aspects other than gender (see Section 6.2) have only been looked at all in terms of perceived benefits so far.

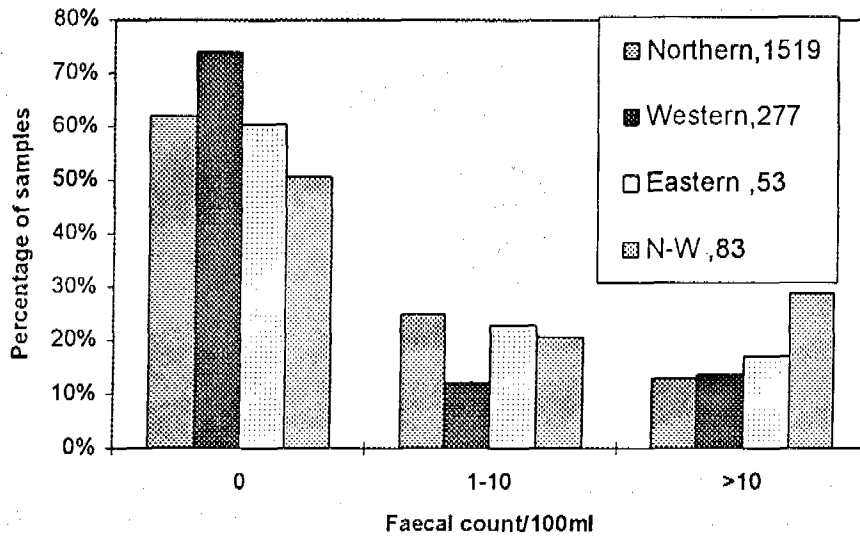
8.4.2 RWHP is increasingly collecting data on water quality, both at source and in the home. However to provide information which can be analysed with any statistical significance there is still a need to structure testing and include control sites. The greatest number of samples have been from RWHP hand-dug wells with bucket and windlass, and these can be compared with other sampling programmes elsewhere in Zambia (see Fig 8.1)

8.4.3 This tends to suggest that, very surprisingly, water quality in the RWHP wells is not quite as good as for other projects. It would appear that a lower proportion of protected wells have no faecal coliform compared with elsewhere, but when quality is compared with unimproved traditional sources in the only area for which a large number of analyses exist, there appears to be a general upward shift in quality as a result of RWHP interventions especially in the reduction in



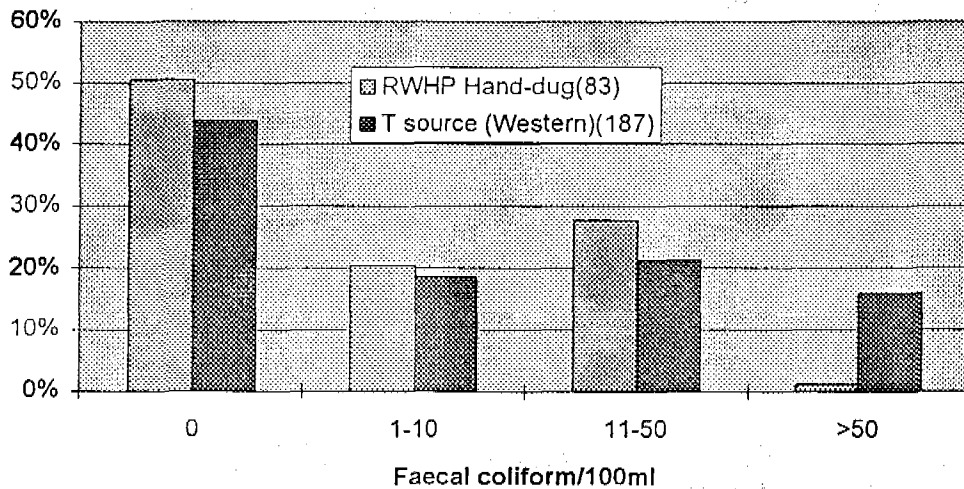
relatively severe contamination (see Fig 8.2). It may be that RWHP focuses on larger settlements where contamination is a higher probability, or that the present level of hygiene education is insufficient to reduce risks from dirt getting into the well. A greater spread of analyses from within the province (both of new and unimproved sources), and perhaps from wells under other programmes in the same area might help to isolate the factors which are giving rise to this pattern. Periodic feeding of known blank and contaminated samples through the laboratory would also provide a standard check on procedures, so that confidence in results is maintained.

**Fig 8.1 Bacteriological water quality in hand-dug wells in Zambia**



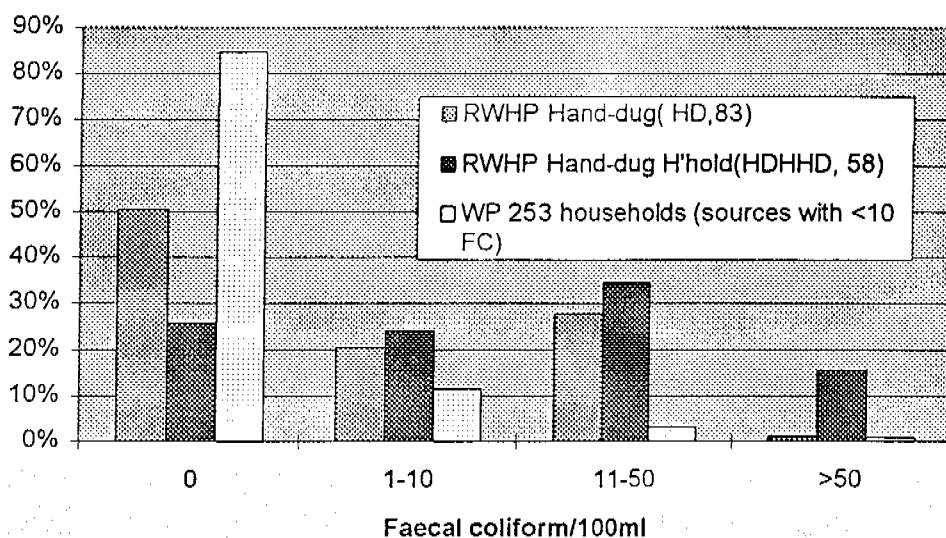
8.4.4 Water quality can also indicate whether the project has, as yet had much effect on water collection and storage practices, and whether such education is necessary. (This element is not a major part of the programme at present and therefore low impact would be expected. Baseline data, however would allow later evaluation of district hygiene education programmes).

**Fig 8.2 RWHP hand-dug wells and other traditional sources**



8.4.5 There are only few results from households in the area so far, and they are not related to specific source water quality. However if sources were representative of the whole it would suggest that there is a deterioration in quality during transport and storage (see Fig 8.3).

Fig 8.3 Household water quality



Household water quality measured in Western Province<sup>25</sup> was, to simplify analysis, only taken in communities where source water had <10 faecal coliform (both from traditional sources and new wells), and therefore water from storage jars would be expected to have fewer faecal coliform. However it also shows that in this area contamination during transport and storage is low, despite little or no attention being paid to this aspect in community education. Examination of the difference in practices in the two areas might help to isolate those factors which lead to most risks of contamination.

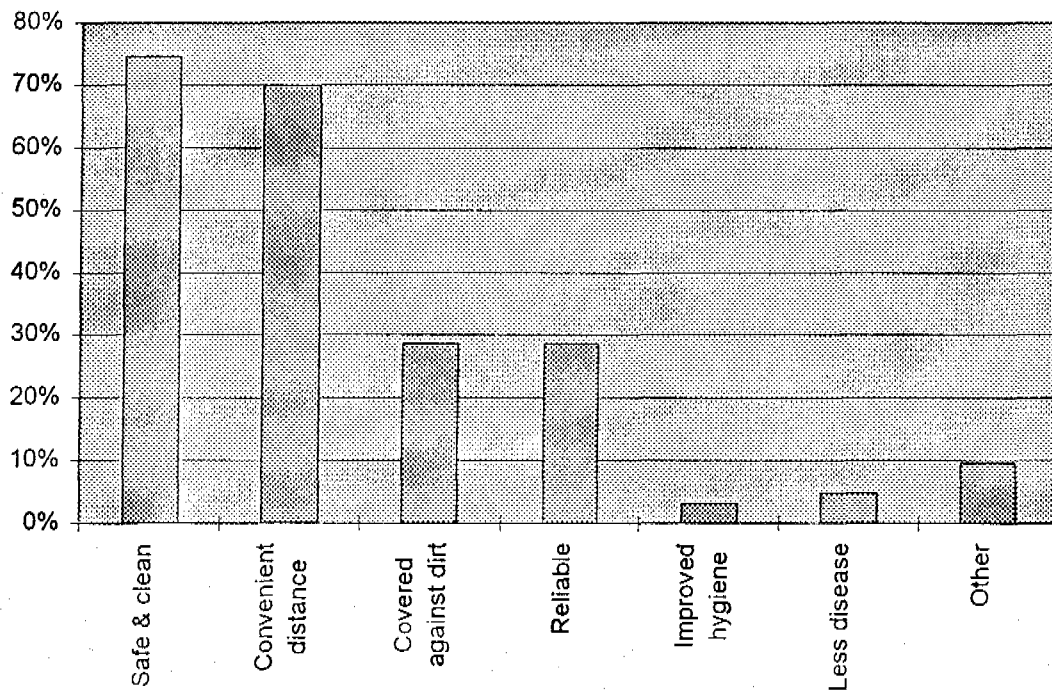
8.4.6 Perceived benefits of water supplies give an indication of the aspects which users most feel have been changed, but do not necessarily provide an accurate picture of those changes. In Fig 8.4, based on the survey carried out by CHAs in Dec 1996, it appears that distance and quality of water are almost equally identified as benefits, but that improved reliability or changes in health are not regarded as major impacts by users. Possibly the aspects identified may be mainly those which were voiced during introduction of the projects aims to the community. Additional benefits were identified where the well had allowed making of bricks, watering of animals and gardens, or helping travellers passing by on the road.

8.4.7 At the same time people were asked to voice any disadvantages brought by the water supply system. Few (<10%) identified none, but most related to the expense of repairs and the lack of effective fund-raising, leading on to people who don't pay and conflicts which then arise (25%). A few found the system dangerous or impossible for children to use, and with the older wells, problems such as shifting liners, weak windlasses, gravel pack causing drying

<sup>25</sup> D. Mubiana, S Sutton, Household water quality in rural Zambia. Waterlines vol 8 no 1 July 1989

(reducing water column), and inconvenient height. It is noticeable that the proportion of people who perceive any health benefit is very low, suggesting the link between health education, behavioural practice and the appreciated 'safe water' is still weak.

Fig 8.4 Perceived benefits among 63 communities



8.4.8 MOH have been asked to consider what practical ways there might be to monitor impact of RWHP activities on health. However, as has been found by others, the possibilities to undertake this without enormous resources (a project in itself) are limited<sup>26</sup>, and benefits are not usually immediately obvious but may take years or even generations to be realised. In addition while morbidity (reported incidence) may not be greatly reduced, the intensity of the illness (and therefore mortality) may be. MOH in 1994<sup>27</sup> mentioned that the admission rate for diarrhoeal diseases was reducing as a result of health education and improved water supplies nation-wide, and this does seem to be a slight trend in the three districts in the past six years (see Appendix 4) In order to provide base data against which long-term changes may be measured, the review team collected data for a six year period for six health centres in each of the three districts, and these include ones with highest number of people served with RWHP wells and those with the fewest. This data is now on the computers of RWHP. Appendix 4 gives a summary of the district information for the six years, and suggests that diarrhoeal diseases are a fairly constant proportion of overall OPD attendances, but may be falling slightly if a longer period were taken. Kasempa shows the highest variability in incidence, with levels in 1994 less than

<sup>26</sup> Evaluating Health Impact. Water supply, Sanitation and hygiene education. J. Briscoe, R Feachem, MM Rathaman/IDRC 1986

<sup>27</sup> Bulletin of Health Statistics 1989-1992 Major Health Trends. MOH Health Information Unit 1994

half those in 1993 but this is reflected in an equally wide variation in total attendances which may mean that other factors (such as availability of drugs) may be affecting data.

Any statistically valid changes in health profile would reflect the sum of health interventions, not simply those attributable to RWHP, but in which the latter has played a vital part.

## 8.5 Monitoring plans

8.5.1 RWHP plans to set up a more systematic monitoring, to identify positive impacts, and problems in progress and approach. It is hoped that an annual plan for monitoring will be designed during 1997, and aspects of impact monitoring and the applications and follow-up activities be defined along with the necessary baseline information. The discussions and fieldwork on which Table 8.1 and section 6 of 'Revisions to the Monitoring system' are based are only the first step in the evolution of such a monitoring system in which it is essential the extension workers and their superiors are involved, as the DHEP intends.

8.5.2 Much of the information collected so far is either not analysed at all, or looked at in a way which makes it difficult to correlate different aspects. More importantly perhaps, surveys appear to have only practical application in terms of (internal RWHP) adjustment to programmes. There would appear to be little or no feedback to extension workers with discussion of problems found during surveys such as conflicts within communities, non-use for drinking because of poor water quality, or positive aspects such as communal income generation which could be encouraged and built upon. Since the RWHP at present has very little spare capacity to follow-up on survey results a monitoring link to extension workers would

- ensure maximum use of information collected
- begin to create an awareness among extension staff of monitoring objectives
- stimulate the process of long-term community support

The link could be via district officers or through D-WASHE to make best use of the various extension staff in contact with different communities and with different capacities/ workloads.

### CONCLUSIONS ON PROJECT IMPACT AND MONITORING

1. The Project has begun both to consider the design of monitoring systems and the necessary rationalising of data collection to judge progress and effectiveness.
2. For the physical situation baseline data are collected on assessment forms, but KAP aspects are so far not covered. If behavioural change is a major objective this needs to be developed as soon as possible.
3. Water quality shows a significant improvement but the reasons for relatively limited decrease in faecal coliform needs further investigation.
4. The use of indirect data collection through schools and inter-community discussions could be considered.
5. The main perceived benefits are that water is clean and at a convenient distance. Health impact either does not exist or is not perceived by most users.
6. Monitoring is only justified if it stimulates actions. Some of these are changes in RWHP approach, which are being made, but feed-back to EWs and communities is also necessary

**ACTIONS.**

1. Establish aspects for KAP, design survey and train fieldworkers in survey methods, especially those not asking direct question (partly being done in DHEP)
2. Make policy on %age time CHAs and EWs will spend on survey work
3. Select sample communities (based on particular social/ physical situations)
4. Re-design assessment forms
5. Link up with MOE for possible school-based surveys, games, and applications within the curriculum of RWSS data

## 9. PHASING OUT

### 9.1 Reduction in project dependency

9.1.1 Reduction in project dependency was recognised in the Phase 3 proposal as a necessary pre-cursor to phasing out if the investments made so far both in people and supplies are to have a maximum long-term benefit. The strength of RWHP in providing the main resources for rural water supply implementation in the area, and its own management, planning and monitoring of progress have been combined with the involvement of seconded staff whose links with their parent organisation are weak. This has tended to encourage RWHP to act fairly autonomously, and for district and provincial authorities to appreciate its good organisation and productivity, tending to view RWSS interests as being well-covered without playing much part in the decision-making for this sector for the three districts.

9.1.2 The major changes taking place in the water, health and local government sectors have led to a continuously changing environment in which some handing over of project responsibilities is not easily achieved. First attempts met with limited success ( see Sections 5.4 and 7.2). Other responsibilities would appear to be best taken over by the CU and the delay in its establishment mean that RWHP have held on to certain management and implementation roles which might otherwise have been handed over. The lack of clarity over DWA role in RWSS, (Lusaka HQ continuing up until Dec 1996 to claim RWS would remain as part of their 'de facto' responsibility) and the lack of commitment by district councils to establish DDCCs, plus limited GRZ resources in some sectors, have created an environment in which only very strong project initiatives would have had a chance of succeeding, and this aspect was not perhaps its highest priority. It was also the most difficult aspect on which to get participatory discussion under way.

9.1.3 In order for project staff to have a high commitment to handing over of responsibilities and phasing out there needs to be a very clear plan, in which their future is defined and made as secure as possible. Where they will assume new roles as they give up old ones, this should be discussed, as should the future of seconded staff who will return to their ministries. Several other projects in Zambia have found difficulty to achieve a smooth phasing out as no-one who has given good commitment to their work wants to see that work disappear and no future security in times of economic hardship. Commitment to this element of a project is therefore, not surprisingly, often low, unless given particularly careful attention.

9.1.4 There appear to be several areas of project dependency at provincial and district level:-

1. well construction
2. planning and monitoring progress
3. funding of RWSS
4. co-ordinating construction, with community education
5. preparing communities for well construction and maintenance
6. developing community education programmes

7. training
8. services provided within the project but used (or with potential to be used) by others on a commercial basis

9.1.5 There are several potential strategies which in various combinations would decrease these dependencies:-

Table 9.1 Strategies for phasing out.

Strategies	Activities	Status
The establishment of an intersectoral co-ordinating body	Recruitment of IDA Discussion with councils Involvement of N-WASHE	Done Very limited Not involved
The building up of capacity within an organisation for RWS construction and centralised maintenance services	All depend on formation of CU and policies linking all districts of N-W Prov.	Previous meetings held with councils on re-organisation No further action possible except liaison with GTZ/councils
Working with GRZ institutions and CMMU	Reduction of CHA involvement at community level Support to MOH and other ministries for training esp in PEP Trial of CMMU guidelines, discussion of incorporation in DHEP	See Section 7.2 -7.4
The gradual handing over of assets and return of seconded to staff to work within their own ministries (in positions where, as far as possible, their expertise could still be used in the sector)	Discussion with ministries of their plans and resource needs Improving links between seconded staff and parent ministry Assisting ministries to be aware of & budget for associated recurrent costs	Not yet started
The establishment of private enterprises to carry out some of the services at present offered by RWHP.	Separate accounting for each section Spares ordering and financial management by section heads Establishment of business plans	Beginning for mechanical workshop, printing. Scope for others being explored. Some dependency on policies and demand of CU., and GRZ policies as a whole.

## 9.2 Scope for establishing sustainable units

9.2.1 RWHP activities which could become commercial include -:

- Mechanical workshop (mechanical repairs and welding)
- Well maintenance back-up
- Printing
- Well construction (particularly hand augering)
- Laboratory analysis
- Database setting up and management
- Training in PEP techniques

9.2.2 Possibilities were explored mainly with regard to the mechanical workshop, but the conclusions drawn are in some part relevant to other sections. The main issues identified were -:

- Potential markets and competition
- GRZ employee willingness to leave public sector to low job security
- Management expertise without outside back-up, or cost implications of its replacement
- Problems arising from VAT exemption for donor projects but not for commercial enterprises
- Government policy on independent commercial interests operating from GRZ premises
- Final understanding on SNV agreement with GRZ on hand-over of assets (at present it is expected that assets would be handed over to DWA but is not clear what will happen when DWA is no longer responsible for RWS, when according to the agreement SNV have the discretion to alter the destination of assets).

9.2.3 In December Mr Mwanamwange undertook a brief assessment of the commercial viability of the mechanical workshop, which is presented in Appendix 5. It would appear that no other garage in the area offers the services and expertise that the RWHP workshop can. In addition its future was discussed in the review workshop, with emphasis on the ways which it could help expand its role to improve viability.

The proposed developments included -:

- panel beating
- advertising
- extending capacity to 150% to reduce the present dependence on the project as the main customer
- sales of spares, tyres etc
- separating project billing, administration and spares from other customers'
- gradually making treatment of project similar to that for other customers
- making RWHP a (prioritised) partner
- training staff (eg in generator maintenance)
- providing training to others (eg driving and motor-bike basic maintenance)

9.2.4 The risks identified in privatising the mechanical workshop included the following-:

- Customers are mainly government institutions who are often bad at settling bills
- Costs are at present covered as 50% business from RWHP, this would need to be replaced for viability, but while RWHP still has major service requirements workshop may not be able to cope with such an increase in customers(space and labour at capacity)
- Procurement is facilitated at present by project FOREX and procurement system including custom clearance
- The whole business might be handed over to GRZ where commercial management is lacking
- The legislative structure may not allow the transformation of a GRZ/donor organisation into a commercial enterprise
- Rental for premises, if remaining on DWA compound is not known



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- The whole business might be handed over to GRZ where commercial management is lacking
- The legislative structure may not allow the transformation of a GRZ/donor organisation into a commercial enterprise
- Rental for premises, if remaining on DWA compound is not known

- The workshop breaks even at present, based on an expatriate manager, a DWA assistant manager and two newly recruited mechanics. The two managers are not likely to be available to the commercial enterprise and at present neither of them's salary has to be paid from workshop income.

9.2.5 The workshop functions efficiently and its assets are mainly those accumulated from long-term donor investment in the enterprise. This, plus the management capacity developed provides advantages which no other workshop in the area has. It is an asset which has considerable value. If it is simply handed over to an organisation there is danger of asset stripping. To avoid this and encourage commercial management, it would seem necessary to give assets a value and sell the business accordingly. This could be to the CU or to a private trader with management capacity to recognise the worth of the investment, and the incentive then to make it profitable. The same would seem to apply to other sections of RWHP for which commercialisation is an alternative. In this case GTZ who are planning the establishment and budgeting of the CU should be made aware of the services and resources which RWHP offers so that as far as possible the design of the CU would allow their incorporation, if that was deemed the best alternative from all points of view. The water testing laboratory would fall into this category, as MOH have already planned an analytical lab in Solwezi.

### 9.3 Phased transference of responsibilities

9.3.1 Close co-operation with MOH and CDC is already proposed so that seconded staff are more easily re-absorbed into their ministries, and responsibilities transferred without mis-understandings.

Strategies might include -:

- Analysis of present roles and responsibilities
- Definition of preferred final situation
- Programme for transition, including -:
  - Training needs
  - Resources and their sources
  - Support from ministry and RWHP
  - Timing
  - Monitoring of progress

These could be planned for completion before the end of 1999.

9.3.2 Those aspects which might originally have been handed over to DWA will now probably move to the CU. This will cause difficulties in terms of seconded staff. The CU is unlikely to be able to employ more than one or two rural water engineers, at most. Any construction work will be carried out by contract. DWA establishment is still uncertain. Although the plan is to retain as many or more staff at district and provincial level it is difficult to see how this will be justifiable when their only role will be the management of water resources for which there is little demand in the province. Those staff at present seconded to the project are likely either to -:

- apply for jobs with other (mainly urban) water supplies
- stay with DWA and do no RWS work
- apply for re-training .

This problem needs early discussion with GTZ, since RWHP could end up with no Zambian management on the well construction side (or at least none with

experience of the Project to date. The way the CU will work RWS contracts is not yet defined but will have a major bearing on RWHP ability to continue operating as it does now.

9.3.3 The lack of the CU on which much of project phasing out is dependent leads to many uncertainties. As far as taking over responsibility for all RWSS activities is concerned, GTZ feel it is unlikely that the CU, expected to be formed at the end of 1997, will be capable of undertaking this within three years. Chipata water company were still reluctant to take over rural water supply management seven years after they were formed, despite major donor support. This should be borne in mind in when considering the complete phasing out RWHP.

#### **CONCLUSIONS ON PHASING OUT.**

1. Plans for phasing out are difficult to design or implement while the CU does not exist, and its form is still being defined. It is doubtful whether it will be in a situation to take over all RWS responsibility within three years.
2. Seconded and project staff need a clear picture of their future job security if they are to be fully committed to assisting in the phasing out process
3. Many organisations would like to take over RWHP resources, but with a high risk of asset stripping through lack of capacity to cover recurrent costs. This can only be avoided if some value is put on assets.
4. The mechanical workshop runs efficiently and has no competitor in the range of services it offers. The risks attached to privatising are high if present management (part SNV part DWA) is withdrawn. Costs are at present just covered but under very favourable (ie RWHP supported) conditions.
5. The transition from donor to commercial enterprise needs careful examination. (eg. Attitude of HO, VAT, use of government premises, procurement with FOREX etc)
6. The situation for seconded staff from DWA will need definition with GTZ, WSDG and DWA if they are not to seek employment elsewhere and if Engineering assistants are to continue to be a major resource on which RWHP depends.

#### **ACTIONS.**

1. As in Ch 7, close liaison with GTZ/ WSDG/NWASCO and council over formation of CU
2. Discussion with all parent ministries on future of seconded staff
3. Discussion with DWA on policies relating to premises and SNV/DWA agreement on final handing over of assets
4. Increased separation of accounting, procurement, and management from RWHP for those sections which might be commercialised either through CU or privately.

#### **RISKS.**

1. GRZ may require handing over of all assets as part of phasing out.
2. DWA may not be able to continue seconding staff when it is only responsible for water resources
3. DWA establishment may remain at present levels but with only water resources, so giving job security and leading to reluctance for civil servants to leave for the insecurity of private enterprise, especially in well construction.
4. CU may be established without due regard for existing resources.

## **10. SUMMARY OF CONCLUSIONS**

### **10.1 Introduction**

10.1.1 This section contains the abstracted conclusions and recommendations from the foregoing text, for ease of reference. It underlines that there are certain fundamental points which occur several times, being common to various aspects of the Project.

They include -:

- degree of project dependency arising from the Project's strong performance in RWS
- the urgent need for an intersectoral decision-making body at district (and perhaps provincial) level ie. D-WASHE
- the importance of integration with MOH,
- the uncertainties of CU establishment
- the poor history of GRZ investment in RWSS and risks of this continuing to receive little priority

### **10.2 CONCLUSIONS ON CONTEXT OF THE PROJECT**

1 The national context for RWSS remains confused. Delays and uncertainties over CU establishment mean that RWHP cannot undertake integration of water supply construction and maintenance activities with this organisation.

2 Health reforms mean that district level management has now been restructured and close liaison is necessary to ensure adequate provision for RWSS support is built in.

3 RWHP has made many changes in the past two years to improve efficiency and effectiveness.

4. Government policy and sectoral uncertainties make the formation of D-WASHE committees an urgent priority which RWHP plans now to address through the IDA.

#### **10.2.1 RECOMMENDED ACTIONS.**

1. Close liaison with GTZ and WSDG to ensure that decisions over the CU take into account RWHP '*modus operandi*', agreement with HO, and available resources.

2. Strengthening all links beyond RWHP and consideration of district opinion on existing distribution of supplies, and resulting priority areas where secure.

#### **10.2.2 RISKS**

1. CU continues to be delayed.

2. CU gives low priority to RWSS.

### **10.3 CONCLUSIONS ON PROJECT TECHNICAL OUTPUTS**

1. RWHP has begun to put more emphasis on quicker methods of well construction (hand-augering and drilling) and has also made major improvements to rates of hand-dug well construction

2. As a result average well costs have fallen from around \$16,000 to some \$10,500, without any apparent reduction in quality of construction

3. So far physical siting of wells seems to have received little attention for its potential in reducing construction time and increasing well reliability.

### **10.3.1 RECOMMENDED ACTIONS**

1. Continued analysis of site reports with causes of delay so that improvements continue to be made, eg. on-site provision of low cost spares, improvisation of additional hand-augering equipment, consideration of purchase of another HA rig
2. Study of hydrogeological prediction so that appropriate technology and timing can be planned.

### **10.3.2 RISKS.**

1. Rates of progress may exceed PEP capacity
2. Hand-dug wells may be terminated above recommended levels through pressure from communities or construction teams to finish quickly.

## **10.4 CONCLUSIONS. ON RWS COVERAGE**

1. There appears to be a problem of falling water levels, with an increasing proportion of even relatively new wells which cannot provide a year-round safe supply.
2. RWHP coverage has reached between 27 and 35% if all wells constructed are assumed to have 150-200 users.
3. If reliability and non-project wells are also considered, coverage for the 3 districts has reached 31-42% with Solwezi district with the highest proportion of rural population served by reliable protected water supplies.
4. The three districts' coverage compares favourably with the other parts of the province, and with other districts in most of Zambia.
5. Problems of supply reliability (especially since this is worst at times when alternative supplies are most likely to be dry) suggest that drilling may be necessary in certain areas for a reliable supply, and that RWHP might review technical strategy for well construction.
6. Despite appearances, washing slabs appear to be used and appreciated.

### **10.4.1 RECOMMENDED ACTIONS**

1. More consideration be given to source reliability in relation to long-term trends, not just seasonal water level fluctuations. Monitoring of sample water levels is needed.
2. District planning of RWS should include the distribution of wells already constructed or planned for construction, so stronger links should be developed as soon as possible, and more use made of CMMU inventory (including keeping it up to date
3. Contract drilling for new wells and re-deepening should be considered in specific areas
4. Washing slab design could have higher community input and awareness of what modifications they can make subsequently.

### **10.4.2 RISKS.**

1. Water levels will begin to drop more rapidly

## **10.5 CONCLUSIONS ON SUSTAINABILITY**

1. Wells with water are generally in fair to good condition. Over 90% of those with water are in use.
2. There are signs of deterioration with age, and that the support system to be provided through extension workers is therefore not yet operating successfully.

3. The majority of communities have taken some action to improve their wells, involving expenditure. Almost all regard the well as theirs and know where to go for assistance.
4. Frequent failures of buckets result from poor manufacture and materials.
5. Kasempa USP has provided basic service of stores and sale of buckets & chain, but suffers from low effectiveness & poor management, requiring continued (additional) RWHP advisory support.
6. With 50% of RWHP Kasempa wells going dry, project image is damaged and there is some understandable reluctance to take RWHP advice. This situation needs urgent discussion with district, RWHP, and perhaps SNV.
7. Other district USPs are not yet established.
8. There are low numbers of wells to cover USP overheads unless more wells are brought into the system, including those with handpumps.

#### 10.5.1 RECOMMENDED ACTIONS.

1. Manufacture of new buckets by RWHP (sheet metal roller already purchased).
2. Intersectoral review by USPCC Kasempa, of USP capacity, roles, and support needed, in relation to district needs. RWHP assistance to be strengthened in the short term.
3. USPCC/RWHP to draw up plan to seek new funding sources and programme for well re-deepening +/- drilling
4. Explore possibility with USPCC (D-WASHE) for CHA Kasempa to be re-integrated into MOH, but to retain role of monitoring and liaising with RHCs on RWSS
5. Other USPs to be established alongside development of D-WASHEs, and made more autonomous from RWHP.
6. Consideration of how more wells could be brought under USP at minimum cost.

#### 10.5.2 RISKS

1. No GRZ funds released for well maintenance
2. No other implementation capacity than RWHP under CU.

### 10.6 CONCLUSIONS ON INSTITUTIONAL WATER SUPPLIES PROGRAMME.

Discussions in the review workshop came to the following conclusions -:

1. The inclusion of other institutions should be considered (eg community development centres, local courts, agricultural training centres)
2. An institutional policy should be developed to assist in prioritising, decisions over what costs ministries should cover, relationship to surrounding communities etc
3. Schools should be considered as the first point of intervention in new areas, to raise awareness of WASHE issues
4. Where community labour contribution is difficult to organise, institutions could be offered the alternative of paying for contracted labour, through user fees or funds from relevant ministries.
5. The opportunity to use schools as centres from which to disseminate knowledge and good practice is not being fully exploited. Schools should act as demonstration points for operation and maintenance training as well as linking with school's training on hygiene issues (as done in Northern and Western Provinces)
6. Institutions have the highest incidence of management problems, but the planned training provides only three sessions compared with ten for communities where

problems are usually less. More attention needs to be paid to preparing management committees for the problems which may arise, and clarification of the roles and responsibilities of each institution and neighbouring communities.

#### **10.6.2 RECOMMENDED ACTIONS.**

1. An intersectoral committee should be formed to formulate district policy on institutional supplies, including budgeting
2. MOE could be requested to provide a teacher to be a CHA on this programme and build up associated activities with school staff and pupils
3. RWHP/ MOH should link more closely with EU Microprojects to attempt consistency of approach and integrated planning in relation to school rehabilitations which include the water supply (and sanitation.)

#### **10.7 CONCLUSIONS ON TRADITIONAL SOURCE IMPROVEMENT.**

The workshop concluded that -:

- The target should be non-qualifying communities, with priority to drinking water sources
- The objective should be an increase in the coverage of safe water supply
- The programme should be separated more from the construction programme for conventional hand-dug wells
- Activities should involve extension workers and include relevant training in motivation, so that they become the prime movers
- They should be consulted on disease prevalence in their catchments

##### **10.7.1 RECOMMENDED ACTIONS**

1. Baseline information should be collected on -:

- Numbers and types of traditional sources in pilot areas, along with source reliability, ownership and uses
- The correlation between water quality and different improvements made by communities to improve sources
- Existing measures for preventive maintenance

2. There should be a preparatory research programme to gain experience on what level of interventions are necessary to make a significant difference to water quality, and to establish what level of risks traditional sources actually present. It should select areas with several traditional sources in both areas of high and low population density

3. Other areas of Zambia should be visited to see what progress has been made in this field already, and how the results of the pilot project compare with them.

Pilot projects for research and demonstration purposes should then be set up, if results indicate their justification, followed by district programmes planned with extension workers and district authorities

##### **10.7.2 RISKS**

1. Extension workers will have too many other commitments to become involved
2. Politicians (and possibly communities) will not accept the value of lower level interventions



## 10.8 CONCLUSIONS ON SANITATION PROGRAMME

1. The sanitation programme needs a new stimulus. This can partly be provided through DHEP.

2. The concentration on the central manufacture of Sanplats makes any improvements transport dependent. Links to the UNICEF Sanplat programme might indicate alternative approaches.

3. The workshop concluded that efforts should be concentrated on improving -:

- personal hygiene (especially hand-washing, water storage and collection practices)
- community management structure and awareness to re-inforce and disseminate hygiene information
- sanitation facilities which could be for demonstration purposes at institutions
- support to local leaders, extension workers, church, et al in the promotion of health and sanitation messages
- awareness of routes of contamination
- faecal disposal practices
- effective water usage

### 10.8.1 RECOMMENDED ACTIONS.

1. Working closely with MOH to -:

- undertake KAP surveys (also part of DHEP programme)
- link with UNICEF initiatives in other provinces (mainly Southern & Eastern)
- motivate extension workers
  - to build on local knowledge
  - discuss local practice
  - re-inforce good practice
  - work out how to deal with bad practice
  - assist communities to establish sanitation norms and personal levels of acceptable hygiene practice

### 10.8.2 RISKS.

1. MOH will have other priorities during this stage of health reforms

2. Budget for sanitation will not receive priority

3. Responsibility for rural sanitation is not clearly defined in the sector re-organisation

## 10.9 CONCLUSIONS ON GENERAL PEP PROGRAMME.

1. Much effort has been put into developing CHA expertise in participatory concepts and collection of basic data on water use and community management.

2. Awareness of gender issues has been increased both within and outside the Project. Recruitment to skilled levels, and through training has given RWHP a more balanced profile and gives communities an example of the wider variety of roles that women have the capacity to perform.

3. Responsibility for extension worker training has been handed over to parent ministries. The timing of this coincided with insufficient agreement on roles, and limited capacity of MOH for field supervision and withdrawal of RWHP support to existing WSS health education.

4. DHEP is a first step by RWHP to stimulate decision making by intersectoral district administration, where the Project acts as a catalyst in district planning.

This could lead to a change in project approach, starting the reduced dependency which Phase 3 was planned to achieve..

5. DHEP will take some time (minimum a year) to produce, test, & train in integrated hygiene education. Meanwhile RWHP has no health education programme and its guidance and support to EWs on WASHE has ceased, so there appears to be a hiatus in an essential part of the programme.

6. CHA roles should be discussed with them and parent ministries, with the idea of their becoming more trainers of trainers, working with PEAs rather than RWHP contact with communities.

7. Links with other PEP and community based initiatives in Zambia could be further developed.

#### **10.9.1 RECOMMENDED ACTIONS.**

1. Discussion with MOH on interim policies on hygiene education.

2. Re-definition with MOH on roles and responsibilities of EWs (see also next chapter)

3. Awareness of and testing of CMMU guidelines, plus suggested collaboration over KAP studies to develop use of indirect information gathering rather than direct questioning.

4. PEP should visit or invite others in the same field (especially in relation to schools and ITS programmes) to become familiar with developments taking place elsewhere in the country.

#### **10.9.2 RISKS**

1. CMMU guidelines will be too resource intensive.

2. KAP surveys require a higher level of training field staff & pre-testing than can be given in the time.

#### **10.10 CONCLUSIONS ON LINKS WITH MOH (also applicable in part to DCD and DWA**

The limited effectiveness of links to MOH to date were concluded to arise from -:

1. Lack of agreement between MOH and RWHP as to what responsibility each has and will have

2. Poor links between CHAs and mother departments

3. Low involvement of MOH in planning stages

4. Low level of dialogue, RWHP informs rather than consults

5. Little involvement of extension workers in Project activities

6. Inadequate orientation in water and sanitation issues

7 CHAs after assessment concentrate only on new sources

8. Monitoring through community support visits by CHAs has ceased

9. WE inputs confined to making introductions at community meetings, so little practice in participatory methods

10. Responsibility for training Us handed over to MOH before they received adequate training to take over from CHAs

11. Us lack confidence to take over and have no detailed agreement with DMZ of what activities and inputs are required in relation to RWHP so have to give other health programmes priority

12. US present experience in teaching on diseases is purely didactic

13. US change frequently and are not necessarily known in communities, and they are still thought to be untrained

14. MOH would like PEP and WASHE training to be provided to all rural health centre staff, not just EHTs

15. Nobody in RWHP previously being responsible for relationship to MOH.

#### **10.10.1 RECOMMENDED ACTIONS.**

a) Formation of a team to set policies and targets at provincial level, with district level variations and training needs identified by district teams. These teams should include MOH, RWHP, DCD and DWA. Policies need defining on extension worker relationship and answerability to project and mother institution.

b) Establishment of forum to discuss RWHP and other water sector progress, plans and quarterly reports (eg. D-WASHE, which may also fulfil the role outlined in a)

c) Plans of extension workers training programmes with MOH (and DCD) plus on-the-job training sessions. Combine with fixed programme for reduction in CHAs inputs at community level, and well designed shift in CHA responsibility for training and monitoring (including baseline data collection and impact monitoring).

d) PEAs completion with CHAs of the design and testing of hygiene education programme, probably based on CMMU guidelines. Followed by training of EWs in its use, and distribution of education materials to RHCs and schools.

e) MOH/DCD exploration of where /if CHAs might fit into their district establishment in the future.

f) Monitoring of CHAs should concentrate on their abilities to act as trainers of trainers not of communities.

#### **10.10.2 RISKS**

1. District administration may not give programme high priority

2. Education level of extension workers may limit effectiveness (not found to be a problem on other similar projects)

#### **10.11 CONCLUSIONS ON LINKS TO DWA**

1. Any further attempts at institutional capacity building should now await the formation of the CU or concentrate at intersectoral levels (WASHE committees) which will still be involved after re-organisation has taken place.

2. Any joint operations with DWA should be justified for their ability to assist DWA and RWHP to better achieve their objectives in the short term rather than for their institutional capacity building.

#### **10.11.1 RECOMMENDED ACTIONS.**

1. Involvement of EAs as well as PWE in meetings so that they become more familiar with RWS planning concepts and RWHP objectives

2. On-the-job training of DWA staff in PEP concepts and quality control for construction, when requested by the PWE

3. Limited funding for USP/DWA for re-deepening and management esp in Kasempa, with joint provincial DWA/ RWHP support

4. Training and utilisation of DWA siting team, if warranted

#### **10.11.2 RISKS.**

1. Uncertainty of when and how DWA will relinquish responsibility for rural water

2. Re-location of DWA personnel will accelerate as re-organisation progresses

3. Most able DWA personnel will seek transference or new jobs first

supply

## **10.12 CONCLUSIONS ON RWHP ORGANISATION**

1. Internal organisational changes have been constructive in improving project efficiency
2. Links to other organisations perhaps remain the weakest aspect of the project despite efforts to improve the situation. They reflect limitations of capacity and resources outside the Project as well as a previously limited commitment to the concept within it.
3. Efforts in the short term should concentrate on intersectoral links, MOH and keeping in close contact with policy-making bodies preparing the establishment of the CU.
4. The positioning of the IDA within DWA should be re-assessed in a few months time
5. The job descriptions of all senior management should be re-defined once the PM and IDA are in place, and the roles of IDA defined in relation to DWA, council and later CU responsibilities for sector re-organisation at provincial and district level.

### **10.12.1 RECOMMENDED ACTIONS.**

1. Regular discussions should be held with WSDG and GTZ prior to CU formation, and links to councils (as major share-holders in CUs) strengthened
2. IDA should become familiar with operation and outputs of D-WASHE committees elsewhere in the country
3. N-WASHE should make joint programme with RWHP for D-WASHE establishment and training. There should be agreement with GTZ how the province as a whole will be covered.

### **10.12.2 RISKS**

1. National policy on rural water supply may change
2. CU may not give RWSS a high priority
3. Organisations involved in sector re-organisation may not all accept position of IDA
4. New structure of district level administration in various sectors may not have the capacity, interest or resources to give priority to water and sanitation

## **10.13 CONCLUSIONS ON PROJECT IMPACT AND MONITORING**

1. The Project has begun both to consider the design of monitoring systems and the necessary rationalising of data collection to judge progress and effectiveness.
2. For the physical situation baseline data are collected on assessment forms, but KAP aspects are so far not covered. If behavioural change is a major objective this needs to be developed as soon as possible.
3. Water quality shows a significant improvement but the reasons for relatively limited decrease in faecal coliform needs further investigation.
4. The use of indirect data collection through schools and inter-community discussions could be considered.
5. The main perceived benefits are that water is clean and at a convenient distance. Health impact either does not exist or is not perceived by most users.
6. Monitoring is only justified if it stimulates actions. Some of these are changes in RWHP approach, which are being made, but feed-back to EWs and

communities is also necessary if people are to continue to give time and information willingly and accurately.

#### **10.13.1 ACTIONS.**

1. Establish aspects for KAP, design survey and train fieldworkers in survey methods, especially those not asking direct question (partly being done in DHEP)
2. Make policy on %age time CHAs and EWs will spend on survey work
3. Select sample communities (based on particular social/ physical situations)
4. Re-design assessment forms
5. Link up with MOE for possible school-based surveys, games, and applications within the curriculum of RWSS data

#### **10.14 CONCLUSIONS ON PHASING OUT**

1. Plans for phasing out are difficult to design or implement while the CU does not exist, and its form is still being defined. It is doubtful whether it will be in a situation to take over all RWS responsibility within three years.
2. Seconded and project staff need a clear picture of their future job security if they are to be fully committed to assisting in the phasing out process
3. Many organisations would like to take over RWHP resources, but with a high risk of asset stripping through lack of capacity to cover recurrent costs. This can only be avoided if some value is put on assets.
4. The mechanical workshop runs efficiently and has no competitor in the range of services it offers. The risks attached to privatising are high if present management (part SNV part DWA) is withdrawn. Costs are at present just covered but under very favourable (ie RWHP supported) conditions
5. The transition from donor to commercial enterprise needs careful examination. (eg. Attitude of HO, VAT, use of government premises, procurement with FOREX etc.)
6. The situation for seconded staff from DWA will need definition with GTZ, WSDG and DWA if they are not to seek employment elsewhere and if Engineering assistants are to continue to be a major resource on which RWHP depends

#### **10.14.1 ACTIONS.**

1. As in Ch 7, close liaison with GTZ/ WSDG/NWASCO and council over formation of CU
2. Discussion with all parent ministries on future of seconded staff
3. Discussion with DWA on policies relating to premises and SNV/DWA agreement on final handing over of assets
4. Increased separation of accounting, procurement, and management from RWHP for those sections which might be commercialised either through CU or privately.

#### **10.14.2 RISKS.**

1. GRZ may require handing over of all assets as part of phasing out.
2. DWA may not be able to continue seconding staff when it is only responsible for water resources
3. DWA establishment may remain at present levels but with only water resources, so giving job security and leading to reluctance for civil servants to leave for the insecurity of private enterprise, especially in well construction
4. CU may be established without due regard for existing resources

## APPENDICES

## APPENDIX 1 TERMS OF REFERENCE

### 1. CONTEXT OF THE REVIEW

The annual plan and budget 1996 cater for a post evaluation at the end of Phase II. However, since approval of the third phase has been received at the end of June 1996 the review team should not only evaluate phase II but also look at future policies and implementation procedures of phase III. The additional proposal for an institutional development advisor should also be taken into consideration. During the month of June the Rural Water for Health Project received a team of monitoring consultants their recommendations and findings will form an extra input to the Review team.

### 2. OBJECTIVE OF THE REVIEW

The aim of the review is to

- (1) review the existing activities of the Project and to assess whether these are in line with the recommendations made by the Mid-Term Review and;
- (2) review the existing activities to:
  - (a) assess whether these activities have sufficiently contributed towards reaching the objectives of phase II and;
  - (b) to assess whether these need to be adjusted to meet the objectives set for the current phase.

### 3. FIELD OF STUDY

The review team will look into the following themes:

- a. Project activities;
- b. Sustainability of the water supply facilities;
- c. Participation and Education Programme;
- d. Other agencies in the Water Sector;
- e. Phasing out of the project.

Detailed issues under the above mentioned topics which need special attention by the Review team are -:

#### a. Project activities:

- review the approach of the Project with special emphasis on the gender perspective, participatory methodologies and community involvement;
- review and assess the progress of the Project and the improved living conditions of the beneficiaries;
- review the existing organisational structure within the Project and assess whether this facilitates the achievement of the objectives;
- assess the effectiveness of the Project (the extent to which the Project is or will be successful in achieving its objectives);
- assess the efficiency of the Project (input versus output); and formulate recommendations on possible improvements and/or adjustments to be made to

the Project policy and implementation procedures to meet the objectives set for the third phase.

**b. Sustainability of the water supply facilities;**

- functioning of wells (water levels; rain fall data, water quality; distance);
- use of wells (operation by users);
- maintenance of wells (by users);
- knowledge of infrastructure by users; and
- the effectiveness and efficiency of the Users Support Programme

**c.. Participation and Education Programme:**

In relation to the following Project objectives:

- ◊ maximising long term sustainability
- ◊ maximising potential health benefits in relation to sanitary conditions and improved water supply facilities;
- ◊ strengthening the institutional capacities of the involved Ministries;

give attention to the following -:

- assess the effectiveness of the separate School, Rural health Centre and Traditional Sources Programmes,
- assess the effectiveness of the other existing training programmes for beneficiaries,
- assess the present Health Education programme and/or components;
- review and assess the internal organisation of the PEP team; and formulate recommendations on possible improvements and/or adjustments to be made to the Participation and Education Programme to meet the objectives set for the third phase.

**d. Other agencies involved in the Water Sector;**

Assess the present knowledge and understanding of the water sector reforms related to the Rural water and Sanitation component and the possible consequences for each party involved in the restructuring (MoH, DWA, DoCD, MoE, Councils, CU, PPU, NWASHE, DWASHE);

In the light of the above: formulate recommendations for special fields of interest for the Institutional Development Advisor regarding training needs and coordination structures; and recommend (a) possible partner(s) for the Rural Water for Health Project.

**e. Phasing out of the project.**

- Assess the environment the Rural Water for Health Project is working in (special emphasis on organisational and financial capacities) and formulate recommendations for future activities to achieve objective five;
- Review the activities of Kasempa District Council;
- Assess the commercial viability of an independent workshop; and
- Review the Function Task Description of the Institutional Development Advisor and formulate recommendations and/or possible adjustments.



#### 4. EXPERTISE OF THE MISSION:

The foregoing leads to the following expertise of the review team:

- a. Organisation, project management and development, monitoring,
- b. Institutional development and inter-sectoral approach,
- c. The water sector in Zambia and rural water and sanitation programmes in particular,
- d. Health education programmes, extension service and training, and
- e. Involvement of beneficiaries (participatory techniques), gender issues (women involvement).

Hence, it is likely that the team will consist of two or three people, approved by all parties involved.

#### 5. REMARKS:

- a. The review team will plan and implement the mission in close cooperation with the relevant Zambian and Dutch parties involved in the implementation - directly or indirectly - of the Project.
- b. The mission team will conduct the review in a participatory manner, involving Project and seconded staff to the extent possible in formulating findings, conclusions and recommendations.

#### 6. TIMING:

The review will take place during the final quarter of 1996 or the first quarter of 1997. The review team should spend two weeks at the Project in and around Solwezi and Mwinilunga carrying out the actual review. One or two days will be spent to travel to Kasempa. Some days before and after will be used to meet officials of the different parties involved in the Project.

Find below the proposed tentative programme for the review.

DAYS & DATES	LOCATION	PROGRAMME
one day	Lusaka	Arrival
one day	Lusaka	Meetings at DWA, Embassy and SNV
one day	Lusaka-Solwezi	Travel to Solwezi
thirteen days	Solwezi Kasempa Mwinilunga	RWHP visit to conduct to conduct actual review
one day	Solwezi	concluding workshop
one day	Solwezi-Lusaka	Return to Lusaka
one day	Lusaka	Meetings at DWA, Embassy and SNV

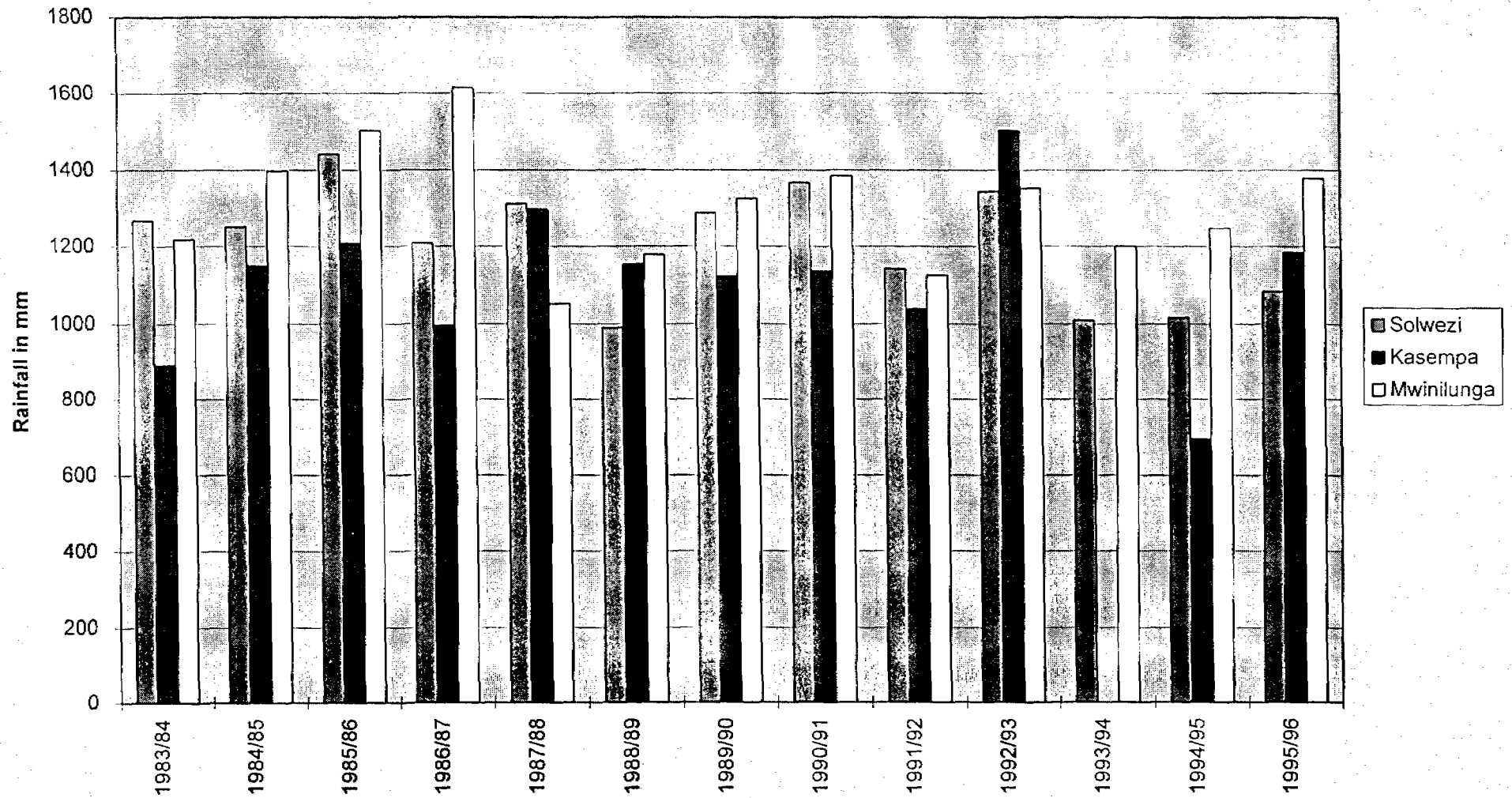
#### 7. REPORTING:

Main conclusions or executive summary must be distributed and discussed with the main parties involved before the team leader leaves the country. The final version of the review report is to be submitted before the end of February 1997. The report should contain an executive summary of not more than two pages and a summary of recommendations.

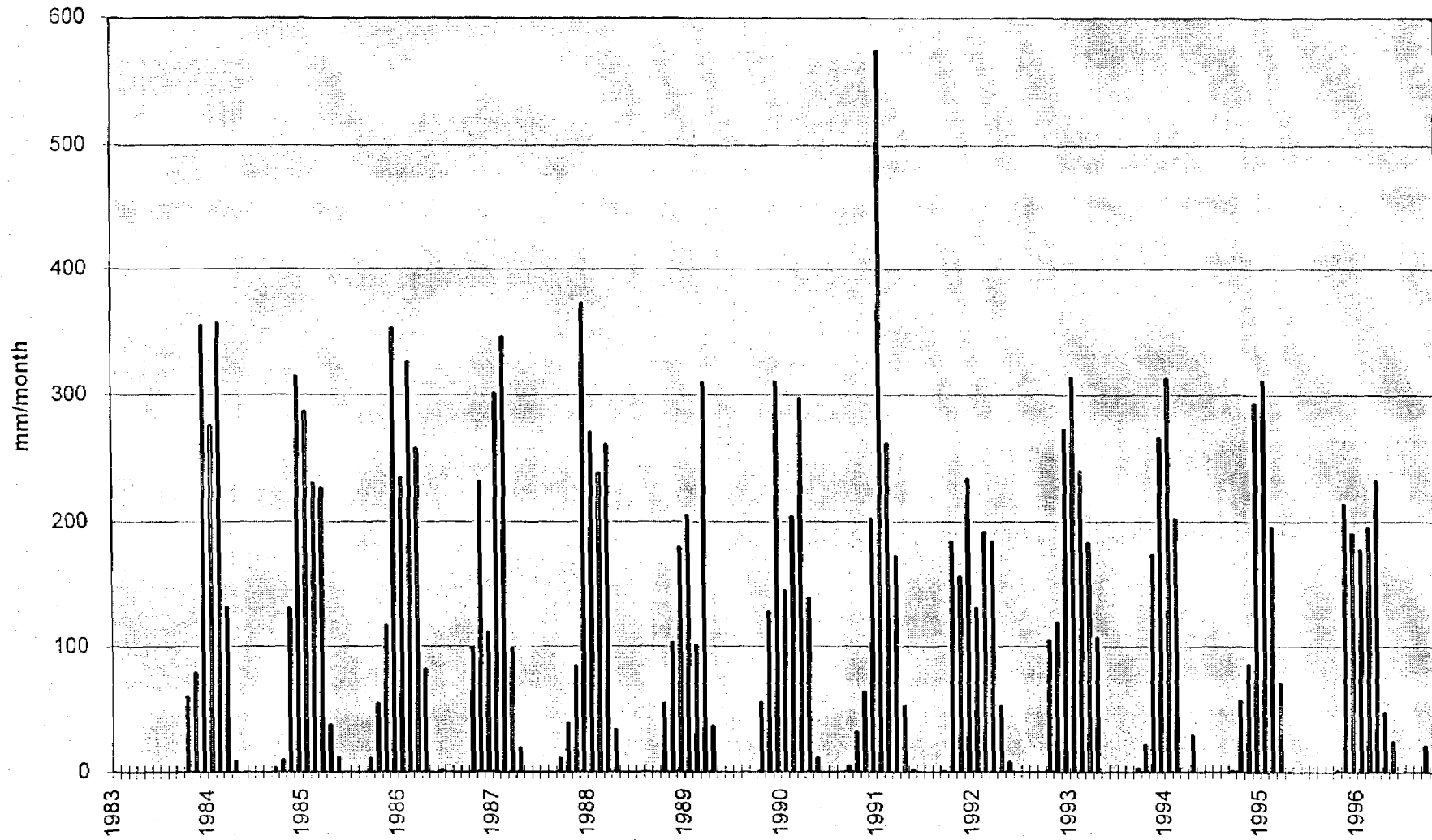
**APPENDIX TWO**

**RAINFALL STATISTICS**

### Annual rainfall, three districts of North-western Province 1983-96

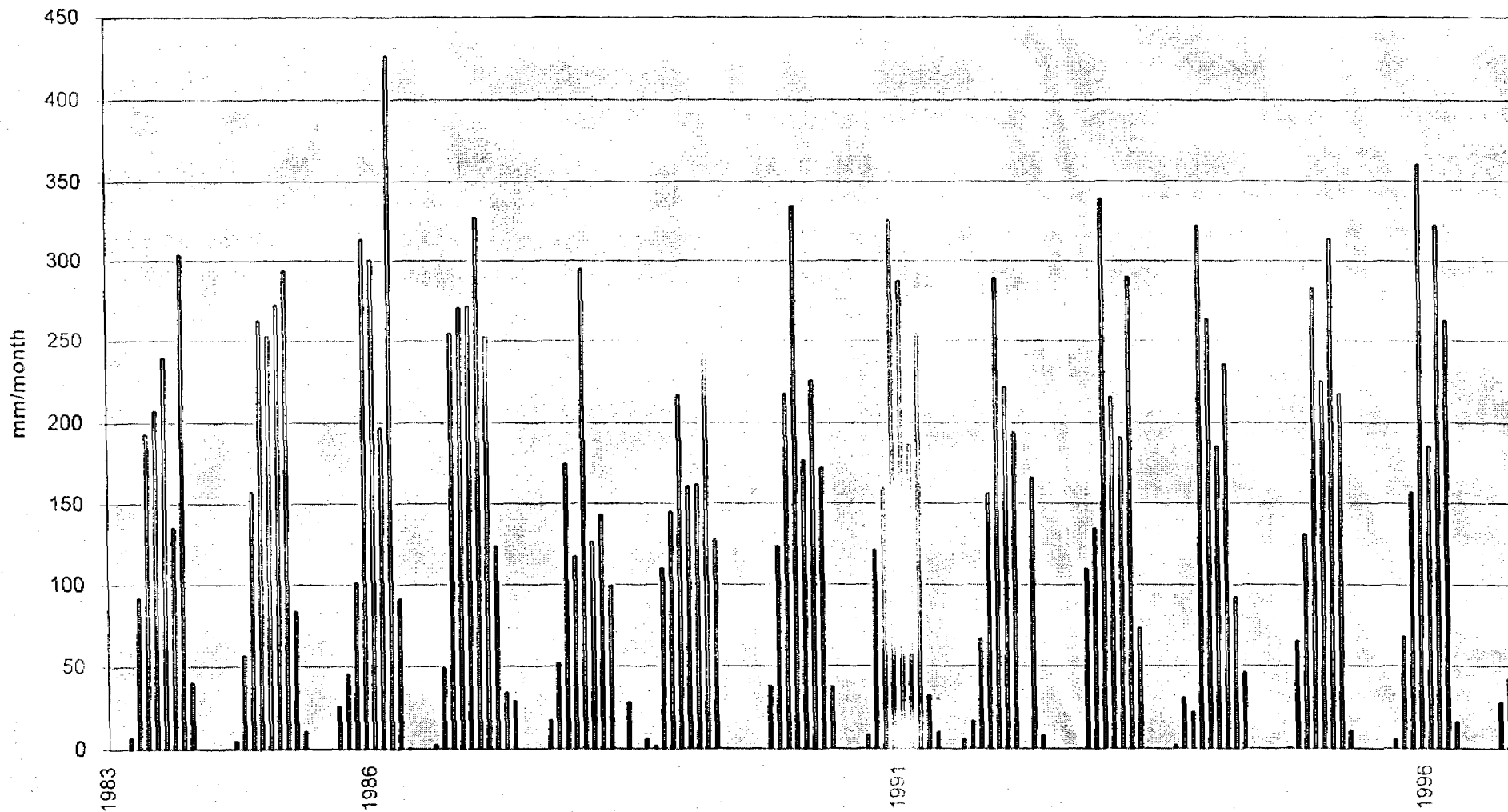


Monthly rainfall, Solwezi 1983-96

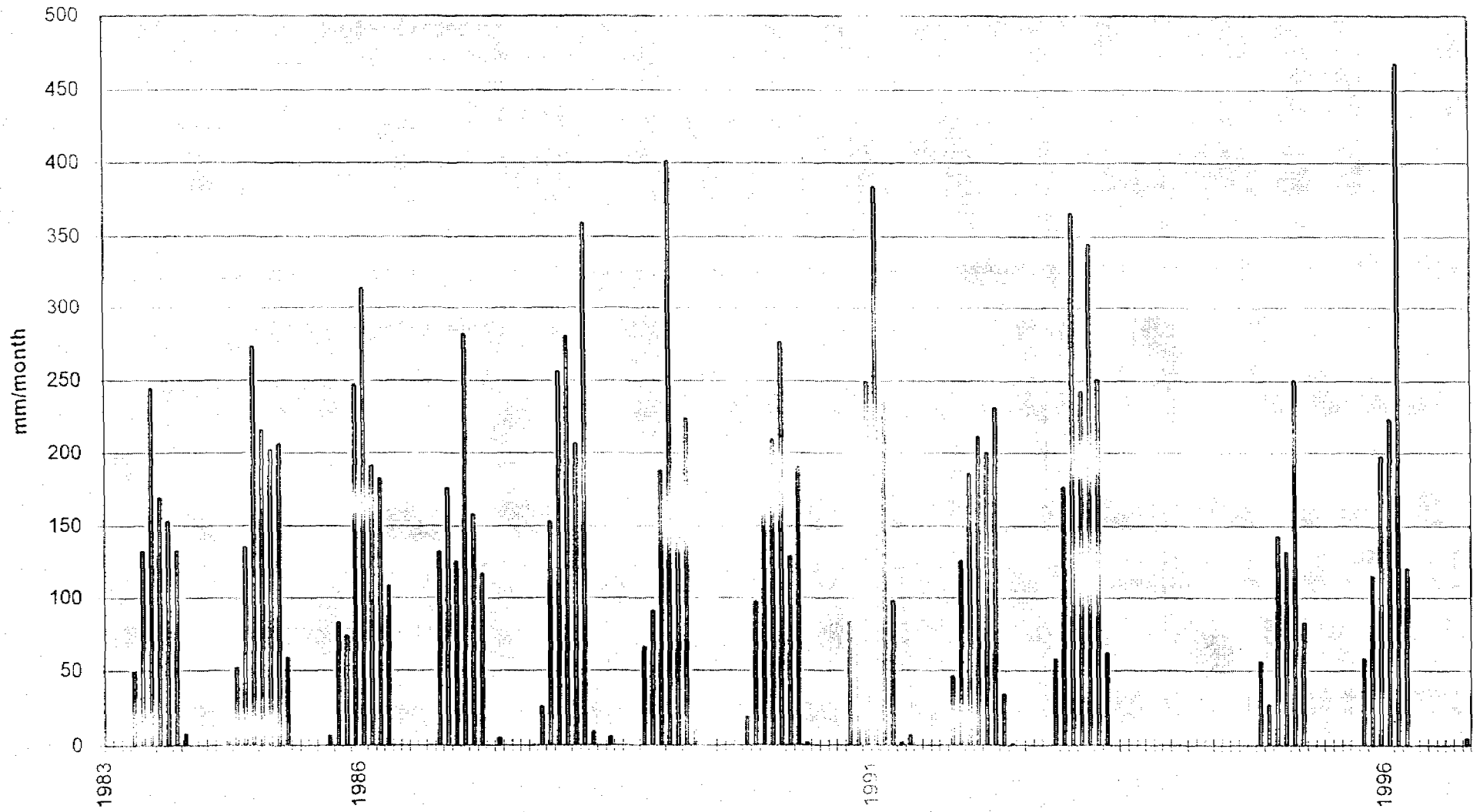


Mwinilungu

Monthly rainfall, Mwinilungu, 1983-96 (mm/year)



Monthly rainfall, Kasempa, 1983-96



Rainfall data, Mwinilunga								
(in mm)								
Year	Month	Rainfall	Year	Month	Rainfall	Year	Month	Rainfall
			1988	1	294.9	1993	1	215.7
				2	126		2	191.4
				3	143.3		3	290.2
				4	99.1		4	73.7
				5	0		5	0
				6	27.8		6	0
1983	7	0		7	0		7	0
	8	0		8	6.2		8	2
	9	7		9	1.8		9	30.5
	10	92.2		10	109.7		10	22
	11	193.6		11	145.1		11	322.1
	12	207.2		12	216.7		12	263.8
1984	1	239.3	1989	1	160.7	1994	1	185.7
	2	135		2	161.8		2	235.6
	3	304		3	249		3	93.1
	4	40.2		4	127.6		4	45.9
	5	0		5	0		5	0
	6	0		6	0		6	0
	7	0		7	0		7	0
	8	0		8	0		8	0
	9	5.1		9	0		9	1
	10	57.1		10	38.3		10	65.8
	11	158.1		11	123.5		11	130.6
	12	263.1		12	217.4		12	283.3
1985	1	253.1	1990	1	334.8	1995	1	225.2
	2	273		2	177		2	313.7
	3	294.2		3	225.7		3	217.8
	4	84.1		4	172.3		4	10.9
	5	10.4		5	37.4		5	0
	6	0		6	0		6	0
	7	0		7	0		7	0
	8	0		8	0		8	0
	9	25.6		9	8.3		9	5.5
	10	45.7		10	121.2		10	68.5
	11	101.4		11	159.8		11	157.1
	12	313.2		12	325.3		12	360.4
1986	1	300.5	1991	1	287.4			
	2	197.2		2	187.2			
	3	426.5		3	254.4			
	4	91.7		4	32			
	5	0.6		5	10.2			
	6	0		6	0			
	7	0		7	0			
	8	2.5		8	6			
	9	48.8		9	16.5			
	10	254.9		10	67.5			
	11	271.2		11	156.7			
	12	271.8		12	289.4			
1987	1	327	1992	1	221.8			
	2	252.9		2	194.2			
	3	123.5		3	0			
	4	34.1		4	166			
	5	28.7		5	8.1			
	6	0		6	0			
	7	0		7	0			
	8	0		8	0			
	9	17		9	0			
	10	52.3		10	109.6			
	11	175		11	134.4			
	12	116.9		12	338.9			

750

1400

550

1100

1400

May - Sept  
Oct - April

900 - 1400

1200

1300

1700

1000

Rainfall Data, Solwezi								
(in mm)								
Year	Month	Rainfall	Year	Month	Rainfall	Year	Month	Rainfall
1983	1	n/a	1988	1	271.4	1993	1	314.5
	2	n/a		2	239.3	1993	2	241.3
	3	n/a		3	261.7		3	183.3
	4	n/a		4	33.6		4	107.6
	5	n/a		5	0		5	0
	6	n/a		6	0		6	0
	7	0		7	0		7	0
	8	0		8	0		8	0
	9	0		9	0		9	3.4
	10	60.4		10	54.5		10	21.3
	11	79.4		11	103.2		11	173.5
	12	356.4		12	179.3		12	267.3
1984	1	276	1989	1	205.6	1994	1	313.4
	2	357.9	1100	2	101.2	980	2	202.7
	3	130.6		3	310.1		3	n/a
	4	8.9		4	36.2		4	28.9
	5	0		5	0		5	0
	6	0		6	0		6	0
	7	0		7	0		7	0
	8	0		8	0		8	0
	9	3.7		9	0		9	1.4
	10	9.5		10	55.4		10	56.7
	11	129.8		11	127.6		11	86.1
	12	315.2		12	310.8		12	293.6
1985	1	287.5	1990	1	144	1995	1	312.2
	2	231.1	1100	2	204.5	1000	2	196.1
	3	227.1		3	297.9		3	70.9
	4	37.3		4	138.1		4	0.5
	5	11.5		5	11.2		5	0
	6	0		6	0		6	0
	7	0		7	0		7	0
	8	0		8	0		8	0
	9	10.6		9	4.9		9	0
	10	54.4		10	31.4		10	1.4
	11	116.8		11	63.8		11	214.3
	12	354.5		12	203.2		12	190.6
1986	1	235.4	1991	1	574.9	1996	1	177.3
1100	2	326.7	1900	2	262.9		2	196.1
	3	258.7		3	172.7		3	233.2
	4	82.1		4	52.5		4	47.2
	5	0		5	2.1		5	24.1
	6	2.1		6	0		6	0
	7	0		7	0		7	0
	8	0		8	0		8	0
	9	0		9	0.8		9	20.8
	10	99.5		10	184.1		10	0
	11	232		11	155.2			
	12	111.1		12	234.7			
1987	1	301.9	1992	1	130.4			
1100	2	347.6	1100	2	192.3			
	3	98.4		3	184.5			
	4	19.2		4	52.4			
	5	0		5	8.2			
	6	0		6	0			
	7	0		7	0			
	8	0		8	0			
	9	10.6		9	0			
	10	39		10	105.2			
	11	84.5		11	119.2			
	12	373.3		12	274			



Rainfall data, Kasempa								
(in mm)								
Year	Month	Rainfall	Year	Month	Rainfall	Year	Month	Rainfall
			1988	1	279.9	1993	1	243.4
			1200	2	207		2	345.1
				3	359.5		3	251.2
				4	9.6		4	62
				5	0		5	0
				6	6		6	0
1983	7	0		7	0		7	0
	8	0		8	0		8	
	9	0		9	0		9	
	10	49.7		10	66.2		10	
	11	132.6		11	91		11	
	12	244.8		12	188.2		12	
1984	1	169.5	1989	1	401.5	1994	1	
	2	153.4	1100	2	168.7		2	
	3	132.8		3	224.5		3	
	4	8		4	13.4		4	
	5	0		5	0		5	
	6	0		6	0		6	
	7	0		7	0		7	0
	8	0		8	0		8	0
	9	3.5		9	0		9	0
	10	52.4		10	19.7		10	56.4
	11	135.7		11	97.5		11	27.6
	12	272.8		12	196		12	143.3
1985	1	216.6	1990	1	210	1995	1	132.3
	2	202.6	1000	2	276.3		2	250.9
	3	206.5		3	129.3		3	82.6
	4	58.6		4	191		4	0
	5	0		5	2.1		5	0
	6	0		6	0		6	0
	7	0		7	0		7	0
	8	0		8	0		8	0
	9	7		9	0		9	0
	10	83.1		10	83.7		10	58.1
	11	73.8		11	74		11	115.6
	12	247.5		12	249.8		12	197.7
1986	1	314.3	1991	1	384.2	1996	1	224.2
	2	191.3		2	236.6		2	468.4
	3	182.5		3	98		3	120.9
	4	109	1100	4	2.4		4	0
	5	0		5	7		5	0
	6	0		6	0		6	0
	7	0		7	0		7	0
	8	0		8	0		8	0
	9	0		9	0		9	0
	10	132.2		10	46.6		10	5
	11	176.2		11	126.1			
	12	125.5		12	186.2			
1987	1	281.3	1992	1	211.6			
	2	158.2	1200	2	200.5			
	3	117		3	232			
	4	0		4	34.6			
	5	5.5		5	1.6			
	6	0		6	0			
	7	0		7	0			
	8	0		8	0			
	9	0.5		9	0			
	10	26.4		10	57.8			
	11	153.4		11	176.8			
	12	256.6		12	366.2			

**APPENDIX THREE**

**RESOURCES OF DWA SOLWEZI**

## APPENDIX THREE.

### Resources of Provincial DWA , Solwezi.

#### 1. Staff.

DWA has no well foremen at present. One has to be trained since the establishment provides for one well foreman. So far there seems to be a lack of sustainable base for skilled manpower to undertake RWS and this may become a contributing factor to failure of USP on integration in the GRZ system. On a sub-professional level there is good involvement of number of Engineering assistants (EAs). Five EAs have been seconded to the Project. In Solwezi one EA is holding a senior position of Assistant Project Manager, the other is a project supervisor while a third one is an Assistant Workshop Supervisor. In Mwinilunga both EAs are Project Supervisors.

#### 2. Equipment.

The Department has limited equipment available at the time of this review.

Type	Number	Remarks
Welding Machine	1	Good
Generator	1	Good
De-watering pump	1	Good
Drilling rig		Under repair
Compressor	1	Good
Concrete Mixer	1	Poor condition

#### 3. Transport

The transport situation is quite poor since out of the total fleet of vehicles available at the time of the review only one truck is in good condition. The other two, a pick-up and a station wagon are both in fair condition. The following table shows the transport situation.

Reg no. GRZ	Make	Type	Remarks
970BH	Nissan diesel UD	Truck	Good
438BE	Nissan diesel UD	Truck	Runner (bad condition)
268BF	Nissan diesel UD	Truck	Non-runner
225BJ	Mitsubishi WD	Pick-up	Fair
319BE	Toyota Land cruiser	Pick-up	BOS
320BE	Toyota LC	Pick-up	Fair
	Nissan Patrol	Station wagon	Fair

(DWA also has motor bikes through CMMU but these are shortly to be returned to Lusaka).

#### 4. Work done.

The DWA has not done much in financing the Provincial Office for the RWS programme (although it has provided the counterpart funding to RWHP as per the Agreement). The Provincial Office was only funded in 1994 directly by the government. A full range of jobs undertaken by the department is shown in the following table.

Source of finance	Boreholes			New wells			Wells rehab				Funds
	Sol	Muf	Kas	Sol	Kas	Zam	Kas	Sol	Zam	Kab	
<b>1995</b>	5	2		1	5						
											Via contractor
GRZ											Nil
USAID				1							8 million
<b>1994</b>											
Drought relief	1	6	13	1	7		2	1		2	Via contractor
GRZ drought relief											&GRZ 24 million
<b>1993</b>											
Drought relief				5	5	5	1	8	6		30 million

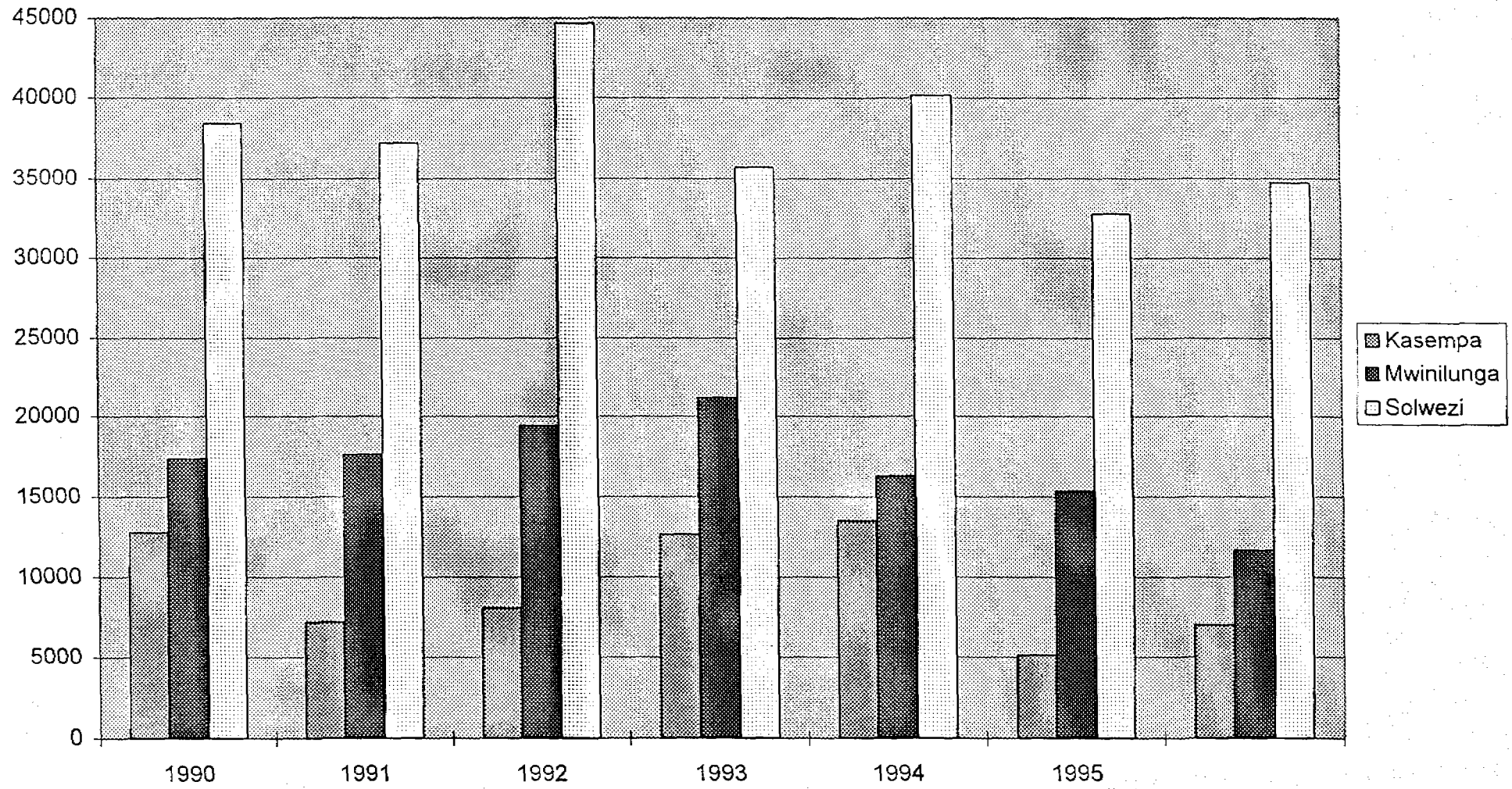
Since boreholes are constructed by contractor, the maximum output from DWA was in 1993 when 15 new wells and 15 rehabilitations were undertaken.

**APPENDIX FOUR**

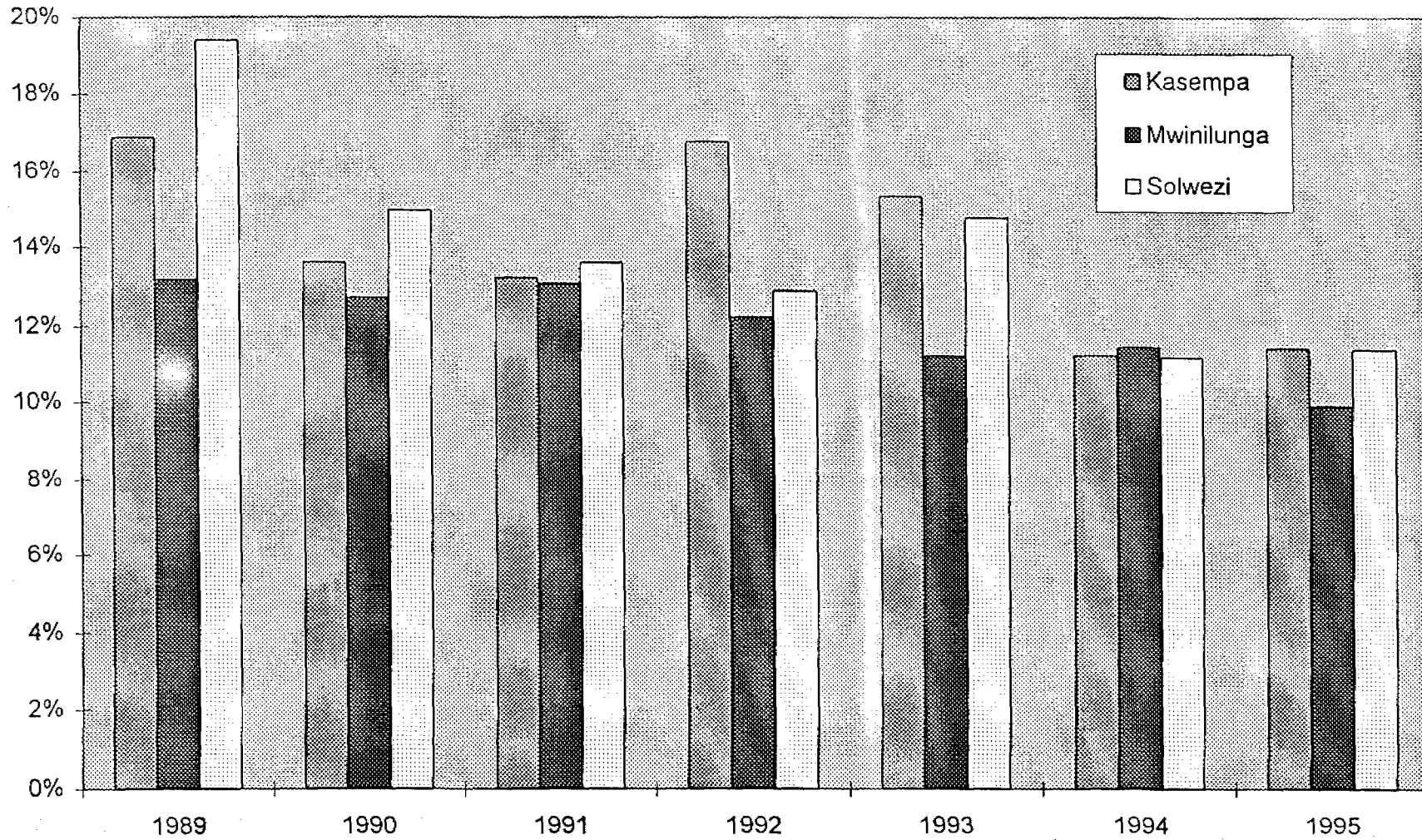
**HEALTH STATISTICS**

HEALTH RECORDS BY DISTRICT															
NORTH-WESTERN PROVINCE, ZAMBIA															
KASEMPA	OPD attendances							Percentages							
	1989	1990	1991	1992	1993	1994	1995	1989	1990	1991	1992	1993	1994	1995	
Malaria	16203	14948	17996	21381	28434	17358	22971	21%	28%	30%	28%	32%	38%	37%	Malaria
URTI	14961	9741	10907	13641	18665	8601	12125	20%	18%	18%	18%	21%	19%	20%	URTI
Diarrhoe	12739	7190	8068	12613	13463	5132	7032	17%	14%	13%	17%	15%	11%	11%	Dia D
Eyes	5783	5043	4207	5910	7009	3528	6230	8%	10%	7%	8%	8%	8%	10%	Eyes
Skin	8046	4688	7464	7180	4301	3567	3546	8%	9%	12%	10%	5%	8%	6%	Skin
Injuries	8546	5532	5420	5932	6041	3099	3169	11%	10%	9%	8%	7%	7%	5%	Injuries
Worms	4967	1456	2583	2094	2278	1094	1948	7%	3%	4%	3%	3%	2%	3%	Worms
Ears	1959	1590	1541	2010	1896	1014	1758	3%	3%	3%	3%	2%	2%	3%	Ears
Pneu	2360	1320		2122	2497	931	1506	3%	2%	0%	3%	3%	2%	2%	Pneu
Dental			1508	1303	2495	878	755	0%	0%	2%	2%	3%	2%	1%	Dental
Bilharzia	1879	1295	1489	952	645	475	478	2%	2%	2%	1%	1%	1%	1%	Bilharzia
Tot atten	75443	52803	60883	75138	87724	45675	61516								
Other	46494	30658	34912	41137	45820	23180	31506								
MWINILUNGA															
	1989	1990	1991	1992	1993	1994	1995	1989	1990	1991	1992	1993	1994	1995	
Malaria	29630	31255	40230	58554	53247	51494	50362	22%	23%	27%	34%	37%	38%	43%	Malaria
URTI	37233	29616	34148	40270	35667	29680	26974	26%	21%	23%	23%	25%	22%	23%	URTI
Dia D	17409	17660	19398	21143	16322	15332	11671	13%	13%	13%	12%	11%	11%	10%	Dia D
Eyes	8274	12210	9573	11152	9684	9718	8413	6%	9%	6%	6%	7%	7%	7%	Eyes
Skin	18285	28731	23644	17969	9895	8383	6053	14%	21%	16%	10%	7%	6%	5%	Skin
Injuries	7125	7189	5801	7139	6051	6386	4132	5%	5%	4%	4%	4%	5%	4%	Injuries
Worms	3548	3975	4810	4335	4121	3837	3062	3%	3%	3%	3%	3%	3%	3%	Worms
Ears	4310	4112	4028	4484	3109	2943	2356	3%	3%	3%	3%	2%	2%	2%	Ears
Pneu			2170		2673	2616	2086	0%	0%	1%	0%	2%	2%	2%	Pneu
Dental	2188				1952			2%	0%	0%	0%	1%	0%	0%	Dental
Bilharzia	2036	2016	1510	1625	864	1132	551	2%	1%	1%	1%	1%	1%	0%	Bilharzia
Mal/fana	2047	1940	2970	6009	1832		1872	2%	1%	2%	3%	1%	0%	2%	Mal/fana
TB						2266		0%	0%	0%	0%	0%	2%	0%	TB
TOTALS	132085	138704	148082	172680	145437	133787	117532								TOTALS
Other	47813	60173	54306	52713	40181	37281	28525								
SOLWEZI															
	1989	1990	1991	1992	1993	1994	1995	Solwezi %age OPD totals first ten diseases.							
Malaria	38953	58075	89582	82543	89606	93745	105262	19%	23%	27%	30%	33%	32%	35%	
URTI	58402	59915	79930	67242	71499	77525	75115	28%	24%	24%	24%	26%	26%	25%	
Diarrhoe	38440	37221	44891	35708	40159	32739	34727	19%	15%	14%	13%	15%	11%	11%	
Eyes	12671	18037	18569	17672	18923	23820	21686	8%	7%	6%	6%	7%	8%	7%	
Skin	16497	33796	47115	28543	16325	18371	18738	8%	14%	14%	10%	6%	6%	6%	
Injuries	16390	18990	18108	14601	11169	14802	13333	8%	8%	6%	5%	4%	5%	4%	
Worms	4897	6597	10186	8970	7602	12055	12866	2%	3%	3%	3%	3%	4%	4%	
Ears	4710	4727	8664	7238	5747	6942	7464	2%	2%	2%	3%	2%	2%	2%	
Pneu	4570	4515	5573	6250	6136	6045	7977	2%	2%	2%	2%	2%	2%	3%	
Dental	4331	3869	5279	4970	3792	4952		2%	2%	2%	2%	1%	2%	0%	
Bilharzia	2476	3003	2744	2607	1170	1882	2437	1%	1%	1%	1%	0%	1%	1%	
Mal/fana							5535	0%	0%	0%	0%	0%	0%	2%	
TB															
TOTALS	198337	248745	328439	276344	272128	292878	304920								
Other	66542	93534	114236	90851	70864	88869	89616								

Incidence of diarrhoea in OPD attendances, three districts.



### Diarrhoeal incidence as proportion of total OPD attendances North-western Province





### Main disease prevalence. Kasempa

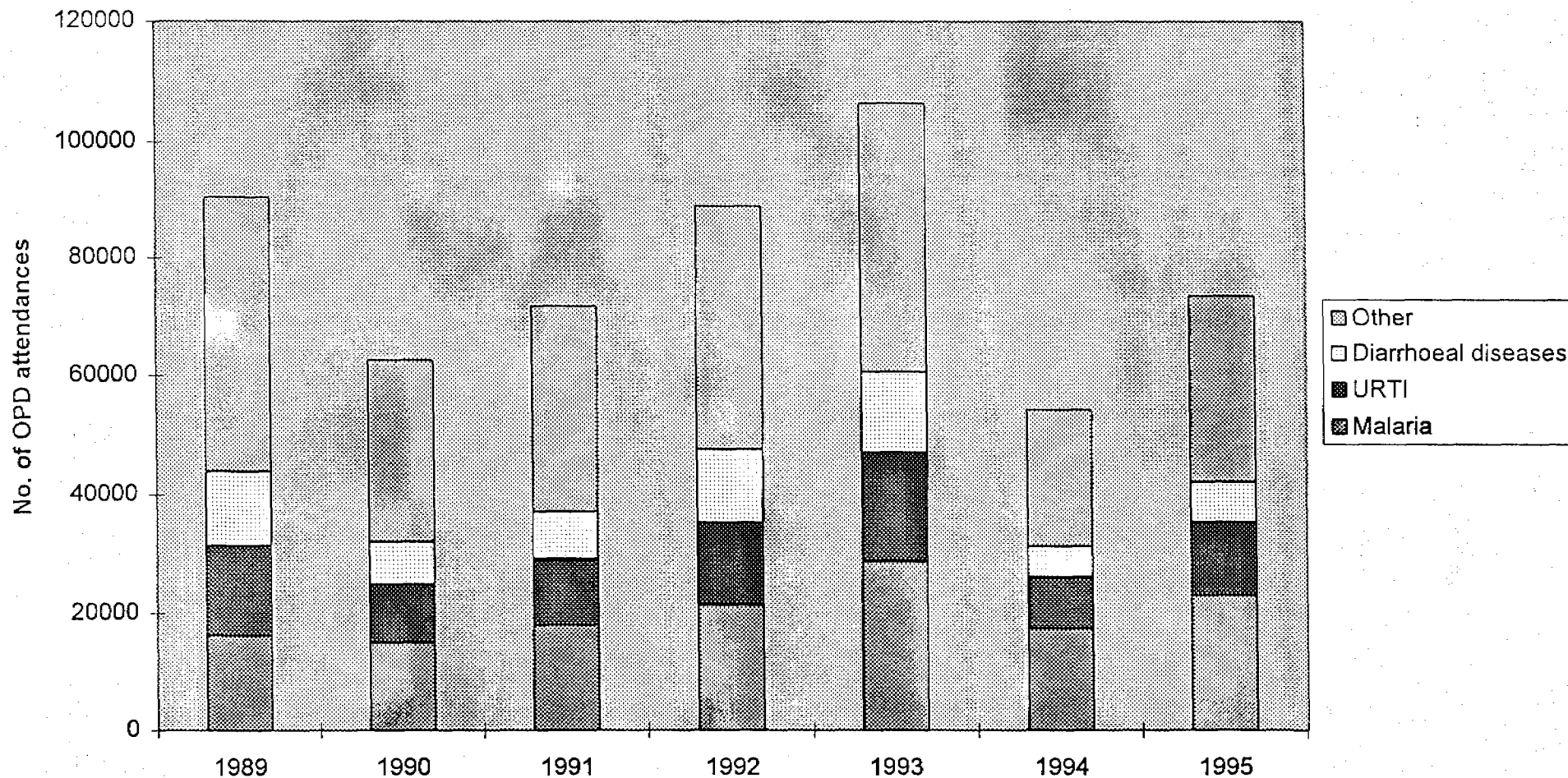
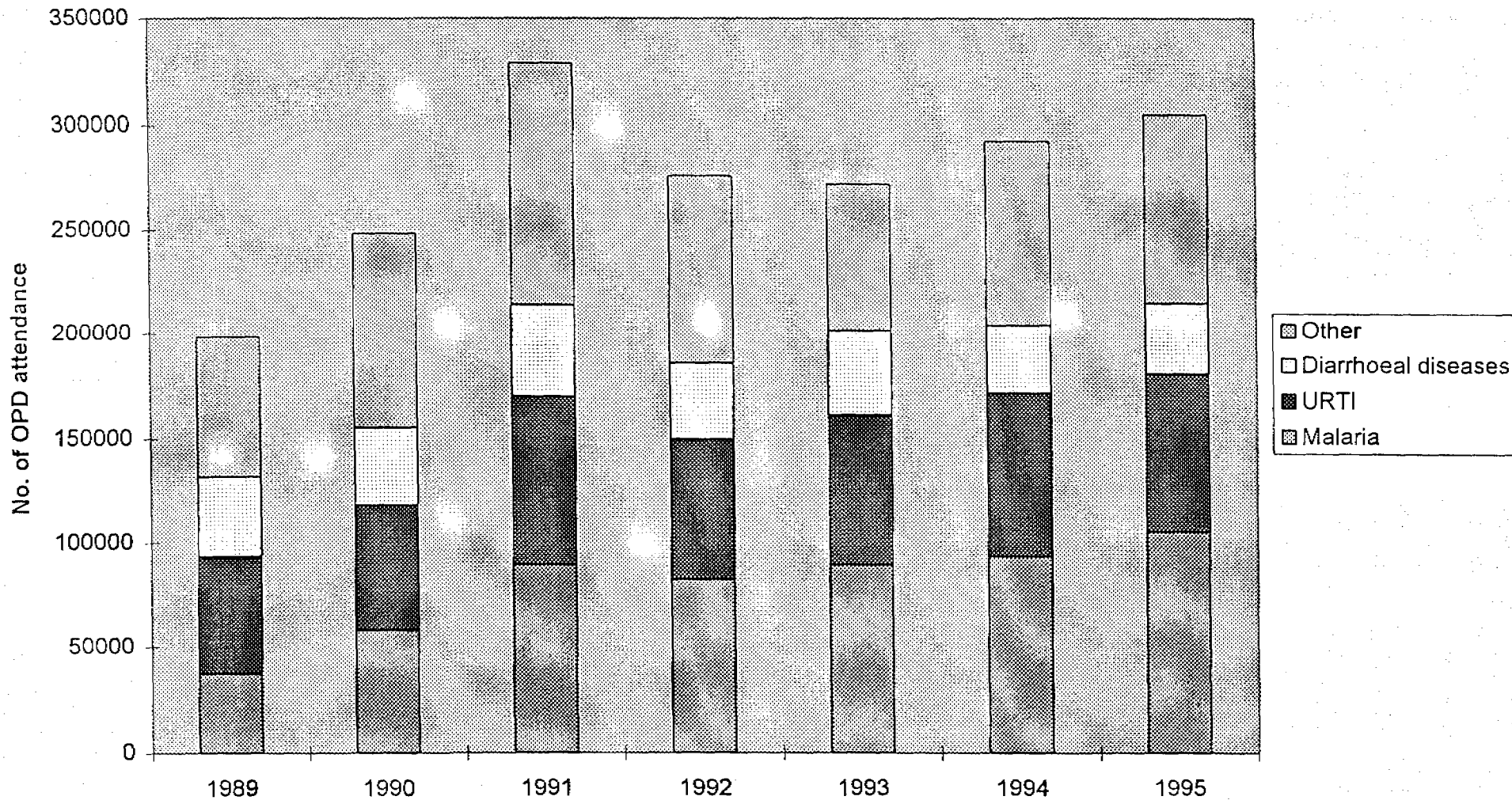
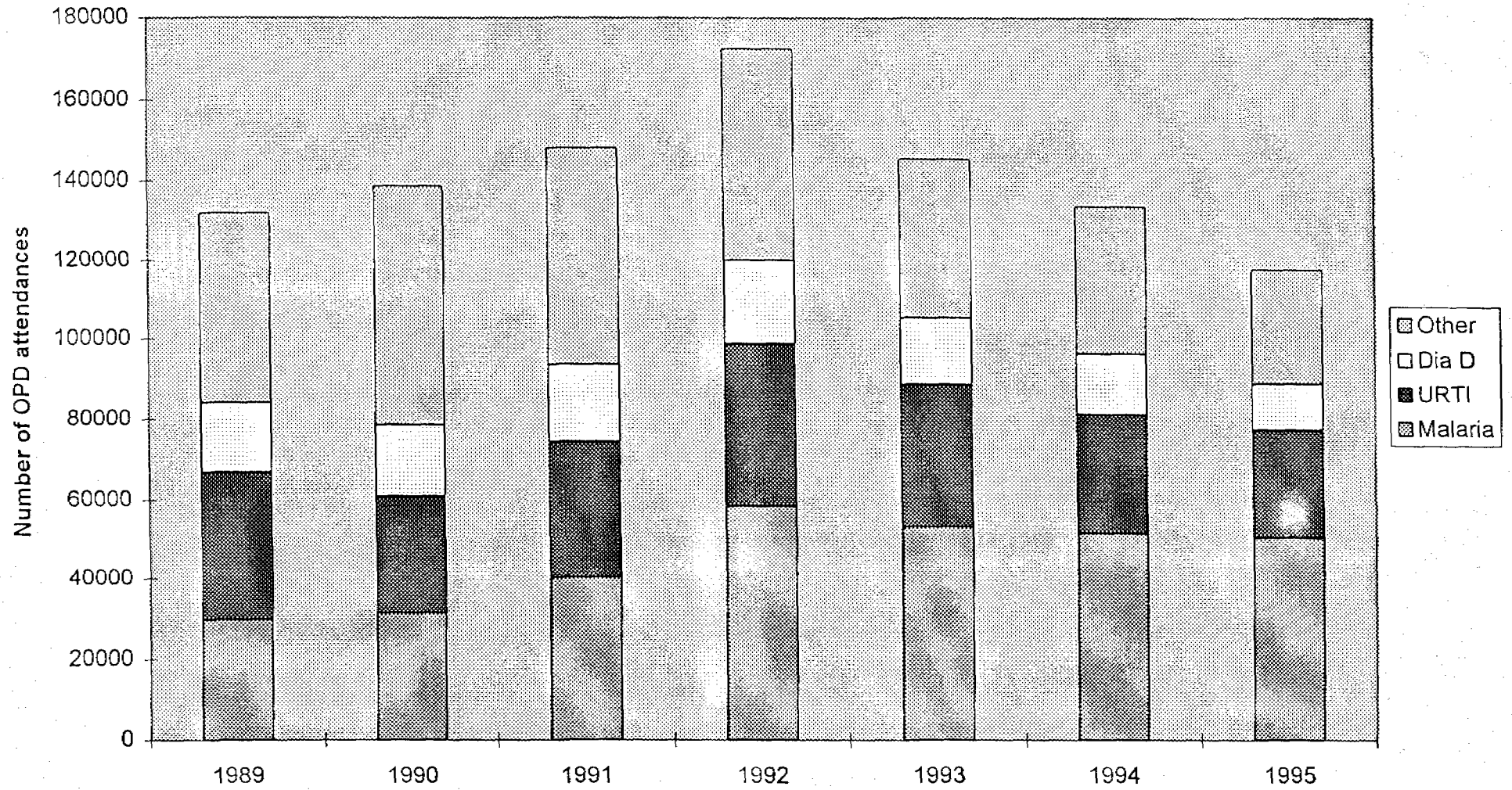


Chart3

### Main disease prevalence Solwezi.



### Main disease prevalence, Mwinilunga



**APPENDIX FIVE**

**COMMERCIAL VIABILITY OF AN  
INDEPENDENT WORKSHOP**

## **COMMERCIAL VIABILITY OF AN INDEPENDENT WORKSHOP**

### **1 Introduction**

One of the themes in the field of study by the review team is the phasing out of the Rural Water for Health Project. Under this theme the review team is required to comment on the commercial viability of an independent workshop. The original operational aim of a RWHP workshop was to have it continue rendering service after the project is phased out. Hence the viability of this workshop should be considered in the context of the existing commercial garages within Solwezi. A survey of existing garages in Solwezi yielded the following features:-

### **2 Zambia National Service**

Interviews revealed that there was no repair work being carried out at this institution for customers. The building was largely used for storing spare parts for bull dozers, JCB, tractors etc. Staff was mainly involved in the hiring of earth moving equipment to institutions and persons wanting to use such equipment. Repair work that was carried out was mainly on ZNS equipment and no private work from outside customers was done.

### **3 North West Contractors Ltd**

No mechanic is employed at the premises. If at all any repair work were to be carried out a mechanic was hired from the compound and the customer had to take own spare parts if it means change of oil then the customer should actually buy the oil and take it there. Surprising enough North Western Contractors were found to be among the list of customers of the RWHP Workshop. These contractors can therefore be counted out of the competition field of any repairing work.

### **4 Patel**

The repairing area is located at Patel filling station outside the eastern end of the supermarket. There is neither building nor shelter all repair work is done in the open space. There is only one mechanic who does both welding and gas welding. The same mechanic also does some panel beating and spray painting of vehicles. Turn over of jobs is obviously very low. The mechanic however does some full service of trucks at a fee between ZK 250,000 - ZK 300,000 and pick ups are serviced at cost of between ZK120,000 - ZK 200,000. There were no standard rates for repair charges, cost of repairs depended upon gentleman agreements.

### **5 Esco**

Esco has an established premises comprising a workshop and offices all fenced in one area. Unfortunately at the time of the visit the only staff that were found were an office clerk and the Regional Manager. Interviews with the Regional Manager revealed that he was stationed at the Ndola Esco office and was responsible for arranging all repair work for three provinces namely:- Copperbelt, North Western and Luapula. He explained that there was no staff stationed at the Solwezi Workshop for any repair work.

**5.1 Mode of present operation of Esco in Solwezi entails a customer to explain to the clerk the nature of repair work that is required. The clerk then submits these demands to the Regional office in Ndola. The Ndola office submits a quotation to the customer and if the costs are acceptable to the customer the Regional office then despatches mechanics from Ndola to come to Solwezi to execute the job**

.6 RWHP WORKSHOP

.6.1 WORKSHOP STAFF

POST	QUALIFICATIONS	EXPERTISE/SPECIALITY
Mechanical Supervisor	Higher Technical Education	Automotive Technician
Assistant Mechanical Supervisor	Diploma	Agriculture Engineering
2 Mechanics	Trade test Grade 5	Automotive Mechanics
2 Welders	Experience	Experience
1 Welder	Trade Test grade 5	Welding
Stores Officer	Grade 9 + Certificate in Store Keeping	Store Keeping
2 Apprentice Mechanics	Industrial Break in a process of obtaining Trade Test grade 5	Plant Mechanics

.6.2 WORKSHOP EXPENSES

A. STAFF SALARIES

NO	POST	ZKW PER MONTH	ZKW PER YEAR
1	Mechanical Supervisor	200,000.00	2,400,000.00
2	Mechanics	160,000.00	3,840,000.00
3	Welder	160,000.00	5,760,000.00
1	Stores Officer	160,000.00	1,920,000.00
2	Apprentice Mechanics	60,000.00	1,440,000.00
4	Watchmen	37,500.00	1,800,000.00
Annual Total			17,160,000.00

Workshop Equipment valued at ZKW 30,400,000.00

B. Other Annual Expenses (assumed):

Depreciation on workshop equipment	@ 12.5%/yr	3,800,000
Maintenance of Building		1,200,000
Electricity bills	@ 160,000/m	1,920,000
Water bills	@ 15,000/m	180,000
Telephone bills	@ 200,000/m	2,400,000
Rent for the premises	@ 400,000/m	4,800,000
Stationery	@ 80,000/m	960,000
Overheads	@ 80,000/m	960,000
Training	@ 100,000/m	1,200,000
Consumable	@ 60,000/m	720,000
miscellaneous	@ 90,000/m	1,080,000
Total costs		19,220,000

C. Total Salaries + other costs

36,380,000

**APPENDIX**  
**RWHP WORKSHOP**

**1. PERSONNEL**

- 1. M.S
- 1. A.M.S
- 2. MECHANICS
- 2. APPRENTICE MECHANICS
- 3. WELDERS
- 1. STORE KEEPER

**2. Private Customers**

- 1993 - CUSA ZAMBIA
- MAJOR TEMBO
- G.T.Z
- GITTI BENTS
- IFAD
- DAPP
- SNV
- MYSTC
- ZAMBIA ARMY
- ZESCO
  
- 1994 - UNIP
- MAJOR TEMBO
- CUSA ZAMBIA
- GITTI BENTS
- ZAMBIA ARMY
- ZESCO
- MIN. OF HEALTH
- N.W. TRANSPORT
- MYSTC
- SNV
- DAPP
- G.T.Z
- PPU
- UBZ
- VINCENT HECT VELD
- ALBERT SOER
- P.T.C
- FEEDER ROADS
- SOLWEZI DISTRICT COUNCIL
- Z.N.C
- ZACTS
- KANSANSHI MINE
- Z.D.T

**PRIVATE CUSTOMERS 1996**

FEEDER ROADS

SNV

NPF

WILDLIFE

P.S.

LOCAL GOVT.

CARLOS

PPU

KALIYANGILE

MINISTRY OF HEALTH

MUZAMA CRAFTS

MYSTC

ZDT

ZCF

SDC

USP

GDS

HIGH BEAT CHINGOLA

MIKE DE WIT

DEPT OF AGRICULTURE

IFAD

RAIN BOW

FORESTY

LWF

CAVMONT BANK

DCIPP

ZESCO

STTI

MAZAKAKA CHINGOLA

IMKE

RTP

ZAMBIA POLICE

CARA BAKKER

NW FARM

STTC