



THE ROYAL NORWEGIAN MINISTRY  
OF DEVELOPMENT COOPERATION

# Evaluation Report 2.85



**Rural Water  
Supply Reconstruction and  
Development Programme,  
DDF - ZIMBABWE**





Evaluation of the District Development Fund, Zimbabwe  
Rural Water Supply Reconstruction and Development Programme.

by

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**The views and interpretations expressed  
in this report are those of the authors  
and should not be attributed to the  
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### P A R T   I I R E P O R T   O N   T H E   F I N D I N G S   O F T H E   S O C I O - E C O N O M I C   S U R V E Y

A separate Table of Contents is included in the report.







**ABBREVIATIONS**

CDO	Community Development Officer
DA	District Administrator
DDF	District Development Fund
DHA	District Health Assistant
DMO	District Medical Officer
DTH	Down-the-hole operation
EEC	European Economic Community
GTZ	The German Agency for Technical Cooperation
IC	Interconsult
LWD	Light Weight Drill rig
LWF	Lutheran World Foundation
MDC	Ministry of Development Cooperation
MEWRD	Ministry of Energy and Water Resources Development
MFEPD	Ministry of Finance, Economic Planning and Development
MLGTP	Ministry of Local Government and Town Planning
MOH	Ministry of Health
MWACO	Ministry of Womens Affairs and Community Development
NAC	National Action Committee for activities related to the International Water Decade
NGO	Non Governmental Organizations
NOK	Norwegian Crowns
NORAD	Norwegian Agency for International Development
NWMP	National Master Plan for Rural Water and Sanitation
O/M	Operation and Maintenance
ODA	Overseas Development Administration
PME	Provincial Mechanical Engineer
PWE	Provincial Water Engineer
TNDP	The Transitional Development Plan for Zimbabwe
TOR	Terms of Reference
VHW	Village Health Worker
VIDCO	Village Development Committee
WADEC	Ward Development Centre
WARDCO	Ward Development Committee
ZIDS	Zimbabwe Institute of Development Studies
Z\$	Zimbabwe dollar



## **INTRODUCTION.**

After Independence in Zimbabwe 1980 a programme was initiated for reconstruction of infrastructure in the communal areas where the majority of the independent black population is living. A major part of this work was organized by the Ministry of Local Government and Town Planning, with District Development Fund as implementing agency. Norwegian funds were committed to the programme from the financial year 1981/82 onwards, as the only external donor in the field of water supply reconstruction and development.

In 1984, after three years of operations, an evaluation was initiated by the Norwegian Ministry for Development Cooperation. The Norwegian firm Samset & Stokkeland Consulting A/S was contracted in order to organize and coordinate the work.

As part of the preparations for the evaluation, a socio-economic study was undertaken in a selection of areas covered by the programme. The study, undertaken by a Harare based consultancy firm, Zimconsult, focused on the operational level of the programme so far, its social relevance and its impact on the recipient population.

For the purpose of evaluation of the programme an Evaluation Mission was appointed. The members were appointed in their professional capacities as independent experts:

Mr. Dale Dove, M.Sc. regional and urban planning, project manager, Zimconsult, Harare, Zimbabwe.

Mr. Tore Liur, M.Sc. Senior Sanitary Engineer, Norwegian Water-resources and Electricity Board, Oslo, Norway (head of the mission).

Mr. Samson Hoyo, M.Sc. geography, Senior Research Officer, Zimbabwe Institute of Development studies, Harare, Zimbabwe.

Ms. Astrid Nypan, Ph.D. sociology, professor, University of Oslo, Norway.

Mr. Knut Samset, M.Sc. mechanical engineering and sociology, consultant, Samset & Stokkeland Consulting A.S, Oslo, Norway (coordinator of the evaluation).

The evaluation team worked in Zimbabwe for three weeks, including two field visits and a number of discussions and interviews with officials both in the districts and in Harare.

A summary of findings and recommendations were presented and discussed with the District Development Fund during a summing-up meeting on November 2. On November 23., a consolidated final draft of the evaluation report was sent to the Norwegian Ministry for Development Cooperation and the members of the Evaluation Mission. Their comments have been incorporated in this final report.



The report is divided into two separate volumes:

- Vol.I Evaluation Report
- Vol.II Socio-economic Survey

In Vol. I the findings, conclusions and recommendations of the Evaluation Mission is presented. Vol II presents the findings from the socio-economic survey covering 400 households on issues related to water use patterns, sanitation and health.

#### **BACKGROUND INFORMATION.**

Much of the infrastructure in Communal lands were damaged or destroyed during the 7 years of war operations in Zimbabwe. Water supplies, cattle dips, as well as government buildings were targets for destruction.

In addition to reconstruction of roads, bridges and a great number of water points, dams and piped schemes required reconstruction.

In the aftermath of the war situation, the District Development Fund under the Ministry of Local Government and Town Planning, was given the responsibility for virtually all reconstruction work related to the provision of infrastructure in Communal lands.

Basic water supplies in the Communal lands were severely damaged during the war. Physical damage was done on a large number of water points such as bore holes and wells, while at the same time it was impossible to carry out maintenance work on many of the installations. As a result, thousands of boreholes were out of operation at the end of the war. In addition to this, a number of remote dams were in a serious state of decay due to lack of maintenance.

At the end of the war reconstruction work related to water supplies in Communal lands was placed high on the priority list. According to information presented by DDF, over 3500 boreholes were brought back into operation, 61 dams were repaired, and 8 piped schemes were installed during the budget year ending June 30, 1981.

Since 1981 Norway has been one of the major donors to the programme, with an allocation of NOK 110 millions. In addition, NOK 30 millions has been allocated for 1984/85, giving a total allocation of NOK 140 millions for the programme. Within the total reconstruction programme, Norwegian funds have been tied to water supply development.

Under the previous agreement, which expired in June, 1984, no provisions were made for technical assistance from Norway, and no expatriate staff have been assigned to the programme so far except for a training programme in connection with the procurement of drilling rigs. In the current situation, the



previous agreement has been extended for one year, to June 1985, when a new agreement is due to be signed, taking into consideration the findings of the present Evaluation Mission.

According to DDF, the rehabilitation programme in the water sector was by and large completed at the end of 1983. By the end of April 1984, DDF reported that 6750 boreholes, 407 dams and 25 piped schemes had been completed. Later, however, it has been confirmed by DDF that these figures are incorrect due to inadequate internal reporting procedures, and the total output of the programme so far is not known to the Mission - or to the DDF Head Office.

The total expenditures in the water sector up to the financial year 1983/84 was about NOK 65 millions, covering the rehabilitation and construction costs for about 3000 boreholes and 250 dams.

As the reconstruction programme has phased out, the emphasis has gradually shifted to regular construction of new water supplies. Most of this work has been done through the Ministry of Energy and Water Resources Development (MEWRD), while DDF as the funding agency has organized the selection of sites for new installations.

It is expected that in the future DDF activities in the water sector will be at least of the same magnitude as today. Evidently, it is the intention of DDF to take over most of the construction work for the provision of water in the Communal Lands by building up a separate water division within its organization.

#### **PREVIOUS PROJECT REVIEWS.**

The Norwegian commitments in the programme have been limited strictly to financial support, with no involvement by NORAD or Norwegian experts in the implementation process.

At the end of January, 1982, a NORAD mission visited the programme and held meetings with DDF, MEWRD and the Ministry of Finance and Economic Planning, including field visits to the southern part of the country. The mission report by Mr. Å. Samuelsen and O. Paulsen of February, 1982, offers broad background information of DDF and its current activities.

The second review mission took place in February/March 1983. The mission met with a number of DDF officials and undertook field trips to the southern and central part of the country including visits to training centres and provincial workshops. The report by Mr. T. Lium dated March, 1983, provides a detailed review of ongoing activities and organizational aspects of the programme, raising a number of questions for the consideration of future missions.

During May, 1984, a preparatory mission for the present evaluation was undertaken for the purpose of initiating a socio-



economic survey in the programme areas. The mission met with a number of officials from various ministries, and undertook field visits in the central part of the country.

In June, 1984, a NORAD mission visited Zimbabwe in order to review existing and planned projects within the water sector, including ZIB 001. The mission met with officials from a number of ministries and institutions, including field visits to the central eastern part of the country. The report provides a number of guidelines for future programmes in the water sector and raises a number of questions to be answered by the present evaluation.

## **SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS**

### **General**

The present evaluation is focusing on the social relevance of the programme, the use of NORAD funds and the functioning of DDF. The major trends in the conclusions and recommendations of the Mission are described below. More detailed information is referred to the chapters 1 - 13.

The chapters are divided into three parts: findings, conclusions and recommendations. The findings are based upon rather comprehensive background information, a number of consultations and inspections made by the Mission. The conclusions deriving from this material can be interpreted as guidelines or recommendations from the Evaluation Mission to DDF and the relevant Ministries in Zimbabwe, whereas the recommendations are adressed to NORAD directly.

### **Social relevance of the programme**

The programme adresses itself to rehabilitation and construction of primary water supplies in communal areas where the majority of the black farmers live, while farm-workers and miners living on commercial lands will not benefit from the programme.

In the areas where the programme has resulted in improved water supplies, it has definitely succeeded in providing a majority of the people with higher quality water, and in saving of both time and efforts in the collection of water. There is no evidence that the more wealthy and priviledged have benefitted more from the programme than others.

The water supply schemes provided under the programme are generally for domestic purposes, while there is great demand for combined solutions where water can also be used for watering of gardens, small-scale irrigation and other activities that might give direct economic results. The present programme to a very small extent addresses such needs.

A positive health effect of the programme is indicated. However, partly because the headworks and the surroundings of the water points generally are unsanitary, and there is a lack of latrines and other sanitary facilities, there should be scope for further improvements.

It is recommended by the Mission that Norwegian assistance to the programme should continue, emphasizing a more integrated approach whereby the provision of water, sanitation and hygiene education are intimately linked together.

### **The use of NORAD funds**

Since 1981, NOK 110 millions have been allocated to DDF under this programme. Only half of the funds that have been allocated to DDF, have been used directly for the intended purpose, namely



the provision of primary water supplies in rural areas. Half of the funds have been used for capital investments. It is the opinion of the Mission that this is an unfortunate development which should be avoided in the future.

The funds that have been used for water supplies have resulted in boreholes, dams and piped schemes. An even more appropriate use of resources could be achieved through a strengthening of the water sector coordination, both at national and provincial levels. Today there is a general lack of coordination in the siting and selection of technology for water supply schemes. In the future, more emphasis should be on the construction of shallow wells and dams in those areas where such alternatives are feasible and cost-effective.

The other half of the Norwegian funds have partly been used for the procurement of transport equipment, which to some extent is justified, since DDF operates as a decentralized maintenance organization at the district level. Some funds have been used for the purchase of ten drilling rigs. The Mission has found no justification for this decision, since it represents a duplication of work done by other institutions and the existing capacity of drilling rigs in the country is sufficient.

The unfortunate use of funds is a result of large under-expenditures by DDF from one year to another, resulting partly from too rigid budgeting procedures. It is the opinion of the Mission that DDF has maintained this situation in order to use the carry-over of funds for capital investments. DDF has also failed to inform MEWRD about their intentions to enter into their traditional field of operations.

The situation also reflects the lack of follow-up by NORAD, which can be explained by insufficient reporting requirements in the bilateral agreement for this emergency reconstruction programme, and the fact that there is no NORAD representation in Zimbabwe. Considering the rapidly increasing Norwegian commitments in the water sector, and the findings of this Mission, necessary measures should be taken to establish a NORAD representation in the country.

#### **The functioning of DDF**

DDF is mainly a financing and maintenance organization. Impressive results have been achieved by DDF in keeping existing water supplies operational, but also in their programme for manpower training.

Since it is automatically the responsibility of DDF to maintain primary water supplies in communal areas, it is highly unfortunate that a substantial part of the Norwegian funds have been used for the purchase of drilling rigs and heavy machinery, resulting in a major redirection of the DDF into the field of construction.

It is unfortunate because of the mounting pressure for



maintenance and improvement of a rapidly increasing number of water supplies in Zimbabwe. During the last two years, Government funds for maintenance of water supplies have been reduced. It is recommended by this Mission, therefore, that a future agreement on development of water supplies should be made conditional on Government commitments in providing necessary funds and personnel for maintenance.

The picture of DDF at present is that of an organization with a weak management and reduced overall capacity. The magnitude of activities seems to be about to stretch DDF's capacity beyond its present limits. The organization seems to be without adequate management tools for planning, executing, controlling and directing activities, with a management which is not sufficiently informed about the activities at district level, and which is without the necessary professional qualifications and experience to operate a large, mainly technical institution like DDF.

It is the opinion of the Mission, therefore, that future assistance to DDF should address its needs for technical assistance rather than adding new activities to an already overcommitted organization with ambitions higher than its present capability.

### **Conclusions.**

The present programme has been successful in the sense that a high number of water supplies have been put (back) into operation, and that DDF so far has been able to provide relatively good maintenance service.

However, the trend is negatively affected due to DDF's intentions of becoming a construction agency despite of the present management constraints, while at the same time resources available for maintenance are falling short of the demand.



## 1. PRESENT AND FUTURE OBJECTIVES FOR THE PROGRAMME.

### 1.1 Objectives and evaluation.

The bilateral agreement between the Government of Zimbabwe and the Government of Norway states that an overall objective for the **reconstruction** programme is "the promotion of the social and economic development of Zimbabwe". The objectives are not specified further nor have they been made more precise in terms of quantifiable targets that could be used during an evaluation of the programme.

Although not explicitly mentioned, the targets appear to be mainly technical; that is, to bring existing infrastructure, including water supply schemes up to an adequate standard.

There is no doubt that there is a pressing need for **new development works** to be carried out as a continuation of the reconstruction programme, which has now been completed. Norway has agreed to allocate funds for this purpose for the budget year 1984/85. This major shift in the programme underlines the necessity of specifying objectives and targets in the future agreement.

The lack of clearly defined objectives and targets have made the present evaluation of the programme problematic. In order to fulfill its tasks and arrive at constructive suggestions for the future implementation programme, the Mission has chosen to evaluate the present programme in terms of a wide overall objective, namely to improve the living conditions for the rural population in Communal Lands in terms of health and welfare improvements.

### 1.2 Integrated development.

Although the provision of an adequate supply of safe drinking water may be expected to reduce the incidences of water related diseases directly, there are a number of factors such as inadequate sanitation, hygiene and various facilities which make the relationship between water and health problematic.

Water may for example easily become a breeding place for parasites and insect vectors that cause diseases, if measures are not taken to prevent it. As water, sanitation and health are intimately linked, the mere provision of a source of clean water cannot ensure that the potential for health improvements are realized.

It is generally recognized that improvements in health and welfare can best be achieved through integrated development programmes in which sanitation and health education is promoted along with the construction of new schemes for water supplies. Furthermore, community participation should be included in such integrated programmes to ensure that they are implemented in ways that satisfy the needs of the population, are adapted to local conditions and appropriate for the cultural values and



social practices in the community.

### **1.3 National Policies.**

It is pertinent, at this point, to relate the objectives and targets for the programme to national objectives and policies that are relevant to the water sector.

The Transitional National Development Plan 1982/83 - 1984/85 for Zimbabwe takes as its overall objectives growth and equity. The highest priority is accorded to Communal Lands, in order to redress the gross imbalances between the modern sector and the rural peasant sector. Priority is here given to repairs, enhancement and expansion of rural infrastructure including, inter alia, water supplies and health services (TNDP, Vol. I, p.24-25). Adequate and secure water supplies are seen as a necessity for human welfare and a key element in raising the standard of living of the people.

The formulation of objectives and a strategy for water resource development await findings and recommendations of the Master Plan for Rural Water Supply and Sanitation, that will be presented early next year.

The Ministry of Energy and Water Resource Development has at the moment no particular programmes that relates the position of water in an integrated manner to other components of welfare.

However, the Ministry of Health has formulated objectives and outlined a strategy for an integrated approach to improvements in health conditions which relates health to water supplies and sanitation and involve community participation in the implementation of its programmes.

It is stated that "because of the mutual interdependence between health and other elements of socio-economic development, the rural health programmes will be integrated with measures and programmes for the improvement of the rural infrastructure including education, housing, agriculture, water supply and waste disposal each of which will have a direct, and indirect positive impact on the physical and social well-being of the population" (TNDP, Vol II, p. 32). The Ministry also emphasizes community participation in health promotion, to encourage people to utilize services and to achieve improvements in hygiene.

A National Action Committee has been formed to formulate policy in compliance with the UN International Drinking Water Supply and Sanitation Decade.

### **1.4 Objectives for the continued support of the DDF water programme.**

The Mission is aware that DDF as an organization is generally responsible for the operation and maintenance of capital works in the communal lands. The DDF act excludes DDF involvement in the field of sanitation, health education and community participation. Whatever the conclusions of this evaluation



regarding health, sanitation and community participation, one has to bear in mind this restriction on the DDF programme at present.

A future agreement between Zimbabwe and Norway should be specific with regard to objectives and targets to be reached during implementation.

In considering such objectives several factors should be taken into account:

The UN International Drinking Water Supply and Sanitation Decade has been adopted by many countries, including Zimbabwe, in the recognition of the complementarity of water supplies and sanitation. A future programme for water supplies and sanitation should be integrated and linked with programmes for health improvements as well as with other development sectors.

Integrated programmes, however, require particular attention to division of responsibilities and to coordination between respective governmental agencies at various levels.

It is possible to link the provision of improved water supplies to other components of welfare than health: Water used for productive purposes in agriculture may strengthen the village economy, providing additional income or improved nutrition. In particular, arrangements for allowing the watering of vegetable gardens should be given consideration.

Community participation may be regarded as an approach, or as a means, to implement parts of a development programme. However, community participation may also constitute an objective in itself implying the view that real and lasting community development can only be achieved if and when the members of the community are willing and able to be actively involved in its development.

Through involvement in planning and building villagers can gain increased understanding and skills. The cost of operation and maintenance of water supply schemes may be reduced as villagers may be able to perform some of these functions. In general, through involvement and participation in activities, as individuals, as families or as communities, it is more likely that people will identify with and feel responsibility for the facilities provided.

Community participation is widely used by the Ministry of Health, by several non-governmental organizations in various programmes connected, inter alia, with health, water and sanitation and by the Ministry of Community Development and Women's Affairs as well as in income generating projects, such as fish ponds, cooperative gardening and irrigation schemes.

Community participation as an integral part of a programme requires staffing for mobilization, supervision, coordination and other back-up activities, which some of the above ministries

have organized or are in the process of developing.

### 1.5 Conclusions and Recommendations.

1. Since the reconstruction phase is now completed and construction of new installations has taken over, the present programme agreement for the reconstruction programme of DDF is inadequate as far as objectives and targets are concerned,
2. In order to achieve improvements in health and welfare, the provision of safe water should be included in a wider strategy for integrated developments which relates water supplies to health and sanitation and involves community participation in the implementation of the programme.
3. The Mission therefore recommends that improvement in living conditions and welfare be formulated as main objectives to be achieved by the programme, not only by improvements in water supplies, but also by health education, building of latrines and ancillary facilities that meet with the needs and requirements of the rural population.
4. The objectives for the DDF programme should, to the extent that it is possible, be in accordance with the objectives and programmes of The Water Master Plan for Rural Water Supplies and Sanitation that will be presented by MEWRD in the beginning of 1985.



## 2 **IMPACT AND SOCIAL RELEVANCE OF THE PROGRAMME.**

### 2.1 **Findings.**

The full report on the Socio-economic Study made by Zimconsult, a report from an observational study and interviews with local community leaders is given in vol. 2 of this evaluation report. The main findings that are most relevant to the evaluation of the DDF water programme have been summarized below to substantiate conclusions and recommendations of the mission.

#### **Limitations of the Socio-economic Study.**

The socio-economic survey includes 400 households from a random selection of 17 localities in different parts of the country. The survey offers rough indications of the prevailing conditions and the impact of improved water supplies for all 17 localities taken together. As conditions vary greatly between localities, and given the rather modest number of respondents, it is possible to take local variations into account only in a general manner or in specific instances.

Of course there are obvious limitations to the conclusions that can be drawn from the material. It is likely that people will have a fairly accurate idea of how much water they collect each day on the average, but less obvious that they can reliably account for the average amount used for different purposes. To ask people about the frequency of various diseases among family members, does not necessarily result in reliable information on incidences of such diseases. Nevertheless, such information can still provide valuable indications of the current health situation.

In some instances, results from the different studies, for instance the survey, the observational study, the interviews with community leaders and other sources tend to support the findings, thus increasing their credibility. We also appreciate that the design of the studies makes it possible also to discuss water in a context of hygiene, sanitation and health, which, we argue, are closely connected to the realization of the full benefits of improved water supplies.

#### **General social and economic characteristics.**

About 80 per cent of the population in the country live in the rural areas, mostly on communal lands. There is also a large group of land workers and miners living on commercial lands. A considerable number of males in the rural areas migrate for work. The men may be absent for longer times, or they may be home in the weekends if they find work not too far away.

It is estimated that at any one time about half of the adult male population is living away in wage employment in towns, farms and mines. The adult rural population is thus predominantly female. The 17 areas included in the studies also present such demographic imbalance. Although the proportion of



the adult male population that is absent varies, it may be as high as 80 per cent. This means that women constitute more than 80 per cent of the adult population in some areas. The remaining men are often older or very young.

The preponderance of children, women and older people in rural areas has affected the availability of labour for agriculture. Women also manage agricultural work and have taken over many of the tasks traditionally performed by men. In short, a very heavy workload falls on the women.

Agriculture and livestock provide the main livelihood for the households. About two thirds of the households keep cattle and the average is about 9. Agriculture is the most important source of income. In general the incomes are low, and the size of farms small. 44 per cent of the farms are two hectare or less.

According to the findings of the survey about one quarter of the households had no cash income the previous month. Approximately 27 per cent received income from wages or by remittance from others. The median monthly cash income for the households amounts to Z\$ 10 - 24.

Households are generally large. The average size is about 6-7 members. Polygamous (polygynous) marriages are relatively frequent and means that there are large variations in the number of children. On the average there are three to four children per household. In one area, where the majority of men were reported to have three and even four wives, there could be as many as 20 children in the household.

#### **Access to water.**

The reported number of users served by each handpump or domestic point vary considerably, from about 100 people to 400 families. Assuming an average size of 6 to 7 members per household this means as much as 2.400 to 2.800 people.

The number of people usually covered by a water scheme will of course depend on the settlement pattern. The more scattered the population, the fewer can be covered within reasonable distance.

Another important factor is that the drought will tend to increase the area which a borehole will cover, since people now will walk for considerable distances to sources that still provide water.

It may be mentioned that to what extent an area is covered with adequate water supplies does not appear to play a role as an explicit criterium for locating new water points. It may be of importance indirectly in the priority given to schools, clinics or business centres by the district administration.

#### **Use of improved and traditional water supplies.**

The term improved water used in the survey refers to water from



a tap or borehole constructed or reconstructed through the DDF water programme. No testing of the quality of the water has been carried out. It is assumed that the water from the borehole or tap is clean compared with water from traditional sources such as ponds, wells, rivers or dams.

The survey covers areas within a maximum of 3 kms from improved water sources in each of the 17 localities. It shows that 70 per cent of the families living within this distance from the improved water supply actually make use of it, while they previously relied mostly on unprotected wells and rivers.

It should be noted that the survey was undertaken during a very dry period when there often might be no convenient alternative to the improved source.

The construction of boreholes has brought the source of water closer to the users. Previously more than 70 per cent had to walk for half a kilometer or more to the water points while only 30 per cent of the users are now living that far away from the improved water scheme. Almost one third of those who still use traditional sources of water have to walk for more than 1 km to this source both during the dry and the wet season. The distance to the improved water scheme is considerably longer for most of the non-users.

Other information reveal that many people actually walk over much longer distances than indicated in the survey. In one locality, boreholes are 15 kms apart and the new installations are seen as a great improvement as there is now only a maximum of 7 kms distance to walk.

In general the proportion using an improved water scheme will decrease with distance. Use and non-use also depends gratefully on distance to alternative sources of water.

Interviews with community leaders indicate that all localities but three utilize the improved water source fully. In two localities other sources are available, either another borehole or wells. In the third people do not use the borehole as the water is characterized as "sour" or "oily".

There are some areas in Zimbabwe where salinity makes ground-water unsuitable for drinking purposes and where wells or other schemes for surface water represent a better, or the only, alternative. It is a drawback that the DDF programme does not normally include the construction of wells.

In conclusion, the DDF programme has provided a large part of the population in the communal areas with improved water, which is being used where people earlier had access only to unsafe water from unprotected wells or rivers. For a considerable proportion the distance to the water supply has been reduced, although many still live far from any water supplies.

The findings indicate clearly an overall saving in time used for



collecting water from the improved water scheme. There are no indications that those who are better off in socio-economic terms have a better access to improved water than others.

### **Collection of water.**

Water is first and foremost collected by women and secondly by children. Men hardly ever collect water. Various containers are used, but usually a tin or a bucket of about 20 litres which is carried on the head. Children, especially younger ones, may collect in smaller quantities. Wheel barrows may be used and larger containers like drums may be transported for instance by scotchcart, but this is unusual. Most of the water is carried home by women and children on foot.

Water is most often collected twice a day, mornings and evenings, although a substantial number also collect three and four times a day. This implies that there sometimes will be queueing at the water point, around 10 minutes on the average, and that the water supply can serve less people than its theoretical capacity. Queueing should of course not be considered in entirely negative terms as it provides opportunities also for social interaction. The findings indicate that while one third of the women previously spent more than 2 hours for water collection, most of them now spend less than 2 hours. More than half of them spend less than 30 minutes for collecting water today.

The typical pattern for water collection described above does not give due emphasis to the great variations. It is evident that quite a number of people who use the improved water do walk long distances. The survey shows that about 25 per cent walk for more than one hour on a return trip to collect water. About 10 per cent use two hours or more. Field observations, however, indicate that the women spend a minimum of two hours on this activity each day.

It should be kept in mind that this is the situation in areas where improved water supplies have been constructed. More than half of those who are provided with improved water supplies find it easier to collect water now, and a larger proportion of them find it easy rather than hard to collect water compared to those who still rely on traditional water supplies.

### **Utilization of water.**

Data on the amount of water used for various purposes are probably not entirely reliable. Nevertheless, the findings indicates that most of the water is used for domestic purposes such as cooking, drinking and bathing. It is also, but to a lesser extent, used for washing dishes, utensils and clothes. The data do not show any significant differences in this respect between users of improved water supplies and traditional sources.

Smaller amounts of water are used for cattle and for watering



gardens. Slightly over half of the households do in fact not use water from the improved supply for these purposes. One third of the households do not have cattle.

People usually use different sources of water for different purposes. They will also use different sources during the dry season and the wet season. It appears that those who use improved water supplies are less prone to change according to the season.

Bathing and washing of clothes is often done in rivers, and many people use the water directly at the water points for the same purposes. Also the users of improved water will use water from traditional, contaminated sources for their personal hygiene and for washing clothes. The improved water schemes generally lack facilities for both these activities.

To sum up, water collection, overwhelmingly the responsibility of women, has been made easier by the improved water supplies. However, it is still an arduous task consuming more of women's time than it should considering the burden of agricultural work.

The water is used mainly for domestic purposes, to a much smaller extent for cattle and gardening.

Although the provision of improved water has reduced the use of traditional sources, these sources may also be used depending on the season, the distance and the amount of water required for particular purposes. The boreholes at present lack facilities for such purposes as washing clothes and bathing which require relatively large amounts of water.

There is thus still a need for considerable improvements to make water collection easier and shorten the time involved. Let alone the problem of people reverting to the nearby traditional sources during the wet season.

### **Problems and priorities.**

Well over half of the recipients of improved water are generally satisfied with their water supplies as compared with a much smaller proportion of those who use traditional, unimproved sources. Among both categories the major complaint is that there is not enough water for their needs, secondly that it is too far away. Users of traditional sources of water also mention that the water is not clean, but it is not their major complaint.

The majority want their water supply improved, and those who use traditional sources are, understandably, more in favour of improvements. When specifying the kind of improvement desired, those using boreholes mostly want community taps, while those using traditional sources would like to have a borehole. The survey refers to this as a trend of raising expectations.

The adequacy of water thus appears to be a general problem felt by users of both improved and traditional sources of water. When



asked directly, however, most people, and even more women than men, feel that there is sufficient water for domestic purposes.

The findings of the survey emphasize that need for water for the watering of gardens were expressed by all groups, men and women, users of traditional as well as improved water sources and regardless of socio-economic status. Their first priority is water for gardens, their second is in general water for irrigation.

Here there is an interesting difference between women and men. Women more often than men give relatively high priority to additional water for domestic purposes when all the separate categories of domestic use are taken together. 20 per cent of the women states that water for some kind of domestic use is their first priority and it thus ranks second after water for gardening among the women. When asked about their second priority, nearly 40 per cent of the women mentioned water for some domestic use, such as cooking, drinking, bathing, washing clothes or for sanitation. Although a considerable number felt that there was not enough water for the cattle, when asked about priorities in the use of additional water, water for cattle is not amongst the most frequently mentioned first or second priorities.

There is no doubt that people feel a real need for more water for economic purposes, such as gardening. This is substantiated through interviews with local community leaders. And it was observed by the Mission in the form of communal gardens carefully planned and maintained by the villagers in the near vicinity to the water points.

But adequacy is not only a question of the capacity of the water scheme. It is also a question of the capacity of the people to carry water over relatively long distances back home, given the time and effort required and other work that has to be done. The question is thus whether some activities that require water can be organized at the water point. If activities like watering gardens or washing clothes - or even bathing - can be done at the water point, the water carried home will probably be more adequately used for other purposes.

#### **Community participation.**

Generally, requests for improved water schemes are forwarded to the District Administration by District Councillors, who are elected representatives of wards. Whether the villagers are involved at this stage is unclear. There appears to be a general lack of community participation, or even consultations in connection with the construction of improved water supplies at all stages, whether in planning, siting of the water point, or in construction or maintenance.

On the whole the people are satisfied with the improved water supplies, but some unfortunate siting such as one borehole close to a graveyard could have been avoided had the villagers been



consulted.

The findings of the survey indicate that villagers do not feel that the water supply scheme is their property. It is generally understood that the scheme belongs to "the government" or to DDF. There is no feeling of responsibility for the operation and maintenance on part of the users, who also acknowledge that they lack knowledge or skills to take on such responsibility. When something goes wrong, DDF is called upon to correct and repair the facilities.

There is, however, an expressed willingness to participate in the provision of improved water supply schemes. Interviews with community leaders indicate that a majority of the people are willing to contribute labour to this end, and some are also willing to contribute cash.

The expertise required in the installation of boreholes limits the use of community participation in the actual construction of a scheme, but, as is emphasized in the findings of the survey, community participation can play an important role in the constructions of improvements at water points such as facilities for washing of clothes, watering of cattle and sanitary disposal of excess water.

This may give the villagers an opportunity to design such facilities to suit their needs. Since we assume that the lack of involvement in the planning and construction of the water scheme results in a lack of responsibility for the schemes, such participation may help to provide necessary skill and willingness to carry out basic preventive maintenance as well as to foster a feeling of responsibility for careful use of the water scheme.

#### **Hygiene and sanitation.**

Water that is collected is often covered with leaves to avoid spilling over. Almost all households store water under some kind of cover. The amount is usually small and it is stored overnight only, and not for longer periods except in the few households where drums or larger containers are used for water collection. Only few households boil water for drinking as it is regarded unnecessary because the water is considered to be clean. This may be a reasonable assumption when water is taken from a borehole, but boiling of drinking water is uncommon also when the water is taken from contaminated sources.

The heavy work load involved in water carrying limits the amount of water used, which will most likely affect the use of water for washing and personal hygiene, especially in the dry season. Or, as we have already mentioned, they will use contaminated water from rivers for washing.

It should be emphasized that people in several areas utilize contaminated water for drinking without boiling it, in spite of the awareness that the water can cause ill health. One reason



may be the lack of firewood, lack of time to collect it and to boil the water.

It is evident that the conditions of the majority of boreholes are not adequate from a sanitary point of view. The information provided by the survey indicates that livestock is constantly present at a number of water supply points - drinking, defecating and wallowing in muddy surroundings. Under such conditions repollution of improved water often takes place at the water point. To understand the implications it only needs one look at the way a woman places the bucket on the ground, then lifts it up and secures it in position on her head by gripping around the rim with hands that have been in contact with the soiled bottom part of the bucket.

The use of latrines is generally infrequent. Only 30 per cent make use of latrines. There is considerable variation between one community and another, from 94 per cent to zero. The survey indicates that about two thirds of the families want to build latrines or improve existing ones. The most frequently mentioned reasons for not doing so was the lack of knowledge of how to build, or lack of money to buy materials. Lack of money may constitute a real obstacle. The existing latrines are more often found in households that are economically well off than among others.

#### **Health and diseases.**

Water related diseases are a major problem throughout Zimbabwe, diarrhoea being the most common problem. An estimated 25.000 children die from diarrhoea each year. In general feacally-transmitted and water-related diseases contribute considerably to morbidity and mortality.

Nearly half of the households interviewed stated that a member of the family had been diagnosed as having malaria and bilharzia within the past three years. A quarter of the households reported that in their family a child under the age of 5 had died and that the cause most often was diarrhoea. They feel that malaria and diarrhoea are the most common health problems, but only a modest number were able to correctly identify unsafe water as a cause of diarrhoea.

When asked to pick out one among several "causes" of diarrhoea, only 26 and 34 per cent mentioned dirty water as a cause in children under 5 years of age and in adults adults and older children respectively. Poor diet is often given as a cause, as well as teething and fever in smaller children. There may be a general awareness, but still little proper understanding of the causes of water related diseases or the process by which such diseases are propagated.

According to the present policy, all villages should have a Village Health Worker. The provision of health workers is only recently established. They are not working full time, and are in fact not employed by the Ministry of Health, but are to be paid



or compensated by the villagers. The proper effect of their activities cannot be expected yet for some time. Nevertheless, about 30 per cent of the respondents state that they have received health education within the last two years.

Although water supply, hygiene, sanitation and health are linked together in a complex manner often difficult to measure in surveys, it is encouraging that one of the findings indicate a positive connection between hygiene and health: the better the hygiene, the less frequently do people suffer from water related diseases. There is furthermore a tendency for users of improved water to be less exposed to water related diseases, according to their own reports, than are people using traditional water sources.

Sanitary conditions may be described as unsatisfactory in general, but given the willingness to build latrines, there should be considerable scope for improvements. This presumes that impeding factors such as lack of knowledge of how to build and money for materials can be overcome.

It is difficult to judge the current health conditions on the basis of the survey findings. It would appear that they are similar to those prevailing in most communal lands. Assuming the conventionally accepted relationship between water, hygiene, sanitation and health, there are a number of factors that may offset the expected health benefits from clean water provided by the improved water schemes.

Serious consideration should be given to the problem, both as regards practices and behaviour as well as lack of knowledge on these matters among the population. It is equally important, and not particularly problematic to correct some of the unsatisfactory features of the water supply schemes.

## 2.2 Conclusions.

1. The DDF water programme has provided a major part of the population in the areas where improved water supplies have been constructed, with higher quality water.
2. For a considerable proportion of the population the distance to the water supply point is greatly reduced, resulting in a saving of both time and effort in the collection of water. It is particularly the women who benefit since it is mainly they who collect water.
3. No evidence has been found that the more wealthy are more privileged than others in access to improved water schemes.
4. The programme by and large does reach the target group and it has a positive impact. However, the distance to water supplies, the time and effort still needed for water collection, as well as the use of traditional, unsafe sources of water, emphasize the need for further



improvements, especially when the heavy work load of women in the communal lands is taken into account.

5. The design, construction and maintenance of the water schemes needs to be improved in order to prevent repollution of the water.
6. The population has strongly expressed the need for more water also for productive purposes, particularly for use in the cultivation of vegetable gardens. Adequacy can be improved if design and implementation incorporate facilities for washing, watering of cattle and cultivation at water point rather than after water has been carried back to the household.
7. DDF is not presently organized in such a way that it can draw upon community participation. There is, however, willingness on the part of the communities involved to participate, especially by contributing labour. The use of community participation could provide labour inputs for the construction of ancillary facilities, ensuring that these are in accordance with peoples needs. Community participation may also increase identification with, and responsibility for, the improved water supply schemes.
8. Conditions of hygiene and sanitation prove to be relatively unsatisfactory in many respects, and may have an adverse effect on the potential health benefits from clean water provided by the improved water schemes. There is a lack of knowledge on the importance of hygiene and sanitation and on how to improve them. There are certainly other limitations on the possibilities or capacity of the community members to improve conditions of sanitation and health when necessary measures require extra time and efforts, especially on the part of the women.
9. Sanitation can in many areas be improved by enlisting community participation for the building of latrines if advice on how to build is given and the necessary materials can be provided. If such activities are to be linked to, or coordinated with, water supply programmes, there is a need for cooperation with Ministry of Health.

### 2.3 Recommendations.

1. It is recommended that future Norwegian assistance to the DDF water programme be continued and that the construction of shallow wells be included where these are more appropriate than boreholes.
2. It is recommended that steps be taken to improve the conditions surrounding the water supply schemes so that
  - a) Unsanitary conditions at water point are alleviated by the construction of better aprons and runoffs.



- b) Facilities for washing of clothes, watering of cattle and eventually for bathing are constructed as appropriate.
  - c) Water schemes are planned and sited in order to cater for the needs for communal gardening where this is technically and economically feasible.
3. It should be considered in what way and for what purposes community participation can be used in the water programme, particularly with reference to ancillary facilities and appropriate design.
  4. DDF should consider liaising with MOH at appropriate levels to coordinate its water supply programme with the programmes for improved sanitation and health education of the MOH.







### 3 THE SOCIO-ECONOMIC SETTING.

#### 3.1 Findings.

The present programme addresses itself to the needs for adequate water supplies for the rural population of Zimbabwe. However, a preselection of target group has already been made when DDF is chosen as the implementing agency. This organization is bound by national legislation to limit its activities to designated communal areas where the majority of the black farmers live on their own land.

#### **The worst-case areas**

In Zimbabwe, areas which require special attention include those which have the following conditions:

- (a) general socio-economic underdevelopment which results from:
  - isolation due to inaccessibility; lack of road and rail networks: most of the districts near the Northern, Western and Southern borders of Zimbabwe.
  - distance from major economic activities in mining, agriculture and industry: a number of districts outside the Mutare-Harare-Bulawayo road and rail network.
  - under-developed public sector investment: remote areas, large scale farms and mine compound areas, including farm compounds in natural regions 2 and 3 in the Mashonaland provinces and Midlands.
- (b) Drought prone areas with highly unreliable rainfall, where two out of ten years are good seasons.
- (c) Population pressure areas: pockets in the North East corner of Mashonaland Central, the South West corner of Matabeleland South and a South Central pocket of Masvingo province.
- (d) Health problem areas, which result from natural climatic factors, (e.g. Zambezi Valley areas) which affect both humans and livestock husbandry, and man-made ecological damage (in particular irrigation schemes): The North East and East of Zimbabwe, where schistosomiasis is endemic and is mostly found. The districts along the eastern border where most of the refugees are stationed. The Sabi-Limpopo irrigation schemes in the South and South East of Zimbabwe.

It is believed that the Water Master Plan studies should be able to provide more details on these types of worst-case regions of Zimbabwe.



### **Farm-workers, miners and women.**

The situation for the black farm-workers and their families on the farm compounds throughout Zimbabwe is often critical both in terms of water supplies, sanitation, health facilities and nutrition. The rate of deaths of under-five children and the frequency of epidemic diseases are very high there, where the people live on minimum wages without their own land.

In the communal areas the majority of the adult population are female due to the migrant labour economy. This means that:

- (a) Since women have to do most of the farming the time saved in collection of water and fire-wood is critical.
- (b) Those mostly exposed to diseases are women and children.
- (c) Community participation can only succeed if women are accorded a crucial role in the process.
- (d) Extension services should in general emphasize women as the target groups.

These points have, hitherto, not been fully appreciated in Zimbabwe and too many development programmes are unsuccessful because they have failed to include the role of women in their planning and implementation.

Finally, it is generally assumed that Zimbabwe is more developed than other countries in the region, because of the evident higher level of industrialization and export of mineral and agricultural products. It should be noted that Zimbabwe has a highly dualistic economy with extreme poverty gaps affecting the communal areas and farm workers and miners. Some of the neighbouring countries are better off in respect of levels of literacy, education and self-sufficiency among peasant households. It should also be noted that it is only since independence that most rural development efforts, already being promoted in other countries, have been extended to communal areas. Even research in these areas has only begun and it is difficult to make meaningful generalizations from studies for development planning.

The reader is referred to Vol. 2 of this report for further details.

### **3.2 Recommendations.**

1. It is recommended that a study should be undertaken on the water supplies and health situation on commercial farm compounds with a view to providing assistance in the future.
2. The role of women should be given special attention in the water development programme in the future.



#### 4 DECENTRALIZATION OF THE PROGRAMME.

##### 4.1 Findings.

##### Justifications for uneven distribution of funds.

According to the accounts given by DDF on the use of NORAD funds during the first 3 years of implementation, about half of the funds are used for reconstruction and development of water supplies in the districts. The breakdown on provinces is as follows (percentage):

Masvingo	32
Matabeleland North	22
Midlands	15
Matabeleland South	13
Mashonaland West	7
Manicaland	5
Mashonaland East	3
Mashonaland Central	3
	<b>100</b>

Thus 82 per cent of the funds have been spent in the 4 provinces in the southern and western part of the country, while only 18 per cent has been used in the 4 provinces in the northern and eastern areas.

By and large, seen on the background of distribution of lands in Zimbabwe and the corresponding climatic and agricultural conditions, this uneven distribution might appear well justified. The four provinces in the south and west are the most drought and poverty stricken areas in the country.

An analysis of the district-wise utilization of funds reveals that in each of the 8 provinces between 60 and 90 per cent of the funds are spent in only 2 districts out of 5-7.

Of course this corresponds to a high degree with the distribution of communal areas between the districts, but it also seems to match the general pattern of agricultural potential and the corresponding pattern of drought/absence of drought.

6 districts have used 50 per cent of the total expenditures accounted for by DDF during the 3 year period 1981/82 - 1983/84, while half of the 55 districts have received only 10 per cent of the funds all together. The 6 districts are:

Masvingo	(Masvingo)	12
Nuanetsi	(Masvingo)	10
Nyamandhlovu	(Matabeleland North)	9
Gokwe	(Midlands)	8
Beitbridge	(Matabeleland South)	5
Nkayi	(Matabeleland South)	5

The socio-economic survey undertaken by Zimconsult as a basis



for this evaluation, was carried out in 16 districts in the country, 4 of which were the districts listed above.

A justification for the uneven use of funds is difficult to make as it would be highly influenced not only by the population and the general economic/ecological setting, but also by the number of water supplies existing in the areas before 1981, the number of supplies provided by other organizations and other types of supplies like wells which DDF does not control.

Funds distributed through the DDF programme are normally allocated on the basis of requests from the districts. A deliberate strategy of uneven allocation of funds could not be detected. In the short run concentration of activities may occur in certain districts in order to economise on back-up services when heavy machinery is used. MEWRD officials indicated that such unevenness was unavoidable but tended to even out over short periods of one to two years.

Short term variations in utilization of funds might occur also when district administrators concentrate their efforts on other projects than water supplies, in accordance with priorities set out for the district.

Security problems, notably in Matabeleland have contributed to reduce activities in some areas. This situation has changed recently, and further improvements may be expected.

#### **Criteria and procedures for giving priorities to new schemes.**

Selection of sites for new water supplies is generally made at district level today in direct liaison between the District Administrator and District Councils. It appears that the 55 districts are treated as homogenous political units which should compete only on a fixed set of specific criteria through the same procedures. The same criteria are applied to all districts regardless of their current situation. Geographic, demographic and economic development circumstances are not formally considered in the overall framework of selecting sites for new schemes.

In the districts, schools, clinics and high density areas get first preference, which seems to be socially and politically acceptable. This also provides an economically feasible cut-off point in establishing short-term development plans.

The longer term criteria of providing water within three kilometres of the rural population was found to be generally accepted.

There seems to be an understanding in the districts that DDF allocations are for boreholes, dams and piped schemes, while the construction of wells must be covered from other sources. There is no coordination of the provision of the two alternatives. The appropriateness of the more expensive boreholes are not questioned and District Administrators does not usually consider



to use funds allocated for boreholes for less expensive wells even when he knows that the funds will not be utilized within the financial year. In the final analysis there is no clear cut picture of where the wells fit into the three kilometres radius cells for boreholes.

It has been recognized that the procedure whereby the district councillors play the main role of setting priorities is inadequate in terms of grass-roots democracy. Hence, it has been decided to involve committees at the ward and village levels.

The coordination at the provincial and central level does not appear to have any significant impact on the setting of priorities for water supplies at district level. Provincial authorities make only minor amendments to district priority lists according to the total framework for development in the region. The DDF head office will establish a cut-off point in the priority lists according to the financial resources available. No qualitative assessment is made at head office.

#### 4.2 Conclusions.

1. The available evidence does not permit a thorough judgement of the reasons for the uneven distribution of funds to the districts.
2. The evidence, however, shows that certain districts e.g. Binga, Chibi, and others which have environmental and historical disadvantages in adequacy of water supplies even during normal climatic conditions, are not treated specially to off-set pre-existing imbalances by the current water development programme.
3. The basis on which national, equitable and technically sound water provision programmes could be planned does not exist. An inventory of supplies and actual needs of water supplies in the districts is desperately needed by DDF.
4. Provincial authorities and DDF headquarters need to develop criteria and procedures for making special allocations to especially disadvantaged regions.
5. In the short term the current criteria and procedures for setting priorities for new schemes within districts seems to work reasonable well. The criteria should be officially defined and adopted.
6. There is great need for districts and DDF to have a longer term perspective in their planning of water supplies and to develop specific criteria and procedures for allocating funds in this sector.
7. The construction of wells need to be established as an alternative to boreholes that should be given consideration by the districts when applications for funds are made.



### 4.3 Recommendations.

1. NORAD should insist on the coordination of water supply programmes and clearcut criteria for allocation of funds in order to address the actual needs in the districts.
2. NORAD should continue to support initiatives towards policymaking, national coordination and evaluation of water supply programmes in Zimbabwe, e.g. through NAC, MEWRD, MOH and DDF.
3. NORAD should make provisions in the next agreement for technical assistance to DDF, in order to assist coordination and strengthen the planning of long-term developments in the water sector, in accordance with national planning and corresponding to local needs.



## 5. COOPERATION WITH OTHER MINISTRIES.

### 5.1 General.

A rural water supply programme should always include active promotion of community involvement and participation, hygiene education and improvement of the sanitary standard. With the present administrative division of responsibilities between the existing ministries, this can be achieved only through cooperation between several organizations.

The findings presented below are based upon consultations with government officials at ministerial level and in the districts, and interviewing at village level.

These consultations revealed a very complex set-up in the general field of rural water supply, sanitation and health education and the involvement of communities in these activities.

### 5.2 Findings.

#### Ministry of Health.

The Ministry of Health (MOH) is involved in construction of shallow wells and latrines as well as provision of materials, hand-pumps, cement and hand-augers.

There is no formal linkage between MOH, DDF and District Administrators in projects of this kind. MOH work together with NGOs in a few districts.

MOH organizes community groups to dig their own wells and families to construct their own latrines. Occasionally, when dynamite is required, DDF provides assistance, but usually sites are abandoned when hard rocks are hit.

MOH rely on a decentralized network of rural health centres and health extension personnel, namely the District Health Assistants (DHA) and the Village Health Workers (VHW) in promoting such projects.

Currently the DHAs provide the technical advice in well siting, excavation and construction and supervise the VHws in the mobilization of the people. There seems to be a general lack of sufficiently qualified DHAs and serious financial constraints.

Although there have been some problems in the nature of selection of VHws in some parts of the country and their role does not seem to be sufficiently clarified, it appears that the whole concept is acceptable to people and has achieved a reasonable degree of community support.

The MOH sanitation programmes suffer from the problem of not being standardized across provinces and districts, with no minimum provisions set out per district. At present the success



seems to be more a result of achievements by resolute individuals than systematic efforts.

MOH does not have a special vote for sanitation activities as the funds used today fall under a broader category which includes immunization etc. MOH has relied on an injection of donor funds but these cannot sustain a sanitation programme.

The MOH through its Blair Research Laboratory has developed an internationally reputed PIT PRIVY SYSTEM which is slowly being introduced into the communal areas. Problems affecting the diffusion of latrines are financial and to some extent the lack of commitment of the rural populations to invest in its construction and usage.

#### **District Development Fund (DDF).**

DDF is not, according to current legislation, supposed to involve itself in the health and sanitary aspects of water supply. DDF does not have special funds or provisions of materials to support MOH activities either. However, there has been informal cooperation between DDF, MOH and MCDWA on related matters.

As already stated, DDF perform its drilling and maintenance activities without any participation from local communities. Most of the DDF boreholes visited by the Mission was strikingly unsanitary in their physical surroundings. The investigations of Zimconsult suggests that the level of community participation also in planning and decision-making, in particular the siting of DDF boreholes, is inadequate.

#### **Ministry of Energy & Water Resources Development (MEWRD).**

Being a ministry responsible only for technical and professional engineering services, the MEWRD does not play any role in the coordination of community participation in sanitation and health activities in the districts, and does not have district level personnel which could be used in implementing more integrated water and sanitation programmes.

Still the MEWRD has an important supervisory role to play during all steps of water supply development.

#### **Non Governmental Organizations (NGO).**

At least ten NGOs are involved in water supply activities in Zimbabwe. Some started in the mid-1970s while others entered the scene this year. The most notable contributions have come from the Lutheran World Foundation (LWF) and Catholic Social Services.

Their mode of cooperation varies from working directly with communities having informed only the District Administrators, to working with private contractors and government organizations (DDF, MOH, MEWRD and MCDWA).



The NGO activities are not uniform in the various districts and provinces. It would appear that the programmes of NGO's are not selected according to a national plan of priorities, but are rather located in areas where the NGOs are already involved in other activities.

The NGOs appear to have amassed a wealth of experience in organizing community participation rural development programmes in Zimbabwe. There is much to be learnt through cooperation between government organizations and NGOs.

#### **National Action Committee.**

In late 1982, an inter-ministerial National Action Committee for the International Drinking Water Supply and Sanitation Decade (NAC) was set up. Today 3 sub-committees with clearly stated functions exist:

1. **Baseline Evaluation.**  
Responsible for preparing, distributing and evaluating a questionnaire on baseline information.
2. **Community participation.**  
Examination of current activities, and the need for information and mass education campaigns. Determining the best ways to mobilize for community participation.
3. **Public Health Education and Information.**  
To disseminate information on water and sanitation.

The NAC's role is largely advisory and it has no direct influence over ministries implementing water and sanitation programmes.

Its members are permanent members of staff in various ministries with numerous other duties beside NAC activities to perform. NAC has no permanent secretariat, with a budget and technical capability of its own, which explains their failure to produce an adequate base-line evaluation of the water and sanitation activities needed in Zimbabwe at present.

The committee, however, has initiated the much needed dialogue between ministries in order to set the ground for cooperation. It seems to have done well in circulating information on requirements in water and sanitation services.

#### **The District Administrator.**

The District Administrators perform a varied role in coordinating sanitation, health and water related activities. Each district seems to have its own practices on this matter. District Administrators are generally well respected and authoritative in their districts and could be powerful coordinators.

Much of the cooperation between District Administrators and MOH,



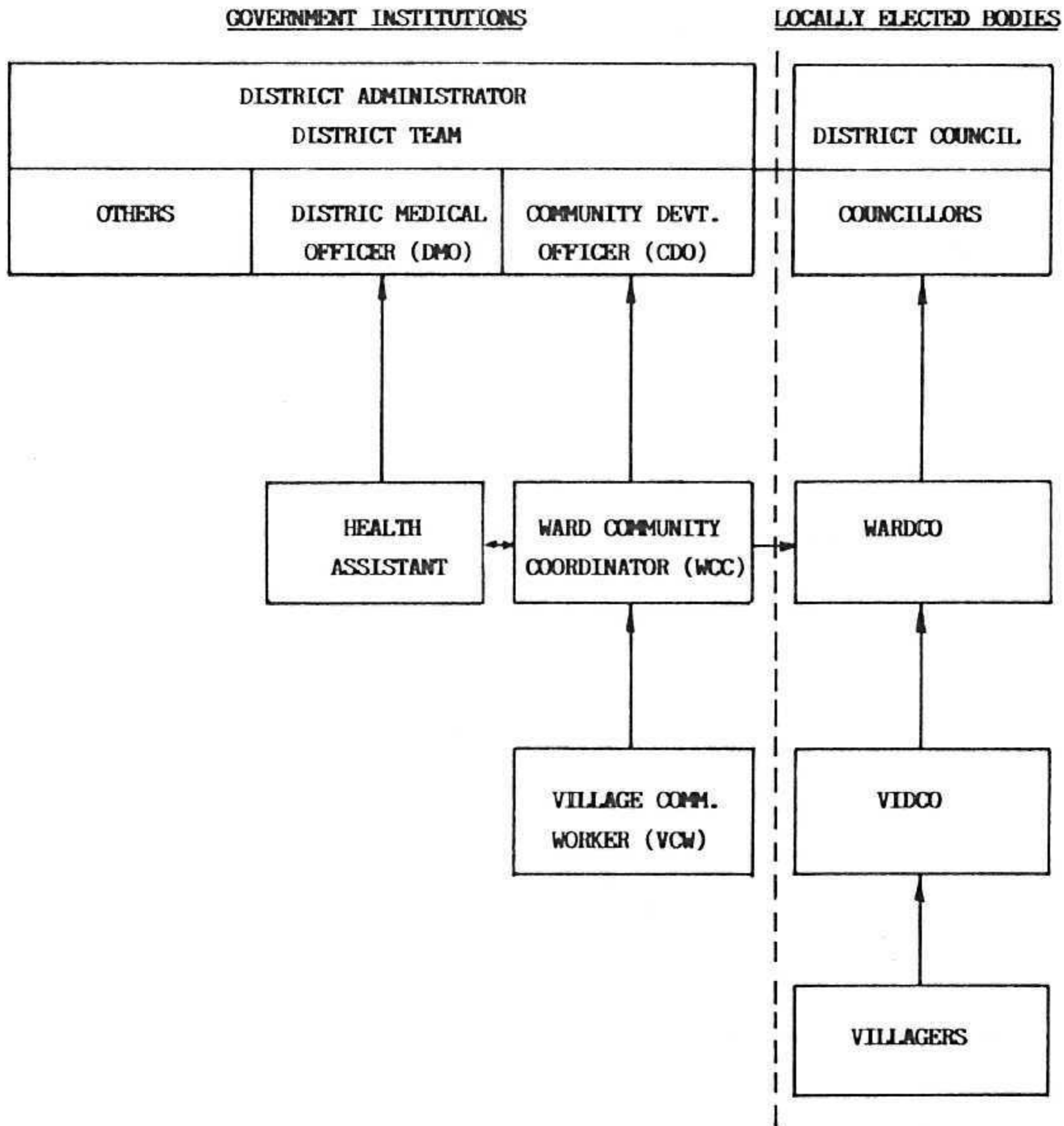
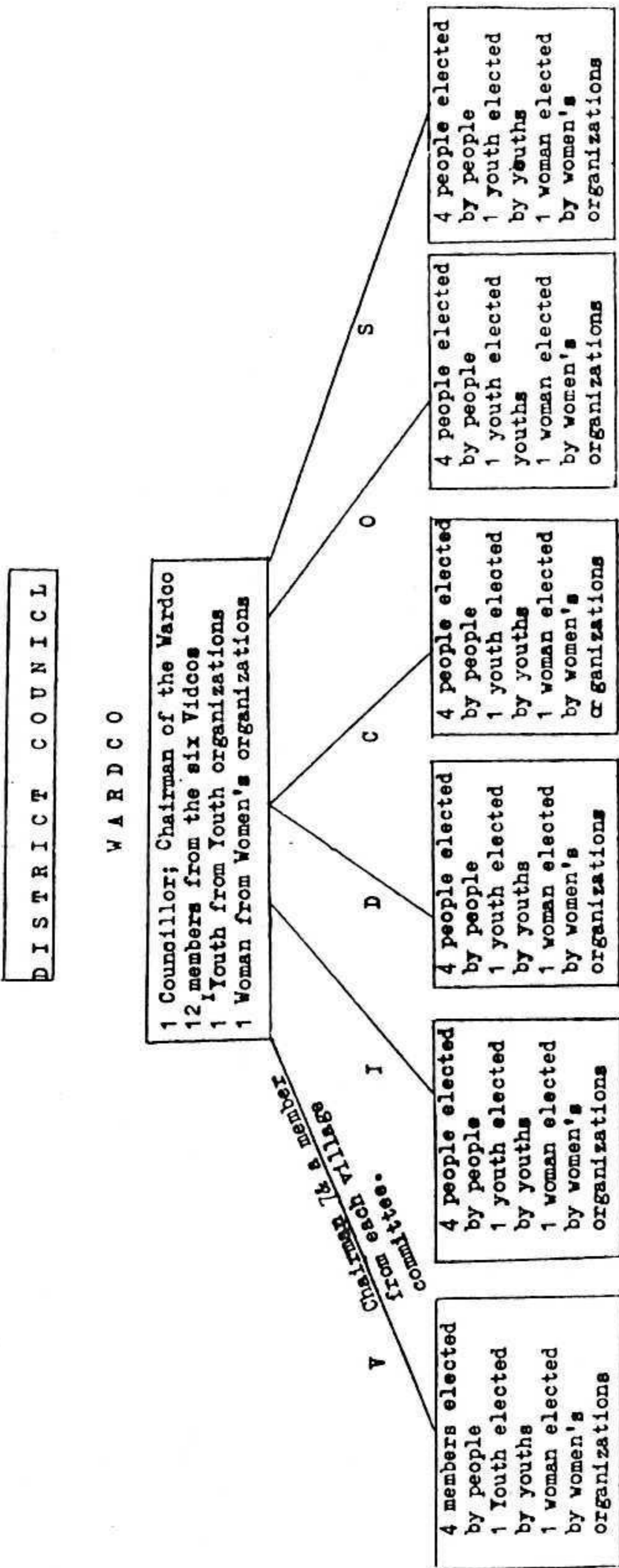


Figure 5.1 Schematic representation of the new local government structure (NMP-study)



WARD AND VILLAGE DEVELOPMENT COMMITTEE STRUCTURE IN ACCORDANCE WITH THE PRIME MINISTER'S DIRECTIVE



Each village comprises of 100 families or 1 000 people.

A ward comprises of six villages of 6 000 people.

Figure 5.2 The new structure of development committees at village, ward and district level.



STAFF DUTIESD/A.

COUNCIL MATTERS  
 DISTRICT DEVELOPMENT COMMITTEE MEETINGS.  
 COMMISSIONER OF OATHS  
 CIVIL & CUSTOMARY MARRIAGES  
 D.D.F. PROJECTS - MONITORING BRIEF  
 D.D.F. ESTIMATES  
 CONTROL OF ALL ACCOUNTS  
 STAFF QUERIES  
 LICENSING BOARD MEETINGS  
 CHIEF'S MEETINGS.

DISTRICT CLERK.

CONTROL OF PASS OFFICE  
 COUNTER SIGNING OF CHEQUES  
 DROUGHT RELIEF  
 MARRIAGE OFFICER  
 MONITORING OF FOOD AID PROJECTS

DISTRICT ACCOUNTANT

TEMPORARY DEPOSITS  
 MAIN CASE  
 GOVT. D.D.F. COMMITMENT REGISTERS  
 GOVT. D.D.F. REQUISITIONS & PAYMENTS  
 SALARIES & ALLOWANCES  
 REGISTRAR OF VESSELS  
 SECURITY STATIONERY  
 TRUST A/C'S  
 HOLDING REGISTER  
 WATER/LIGHT/TELEPHONE A/C'S  
 FINANCIAL CHECKS CANTEN & COUNCIL BOOKS  
 LEASES (REVENUE)  
 D.D.F. MONTHLY RETURNS (PREPARATION & SUBMISSION)  
 LIBRARY  
 CONTROL OF A/C'S  
 TRADESMEN REQUISITIONS.

ADMINISTRATIVE ASSISTANT OFFICER.

MAPS & MAPPING (ALSO GRID REFERENCES OF ALL PROJECTS, i.e.  
 BOREHOLES, DAMS etc  
 TRAINING (STAFF DEVELOPMENT)  
 CORRESPONDENCES (HELPING D.A.)  
 CHECKING HOUSING OF NON-OFFICERS.  
 PROJECT PLANNING (COUNCIL)  
 G.C.S. REQUISITIONS (UNIFORMS)

ADMINISTRATIVE ASSISTANT.

CONTROL OF GOVT. MOVABLE ASSETS.  
 D.D.F. PAYSHEETS  
 HOUSING JUNIOR EMPLOYEES  
 CONTROL OF PASS OFFICE  
 LEAVE APPLICATIONS  
 ALL VEHICLE LOG SHEETS CHECKING (INCLUDING COUNCIL)  
 FUEL RECORDS.

TYPIST STENOGRAPHER.

ALL TYPING.  
 ROAD TRANSPORT REQUISITIONS  
 STATIONERY ORDERS  
 MAIL  
 REMITTANCE REGISTER  
 INTER-DEPARTMENTAL REQUISITIONS  
 RETURNS- OCCUPANCY OF QUARTERS  
 SUPERVISION OF OFFICE ORDERLIES  
 OFFICE GARDEN.

CLERK/TYPIST.

TELEPHONE  
 FILING  
 WITNESS - OPENING OF MAIL  
 SECRETARY - TEAM MEETINGS.

FIELD OFFICER/MECHANIC

MAINTENANCE OF ALL D.D.F. VEHICLES & EQUIPMENT  
 D.D.F. BUILDINGS & ASSETS REGISTER  
 CONTROL OF EXPENDABLE STORES REGISTER  
 DIPPING RECONSTRUCTION  
 FUEL ORDERS  
 FIRE OFFICER  
 ASSISTANT TRANSPORT OFFICER.

FIELD OFFICER/SENIOR ROAD ENGINEER.

ALL D.D.F. PRIMARY DEVELOPMENT & RECONSTRUCTION WORK (ROADS)  
 WATER SUPPLIES - (DAMS/BOREHOLES CONSTRUCTION)  
 TRANSPORT OFFICER.

FIELD OFFICER.

BOREHOLES - MAINTENANCE & RECONSTRUCTION  
 BUILDINGS  
 DIPPING RECONSTRUCTION (WITH F/O SENIOR)  
 ROADS (ASSIST S.P.O)

D.D.F. CLERK

FUEL REGISTERS - ISSUE & RECEIPTS  
 D.D.F. VEHICLES LOG SHEETS (INITIAL COMPILATION)  
 EXPENDABLE STORES - RECEIPTS & ISSUES.

L.C.P.O'S

DEVELOPMENT MOTIVATORS OPERATIONAL AREAS

Figure 5.3 Staff duties of the district administration



NGO and MEWRD staff is done informally with no set procedures that apply countrywide. MOH and MEWRD staff reports to the Provincial Administration directly.

Some District Administrators are able to provide small amounts of materials (cement etc.) and transportation to other organizations without any particular sanitation vote to back them up.

District Administrators play the major role in coordinating the requests from communities forwarded through the existing District Councils. They will continue to play this role also within the new local government structures.

The District Administrators are generally affected by inflexible budgetary arrangements and insufficient allocations for water related developments.

### **The New Local Government Structure.**

Up until 1983, local government was organized only down to the district level. District Councillors elected from wards of various sizes were the only political body which directed the activities of the district administration. The councillors supposedly represented the grass-roots wishes of communities. The District Administrator implemented programmes approved through centrally controlled allocations.

Partly due to the feeling of the unsatisfactory democratic nature of this set-up, new structures were directed by the Prime Minister in 1984, Figure 5.1. Village Development Committees (VIDCO) are to play a greater role in the political process, in identifying and articulating village needs, facilitating decentralized planning and improving the communication with authorities.

Each VIDCO will be represented on a Ward Development Committee (WARDCO) by its chair-person and secretary. Youth and Women's mass organizations will each have one representative on the WARDCO, chaired by the District Councillor for that ward, Figure 5.2. Each WARDCO will therefore represent approximately 6000 people. Provision will be made for a Ward Development Centre (WADEC) to service the ward.

Ward plans will be forwarded to the District Council, which will then refer matters to any of its committees - health, education, finance etc. The WARDCO will follow the progress of its activities through its chair-person who will liaise with the committees of the District Council whenever necessary. Plans from the ward will form the basis for a comprehensive District Plan.



The District Administrator implements the District Plan through the heads of the various extension services represented at district level. Sectoral sub-committees also meet to discuss their issues. Figure 5.3 depicts the typical staff duties of the district administration.

At present there is much enthusiasm and on-going work to develop grass-roots structures to ensure democracy and community participation in development efforts. According to the current plans, a new set of Community Development officers both at district, ward and village level will be assigned in the future. Ref. Figure 5.1.

### 5.3 Conclusions.

1. There is a multiplicity of water supply and water related health activities undertaken by a number of different organizations with varying implementation procedures among the different provinces and districts of Zimbabwe.

This emphasises the need for coordination of activities in general and institutionalised cooperation among ministries and NGOs.

2. There is a striking absence of community participation and sanitation and health education activities formally tied to DDF's water developments.
3. The evidence shows that a number of borehole sites constructed under the DDF programme are points of health hazards and dissemination of diseases due to the unsanitary conditions of the sites and their use for animal watering.
4. The degree of cooperation with other ministries seems to vary widely among districts (e.g. DDF/District Administrator and MOH) and is mostly done on an informal basis where officials happen to acknowledge the coinciding interests. Where this occurs things seem to work.
5. The degree of community participation in, for example, the construction of cattle troughs in the DDF water supply programme is limited to a few districts. However, this shows the existence of some scope for community participation depending on the level of planning and the approaches used.
6. DDF has neither the funds nor the personnel to engage itself in promoting community participation, let alone the more technical health and sanitation activities.
7. DDF therefore can only cooperate with other ministries i.e. MOH, MCDWA, and MGLTP on the basis that DDF providing technical back-up services (i.e. procurement, storage, transportation, maintenance etc.) while other ministries provide personnel, supervision, planning etc.



8. The cooperation required in this matter needs to be coordinated in a clearly defined manner at both the district, provincial and national level.

The evidence indicates that there is much wasted time and conflicts due to grand schemes of taking over functions or field manpower of different ministries. It should be noted that what is required is the strengthening of most of the existing activities of the different ministries, capitalising on experiences gained and the structural capabilities of each one of them, in a coordinated manner.

9. The MOH has an important role in sanitation, with Village Health Workers trained to mobilise and educate communities, and have the experience to spearhead programmes given adequate district level coordination.
10. The District Administrators, due to their position, knowledge and flexibility, seem to be the natural pivot around which district level cooperation in primary water supply development can be organized as demonstrated already in some districts.

To achieve this, funds for materials, hand-pumps and transportation, specifically for mobilization activities in the construction of wells and latrines, should be allocated to the District Administrator/DDF directly.

11. The new VIDCO's should be encouraged to appoint village caretakers supervised by the VIDCO and reporting to DDF maintenance personnel. The caretakers should be briefly trained in elementary preventive maintenance by DDF.

#### 5.4 **Recommendations.**

1. NORAD funds should be utilized to establish a secretariat under the NAC in order to strengthen the efforts towards policy-making, coordination and the dissemination of information related to programmes for rural water supply and sanitation development.
2. Future funds allocated to DDF should be directed towards the strengthening of the budgets of the district administrations, specifying separate votes earmarked for material supplies to well construction and sanitation programmes undertaken by other ministries in connection with rural water supply developments.
3. The District Administrators should coordinate a programme to rehabilitate DDF boreholes in order to provide standard aprons, soakaways, fencing, and cattle watering facilities. MOH should take active part in mobilizing communities towards this end. DDF should provide the technical support.
4. NORAD should consider providing funds to furnish the



District Health Assistants and Village Health Workers with sets of basic implements required to carry well and latrine construction programmes, health education related to water supply and sanitation development, etc.



## 6. OPERATION AND MAINTENANCE.

### 6.1 Findings.

The basic function of DDF is to ensure primary development of infrastructure in the Communal lands, including primary water supplies, which is usually boreholes, small dams and to some extent piped water schemes. DDF traditionally act as the funding agency, while MEWRD to a large extent has been responsible for the physical implementation.

The main responsibility of the decentralized organization of DDF remains to be the maintenance of existing installations in these areas. The organization of DDF is structured especially for this purpose; with a relatively small Head Office, while the major part of DDF is decentralized down on district level serving as the technical arm of the District Administration with permanent staff, work shops, a large fleet of vehicles and transport equipment and an efficient communication system including radios and aircrafts.

DDF also have backup services at provincial level with workshops and training center

The setup is designed to meet with the requirements for efficient maintenance and repair of permanent installations scattered out over a vast area. It is less suitable for organizing major construction works involving heavy machinery, which needs more centralized planning in order to achieve economic utilization.

#### **Functioning of existing schemes.**

The reports on DDF's achievements so far in the field of maintenance and repair has been encouraging. Zimconsult's survey show that the rural population by and large is of the opinion that DDF maintains boreholes and piped water schemes in good conditions. The general impression, with a few exceptions, is that the installations are reliable, and that it seldom takes more than between 1 and 10 days for DDF to repair breakdown after it has been reported - the average time being 5 days.

This impression has been confirmed by others; a survey of 300 boreholes undertaken by Interconsult found that well above 90 per cent of the boreholes were fully operational. The same impression was supported by interviews with a number of District Administrators.

However, what seems to be rather ideal so far might soon become increasingly and severely problematic, the reasons being the following:

1. DDF is automatically responsible for the maintenance of all new primary water supply installations.
2. The pace of construction of new water supplies is increasing, partly as a result of drought relief



programmes. The total number of installations is adding up accordingly. DDF is not always properly informed of commitments thus increased.

3. At present there is a serious lack of recurrent funds for maintenance purposes. Governmental allocations for maintenance of water supplies have been cut by a total of 32 per cent over the last two years.
4. In the same period the cost of spares, petrol etc. has gone up as a result of the general inflationary trend in the country.
5. A great number of installations are still fairly new, and the pressure for maintenance and repair may therefore be felt more strongly in the years to come.

#### **Inadequate funds.**

It is the impression of the Evaluation Mission that the situation is already serious. Interviews with a number of District Administrators and DDF field officers confirms that it is generally acknowledged that funds for spares and maintenance personnel is inadequate today.

Although the seriousness of the problem differs between the various provinces and districts, it seems to be generally recognized at present. The problem was also addressed in the report from DDF to the Prime Minister June 29th 1982, and in the report of the Parliament Select Committee on DDF January 27th 1983.

A point was made that the damage to the infrastructure in communal lands, which was the focus of the large reconstruction programme which is now completed, was the result mostly of lack of maintenance during the war rather than direct acts of war. The seriousness of the situation is illustrated in Figure 6.1

While both DDF expenditures and Government funds for maintenance went up very much during 1982/83, the allocations have since been reduced dramatically. Due to strict budgetary control, measures there have been, since last year, no further increases in maintenance spending. For the present financial year the budget has been reduced to 22 per cent below last years budget.

According to DDF figures the total number of boreholes constructed and rehabilitated went up over the last 3 years by 25 per cent. If the number of boreholes constructed under drought relief programmes and the number of wells fitted with handpumps are added, the total increase of installations to be maintained by DDF will be considerably higher.

The cut in maintenance funds has hit all provinces, except Mashonaland West and Midlands where the budget was slightly increased for the present financial year.



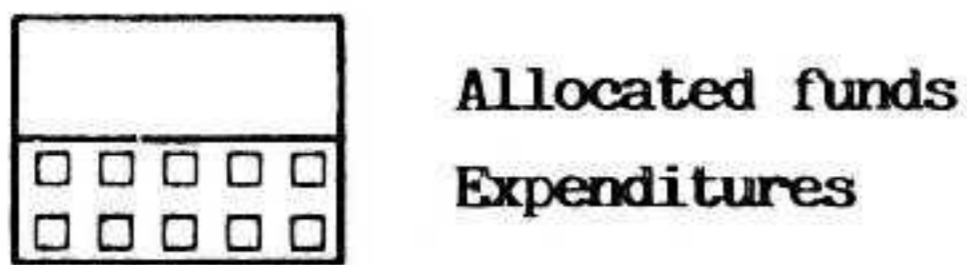
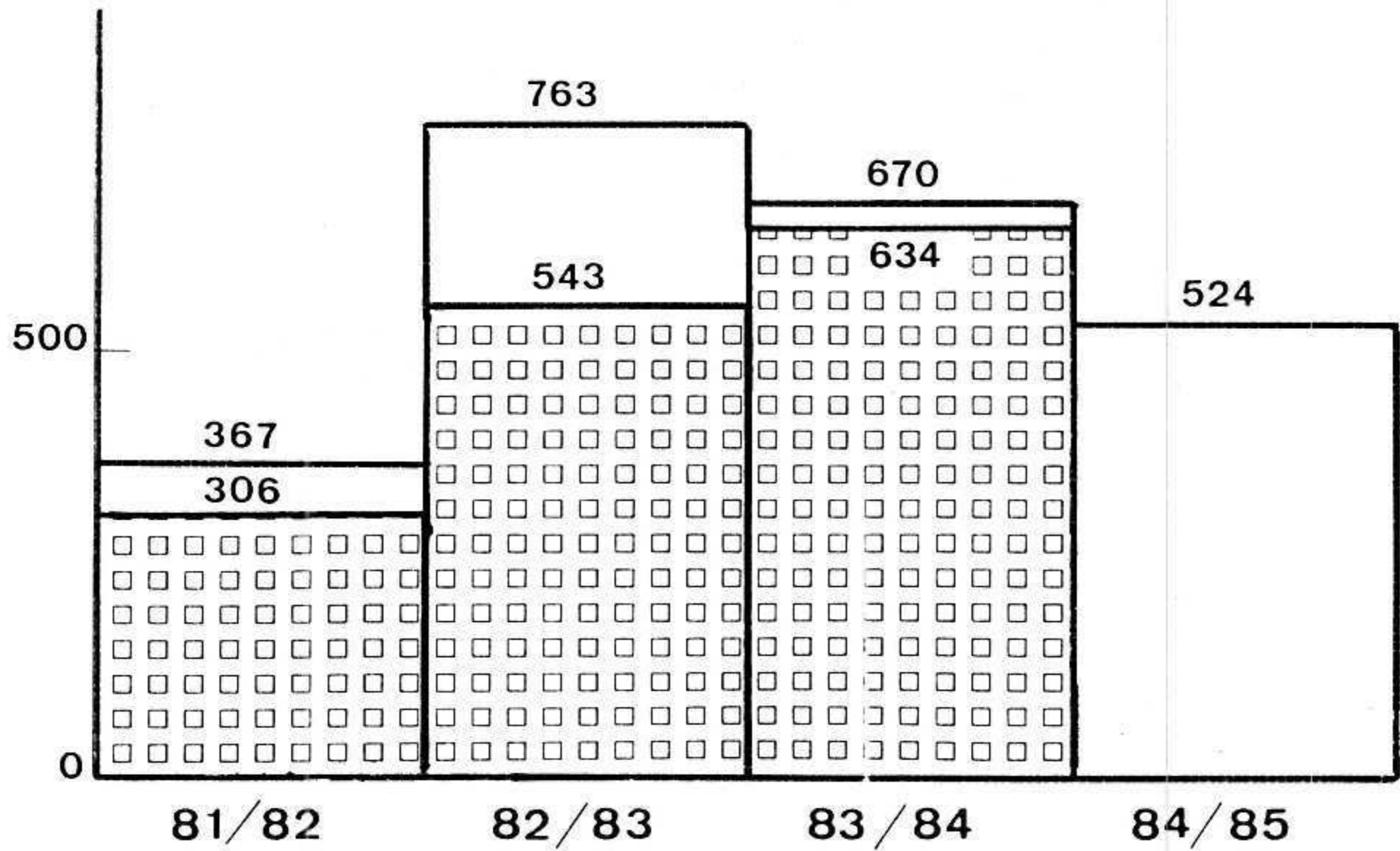


Figure 6.1 Total allocations of Government funds for maintenance of water supplies for the budget years 1981/82 to 1984/85 as compared with actual expenditure on maintenance the last three years. (1000 Z\$)



Figure 6.2 illustrates the distribution of funds for maintenance of water supplies on provinces as compared with the number of existing boreholes in each province, data taken from the NWMP-study. The correlation is less than satisfactory. If the same comparison is based upon DDF's own records of boreholes (which have been admitted to be incorrect) the correlation is even less.

Operation and maintenance of water supplies is not singled out as a separate activity within DDF at district level, and consequently it will be difficult to estimate the cost of resources requirements in this sector. However, in Masvingo province a study has been undertaken by the German Agency for Technical Cooperation (GTZ) recently:

In Masvingo province 555 boreholes were constructed during the financial year 1983/84, half of which were done under a drought relief programme financed by EEC, representing a total increase of more than 60 per cent within one year. For the present financial year 1984/85 a total government allocation for maintenance of water supplies to the province of Z\$ 94.000 has been provided, which is 25 per cent less than previous year (Z\$ 126.000), and 40 per cent less than the year before (Z\$ 156.770).

The GTZ study concludes that:

- The district workshops were found to be well equipped.
- Pumps to be maintained in each district ranged from 246 to 560.
- The maintenance budget ranged from Z\$ 7.710 to Z\$ 19.800
- Maintenance staff ranged from 1 to 9
- The supply of spareparts ranged from none to good
- The areas to be served ranged from 2.000 km<sup>2</sup> to 8.800 km<sup>2</sup>
- Six different makes of hand pumps are used in the province, while DDF only have spareparts in stock for two of the makes.
- There is a general lack of funds and trained workers.
- Records and map references of existing boreholes are inadequate.

Generally the report concludes that the infrastructure in terms of workshop equipment and vehicles are satisfactory while funds are totally insufficient. With the fast growing number of boreholes and wells in the province a proper and permanent maintenance programme for water supplies should be established with increased resources and trained manpower.

#### **Preventive maintenance.**

The GTZ report prescribes a strengthened system for both preventive maintenance and repair, reinforcing DDF at district level. The proposal suggests an initial capital investment for spareparts, tools and vehicles of 1.4 million dollars and a recurrent maintenance budget for 1984/85 of Z\$ 464.000; five times the existing budget. According to the report, the total



ALLOCATIONS FOR MAINTENANCE      EXISTING NUMBER OF BOREHOLES  
 OF WATER SUPPLIES 1984/85      IN EACH REGION ( DES. 1983)

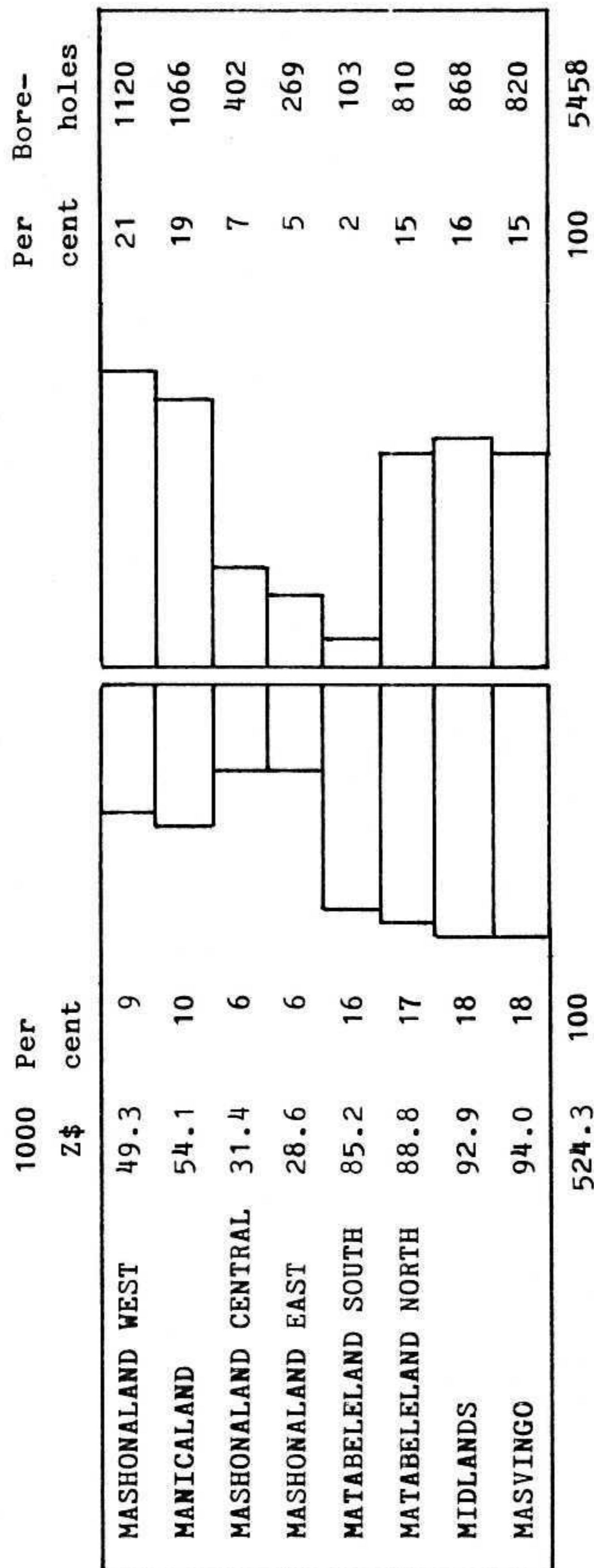


Figure 6.2 Comparison between distribution of Government funds for maintenance of water supplies, and the distribution of boreholes in the different provinces.



annual maintenance cost per borehole will be in the range 175 - 200 dollars which conforms well with the experiences in other countries with similar conditions.

At present maintenance of water supplies is by and large done as repair upon reported failure, with ad hoc inspections of nearby schemes at the same time. The Mission found no evidence of preventive maintenance taking place. With the vast distances it would be very resource demanding for DDF to undertake regular inspections of all the schemes in each district. Still no training of local caretakers is taking place

With the increasing number of water supply installations, the responsibility for maintenance will have to be decentralized further down to village level. Recent reports made by UNICEF and Lutheran World Federation both suggests a system whereby the village elects a water committee and voluntary caretakers for each scheme. At ward level a pump attendant trained and employed by DDF should undertake regular inspections and do minor repairs, while DDF at district level should provide the back-up services and undertake major repair.

#### **Maintenance of transport equipment.**

A total of Z\$ 4.18 millions or some 30 million NOK of Norwegian funds have been used for purchasing vehicles during the 3 years covered by the programme. DDF has failed to present to the Mission the total number of vehicles purchased, but we have reasons to believe that most of the existing fleet of DDF vehicles has been acquired with these funds.

While the emphasis on maintenance of transport equipment has long traditions in Zimbabwe, particularly as a result of experiences from the trade embargo period before independence, the Mission finds reasons to suspect that the fact that the major part of the transport fleet has been replaced within a very short time period might have led to an unfavourable situation with regard to operation and maintenance. Careless driving and lack of preventive maintenance seems to be the explanation to the rapid deterioration and wreckage of new vehicles found in DDF yards in the districts and the provinces.

With the present currency regulations spareparts and tyres become increasingly more difficult to obtain. In some district workshops there is an almost complete lack of spare parts with the result that vehicles are grounded for weeks. The fact that DDF's purchase of vehicles is standardized to makes that are assembled in the country does not seem to change this situation.

## **6.2**

### **Recommendations:**

1. Operation and maintenance should be a major focus in the future and should be addressed directly in the coming agreement between Zimbabwe and Norway, specifying NORAD and DDF commitments as condition of agreement, in order to meet with the needs for maintenance and repair of a



rapidly increasing number of installations.

2. There should be separate provisions made for maintenance of water supply facilities in the agreement to cover such expenses as spareparts, tools, transportation, training of maintenance staff and technical assistance.
3. Future capital investments in the water sector should be made conditional of government commitments to increase employment of operation and maintenance personnel in the districts and to cover the corresponding recurrent expenditures.
4. In order to establish the present and the future needs for operation and maintenance of water supplies, and to coordinate a programme in this area, a short-term technical advisor should be recruited by NORAD as soon as possible.
5. The design of a system for decentralized preventive maintenance should be proposed by the technical advisor, for the consideration of DD<sup>7</sup> and the Government of Zimbabwe, for possible part funding by NORAD.
6. There should be made separate provisions for the purchase of spare parts and tyres in the new agreement. in the event of future requests for the purchase of new vehicles, independent assessments of the existing situation should be made, with emphasis on maintenance and repair of existing transport units.



## **THE CAPACITY OF DDF.**

### **7.1**

#### **Findings.**

In 1980, following Independence, District Development Fund was established as a replacement of the former African Development Fund. The new organization relinquished a number of its functions to other relevant government ministries and departments over a period of two years. This includes the operation of irrigation schemes, soil conservation, forestry, wildlife, cattle dipping tanks, stock marketing and community development. DDF retained the responsibility of to ensure primary development of infrastructure and maintaining roads, bridges, air fields, dams, boreholes and some other basic facilities within the communal areas.

It has been claimed that while the head office is stretched very thin on senior and experienced level of staff, in particular technically competent manpower, the capacity at district level exceeds the level of activities today. It has been difficult for the Mission to verify this statement. However, the lack of ability by the DDF management to provide reliable information to the Evaluation Mission is an indication of a weak management.

#### **Procedure for budget planning.**

As explained in chapter 8 below, Norwegian funds intended for drilling of boreholes for the poor population in communal areas, have partly been used to create a water division within the DDF organization, intended to carry out its own construction work in this field.

Under the present programme, Norwegian funds have been allocated directly to the District Administrators budgets for water supply reconstruction and development.

Proposals for both capital and recurrent budgets are generated by the respective District Administrators. He works in close collaboration with the District Council (including individual councillors) and the respective VIDCO/WARDCOs where such committees have been formed. The so called bids with documentation for each project (capital) and justification for recurrent allocations are forwarded to the Provincial Administrator.

The Provincial Administrator will call a meeting with the respective District Administrators where the bids are discussed. Priority setting, sector development, etc. are compared with government policies and appropriate adjustments agreed upon. Generally it is in the head office where the various budget proposals are trimmed to match the overall budget frame which will eventually be proposed by DDF through MLGTP to MFEPD. Usually the internal priorities for each district are not interferred with.

The budget proposal is discussed with MFEPD. In the current



financial situation substantial cut-backs have been made already during the first round of negotiation. An appropriation is then agreed upon for both capital and recurrent funds.

Shortly before the new financial year starts the final budget estimates are printed by MFEPD. Last year these estimates implied further reductions as compared to the appropriations. The funds may be released upon approval by the Parliament.

#### **The use of funds carried-over for capital investments.**

After the funds have been ear-marked for specific developments in each district within each financial year, specified in separate votes, the initiative for implementing the projects is left with the District Administrators. DDF will make the funds available when the contractor (MEWRD or private contractors) have been assigned to undertake the implementation.

For the whole period covered by this programme, large under-expenditures of funds have occurred in most districts, adding up to a total carry-over at the end of each financial year ranging from 37 per cent to 67 per cent of the total allocations provided by NORAD.

These funds have been used, after approval by NORAD, for transport equipment and other capital investments that have eventually facilitated the establishment of a new water division within DDF.

The status after three consecutive financial years is that only 50 per cent of the Norwegian funds have been spent directly for the intended purpose, namely providing primary water supplies for the rural population, ref. Figure 7.1.

#### **Explanations for under expenditures.**

The high carry-overs raises the question of the capacity of DDF, a problem which have been addressed by the Mission.

Several explanations have been offered to the Mission:

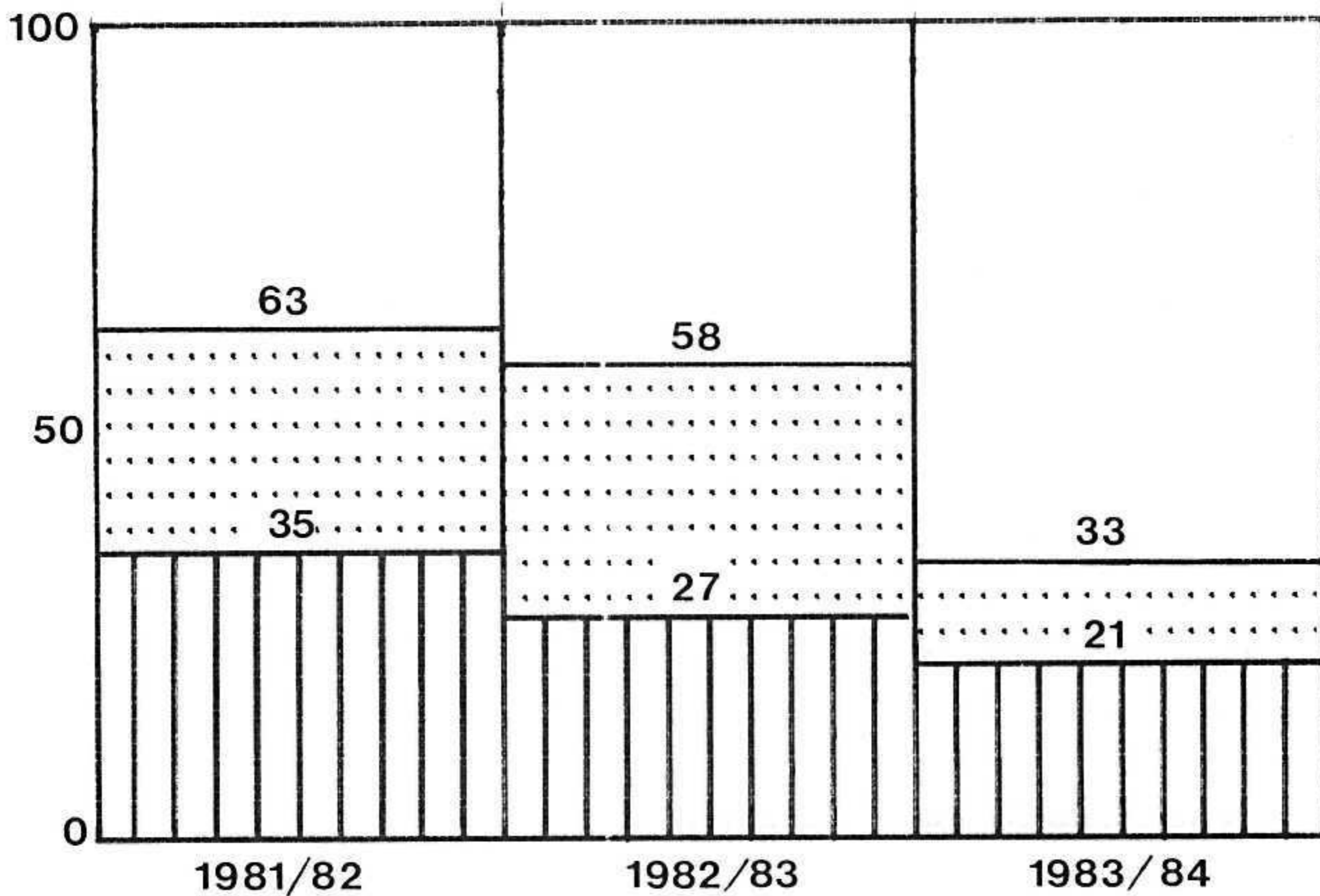
##### **1. DDF's rigid budgeting system:**

At the beginning of each financial year, allocations to the districts are committed within limits of the budget for the period. If the money is not spent in a district during the year, re-allocations will not be made by the head office, and under-expenditure occurs. The under-expenditure from the 55 districts adds up as a total carry-over for the period.

##### **2. DDF's need for purchasing vehicles and machinery:**

The high carry-overs of about 50 per cent of the total allocations given by NORAD, have been utilized in acquiring vehicles and machinery, after approval by NORAD. This has been convenient for DDF (and probably also necessary), as other donors have been unwilling to pay for





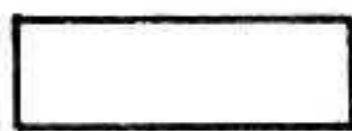
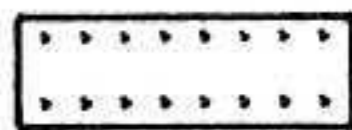
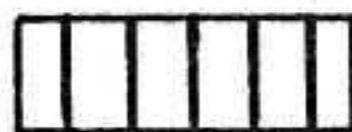
-  Carry-overs (used for capital investments)
-  Other expenses (materials, labour and transport)
-  Payments to contractors

Figure 7.1 Expenditure and underexpenditure of Norwegian funds for water supply by DDF for the budget years 1981/82 to 1983/84. Payments to contractors breaks down with 73 per cent on MEWRD drilling and 27 per cent on private contractors.



such equipment.

3. **DDF's intentions to build its own Water Division:**  
A part of the carry-overs have been used for purchasing 10 light-weight drilling rigs. With the present intentions of DDF to build up its own drilling section, the high carry-overs have been an advantage for the organization.
4. **Reluctance by DDF to use expensive MEWRD contractors:**  
A major proportion of the allocations given to the districts is usually spent on drilling organized by MEWRD. Some of the drilling is done by using MEWRD's own rigs, some by using private contractors. DDF claims that the cost per borehole for these activities is more than twice their own costs. One possible explanation is that DDF is holding back on contracts to MEWRD in order to gradually take over some of the activities.
5. **MEWRD's limited capacity:**  
On the one hand MEWRD claims that DDF is cutting down on allocations for MEWRD drilling, on the other DDF claims that MEWRD does not have the capacity to take on more projects at present.
6. **The number of drought relief programmes financed by external donors:**  
In the present situation, MEWRD and hired contractors use the DDF priority lists to drill boreholes under various drought relief programmes funded by external donors. This results both in a MEWRD shortage of capacity for the regular DDF programme, and cut down on the need for DDF drilling in villages already covered by other drilling activities, which result in carry-overs from the district.

Based upon interviews with officials at ministerial, provincial and district level and review of existing documentation the Mission has found that the occurrence of under-expenditure can be explained by a combination of the six main arguments mentioned above. The Mission has noted the following:

- It was understood by the District Administrators that all un-utilized DDF funds were to be carried forward to the forthcoming budget year, although it was also understood that these funds have been used by the head office to buy capital equipment, and therefore has not been added to the next years budget allocation. The idea of transferring un-utilized funds from one vote to another within one financial year was generally not seen as a feasible alternative.
- According to the head office requests from the district administrators for reallocating funds within one budget vote, would usually be granted. However, the district administrators did not seem to be well aware of this possibility.



- According to the head office, un-utilized funds within one district can only be transferred to another district at the request of the district concerned. No cases were found where this had actually happened. Apparently, the head office has no power to intervene in such matters. However, as the funds are controlled by the head office and payments are based upon disbursement requests, they are quite able to reallocate money for other purposes outside the district administrators budgets when under-expenditures are expected.
- While the investments in vehicles might to some extent be justified, the investment in drilling rigs and heavy earth moving equipment for the construction of water supplies is far more questionable. Efficient transport equipment is a prerequisite if DDF are to fulfill their responsibilities towards the effective maintenance of infrastructure.
- Intervention of drought relief programmes funded by external donors certainly is one factor adding to the under-expenditure at district level.
- It is evident that DDF has made no requests for new boreholes to MEWRD since April 1984 when DDF started its in-service training programme with its own ten drilling rigs.

#### **The overall capacity of DDF.**

Attempts to assess the overall capacity of an organization can only give rough indications unless a thorough in-depth investigation is made.

Judging from the budgets and annual accounts of DDF, the rapid expansion following the Independence, has come to a standstill. During the two first years up to financial year 1982/83 the actual expenditures of DDF increased by 23 and 31 per cent respectively, with a corresponding increase in budget allocations. Ref. Figure 7.2.

The expansion is largely a result of the extensive reconstruction of existing infrastructure in the period. During the same period large capital investments of about 20 per cent of actual expenditures were made.

Last financial year there were no increase in actual expenditures, despite the fact that the technical potential had improved considerably as a result of capital investments. The estimated budgets of DDF have been reduced dramatically over the last two years, with a total of 30 per cent.

The financial record of DDF seems to reflect a situation where reconstruction of existing schemes is now completed, and where the organization, with a weak management, almost without qualified high level technical personnel, is unable to operate their new, highly productive machinery in an efficient way for new construction projects.



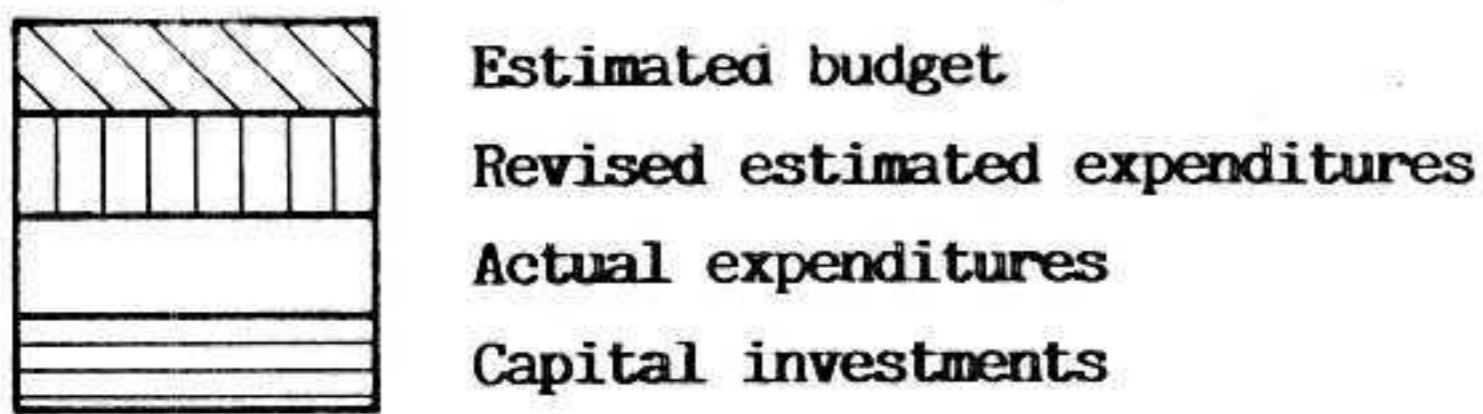
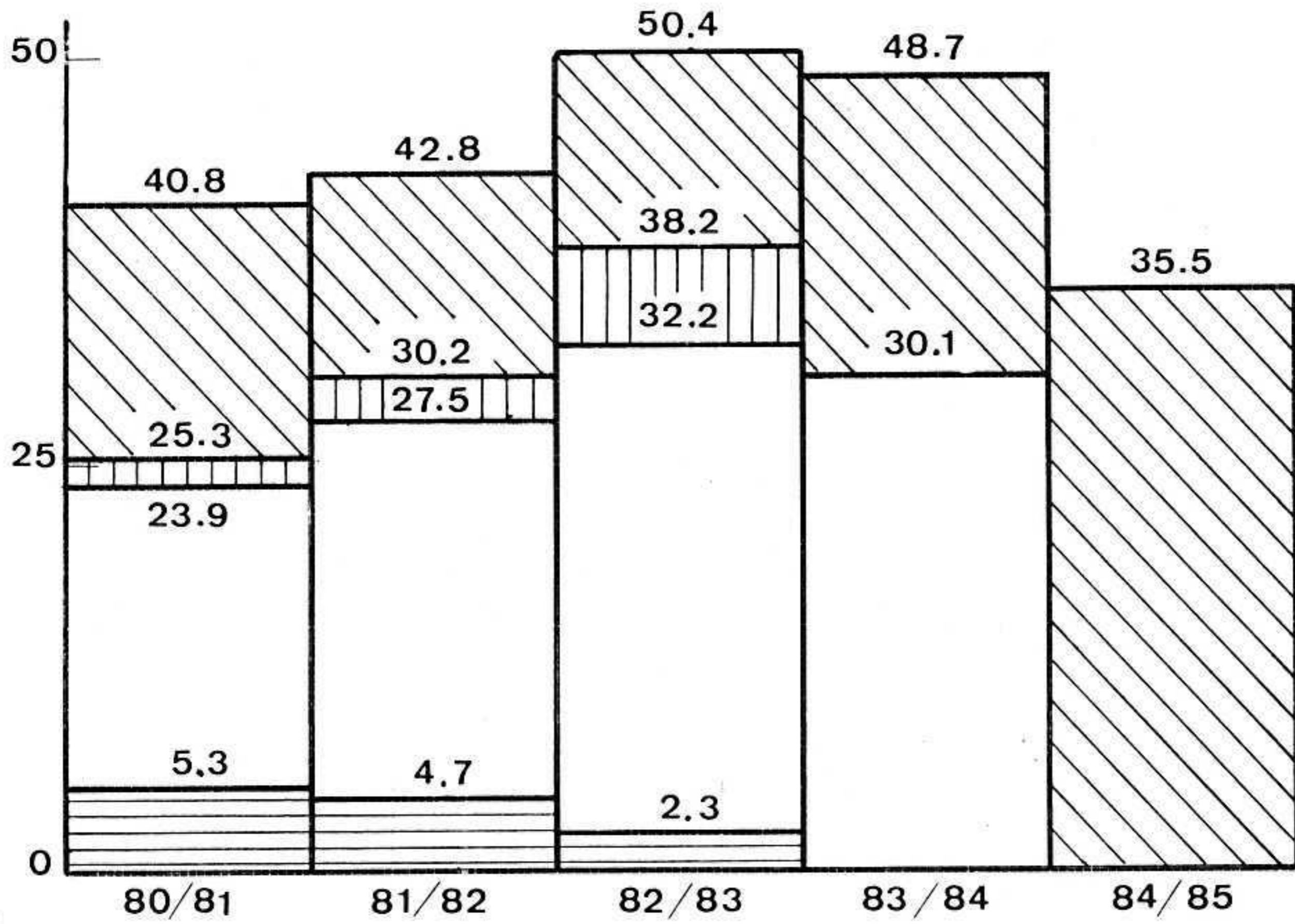


Figure 7.2 Actual expenditures of DDF over the last years as compared with estimated budgets and revised estimated expenditures. Million Z\$



If this is the situation today, a further build up of the hardware side of DDF is of course highly questionable.

## 7.2

### Conclusions

1. In the period covered by this evaluation, only 50 per cent of the total NORAD allocations have been utilized as intended.
2. The Mission finds it unfortunate that DDF has not made requests from NORAD for separate allocations for capital investments rather than maintaining a situation where increasing under-expenditures occurs one year after another in order to build up funds for capital investments, thereby extending the sufferings of a great number of people in the rural areas.
3. Under-expenditures occur when funds allocated to the District Administrators are not used within a financial year, the result being that the number of water supplies that are constructed is reduced accordingly. On the one hand there is too much money in the system - on the other hand the District Administrators complain about shortage of funds for water supply developments.
4. Major explanations for under-expenditures might be the following:
  - Rigid budgetting systems, offering the District Administrators little or no flexibility to reallocate unused funds from one vote to another.
  - High carry-overs have given DDF an opportunity to purchase capital equipment; vehicles and heavy machinery which might not always be well justified.
  - High levels of drilling activities in some areas of the country eg. in connection with drought relief programmes have reduced the capacity of MEWRD to take on regular drilling operations for DDF.
  - Lack of co-ordination resulting in expensive transportation of machinery, delays and wasted time.
5. The Mission has concluded that DDF has not been sufficiently encouraged by NORAD to counteract under-expenditures. A practice has been established whereby DDF can expect NORAD to approve reallocations of funds from actual water supply implementation to capital investments.
6. The building up of a Water Division could be seen as an attempt by DDF to reduce high carry-overs in the long term as the scope of drilling activities eventually increases.
7. A positive result of this is that MEWRD and private contractors are forced to review their pricing policies.
8. The Mission, however, cannot see that it is viable at present to build up a separate drilling unit within DDF.



With an already sufficient drilling capacity in the country, this represent a duplication of work. In a situation where the administrative capacity of DDF is reduced, and there is lack of qualified technical personnel at top and medium level, a new drilling unit will most probably result in reduced overall capacity of the organisation rather than the opposite.

9. The Mission is of the opinion that the most urgent capacity problem at present is that of keeping existing and new installations operational. As the responsibility of DDF is to finance the construction of new developments and maintain them, this is where Norwegian funds should be utilized in the future, rather than for changing the role of DDF.
10. If Zimbabwean authorities decide that DDF should continue its drilling activities, Norwegian funds should be used in strengthening the District Administration's budgets directly in order that the DDF Water Division will compete for contracts along with MEWRD and private contractors.

### 7.3 **Recommendations.**

1. In the future, water supply developments should, as already suggested, be handled as a sector activity within DDF but including operation and maintenance of water supplies as a major area of activity.
2. Norwegian allocations should be used as far as possible to make provisions for water sector activities in the district administration's budgets directly.
3. The allocations should be specified on separat votes covering eg.
  - ground water supplies (boreholes and wells)
  - surface water supplies
  - maintenance and spareparts
  - transport
  - sanitation material
4. In addition to the total budget ceiling for the district administration, a maximum allocation should be set for each vote to such an extent that the sum of maximum allocations should be well above the total budget from one vote to another within each financial year.
5. The next programme agreement between the governments of Zimbabwe and Norway should still be based upon semi-annual disbursement requests, but limited to the actual use of funds by the districts.
6. Provision for capital equipments and other approved allocations for the DDF organization should be specified on separate votes, and not taken from the carry-overs from the districts.



## 8. DDF's WATER DIVISION.

### 8.1 Background.

In 1983, DDF procured 10 light weight drilling rigs with NORAD finance and plans are now in hand for the further expansion of their Water Division. All borehole drilling previously was contracted to the MEWRD who in turn subcontracted to private companies. DDF's recent entry into the field of drilling has caused considerable concern in professional, administrative and political circles.

Although the matter of DDF's responsibilities vis-a-vis those of the MEWRD has been referred to Ministerial level, it is hoped that the Mission's findings will serve as a guideline for the early resolution of this problem.

It is also noted that the NORAD Mission in Zimbabwe in June 1984 recommended that until this question has been resolved no further steps towards the purchase of additional rigs for DDF should be taken.

DDF started drilling boreholes in Mashonaland East in April 1984 as part of the in-service training of their two teams. Although training is underway, it will take several years before this operation can be run without more external assistance than at present.

### 8.2 The capacity of drilling rigs in Zimbabwe.

This table below represents the inventory of rigs in Zimbabwe and their estimated present annual capacity.

	Percussion rigs		Air drills				Total bore-holes
	No	bore-holes	Light		Heavy		
	No	bore-holes	No	bore-holes	No	bore-holes	
MEWRD	35	330	6	114	6	108	552
DDF	-	-	10	180	-	-	180
Pvt. Contractors	65	650	-	-	14	504	1154
TOTAL	100	980	16	294	20	612	1886

Figure 8.1 Total number of rigs in Zimbabwe and their present estimated capacity per year. (Source: MEWRD. November 1984).

The above tabel is based upon current production record of drilling rigs in Zimbabwe which is below the possible capacity within the country. For example the utilization of DDF rigs is only 25-30 per cent at present as compared with their estimated capacity. And the percussion rigs are reported to produce only



one borehole every 5 weeks.

If the efficiency of rigs were increased by proper logistical planning, adequate maintenance, timeous procurement of spares and good supervision of drilling operations, then the utilization of all rigs could be considerably improved. Percussion rigs might be able to drill one borehole in 2 weeks under favourable conditions. Assuming an increase of the utilization capacity of air drills to 75 per cent, then the existing capacity of rigs might be more than doubled. With more modest expectations, however, given proper planning, maintenance and operation of drilling fleets, the possible output of the existing rigs should be more than 3000.

For 1984/85, DDF have been allocated funds from NORAD for an estimated 391 boreholes of which DDF can be expected to drill about half - the remainder being given over to MEWRD to drill a further 575 boreholes in both resettlement and communal areas.

According to existing levels of capacity utilization, this will mean that while DDF and MEWRD are fully utilized, 80 per cent of private contractors' rigs may be idle. If, however, there is only a small increase in the efficiency of DDF and MEWRD operations, then private contractors cannot expect any Government drilling contracts during the current financial year.

### 8.3 **Division of responsibilities between MEWRD and DDF.**

In the ongoing discussion on the division of responsibilities between these two organizations, the MEWRD views itself as a technical Ministry and as a consultant to all other Government Ministries and Departments on water resources development. The DDF's main attribute, on the other hand, is its responsiveness to the needs of local communities in the communal lands. Whereas the proper concern of the MEWRD is at a macro level of planning, coordination and construction, that of the DDF is at the micro level of construction and maintenance of water supplies.

In principle, therefore, where specialised geophysical, hydrological, technical, legal or administrative expertise relating to water supplies is required, the matter might most properly be dealt with by MEWRD. On the other hand, where installation, construction and improvements can be made to water supplies which involves the local community, the responsibility might best be delegated to the DDF. This division could be further refined by stating that the primary role of MEWRD should be in the construction of water supplies, whereas the DDF's primary responsibility should be in the maintenance and improvement of water supplies.

Using these criteria the division of responsibilities could be made by relating the prime functions in water supplies (coordination, planning, construction and maintenance) to the various levels of water supply technology (from large dams, on the one hand, to wells, on the other).



Figure 8.2 suggests some clear divisions of responsibility in that:

- all rural water supplies are **coordinated** by MEWRD
- all water supplies, with the exception of large dam and irrigation schemes are **maintained** by DDF
- responsibility for the planning and construction of water supplies varies according to the level of technology.

#### 8.4 **Responsibility for drilling boreholes in the communal lands.**

In order to justify a transfer of responsibility for drilling operations from MEWRD to DDF, there needs to be established an overriding necessity and cogent reasons for such a transfer.

The DDF's initial request for drilling rigs was based on their claim that MEWRD did not have the capacity to implement DDF's borehole drilling programmes which resulted in under-expenditure on DDF's water supply budget. It was shown earlier in this chapter, however, that at present there is a great deal of excess drilling capacity within the country.

Subsequent to DDF's acquisition of the rigs, they justified their decision by claiming that:

- DDF have a statutory responsibility for all water supplies in the communal lands;
- DDF has the organisational capacity and workshops at district level;
- DDF requires flexibility in its drilling operations;
- DDF can drill more cheaply than MEWRD.

#### **Statutory responsibilities.**

According to the MEWRD policy document of May 1984, one of their principal functions is the:

"Formulation and administration of Government policy on the development of the water resources of the country."

The MEWRD maintains that Government Law and Regulations in the Water Sector make it clear that drilling of boreholes is their responsibility.

Although the DDF has the responsibility for water supplies in communal areas, historically these have been constructed by the MEWRD, DDF's role being to finance and maintain rural water supplies. DDF now maintain that they are empowered by the DDF Act to take over borehole drilling in the communal lands.

#### **Organizational capacity.**

DDF have also subsequently claimed that they have a sound technical back-up at district level and that they have strong links with the local community. It is evident, however, that



	LARGE AND SMALL DAMS				IRRIGATION SCHEMES		PIPED WATER SCHEMES		BOREHOLES	WELLS
	Large	+ 5 m	- 5 m	Weirs	Large	Community	Large	Small		
COORDINATION	MEWRD	MEWRD	MEWRD	MEWRD	MEWRD	MEWRD	MEWRD	MEWRD	MEWRD	MEWRD
PLANNING	MEWRD	MEWRD	MEWRD	DDF	AGRITEX	DDF	MEWRD	DDF	MEWRD	MOH
CONSTRUCTION	MEWRD	MEWRD	DDF	DDF	AGRITEX	DDF	MEWRD	DDF	MEWRD	MOH
MAINTENANCE	MEWRD	DDF	DDF	DDF	AGRITEX	DDF	DDF	DDF	DDF	DDF

Figure 8.2 A Possible division of responsibilities for rural water supplies.



certain elements of drilling operations require little in the way of local participation.

If borehole drilling is viewed essentially as a coordinated technical operation which necessarily requires centralised planning at the national and provincial level, then the fact that DDF is represented at district level is of little importance.

### **Flexibility.**

DDF have claimed that they require the flexibility to move quickly, if necessary, into areas of critical water shortage. However, this need is not consistent with the optimal utilization of their drilling equipment. Because sophisticated drilling rigs are used with high capital depreciation and running costs, their efficient utilization is essential.

At present, the utilization capacity of the DDF drilling rigs is only 25-30 per cent. A higher utilization will require the concentration of drilling operations by blanketing one area before moving on to the next. Unfortunately, such concentration does not allow for the flexibility which DDF desires. In fact, it could be argued that MEWRD with many more different types of drilling rigs would have greater flexibility than DDF.

### **Drilling costs.**

Finally, DDF have claimed that they are able to sink boreholes at a much lower cost than MEWRD. While it is acknowledged that MEWRD's cost do appear to be inflated there has not been any direct cost comparison between the 2 organizations to ensure that the basis of their respective costing systems are the same (see chapter 9.1). In spite of DDF's claims, their cost effectiveness appears to be questionable in the light of the very low utilization capacity of their rigs.

## **8.5 The feasibility of a DDF Water Division.**

DDF intend to extend their activities at the end of 1984 to include dam and weir building. Heavy machines have been purchased by the use of NORAD funds and are expected to arrive shortly.

In order to satisfactorily administrate, plan, handle and maintain all the equipment, DDF have decided to build stores, offices and workshops to accomodate the personnel and machines of the Water Division.

Apparently, technical assistance has already been granted to DDF for their drilling and dam construction programmes. These include a Project Manager, a Water Engineer and a Drilling Manager. With this help DDF is confident that they will be able to cope with their work load.

The MEWRD claim that the build up of 2 Government organizations



within the water sector will cause costly duplication of technical, administrative and training functions as well as unnecessary competition for technical and professional staff, financial resources and equipment which will inevitably result in a lack of cooperation and coordination. Also of concern is the fact that DDF did not inform MEWRD of their intention to acquire the rigs and now see this acquisition as a precedent to establish a Water Division.

But the establishment of the Water Division should first and foremost be viewed in the light of priorities regarding DDF's present responsibilities for water supplies in the communal areas. Already there are severe strains on DDF's resources and its ability to maintain existing water supplies, let alone cope with the marked increases in wells and boreholes which continue to be constructed in the communal lands. There is also an urgent need to improve and upgrade existing water points as well as assist MOH in their well digging exercise by providing technical back-up, materials, storage facilities and transport. In view of the above, the desirability to allocating limited resources for the build up of a Water Division within DDF is questionable.

## 8.6 Conclusions.

1. The Mission has found no reasons justifying the procurement of drilling rigs by DDF. Although all DDF's drilling rigs should be fully operational and the MEWRD's fleet is nearly operating to capacity, most of the private contractor's drilling rigs can be expected to lie idle in the foreseeable future.
2. The costs in duplication and the resultant competition and lack of cooperation and coordination in building two parallel water divisions within the MEWRD and DDF, respectively, mitigates against the establishment of a water division in DDF.
3. The Mission is of the opinion that MEWRD, should continue to be responsible for the coordination, planning, construction and control of rural water supplies. To strengthen planning and coordination it is suggested that a National Coordination Unit be attached to the MEWRD.
4. In terms of costs, staffing, funding, planning, cooperation and coordination, it is preferable for drilling operations to be carried out by one Government organization. In view of the MEWRD's large drilling fleet, its experience and historical role of drilling in the communal areas as well as the fact that there is little evidence or any overriding necessity which justifies the transfer of responsibility for drilling boreholes from MEWRD to DDF.
5. In view of the excess capacity and under-utilization of DDF's drilling capacity there is no need, at present, for the purchase of new drilling equipment.



6. The utilization capacity of the existing fleet of drilling rigs could be substantially improved by geographically concentrating and coordinating the drilling programmes. including timely procurement of spares, adequate maintenance and proper supervision of drilling operations.
7. As the prime responsibility of DDF is the maintenance of water supplies, any future build-up of DDF's Water Division should have the approval of MEWRD.
8. If the drilling division must remain with DDF then cooperation between DDF and MEWRD should be formalised to ensure proper planning and coordination of drilling programmes and that the quality of such drilling and pump installation be controlled by MEWRD.
9. Unless there is a large increase in DDF's expenditure for maintenance and improvement of existing water supplies, DDF will find it difficult, if not impossible, to maintain existing water supplies, let alone cope with improvements at water points and new installations. It is suggested that DDF should concentrate its financial, capital and human resources on the proper maintenance of existing and future water supplies.

#### 8.7 Recommendations.

1. It is recommended that in the future, priority for NORAD assistance should be accorded to DDF to ensure their maintenance capacity as well as improvements of all existing water supplies.
2. It is recommended that NORAD should not grant any further financial or technical assistance for the further build up of DDF's Water Division until there is an agreement between DDF and MEWRD which clearly defines their respective responsibilities in the construction and maintenance of rural water supplies. Nor should further aid be granted for the acquisition of capital equipment until NORAD fully understands the implications of such aid they may offer.
3. Any further NORAD assistance to DDF should take account of the use to which funds from other donor agencies are put in DDF's water supply and maintenance programme.



## 9 COST-EFFECTIVENESS OF BOREHOLE DEVELOPMENT.

### 9.1 Boreholes vs. more cost-effective alternatives.

In the larger part of the communal lands boreholes have been considered the only option for perennial community water supply. DDF has therefore put emphasis almost entirely on borehole drilling for primary water supply.

MOH has a general responsibility for development of shallow wells. In some areas with favourable conditions wells can replace boreholes as a perennial source. In other places shallow wells can provide a safe source during some months of the year and they will dry up before rains can again recharge the shallow aquifers.

The NWMP study will provide a mapping of hydrogeological provinces in Zimbabwe with a view to guide water development efforts. In this connection one should also remember that other options may be feasible, e.g. spring development, rainwater harvesting, dam construction, etc. A minimum of planning including identification of available options and cost calculations is essential for an optimum development of the water resources.

It is in this context that the cost-effectiveness of borehole development should be considered in the future. A secondary level is to scrutinize the operational cost of borehole drilling and pump installation with a view to identifying savings and cost-effective construction methods.

### 9.2 Cost of shallow wells.

Shallow wells ought to be considered as a possible option for cost-effective community water supply in many locations of Zimbabwe. It is therefore of interest to see what they cost under different circumstances. The below cost figures refer to shallow wells up to 10 m, fitted with low lift pump either of the Blair-Prodorite or the type imported by UNICEF.

- Binga District, UNICEF/DDF:  
\$ 800 - \$ 1.000 per well, paid labour, incl. project overheads.
- Matabeleland, Lutheran World Federation:  
Up to \$ 2.000, hand dug wells 1.5 m dia, 1.2 m dia when sunk in rock (blasting), partly free labour.
- Ministry of Health, march 1984:  
Paper on shallow wells and Blair latrines to meet IDWSSD targets in Zimbabwe. Government materials subsidy \$ 170 per well (cement, reinforcement/hand operated auger, shallow well pumps). Free labour is assumed. The costs of MOH supervision and overheads are not included. Allowing for partly free labour, but adding for project overhead costs it is reasonable to assume a cost per well of



**\$ 1.500.** It would also be offered to groups of households that they may carry out all the work themselves and receive certain material inputs free (cement and pump), say at a cost of **\$ 500.**

Thus for each borehole it is possible to construct anything between 5 and 15 wells depending on local conditions and degree of community efforts. The importance of this mode of supply is emphasised by the fact that:

- 60 - 70 per cent of the rural population enjoying improved water supply uses shallow wells (MOH).
- Potentially 60 per cent of the land where there is granite bedrock is suitable for shallow wells; large part of South West Central and North East Zimbabwe, and also some 30 per cent of the land in the southern part is suitable.

### 9.3 **Drilling costs in general.**

DDF is claiming that their drilling operations are considerably cheaper than execution through MEWRD. MEWRD on the other hand claims that DDF's cost calculations are unrealistic.

#### **Cost components.**

Costs of borehole construction are quoted within a wide range internationally. Although the price level may vary from country to country the main reason for discrepancies is differences in the basis of cost calculations. For correct comparisons the following elements should be accounted for:

- Depreciation on all equipment
- All spares and consumables
- Materials and equipment for the complete installation
- Staff for drilling, installation and supervision.
- All back-up services (mechanical repair, transport, overhead costs)

In addition the success rate of drilled boreholes is important. Costs should be compared on the basis of total input both per drilled hole and per productive borehole.

#### **Other factors.**

The use of capital intensive technology (e.g. heavy duty high speed drill rigs for down-the-hole (DTH) air powered operation) requires efficient operation in order to be viable. This requirement is clearly in conflict with a community participation approach.

Cost-efficiency also includes paying attention to reduced future maintenance and foreign currency requirements.



## 9.4 Drilling costs in Zimbabwe.

### MEWRD drilling.

Drilling with government owned rigs is carried out by the Provincial Water Engineer (PWE) in all provinces except in Masvingo and Manicaland. When drilling for DDF the PWE is authorized by a signed Z-form (interministerial "contract"). Basically the drilling is charged at cost, i.e. all-inclusive rate per meter for rig with crew and materials plus certain charges for test pumping, pump installation, mobilization etc.

Costs range from \$ 4.000 - \$ 8.000. per borehole. Much of the work is carried out with percussion rigs. Efficient utilisation of equipment and labour is often lacking, partly due to bottlenecks in the government supply system.

The capacity to supervise drilling in the field is negligible.

### Private contractors.

In Masvingo and Manicaland the PWE will always hire private contractors to drill for DDF. In other provinces contractors may be hired to augment PWE's capacity. The contractors also use percussion rigs to a large extent. The costs range from \$ 3.000 - \$ 5.000 plus administrative overhead costs charged by MEWRD, thus effectively bringing costs to the same level as for government drilling.

Supervision in the field by PWE is negligible. No information is available on the success rate except that a drought relief programme in Masvingo had 93 per cent wet boreholes and only 7 per cent dry.

### International contractors.

As part of the drought relief programmes international tenders have been invited on some occasions. For the NORAD financed crash programme in the 3 Mashonaland provinces the total cost for 400 boreholes are composed of:

foreign contractor, full completion	\$ 2.5 mill.
supply of pumps	\$ 0.6 mill.
consulting services, supervision	\$ 1.5 mill
total	\$ 4.6 mill.

or \$ 11.500 per borehole.

It should be noted that consulting services include a substantial component of communication support and social science in addition to engineering.

Local contractors quoted a price which was 24 per cent higher than the accepted tender from a contractor based in Botswana. During 1983 a Botswana contractor was also awarded the contract on the drought relief programme financed by EEC in Masvingo. The



contract prices were about 20 per cent below those quoted one year later for the Mashonaland programme. British consultants were used and the success rate was 77 per cent.

Another drought relief programme is implemented for MEWRD by a Japanese consortium. Each borehole is costing as much as ca \$ 13.000. This figure however includes the procurement of drill rigs which will later be taken over by Zimbabwe at a considerable salvage value.

#### **DDF drilling.**

After an initial period of training at Hunyani Training Centre DDF started drilling in the field on 21 April, 1984. 154 boreholes of which 21 were dry were drilled by 8 LWD rigs by the end of the budget year.

Each rig took an average of 9 days to complete one well. The work was carried out as on-the-job training. Normally the production rate would be 2-3 wells per week of 6 working days, including reasonable transport.

DDF has calculated the drilling cost at **\$ 3.300 per well**. A completed well including handpump and proper headworks brings the total to **\$ 5.000 per well**. DDF cost calculations seems to include all relevant elements. Provided a somewhat better drilling rate can be achieved the estimate appears realistic.

#### **9.5 Cost comparison with NORAD Project in Tanzania.**

The Mission has been given access to cost calculations from the NORAD financed project in Rukwa, Tanzania. The drilling operations are managed by a Norwegian firm of consulting engineers mainly with local drilling and pumpfitter crews.

The total cost per well is estimated at ca **\$ 4.450** excluding dry holes, general overheads and pump installation. Each successful well (70 per cent, 50 m deep) fitted with a handpump for 30 m lift, excluding again the general overheads, costs ca. **\$ 7.450**.

The general cost level in Tanzania is probably higher than in Zimbabwe, but the major cost items would be similar. The project is well documented with a detailed accounting system.

#### **9.6 Cost-effectiveness of equipment.**

Percussion rigs are simple, cheap and reliable. The fuel consumption per m of borehole is very low. The slow production rate (1-4 m per day) implies high labour costs as the crew is approximately the same as on a high speed drill rig.

DTH rigs with air hammers and normally hydraulic torque and feeding are complicated and have a high fuel consumption (typically 3-5 l per m hole). LWD rigs are by virtue of the small size not very expensive but the heavy duty rigs may cost anything from \$ 200.000 upwards, excluding accessories and



service vehicles, etc.

For a heavy duty DTH rig depreciation alone may account for 15 - 20 per cent of the borehole costs, or say \$ 800. The costs of keeping the crew on the respective types of rigs are per 50 m borehole:

- percussion rig, 25 days at \$ 50	\$ 1.250
- DTH rig, 3 days at \$ 50	\$ 150

The cost of the crew has been assumed to be \$ 50 per day for 5 men.

In financial terms the air rig may therefore come out as more cost efficient. If the equipment is supplied on grant terms by a donor it may appear even more attractive due to lower operational costs. However, in economic terms additional employment paid for in local currency should be favoured. Neither do the percussion rigs require a substantial input of other foreign currency elements.

#### 9.7 Maintenance costs.

The overall cost effectiveness of borehole or shallow well development also depend on the cost of procuring, installing and maintaining the selected handpump. Whereas the cost of an installed pump can be determined accurately the future maintenance requirements are more difficult to assess. The recurrent funds for handpump maintenance should however cover both preventive maintenance (local caretaker), minor repairs to the wellhead (local caretaker), major repairs (district based mobile maintenance) and rehabilitation/ replacement (mobile maintenance or installation crew).

As shown in a case study for Masvingo Province at least \$ 150 should be allocated annually for maintenance of each handpump (as opposed to the present allocation of \$ 80). Thus the discounted value of maintenance cost is a considerable portion of the total present value of a borehole installation. Accordingly a well designed handpump with low maintenance requirement and long life expectancy will contribute towards reduced overall costs.

The so called Bush-pump which is being used almost exclusively on boreholes in Zimbabwe is considered to be maintenance intensive (leather seal cups, no proper bearings, difficult to align properly etc). On the other hand it is simple, heavy and robust, well suited for local manufacture and maintenance (except for the weight).

#### 9.8 Conclusions.

1. There has been an over-emphasis on borehole development at the expense of shallow wells and other technological options. The need for perennial sources during the drought period has promoted this trend. Furthermore the District



Administrators have one major water supply vote which traditionally has been spent exclusively on borehole development, thus discouraging integrated water resources development.

2. Proper criteria and cost calculation procedures must be established for selection of appropriate location and mode of water supply. The aim shall be to pursue the most cost-effective strategy for a given service level. In this field better planning and professional advice to the District Administrators are important measures towards more cost effective development.
3. The cost of borehole drilling in Zimbabwe is well above the level prevailing in neighbouring countries with a similar infrastructure. This is demonstrated by the fact that contractors from Botswana are highly competitive in Zimbabwe in spite of their mark-ups for mobilisation and unfamiliar conditions.
4. The contractor prices are probably determined to some extent by the costs of MEWRD's departmental drilling. MEWRD's high cost level is a result of excessive production time per hole (slow progress). This relates to the type of equipment and probably to inefficient supervision and utilization of labour. Recent experiments by MEWRD to reduce costs prove that there is scope for considerable improvement.
5. DDF's drilling operation show a potential for drilling at a lower cost than current contractor/MEWRD prices in Zimbabwe. Efficiency improvements will contribute towards further cost reductions (drilling of 2 holes per rig per week instead of 1 only). It is believed that the concentrated operations with several rigs within a limited area is highly efficient in terms of reduced logistics and back-up service cost.
6. The LWD rigs might be versatile, but will not be suitable under all conditions. However, in combination with one or two heavy duty DTH air rigs and even some percussion rigs a fleet of the LWD rigs could possibly serve efficiently all areas of Zimbabwe. It is the Missions tentative suggestion that the fleet of 10 LWD rigs already with DDF should be operated together with 2 heavy duty air rigs and 5 percussion rigs. This should not be taken as a specific support for further build-up of DDF drilling capacity, as the LWD rigs could just as well be transferred to MEWRD where other rigs are already available.
7. Proper siting and supervision can easily result in improved drilling performance (progress and success rate combined) amounting to 20 per cent additional production. Thus each high speed drill rig can increase monthly production with 2 boreholes. If successful their value is about \$ 10.000. This indicates that even the use of



expatriate consultants at the cost of \$ 12.000 per month could be well justified.

8. The nature of percussion rig drilling does not justify the omission of proper supervision. More rigs can be supervised at the same time, probably resulting in more extensive travelling by the supervisory staff.

## 9.9 **Recommendations.**

1. In the future agreement for the programme, primary water supplies should be interpreted to include the construction of wells where these are considered feasible, cost-effective alternatives to boreholes.
2. The provision of high speed drilling equipment can be justified only as part of a modernisation process as replacement for outdated percussion rigs with low productivity. The overall drilling capacity in the country should not be increased.
3. There is a general need for professional back-up of borehole drilling. Improved supervision will contribute to reduced costs. NORAD should consider favourably requests for technical assistance to MEWRD (alternatively to DDF) in the field of hydrogeology or geophysics.







## 10. TECHNOLOGICAL FEASIBILITY.

### 10.1 Drilling rigs and equipment.

#### Drilling rigs.

Zimbabwe at present has some expertise both within the MEWRD and in the private sector to operate air rigs. In the face of a very high demand for borehole drilling in the rural areas a substantial fleet of 26 air rigs has been built up. Although about 100 rather antiquated percussion rigs are owned and operated by the MEWRD and contractors, these will continue to play an important role, for example, in areas where access is difficult, and where the geology dictates the use of percussion drilling. MEWRD also reports to have good experience in using percussion rigs in the upper strata of overburden and using air rigs in the deeper layers, in particular consolidated rocks.

It has been claimed that the 10 LWD Swedish air rigs are too small, underpowered and fragile for Zimbabwean conditions and that:

- they have a limited capacity in terms of diameter and drilling speed.
- the power capacity is too small to pull out the drill in case it gets stuck.

The Project Manager, at present representing the Swedish manufacturer of the rigs, confirmed that the rigs are less suitable for Zimbabwean conditions, but that so far no difficulties had been experienced with drills getting stuck. Although the light weight air rigs are versatile, they cannot drill successfully in unconsolidated formations (e.g. Kalahari sands) or to depths much greater than 60 meters. As such it has been suggested that Norwegian manufactured mobile rigs which have a higher capacity would be more appropriate.

A locally manufactured rig, the medium duty "Impact" Air Drill, has been examined by MEWRD drilling specialists during operation. According to the Ministry, this machine appears to be extremely good and well suited to the drilling conditions usually encountered in Zimbabwe. The rig has not yet been engaged on Government work, because of the contraction of demand for drilling.

Although the wide variety of drilling rigs in Zimbabwe allows drilling under almost all conditions, such a variety is most undesirable in terms of obtaining spares, foreign exchange and maintenance; particularly of the large and sophisticated compressors. It would seem prudent, at this stage, to test a number of drilling rigs and standardize on those which cover the range of drilling conditions found in Zimbabwe.



### **Hand operated drilling equipment.**

The locally manufactured hand operated auger which can apparently be used to drill to a depth of 30 m, recently won a price at Bulawayo's Trade Fair.

A number of these rigs have now been made and about a dozen are presently being used by MOH in Masvingo Province with encouraging results. The rigs may also have a role in site testing as part of a well digging programme.

Two basic hydro-geological conditions are necessary for their use. The first is ground-water relatively close to the surface and the second is the absence of rocks, including boulders. According to the MEWRD, the success of its use will depend at least on a minimal level of specialised technical assistance because geological conditions favourable for this type of equipment are highly localized in Zimbabwe. As such, there is a need to define and map out those areas where the hand operated drill has a higher chance of success.

Hand augers obviously cannot replace conventional drilling operations but could certainly complement them if their operation was properly integrated and coordinated in an overall programme of drilling shallow and deep boreholes.

## **10.2 Water Pumping Technologies.**

There are 3 main institutions in Zimbabwe conducting research into water pumping technology. Blair Research Laboratories, the Institute of Agricultural Engineering and the MEWRD.

### **Blair pump.**

The Blair Research Laboratories which fall under the MOH have been in the forefront of the well digging programmes and as such developed a low lift hand pump suitable for depths of up to 11 meters. The Blair pump was originally designed to be made from readily available galvanised piping and standard fittings. Subsequently, a local manufacture of pvc tubing and mouldings, substituted its own pvc tubing for many of the original galvanised components, and went into production in 1980.

### **Bucket pump.**

In 1983, a simple bucket pump for raising water was designed and manufactured. This pump uses a traditional windlass to raise and lower a bucket which slides inside a 125 mm pvc casing into the well water. Water passes through a non-return valve at the bottom of the bucket which closes when the bucket is full and raised. When the bucket pump is not in use a steel cap protects the opening of the well.

Although each bucket raises only 5 litres of water at a time, their simplicity makes them very reliable, and the total cost of the unit is less than \$ 250,00. Bacteriological studies



undertaken by Blair show that the quality of water raised by such pumps is not inferior to that raised by hand pumps.

#### **Bush pump.**

The bush pump is one of the longest established and most widely used designs. The chief advantages of the bush pump are that it is robust, it can lift water from a considerable depth, and it has become so widely used that spares are readily obtainable and, also, DDF teams are familiar with its maintenance.

The MEWRD is working to improve its installation and design in 2 major respects. The first is to reduce the cost of the pumps by reducing the material content and size. The second is to add an attachment to the bush pump which can be used to jack out the downhole components of the borehole by using the leverage mechanism of the pump itself. This is believed to be a major step forward in making it possible for village level maintenance to really work.

#### **Other pumps.**

Apart from the Blair, bucket and bush pumps, Zimbabwe has standardized on 3 other hand pumps for use in the rural areas: the Bumi, the Nsimbi and the Mono.

Although other pumps are brought in by foreign donors and NGOs, there is at present complete agreement on the need to standardize the use of hand pumps between all the principal organizations involved in the installation of primary rural water supplies, and it has been agreed that the 6 types of pumps mentioned above will be the only pumps used in future.

The Institute of Agricultural Engineering have conducted research into a number of alternative energy pumping devices including solar, wind and animal power - as well as hand pumps.

### **10.3 Water supply technology.**

The water supply technologies for the rural areas include small dams, weirs, piped water schemes, boreholes and wells.

Whilst the technologies themselves might be appropriate for rural Zimbabwean conditions, the application of the technologies are often inappropriate. One example of this is the well digging programme of the LWF in Matabeleland where in many cases, it would have been more appropriate to sink a borehole. Conversely, in Mhondoro it was reported that boreholes have been sunk in an area which was well known for ground water near the surface and where wells would have been more appropriate and much less costly.

This haphazard and uncoordinated installation of water supplies by various NGO's and Government Ministries/Departments is caused by the lack of integrated information on hydrological, geographic and demographic information as well as information



relating to the status of existing water supplies at district level. There is therefore no planning procedures at the moment to single out the most appropriate water supply technology for a particular area.

#### **Small dams and weirs.**

According to DDF, provisions have been made for the present financial year for the construction of 10 dams and 2 weirs. In some areas where there is no groundwater potential or where the water is saline, dams might be the only feasible solution.

In many instances dams will be a very cost-effective solution if water from the dam can also be used for irrigation, breeding of fish and watering of cattle.

Water taken from dams is often highly contaminated. Recent preliminary findings from chemical and bacteriological tests of dam water indicate that the water is often unfit for human consumption.

Dam building projects often include community participation as a vital component. Several recent projects have been done on the basis that all manual labour is provided by the community members themselves, mostly women, who are not paid as such, but receive food-for-work.

In order to up-grade the quality of raw water, in particular when abstracted from dams or streams, filtering may be desirable. The method should preferably be one which not only removes solids but also reduces the bacteriological contamination considerably.

Slow sand filters have been studied and developed in a world-wide programme supported by WHO recently. Appropriate designs have been made and tests show that the bacteriological quality is excellent when properly operated.

One system for large scale water filtering is produced in Zimbabwe by Water Associates and Equipment (Pvt).

Another alternative in-situ filtration process is to draw off the water through slotted drainage pipes laid in a gravel/sand trench constructed in the dam or riverbed. If the bed is subject to siltation it may be necessary to rake off the silt cover just above the trenches.

#### **Piped schemes.**

At district level, DDF officials were particularly keen on piped water schemes especially where there was a prolific supply of water and where the recipient population was settled in such a way that warranted the installation of piped water.

The major drawback to piped schemes is the often high cost of installation (non-gravity schemes) and the fact that a breakdown



can deprive a very wide community of water.

Although the NWMP survey covered only 4 piped DDF water schemes, the experience of these schemes have not been encouraging in that they were inadequately planned and designed.

Apart from the fact that DDF claimed to have financed piped water schemes where they had not yet been installed, Zimconsult's socio-economic survey identified serious problems at the piped water schemes they visited. At Nyajena and Zhombe community members complained that the water supply was only rarely switched on and that the taps were often dry. In Binga, a fairly sophisticated supply tank and tap scheme covered a radius of approximately 10-15 kms. No less than 4 of the 5 supply tanks were empty and the one full tank was grossly over-used, serving as it did the entire community and the secondary school on whose premises it was located.

### **Boreholes.**

The last couple of years has seen an intensive drought relief borehole drilling programmes. One of the main problems appears to be the inexperience of drilling under local conditions. It is, for example, a matter of some concern that the percentage of dry wells drilled by EEC contractors in Masvingo Province was 23 as compared to only 7 per cent of MEWRD and private contractors. This has serious repercussions not only in terms of water supplies, but costs. Similarly, the MEWRD has had to offer advice to the Japanese team who are now, apparently, sinking boreholes in line with MEWRD specifications.

Perhaps the most serious weakness in the borehole supply programme is the lack of basic facilities at the water point. MEWRD and contractors are only required to sink the borehole and install a pump. The result is usually muddy and unhygienic surroundings. In most areas the water point is not fenced and watering troughs for animals are not provided. This results in the constant presence of livestock at the water point, drinking, defecating and wallowing in muddy surroundings. Another activity often carried out at the water point is the washing of clothes by women and thus there is a need to provide washing slabs as well.

This is now a well recognized problem in MEWRD, DDF and MOH, and basic designs are in hand to undertake improvements and upgrade the water points.

There is also a growing realization of the need to upgrade the pumping mechanism of the borehole by using alternative energy and pumping devices to increase the output of boreholes so that their use may possibly be extended beyond primary domestic use to the need for watering of gardens.

### **Wells.**

The initial impetus to improve primary water supplies came from



the MOH when, before the war, they set about upgrading unprotected traditional wells. Health assistants would provide the technical advice, and cement would be provided through the MOH. This extension and upgrading programme lead to the development of the "Blair pump".

The MOH has the widest coverage and the largest number of extension workers of any Ministry. The procedure has been for Health Assistants to discuss with villagers how they will finance and organize the construction of a well and to offer assistance by way of cement and handpump, transport sometimes being provided by DDF. Similar assistance is given to families who dig ventilated pit latrines.

The Ministry does not have a separate financial vote for water supplies, but has a Field Vote which may be used for materials, should the Provincial Medical Director so decide. In Masvingo Province it was said that the programme of constructing latrines was severely hampered by a lack of funds for cement.

Since independence, the Lutheran World Federation (LWF), UNICEF and Save the Children Fund have been active in well digging programmes, mainly in Matabeleland Province.

More recently, DDF has in some areas assisted local communities to dig wells. In Chivu, for example, successful cooperation between DDF and the local communities have resulted in the provision of water at a number of schools and clinics. While digging was organized by the community, the DDF supplied concrete culvert piping to line the well and blasted rock for the local diggers. The main advantages of such a programme are that:

- wells are close to those in need
- wells cost far less than boreholes
- Reliance on operations and funding by Government and donor agencies is minimized
- it complies with current efforts by MOH, LWF and UNICEF

#### 10.4 Conclusions.

1. Although the wide variety of drilling rigs in Zimbabwe are suitable for most geographical conditions and areas in the country, this assortment of rigs is clearly undesirable in terms of the availability and supply of spares and the operating and maintenance expertise required. It would be prudent at this stage to set down certain criteria to test a range of drilling rigs with a view to standardizing the Zimbabwean fleet which can cope with the range of geological conditions found in the country. Guidelines should also be laid down for terms of agreement for drilling operations within Zimbabwe carried out by donor countries and NGOs.
2. Hand operated drilling equipment is currently being used with encouraging results. However, the success of its use



will ultimately depend on the mapping of areas in Zimbabwe which favour the use of this type of rig.

3. A small standardized range of tried and tested simple hand pump which are all locally produced are now used in all rural water supplies in Zimbabwe. As such, the chances of success for a community based construction and maintenance programme are very good.
4. There is a large measure of community participation in the current dam and well construction programme of Lutheran World Foundation and it is considered that their experience in this fields could serve as a model on which to base the DDF dam and water building programme. It is essential that DDF consult MEWRD on the design and construction of the dams and that Agritex be involved in the conservation and protection of the catchment area as well as the design for irrigating community gardens.
5. Piped water schemes are very convenient and can be designed to supply water for small gardens. Their main disadvantage is usually the costs and as such this amenity should be paid for by the local community, unless, of course, there is an overriding need for a piped water scheme in preference to a less costly water supply technology. In view of the generally poor design of the DDF piped water schemes it is suggested that the Ministry exercise some control over the installation of the scheme.
6. Boreholes need to be upgraded as necessary by the provision of cattle drinking troughs, washing slabs, run-offs for excess water, and fences, and where the borehole yield is sufficient, consideration should be given to attaching an appropriate pumping device to the borehole to optimize the use of available ground-water.
7. DDF could usefully involve itself in the MOH well digging and latrine construction programme by the provision of back-up services. They could, for example, purchase store and transport materials, supply concrete culvert piping to line wells, provide blasting services when local diggers strike rock and offer technical advice on the construction of the well and maintenance of the pump.

#### 10.5 Recommendations.

1. In the future agreement, funds should be earmarked for improvement of existing water supplies, i.e. through construction of troughs, slabs, fencing, run-offs etc.
2. It is recommended that NORAD should support initiatives towards national coordination of water supply programmes, and in particular the utilization of diversified technologies more appropriate for local conditions.
3. Funds should be made available for piped water supplies



only when they are economically justified and their technical design and supervision have been secured by MEWRD.



**11 REPORTING.****11.1 Findings.****Budget and plan of operation.**

After the budget figures are made available by the Ministry of Finance, it is possible to plan in detail the forthcoming year's activities. For DDF head office this seems to amount mainly to an exercise with cost figures as far as the water sector is concerned. The same applies at the provincial level, in particular because the Provincial Administrator has merely an advisory role in relation to the District Administrators.

Although the District Administrators have specified reporting responsibilities and are subject to cost control and government audit, it appears that they enjoy a rather autonomous status in terms of project and maintenance planning. Firstly the District Administrator would rarely hold professional qualifications and secondly the professional support from PWE's office is virtually non-existent partly due to a lack of PWE capacity and partly not requested by District Administrator.

The Mission could not verify that there is a specified format for a district's plan of operation. It is believed to be left to the District Administrator to formulate one as best he can. The available technical advice would mainly be from the local Field Officer.

At provincial level and in headquarters the activities seem to be viewed only in terms of funds available. In DDF centrally there does not seem to be a proper plan of operation where physical work and tasks to be carried out are specified against the cost estimates and funds available. Without such a management tool it is almost impossible to direct activities of the magnitude assigned to DDF.

**Progress reporting.**

The bilateral agreement between Zimbabwe and Norway is vague in terms of reporting requirements. The question is whether DDF's reporting procedures are adequate for the type and size of activities the organization is responsible for. Furthermore NORAD may also wish to state more specific reporting requirements in new bilateral agreements.

A set of procedures exists within DDF and the Government as a whole for budget preparation, financial reporting and physical progress reporting. It is the Mission's opinion that these procedures which have existed for a long time, are followed consistently.

The respective District Administrators are responsible for planning and reporting on activities in their districts. The accounting returns are retrospective and provide for financial control by provincial and central authorities. It appears that the District Administrators do not prepare a proper forecast of



expenditures to inform the same authorities, but it is believed that some of them do it for their own planning.

The accounts available to DDF do not reflect properly the category and place of expenditure. Within well functioning routines this can probably be improved upon without particular difficulty.

The Mission has not been able to establish that DDF is compiling or keeping records of physical progress of works, although it was claimed that new procedures are being established. The lists submitted to NORAD (and also serving DDF's internal needs) show accumulated totals at the end of each month for the respective categories of works (boreholes, dams, piped supplies, etc.). Details of work in progress or expected to be commenced or completed within the next reporting period are not given.

These progress reports contain some conflicting information e.g. that the accumulated total is decreasing from one month to another. It has been stated by DDF that the accumulated total (e.g. 6662 boreholes as of 30th June, 1983) does not necessarily reflect the total number of objects reconstructed/constructed. Repeated visits to the same object may have been counted once for each visit.

DDF has issued a number of reporting forms to be used by the District Administrators and Field Officers. Some of these are listed below:

- DDF form 1: Monthly construction return
- DDF form 2: Monthly maintenance return
- DDF form 3: Monthly construction returns for water supplies
- DDF form 4: Monthly maintenance return for water supplies
- DDF form 5: Project-Certificate of Completion

Obviously these might form a good basis for developing a consistent reporting system. What must be added is information estimating projections for non-completed works. Furthermore the information must be compiled and forwarded through the system in a format which allows the DDF management to act on irregularities.

Reporting routines for equipment (inventory and maintenance) and other facilities have not been investigated in any detail. Based on earlier NORAD review reports the Mission believes a relatively good system exists. Again, however, the magnitude of activities seems to be about to stretch DDF's capacity beyond its present limits.

#### **Programme Management.**

Good management can only exist in an organization where appropriate information is readily available. It follows from the above that the DDF managers are hardly informed of the physical progress and the financial information provided is mainly retrospect.



Communication of information and direction of activities require an organisational structure with well defined responsibilities and lines of command. The present organisation of DDF does not fulfill this requirement. However, the adjustments to be made are not very substantial except that staff with technical competence must be placed in the head office administration to assist in the management decisions.

The District Administrators seem to do their utmost to comply with budgets and guidelines as communicated to them by DDF through the Provincial Administrators. The result is a rigid system which does not react appropriately when irregularities in cost estimates, work progress, etc. occur.

#### **Documentation provided to NORAD**

The insufficient reporting (and programme planning for that matter) has made it difficult for NORAD to follow up on the lack of progress. Moreover the overall information available makes it difficult to take well justified decisions e.g. on the requests for approval of specific procurements.

The Missions request for documentation on the completed piped schemes (25 at the end of financial year 1982/83) may serve as an example. Information pertaining to design, completion certificates, manuals and expenditure reports on the various schemes was requested in writing by the Mission. The letter arrived in DDF on 24 October 1984 and no document had been received upto the departure on 4 November. The request was repeated with some strength during the summary meeting with DDF on 3 November. Ref. Appendix 3. In the reply on 26. November, DDF failed to present the information requested by the Mission. Ref. Appendix 4.

The reimbursement requests presented to NORAD by DDF through MFEPD have contained a number of summary forms. The most important ones are:

- a) Monthly report of estimated expenditure, and request for funds.
- b) Monthly provincial summary of reconstruction progress in communal lands, progressive totals.

In a) all the water supplies in DDF's programme have been compounded to one line in the report. In b) only the number of objects are included, broken down on 3 categories of supplies (dams, boreholes, piped schemes) and on the respective provinces.

The reimbursement requests have been substantiated by including copies of invoices/payment vouchers for specific procurements. For general expenses the reports have constituted the whole documentation.



The reporting deficiency was pointed out by the NORAD review mission in February/March, 1983. It is not known whether NORAD formally followed up the recommendations of the Mission report. However, the Mission presented the case to DDF in a summary meeting on 10 March, 1983. During that meeting DDF commented that improved reporting had already been taken up internally, in particular because activities were about to switch from reconstruction to new constructions.

The Mission cannot see that such improvements have materialized. For continuation of NORAD's assistance to the programme proper reporting and information distribution must be considered a prerequisite.

## 11.2 Conclusions.

- 1 The activities of a large organization like DDF requires a proper management tool for planning, executing, controlling and directing the activities. This does not seem to exist in DDF, at least not of the required standard.
- 2 Being without on-line information from a well disciplined monitoring and reporting system the DDF management cannot possibly be able to direct the activities. This is partly the reason for carry-overs and other irregularities in the activities.
- 3 The reports which are forwarded from the District Administrators via the provincial headquarters to DDF state only the accumulated total of works completed. As no comparison is made between physical work and expenditure it is impossible for DDF to take action on the basis of the reports with a view to redirect the various project activities.
- 4 The financial reporting and accounting system appears to be much better. It is, however, a retrospective exercise which does not facilitate project management beyond the point of issuing warnings against over/under expenditures which may seem to occur. Therefore the feed-back to the executing level is virtually non-existent.
- 5 It is the Mission's impression that the reporting discipline is good, in particular with respect to finances and expenditure. Project management seems to be left up to the individual District Administrators to a large extent. Although this promotes decentralised decision-making it is the Mission's opinion that most District Administrators require the backing and support which should be provided by a well informed management at higher levels.
- 6 The inadequate reporting system results in ignorance at higher levels as to what are the resource requirements and bottlenecks for proper project implementation and subsequent maintenance.



7 Expenditure control is not merely a task of recording the history of payments and commitments. It also entails the active direction of activities in order to expand the funds optimally for the intended purposes. The present system does not produce the required information to achieve this and there also seems to be a degree of inflexibility (at least in practise) as regards re-allocation of funds between projects, districts and provinces respectively during the financial year.

8 Government regulations are no obstacle in this process. Re-allocations can be applied for and it is also possible to authorise commitments above the budget ceilings on the assumption that some projects do not reach the forecasted progress within the financial year.

9 An annual plan of operation must be developed as a major tool for project management, budgeting and reporting within each district. The plan will serve as a baseline document for evaluating both the technical and financial progress of the activities as they are monitored during the financial year. These plans can be given a very simple format organised in a hierarchy comprising plan of operation for district, province and head office.

Procedures for updating the plan according to actual progress and decisions taken must be developed. The plan will thus serve to communicate information on interventions to other management levels and other involved parties.

10 The procedures established for DDF's drilling activities go a long way towards meeting the requirements as to documentation of activities.

The difficulty in obtaining consistent and accurate information by the Evaluation Mission is indicative of the shortcomings of the present reporting system. Documentation is fragmented and discrepancies seem to exist without being checked.

11 Other agencies collaborating with DDF in the future NORAD assisted programme (e.g. MEWRD, MOH, etc.) must be required to report in the same format. After compiling the information into the overall progress report, lack of inputs can be identified and co-ordination should be initiated as part of the response procedure.

### 11.3 Recommendations.

1. The annual budgets must be based on a tentative plan of operation built up on the basis of proposed activities in each district.
2. Procedures for re-allocation and authorisation of commitments must be developed with a view to achieve



flexible budget management. NORAD should require this principle to be stated in the bilateral agreement.

3. The development of reporting procedures should primarily serve the internal needs of DDF, but they should also satisfy the requirements of NORAD for consistent, management oriented reporting. It is recommended that the following reports and documents are prepared:
  - **Annual Plan of operation.**  
To cover planned works, procurements, resources allocation and budget breakdown for both capital and recurrent. Time of issue: July.
  - **Annual Budget Proposal.**  
To be based on tentative plan of operation. Time of issue: According to instructions from Ministry of Finance and Economic Planning (ca. November).
  - **Quarterly Physical Progress Reports.**  
Summarising detailed project information in standardised formate. Time of issue: November, February, May, August.
  - **Bi-annual Financial Progress Reports.**  
Expenditure reports and forecasts, proposals for reallocation. To be combined with respective physical progress reports and update plan of operation. Time of issue: August, February.
4. A Project Manager appointed by DDF's director should be responsible for the preparation of the reports as they relate to the NORAD financed programme. NORAD should consider to recruit this Project Manager if requested by DDF.
5. NORAD should provide short-term technical assistance to DDF in order to design and implement a system for operation planning, progress reporting and cost control.
6. The absence of a NORAD representation in Zimbabwe has made adequate follow-up of the programme so far virtually impossible. Whith the rapidly increasing NORAD commitments in Zimbabwe, the early establishment of a NORAD representation in the country should be assured.



## 12 TRAINING.

### 12.1 Findings.

#### Background for DDF Training Schemes.

Before Independence, DDF used the Dombashawa training centre belonging to the Public Service Commission as the major training facility. Formal training was earlier provided on a small scale for apprentices who were employed and trained on the job by DDF throughout the country.

At the time of independence the extensive reconstruction programme caused an overall growth in the activity level of DDF. Supply of skilled staff was considered to be a prerequisite for timely execution of the tasks ahead. Within four years DDF has established a total of 7 provincial training centres:

- Domboshawa (Mashonaland East/Central)
- Hunyani (Mashonaland West/East)
- Mutare (Manicaland)
- Masvingo (Masvingo Province)
- Senga (Gweru in the Midlands)
- Gwanda (formerly Tuli-Makwe, Matabeleland South)

Some were built on the basis of existing DDF facilities and others were constructed from scratch.

In this process, DDF trainees were used to construct their own training facilities. The result is quite impressive both in terms of completion standard and volume of work carried out. This type of meaningful training obviously provided for good motivation and could serve as an example for other training schemes.

#### Training for Water Supply Sector.

The training provided by DDF is only to a limited extent specific for the water sector, e.g. pump mechanic courses. MEWRD is providing some training for water plant operators and the Ministry has sent trainees to DDF for pump mechanic courses. In other skills required for the water sector construction, operation and maintenance there seem to be no consistent effort to supply the required staff.

Vocational training as part of the general government education system is being developed under the Ministry of Labour, Manpower Planning and Social Welfare. The Ministry is concerned that the training provided by various service ministries does not overlap or duplicate unnecessary.

For technician and professional staff specialized training is very limited. The poly-technics have no specialized courses for water technicians although it is currently being considered. In general civil and mechanical engineering the situation is somewhat better although it is a general opinion that the



capacity should be augmented.

The Mission learnt that it is possible to specialize in water engineering for students attached to the Department of Civil Engineering at the University of Zimbabwe. The quality and capacity of available courses are considered deficient compared to the needs of the country. The situation is the same for most disciplines required for the water sector.

#### **DDF Training Courses.**

During the 1982/83 financial year 925 trainees went through courses at the DDF training centres. The figure includes 62 field officers. 30 trainees passed the trade test as mechanics and 30 as builders. During that year there was a bias towards training of builders because they were needed for the construction of the training centre facilities (and in some instances of other buildings erected by DDF). The potential combined capacity of the 7 training centres is in the range of 1500 trainees per year.

The training centres provide courses in mechanics (grade 2-4, trade test), building (grade 2-4, trade test), pump maintenance, painting, welding, plumbing, carpentry and for field officers.

The training is based on a modular system. The trainees are accepted for a first basic course, then they go back to work (on-the-job training) and return about one year later for the next module of training. Until now DDF has used a selection process based on "talent-scouting" and evaluation of job performance. At the same time DDF has disregarded the formal education requirements for entry to vocational training in general. This procedure is assessed both within and outside DDF to ensure a stable and motivated work force.

The Ministry of Labour, Manpower Planning and Social Welfare has now fully recognized the DDF training, allowing the trainees to sit for trade testing at the end of the modular courses. DDF is still discussing with the Ministry some problems concerning recognition such as non-trade disciplines, intermediate trade tests and openings for continued education at poly-tech level (technicians).

75 per cent of DDF's instructor posts are filled at the moment. Of these ca. 25 per cent do not hold the specified qualifications. Thus there is a considerable strain on the well qualified instructors. This will increase as more trainees probably will be accepted for the most advanced modules.

DDF has identified some specialized fields where training staff shortages are most serious. These include: diesel technology, heavy plant mechanics, hydraulics and auto-electrics.

The main overseas assistance to the establishment of DDF's in-service training has been provided by the United Kingdom through Overseas Development Administration (ODA). ODA has provided



funds, equipment and technical assistance (Chief Training Officer).

### **Training for Drilling Operations.**

A training package was included as a part of the NORAD-financed contract for supply of 10 drill rigs to DDF. The following courses have been conducted with the Hunyani training centre as a base:

- Water prospecting training (11 weeks, 2 prospecting teams).
- Drilling training (11 weeks, drillers for 10 rigs).
- Repair and maintenance course (2 weeks, trained mechanics).
- Pumpfitter course (1 week, for handpump installation).
- Stores operation (1 week, staff to serve drilling unit).

The respective courses were timely conducted after some initial delays. In order to extend on-the-job training some additional time was allowed for the expatriate hydrogeologist and geophysicist. Partly due to the mode of operation (2 separated fleets of rigs) a second drilling foreman was also included in the team.

The drilling carried out by DDF has provided on-the-job training for one hydrogeologist and one geologist, both University graduates. In additions crews of technician geophysicists for water prospecting teams have been trained. Two swedish professionals were in charge of this training.

Formally the training continues on-the-job upto February 1985. The intention is to approach gradually the potential (or normal) production level of ca 2 holes per week. On average the production time has been 9 days per hole (or 0.78 holes per week) during the field training period.

The Ministry of Labour, Manpower Planning and Social Welfare has requested MEWRD to evaluate the training carried out for DDF by staff on contract with Welldrill AB. Apparently MEWRD has taken no action to this effect and it is most uncertain when, or if, the evaluation will be made.

Judging from discussions with the staff and making observations during visits both to Hunyani and to field sites the Mission can state the following:

- The recruited DDF staff had appropriate background and qualifications.
- The various skills have been acquired as per the objectives of the training package.
- In terms of skills the drilling operations can continue without expatriate expertise.
- The back-up services (transport, materials, etc.) have been the constraint during the training period.



The Mission shares the opinion that the training for drilling operations has been well conducted. It is worth noting that MEWRD received 4 similar rigs at about the same time as DDF and that there has been little, if any, cooperation regarding the staff training.

The Mission does not, however, share DDF's optimism regarding the continued progress of drilling operations. Water well drilling is a trade which takes considerable time to learn both in terms of professional experience, operator skills and logistical support. For the young professionals who have now taken over responsibility for well siting, and thereby the success-rate of drilling, the situation may become difficult. It would be fair if they had experienced professionals to lean on also in the future.

The climate of cooperation between DDF and MEWRD, caused mainly by the drill rig procurement issue, seems to prevent exchange of recourses and experience. The need for continued supervision of DDF's drilling activities could otherwise be covered through MEWRD (in-house experts or consultants).

#### **Assessment of Training Quality.**

The Mission cannot evaluate the quality of training undertaken by DDF on the basis of its own independent surveys. However, a qualified opinion has been formed through random observations, interviews with supervisory staff, examination of relevant documents, etc. Some of the findings are:

- DDF has been able to meet the demand for skilled workers reasonably well.
- The training activities are well documented (plans, schedules, reports, etc.).
- The selection criteria provides for a stable work-force as the trainees are mostly posted to their home area.
- The modular system provides for a good structure of skills distribution. Upgrading according to demand can easily be accomplished.
- Ministry of Labour, Manpower Planning and Social Welfare is satisfied with the level of skills possessed by trade testing candidates.
- Workshop supervisors are satisfied with the skills improvement resulting from each training module.
- The trainees appear to be motivated and happy with the training scheme offered to them.
- The lack of established posts resulting in many trained workers employed on casual terms is likely to off-set some of the potential improvements in performance.



### **Additional Courses to be Provided.**

Plans are at hand to set up pump maintenance (and fitting) courses at several centres during 1985. Such courses have only been conducted at Hunyani upto now.

Training of "Pump-minders" to work at ward and village level has been tried on a small scale at the Tsholotsho and Masvingo training centres. These courses will shortly be extended to other centres. The fully fledged programme on training of this cadre should ,however, await a decision as to the maintenance system to be employed (status of caretaker/minder, location of mobile units, responsible agency, etc.).

Certain courses related to operation and maintenance of new heavy equipment have already been mentioned. This equipment is primarily for road works, but NORAD-financed dam building equipment also falls into this category.

Mechanical training staff with pump experience are available at all centres. For heavy equipment some specialized instructors (and cooperation with the suppliers) will be required.

The DDF training centres could also play an important role in upgrading the more senior staff through courses related to project management, supervision, workshop and stores management, etc.

### **Constraints.**

Some constraints have already been mentioned (casual staff, vacant instructor posts, etc.). Obviously new courses will require additional funding over and above the regular operation funds.

Whether funds for completion of the training centres under construction have been secured, is not known. Probably DDF will still need to solicit financing for equipping the centres with appropriate models, tools and equipment.

Tool sets have been specified by DDF as a requirement for pump fitters to be trained shortly. Similarly, when pump-minders are trained, some 500 sets of hand tools and bicycles for transport will be required.

DDF has explicitly said that they foresee no specific bottlenecks in expanding the training activities. The Mission takes this to imply that overseas funding will be available at the same rate as in the past. For instance during 1982/83 the entire training budget of DDF was covered by the United Kingdom. As for other DDF activities it is open to question whether the high level of activity, let alone expansions, can be contained within a budget relying less on foreign finances.



## 12.2 Conclusions.

1. With increased activity level and complexity of operations DDF will certainly need technical staff both at professional and sub-professional level. In relation to the NORAD financed programme technicians specialised in water, soils and mechanical engineering will be required. The actual numbers have not been estimated. The supply could be either through external recruitment or by providing continued education at polytech level for well qualified Field Officers.
2. A core staff of professional engineers is required at the head office to direct the future activities as they are envisaged by the DDF management. The intention must, however, be to avoid duplication of the expertise possessed by other Ministries (MEWRD, MOH, etc.). Eventually the posts should be filled with Zimbabwean graduates, but technical assistance will probably be required for some time to come.
3. The DDF training is fully recognised and it provides a wellcome opportunity to give training to individuals who do not possess high formal qualifications but who show talents in their work. The rate of upgrading/supply also appears to have met reasonably with the demand. One problem is that the lack of tools, equipment and other facilities at the trainees' respective work places prevent the full realisation of their acquired skills. Thus training is not the only answer to improved job performance. A parallel programme to the training should be upgrading of workshops and management procedures.
4. The Mission is satisfied that the DDF training centres are able to supply the organization with the required mechanics and builders. As all 7 training centres become fully operational continued upgrading, refresher courses and admittance of new trainees will be feasible. DDF must pursue the possibilities available for offering in-service technician training to the most talented trade tested staff.
5. Courses for ungraded skilled staff are set up according to the needs of DDF's field organization. Courses on pump maintenance, welding, borehole drilling, etc. have been conducted. DDF's wide responsibility for maintenance of primary water supplies will require specialized courses to be established, both to teach skills and to give orientation in the field of public health engineering. Notably hand pump installation and maintenance, well construction and maintenance, communication techniques and environmental health, must be covered in new courses to be developed.
6. Courses for local hand pump caretakers will also have to be established, presumably as mobile courses within each



district. The DDF training organization would be well placed to take charge of such courses, however, in cooperation with the staff of MOH for environmental health components.

7. Upon completion the potential capacity of the 7 training centres is more than 500 trainees at any one time. For 12 week modules 1.500 trainees can go through training each year. Unless a high turnover rate of staff will occur this capacity allows for both continuation of the present courses and for additional, specialised courses.
8. All the seven training centres are nearing completion. Equipment for all centres has not yet been secured. In terms of NORAD's particular field of interest it is essential that facilities for pump installation and maintenance, plumbing, well construction and related subjects are established as soon as possible. The detailed requirements can be outlined on the basis of envisaged construction programmes and maintenance schedules for DDF's country-wide activities.
9. A permanent staff of qualified instructors is a prerequisite for sustained quality of training. The present rate of vacancies (25 per cent) combined with the use of not fully qualified instructors (25 per cent) indicates a need for further recruitment and training of instructors.
10. The shortage of qualified technicians available for government service points at internal recruitment and in-service training of instructors as the most feasible strategy. A programme towards this end taking into account present priorities and new courses to be taught would assist in consolidating the quality and appropriateness of training offered.

### 12.3 **Recommendations.**

1. Training of staff required to execute DDF's responsibility for operation and maintenance of water supplies in communal lands must be established. This would comprise both mobile maintenance and local caretakers.
2. The syllabus of the various courses should emphasise environmental health and communication techniques in order to promote community involvement and collaboration with MOH staff.
3. Equipment and other facilities must be secured for the training centres appointed to undertake the new courses. Likewise facilities must be made available for training of local caretakers. Mobile training units are envisaged.



Tentatively 3 fields are to be covered in relation to the activities or procurements financed by NORAD:

- Heavy plant and diesel technology
  - Vehicle maintenance
  - Handpump maintenance
4. NORAD should make provisions in the coming agreement for equipment and technical assistance necessary to address the needs described above. Instructors should only be considered recruited for a "training of trainers" role



### 13 THE NEED FOR TECHNICAL ASSISTANCE.

#### 13.1 Findings.

According to information given by DDF, the organization currently employs nearly two thousand permanent staff and some ten thousand temporary or casual employees.

The present activities of the fund includes administration, general operation and maintenance, construction management, road construction, training of artisans and logistic support. With the Water Division that was established 1983, the drilling of boreholes and small dam construction will be added. In the technical field DDF has traditionally relied on services given by professionals belonging to the specialized ministeries, and has traditionally not employed professionals within the respective engineering fields.

During the financial year 1983/84 the staff was distributed as follows:

- general administration, head office	42
- field and technical staff	1547
- air transport section	26
- radio section	16
- training section	146
- water division	71
- total	1848

After independence it has been a major shift of personnel in the management of DDF. The combined effect of the urge to africanize, with retirements and the general movement by professionals from civil service has attributed to this. Although well qualified within their previous professions, the new management does not have much experience in the technically related activities of DDF, and few have any formal technical education.

The present director of DDF is an experienced school teacher, and the deputy director has a background both as school teacher and a District Administrator.

The need for technically experienced staff becomes ever more pressing with the present shift of emphasis by DDF towards construction of roads and primary water supplies including dams.

At district level the trend towards africanization has more or less been completed. The new District Administrators may have higher formal qualifications than their predecessors, but they still do not have extensive experience in their new positions and they usually have little technical insight. Many of the District Administrators are school teachers by profession, followed up by a three months MLGTP training course before they entered their new positions.

At medium and lower level categories of personnel staff short



falls have effectively been reduced by intensified training within the DDF structure.

The problem at sub-professional and professional level may become more difficult, also because of an increased need for professionals when construction activities expands. At present DDF employs relatively few in these categories and an active recruitment policy combined with relatively attractive terms of service seems to have counteracted most of the problems so far.

### 13.2 Conclusions.

1. DDF seems to be stretched very thin at the management level. The situation will be even more critical if DDF in the future in addition to being a financing institution and a maintenance organization take on increased commitments in construction of roads and water supplies as well. The lack of highly qualified technical personnel is felt particularly.
2. If DDF shall continue its efforts towards building up a separate water division, further technical assistance will be required. In addition to the programme manager that is under recruitment at present, there will be a need for water engineers, hydrogeologists, dam construction engineers and additional drilling staff.
3. At the district level additional personnel for maintenance of water supplies will be required. This presupposes increased commitments by the Government and should be included as a precondition in the next agreement between Zimbabwe and Norway. The need for technical assistance will in the first instance be a technical advisor to DDF on operation and maintenance, who should identify the needs for assistance in this field, and establish and coordinate an operation/maintenance programme for the water sector.

### 13.3 Recommendations.

1. A general technical advisor should be recruited by NORAD to be given an advisory position directly subordinate to the director of DDF. The person in question should be a highly qualified civil engineer with extensive experience from developing countries and in particular in the field of water supply and road construction.
2. A technical advisor on operation and maintenance should be recruited as soon as possible. His responsibility will be to investigate the needs for maintenance with respect to primary water supplies in communal areas, and to design a programme for preventive and curative maintenance to be organized by DDF in the future.
3. No additional personnel should be recruited to the water division of DDF before the division of responsibilities



between DDF and MEWRD is resolved. If a go-ahead is given by the government, NORAD should respond to requests from DDF along the lines indicated in paragraph 2 above.







Terms of reference for the evaluation  
of ZIB 001 Norwegian financial assistance to  
District Development Fund:  
water sector reconstruction and development  
programme Zimbabwe.

## **1. Background**

The present programme, is organized under the Ministry of Local Government and Town Planning, with District Development Fund (DDF) as implementing agency. The Government of Norway has contributed to the programme since 1981.

The agreement between the Governments of Zimbabwe and Norway, signed on March 26th. 1981, states that a review of the status and progress of the programme shall be carried out at an appropriate time to decide the mode and extent of possible further Norwegian financial assistance.

## **2. Participants - mode of work**

Towards this end, a Harare based consultancy firm, Zimconsult, has been contracted by the Norwegian Ministry of Development Cooperation to undertake a socio-economic study in a selection of areas covered by the programme.

The study will focus on the operational level of the programme so far, its social relevance and its impact on the recipient population. A Terms of Reference for the study is enclosed as Appendix 1.

Based upon the results of this study, an evaluation of the programme will be undertaken in October 1984, in order to assess the current results of the programme against the present programme objectives.



The following persons have been appointed members of the evaluation mission:

- Mr. Dale Dore                      Zimbabwean citizen  
 M.Sc. Regional and Urban Planning  
 Project manager, Zimconsult, Harare.  
 Work experience in Zimbabwe since  
 1972 in planning and consultancy  
 work.
- Mr. Tore Lium                      Head of the mission.  
 Norwegian citizen  
 M.Sc. Civil Engineering  
 Senior Sanitary Engineer, Norwegian  
 Water Resources and Electricity  
 Board, Oslo.  
 3 years work experience in Kenya  
 and a great number of short term  
 assignments as consultant in Eastern  
 and Southern African countries.  
 Review of ZIB 001 activities in  
 1983.
- Mr. Samson Moyo                      Zimbabwean citizen.  
 Ph.D. Geography  
 Senior Research Officer, Zimbabwe  
 Institute of Development Studies,  
 Harare.  
 Work experience as lecturer and  
 researcher in Canada and Zimbabwe.
- Ms. Astrid Nypan                      Norwegian citizen  
 Ph.D. Sociology  
 Professor, University of Oslo.  
 Specialist in development sociology.  
 A great number of research and  
 consultancy assignments in Ghana,



Ethiopia and Tanzania since 1959.

Mr. Knut Samset                      Coordinator of the evaluation.  
    Norwegian citizen  
    M.Sc. Mechanical Engineering and  
    Sociology  
    Partner, Samset & Stokkeland  
    Consulting A/S, Oslo.  
    Research experiences in development  
    theory, a number of short term  
    consultancies, and work experience  
    with ILO in Eastern Africa

The evaluation shall be undertaken in close cooperation with the Norwegian Ministry of Development Cooperation and the Norwegian Embassy in Harare.

The work will include talks and interviews with official staff and persons concerned with the project at headquarter, province and local levels and will entail field visits in villages to be selected by the team in consultations with District Development Fund.

### **3. Tasks for the evaluation team**

The evaluation team shall

1. Review the programme activities and achievements in relation to goals, production targets and inputs, as these are stated in budgets, plans or other documents.
2. Assess whether the programme has been implemented in accordance with national policies within the sector and to what extent it has been coordinated with government activities in general.
3. Determine whether plans are followed and budgets adhered to and suggest likely reasons for possible



discrepancies.

4. Assess the social, economic, cultural, ecological, etc. impact of the programme and whether the target group is reached. The evaluation team will draw their conclusions on the basis of both field visits and the results of the socio-economic survey undertaken by Zimconsult, Harare, towards this end.
5. Assess whether design, implementation and operation is in accordance with needs and wishes of the target group and assess whether local participation is adequate.
6. Assess positive and negative unexpected consequences of the programme.
7. Consider the adequacy of institutional and administrative procedures, including training of local staff members.
8. Discuss choice of technology of machinery, equipment and materials, in view of foreign exchange requirements, need for expatriate personnel, employment creation and operation/maintenance.
9. Assess the need for future technical and financial assistance to the programme. Comment on the need for further studies or evaluations.
10. Evaluate any other matter which the team finds relevant.

#### **4. Reporting**

A joint report in the English language comprising of all the findings and recommendations is to be submitted to the Ministry of Local Government and Town Planning, and the



Norwegian Ministry of Development Cooperation, before  
December 15th 1984.

Oslo,

Helge Kjekshus, head of division  
The Norwegian Ministry of Development Cooperation  
2. Planning Division







I T I N E R A R Y

- 10.10 Preparatory meetings with DDF, MEWRD, MOH, MCDWA,
- 13.10 Zimconsult, Interconsult and the Norwegian Embassy
- 15.10 Review of Zimconsult report
- 16.10 Internal briefing of the evaluation team
- 17.10 MEWRD, DDF, Domboshawa Training Center
- 18.10 Field visits Mhondoro, Chivu
- 19.10 Provincial Administration, Provincial Health Officer,  
Provincial Water Engineer, Masvingo province
- 20.10 Field visits Chibi district
- 22.10 MCDWA
- 23.10 MEWRD, DDF
- 24.10 DDF, MLMPSW, MOH
- 25.10 Interconsult
- 26.10 Field trip to Binga
- 27.10 Field visits Binga district
- 29.10 Report writing
- 30.10 Report writing
- 31.10 Interconsult, MEWRD
- 1.11 Report writing
- 2.11 DDF summing up meeting



To: Mr. J. Chataurwa, DDF

From: F. Carlsen

Date: 20.11.84

cc: Royal Norwegian Embassy

✓ cc: Mr. Knut Samset

Dear Mr. J. Chataurwa

DDF'S WATER SUPPLY PROGRAMME. QUESTIONS BY THE EVALUATION MISSION

As you will recall the head of the evaluation mission, Mr. Tore Lium, at the meeting at DDF 2.11.84 asked for the following informations :

1. A statement by DDF on how the fund built up by as a result of the borehole drilling is planned to be used.
2. A documentation e.g. by completion-certificates, for all the piped schemes DDF has reported to be financed and constructed.
3. Copies of writted requests to MEWRD concerning construction of boreholes during the fiscal year 1983/84, and especially after April 1984.

Since the mission has not yet received any of the requested information, I have been asked to remind you of the case.

The report by the evaluation mission will be completed in good time before 15.12.85 and your urgent reply would be appreciated.

Yours sincerely,

Finn Carlsen





26th November 1984

The Royal Norwegian Embassy  
Harare

Attention : Mr F. Carlsen

DDF WATER SUPPLY PROGRAMME : QUESTIONS BY THE EVALUATION TEAM

Please find below the replies to question that were raised:-

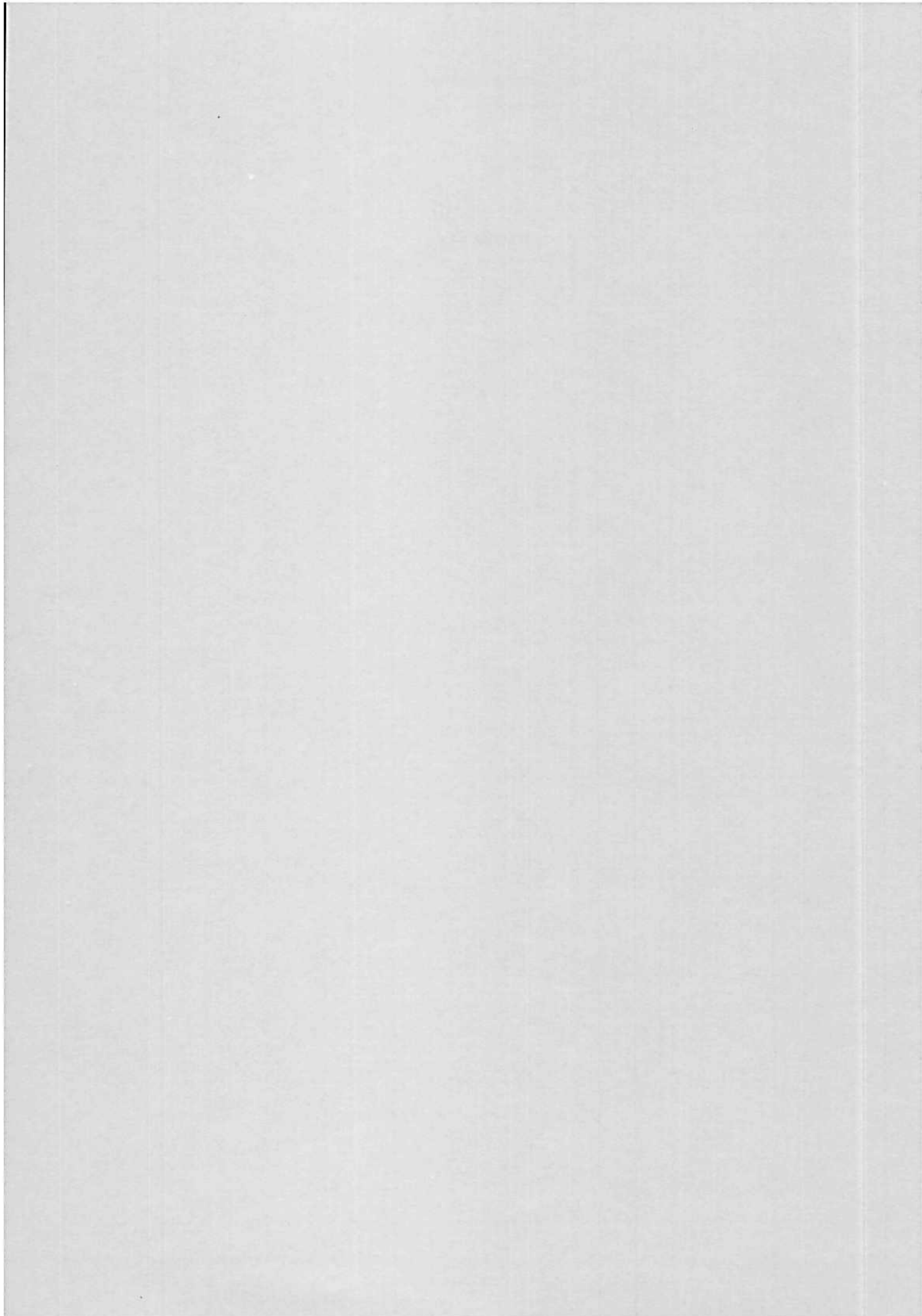
- (i) DDF has undertaken borehole drilling as an on-going exercise. Indeed it will take a long time before communal area people are adequately supplied with clean water.
- (ii) The funds generated through water drilling will be ploughed back into water supply activities.
- (iii) The funds will also be used to rebuild, replace drilling rigs, compressor, water prospecting instruments and vehicles.
- (iv) A total amount of Z\$4 301 458 were spent on the purchase of vehicles that back-up the drilling programme. However, it must be noted that DDF uses some vehicles that were funded by NORAD under reconstruction programme to back-up the drilling programme as well.
- (v) As regards to the documentation e.g. by completion certificates for all the piped water schemes, DDF has constructed, there is non. In other words it is a nil return. However, DDF returns that were phased out at the end of the reconstruction period reflect 25 piped water schemes that were reconstructed. It will be difficult to page backwards and forwards in order to obtain the exact dates of completion and complete accurate completion certificates for reconstruction work beginning from 1980.
- (vi) DDF has not been informed by the Ministry of Finance, Economic Planning and Development that the necessary papers have been signed and that DDF can proceed to spend the funds on new water supplies. When DDF is authorised to proceed, we will also inform the Ministry of Energy, Water Resources and Development to proceed.

J.P. Chataurwa  
for: DIRECTOR, DISTRICT DEVELOPMENT FUND

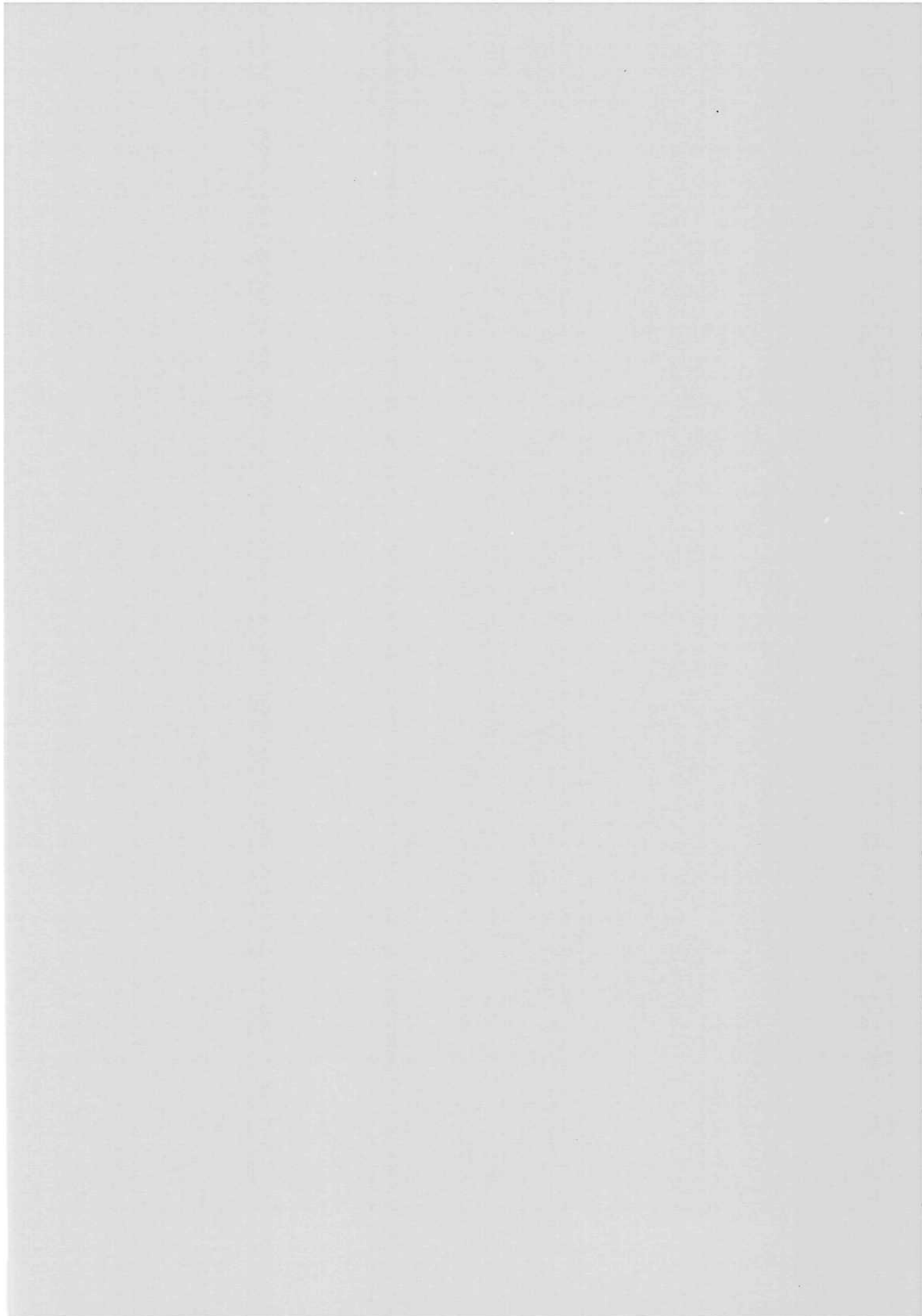












# PART 2

A REPORT ON THE FINDINGS  
OF THE SOCIO-ECONOMIC SURVEY  
OF THE NORWEGIAN AIDED  
RURAL WATER SUPPLY PROGRAMME  
IMPLEMENTED BY THE  
DISTRICT DEVELOPMENT FUND

*Prepared for:*

Royal Norwegian Ministry  
of Development Co-operation  
Oslo, Norway

*Prepared by:*

Zimconsult  
Harare  
Zimbabwe

November 1984  
Harare





A REPORT ON THE FINDINGS  
OF THE SOCIO-ECONOMIC SURVEY  
OF THE NORWEGIAN AIDED  
RURAL WATER SUPPLY PROGRAMME  
IMPLEMENTED BY THE  
DISTRICT DEVELOPMENT FUND

*The Zimconsult team comprised:*

Stuart Stevenson	Project Director
Dale Dore	Project Manager
Frances Owen	Rural Sociologist
Peter McBurney	Statistician & Computer Analyst
Moffat Jhamba	Interviewer/ Field Supervisor
Leah Maramwi	Enumerator
Wishes Mupambawashe	Enumerator
Alfred Manungo	Enumerator
Watson Mpando	Enumerator
Gloria Zemura	Enumerator
Nyasha Kanonhuwa	Enumerator
Gilbert Ndebvu	General Assistant
Margaret Zingani	Secretary

*The Project Co-ordinator was  
Knut Samset of Samset and Stokke!and*

November 1984



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## SUMMARY OF MAJOR FINDINGS

Three years of severe drought in Zimbabwe has retarded the general development of the communal lands, especially agricultural production. This has focused attention on the critical need for water and the high priority accorded to improved supplies which have been of considerable benefit to the rural recipients.

The installation and reconstruction of boreholes, for example, has significantly improved access to clean water and has helped to reduce the incidence of water related diseases.

### Access to water

The reconstruction and installation of improved water supplies has brought water nearer to many people in the survey area and has, in terms of distance travelled and time taken to collect water, dramatically improved access to water.

Those people who still had to use traditional and usually contaminated sources of water (non-recipients) had to walk further and took much longer to collect water than the users of improved water supplies ('recipients'). Four times as many 'non-recipients' had to walk over 1 km and took more than 2 hours to fetch water, than recipients.

In a number of remoter areas, it was not uncommon for people to walk more than 3 km, and sometimes as far as 10 to 15 km, to collect water. In 3 areas visited water was being carted at great cost by bowser to schools, clinics and villagers whose sources had dried up.

Significantly more recipients than non-recipients were satisfied with their water supply. Although both groups were equally concerned about the inadequate supply of water the major complaint of non-recipients was the long distances they had to walk to their source of supply as well as the dirtiness of the water.

### Water usage

Water collected was most commonly used, by far, for domestic purposes. Yet, in spite of access to improved supplies of water, half of all households sometimes wash their clothes in rivers and a third sometimes bath and swim in a river. This may be attributed to the proximity to alternative water supplies, the type of water usage activity (bathing/washing) and the inadequacy of facilities at sites around the improved water supply point.

### Priorities of water usage

The most important priority for all groups, given an increase in the supply of water, was for the watering of gardens. The next most important priority was for the irrigation of crops. In view of these explicit preferences, it was interesting to note, however, that most households felt that water could most easily be saved by using less water for gardens. It would seem that the extent to which gardens are grown would give a good indication of the general availability of water.



### Hygiene

Hygiene was significantly related to sanitation, water related disease and whether a household used traditional or an improved source of water supply. The prime importance of this finding is the way in which it underlines and stresses the need for health education for hygiene and sanitation and the inter-relationship of the various components of health.

Generally the surrounds of water points were found to be unhygienic, being prone to insect vectors propagating in muddy, stagnant water as well as contamination by the continuous presence of domestic animals.

### Sanitation

Although only 30% of households used a latrine, this fact disguises a significant difference between districts of the percentage of ownership of latrines. In Chinamora, for example, 94% of respondents owned a latrine whereas not a single toilet was owned by respondents in Nkai or Binga.

Sanitation was significantly related to the socio-economic status of the household. Not surprisingly, Nkai and Binga ranked third last and last, respectively, on a wealth index.

At present, there has been a cut-back in the cement provided by the Ministry of Health for the construction of latrines. Given the willingness of households to build their own latrines, the shortage of cement is seen as a major constraint in the construction of more toilets.

### Water related diseases

Malaria and diarrhoea were the most frequently mentioned illnesses and are the most common major health problems.

Water related diseases were significantly lower for those households with good access to improved water supplies. Accordingly, recent cases of diarrhoea were reported significantly less often in questionnaire zones 1 and 2, closest to the borehole/piped scheme, than in zones 3 and 4, which were further away.

The quality of water, of unprotected springs/wells and alternative water sources, particularly dams, was very much lower than the well constructed borehole pumps and wells using the low-lift hand or 'bucket' pump.

### Health education

Local community leaders felt that the main benefit of health education was the advice received by Village Health Workers and Health Assistants on the advantages and method of construction of latrines.

All areas had a shortage of health care establishments, preventative facilities and health extension workers.

Malnutrition was evident in all areas. Although a few areas reported that it was decreasing as a result of health education, malnutrition remained a major problem in all areas.



The importance of health education and the need for an integrated approach to health in general was demonstrated by the fact that health education attendance, advice on water use, personal hygiene, specific illnesses and general health problems were all significantly related to householders' knowledge of the causes of diarrhoea.

#### Community participation

The District Administrator, local community leaders and a high proportion of householders expressed their willingness to participate in community health projects. Householders were particularly keen to contribute their labour towards water supply schemes and self-help sanitation projects but few could afford or were willing to make a cash contribution.

At present, only a small proportion of cash and labour contribution have been made towards water supplies. In view of the willingness of most respondents to spend one day a week working on community projects there is a considerable amount of excess capacity of participatory potential which could be harnessed.

The degree of community participation possible for the installation of boreholes is very limited compared to other water supply techniques such as wells, piped schemes and dams. There is currently no community involvement in the maintenance of boreholes.

#### Identification with scheme

Decision making and consultation, by the local community, in the siting of boreholes is weak and there was no community participation in their installation and maintenance. As a result villagers fail to identify boreholes as community based utilities. Consultation with local communities should be strengthened with the advent of the proposed new administrative and development structures.

#### Operation and maintenance

The increase in the number of boreholes installed, inadequate maintenance funds and the shortage of well trained maintenance staff have made it increasingly difficult for DDF to maintain boreholes and piped water schemes in good order.

The severity of the drought has resulted in the lowering of the ground water table. Consequently, both traditional and improved water sources are drying up, which has meant that those boreholes still delivering water have become increasingly overused. Inevitably breakdowns have become more frequent, thus stretching already extended DDF maintenance teams still further.

## 1. BACKGROUND TO SURVEY

Under the agreement between Zimbabwe and Norway, a review of the status and progress of the programme was to be carried out at an appropriate time to decide the mode and extent of possible assistance.

In the light of this agreement, a Norwegian mission was required to undertake a broad and detailed analysis and evaluation of DDF activities. It was deemed, on the basis of the findings of this mission, that a new agreement for further Norwegian aid for development would be drawn up between Zimbabwe and Norway.

According to the co-ordinator of the proposed evaluation mission, the two major inputs for evaluation would consist of:

- the organization of DDF and the division of responsibilities between DDF and other Ministries; and
- a socio-economic survey.

In June 1984, therefore, Zimconsult was commissioned to undertake a socio-economic survey in a number of areas within the Communal Lands which had been supplied with improved water under the Norwegian-sponsored DDF programme. In addition, Zimconsult was required to look into the functioning of the local administration in the various provinces.



## 2. OBJECTIVES AND TERMS OF REFERENCE

The main objective of the survey and the evaluation was to *'establish the status, so far, in terms of operational level, social relevance, strengths and bottlenecks, of the programme.'*

The Terms of Reference made it clear that the evaluation should study the impact of the programme at the user and with a view to a possible integration of other project components such as sanitation, community participation and health education in a future programme.

On the basis of the Terms of Reference, the socio-economic survey was divided into 3 components:

- an overview of the project area (that is, all communal lands within Zimbabwe);
- the household survey; and
- the service level in the (project) area.

### Overview of project area

Zimconsult was required to *'collect background information on the socio-economic, geographical and political situation in the programme area.'* Another requirement of the survey was to cover *'major differences between the eight provinces'*. While the general background information on a national basis is readily available, very little, if any, information exists on inter-provincial differences. Secondly, the very small sample of the socio-economic survey makes it difficult, if not impossible, to extrapolate survey findings to draw general conclusions on an inter-provincial basis. These, then, are the two cogent reasons for deciding against attempting an inter-provincial analysis and concentrating our overview on general conditions in the communal lands. This overview is presented in the next section (3), both as an introduction and to set the survey in its physical and socio-economic context.

### Household survey

The survey was required to be based on *'a stratified random sample of households in a selection of the project areas (which) reflects the typical situation of the beneficiaries of the programme'* and who use boreholes or piped water schemes, reconstructed or installed by DDF since July 1981.

In particular, the Terms of Reference required the consultant to cover the following components:

- socio-economic status of the household;
- access to, collection and utilization of water;
- problems and priorities; and
- community participation.

Comment on the differences between sexes and between users of traditional and improved water supplies was also called for.

### Service level in project area

Through interviews with administrators, both at district and provincial level, a study of the service level and functioning of back-up services in relation to water supplies was undertaken.



### 3. OVERVIEW OF PROJECT AREA

#### 3.1 Geographic characteristics

Four main topographical regions can be identified in Zimbabwe (Map 1).

The first is the mountainous region running along the eastern border of the country which rises from about 1 500 m up to the highest point, 2 594 meters above sea level. Orographic rainfall associated with these mountains makes this region the highest rainfall area in the country with a mean annual rainfall of over 1 200 mm (Map 2). Moving westward, rainfall drops off sharply, particularly in the south, in the rain shadow of the Chimanimani mountains. Vegetation is lush and activities associated with this region include tea and coffee cultivation, deciduous fruit plantation and forestry.

The second major region is the highveld with an altitude of between 1 200 and 1 500 m which forms part of the high plateau of south-central Africa. It stretches westward from the eastern highlands to the north of Harare and then south west to Bulawayo. Running down the spine of the country is the Great Dyke, a mineral rich igneous intrusion which has the world's largest reserves of chrome. In addition platinum, copper, nickel and asbestos are mined from the Dyke.

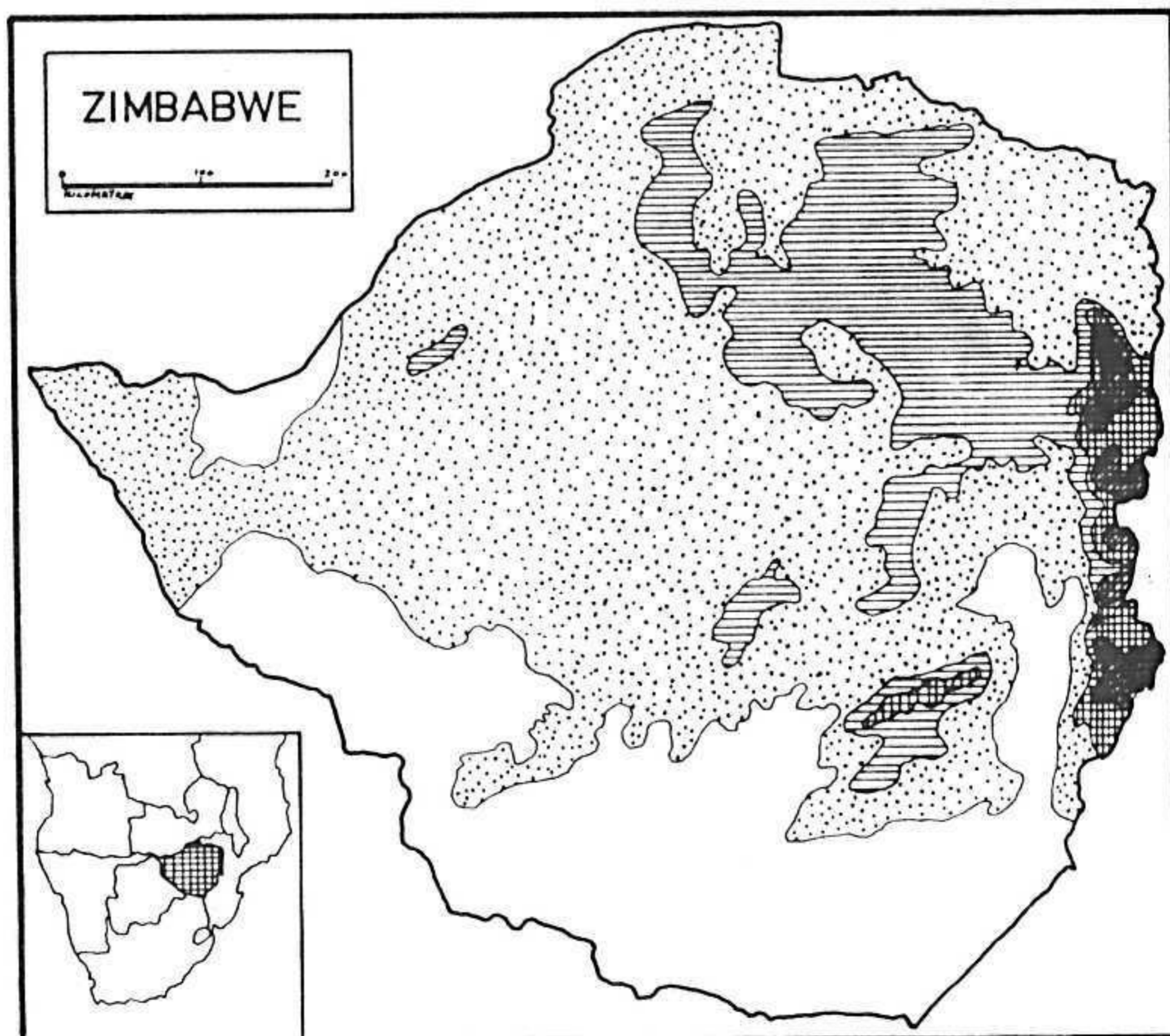
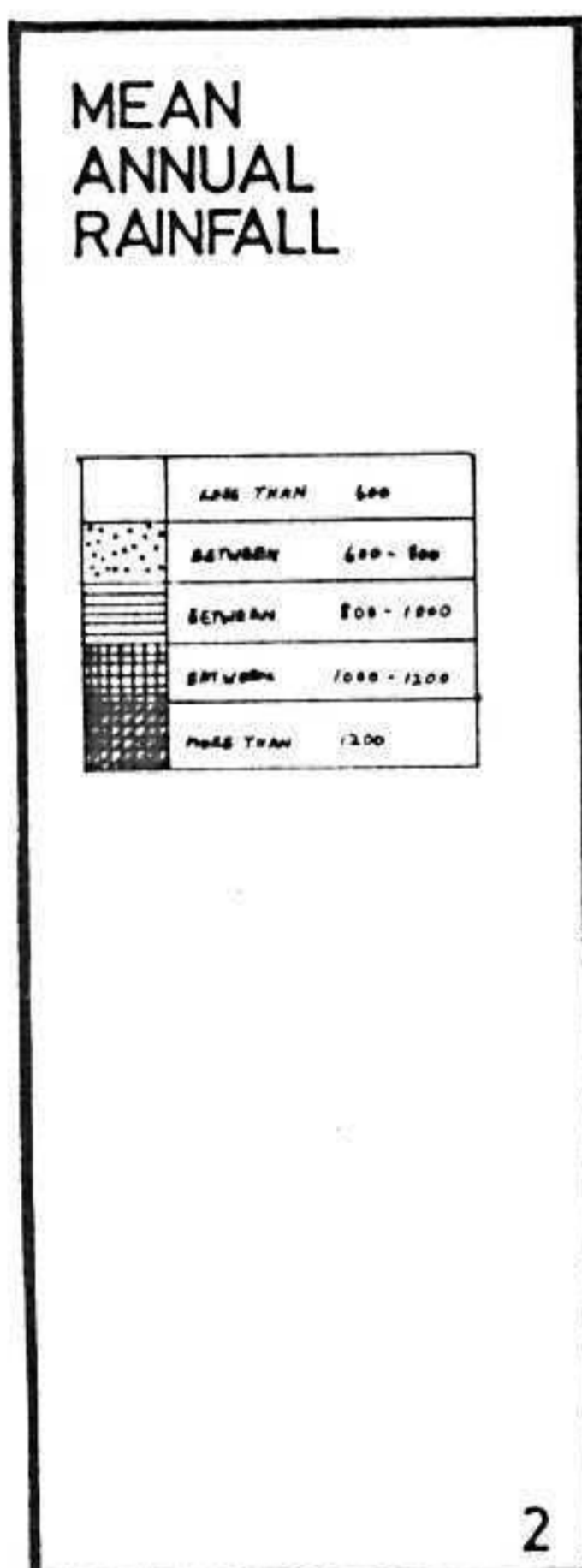
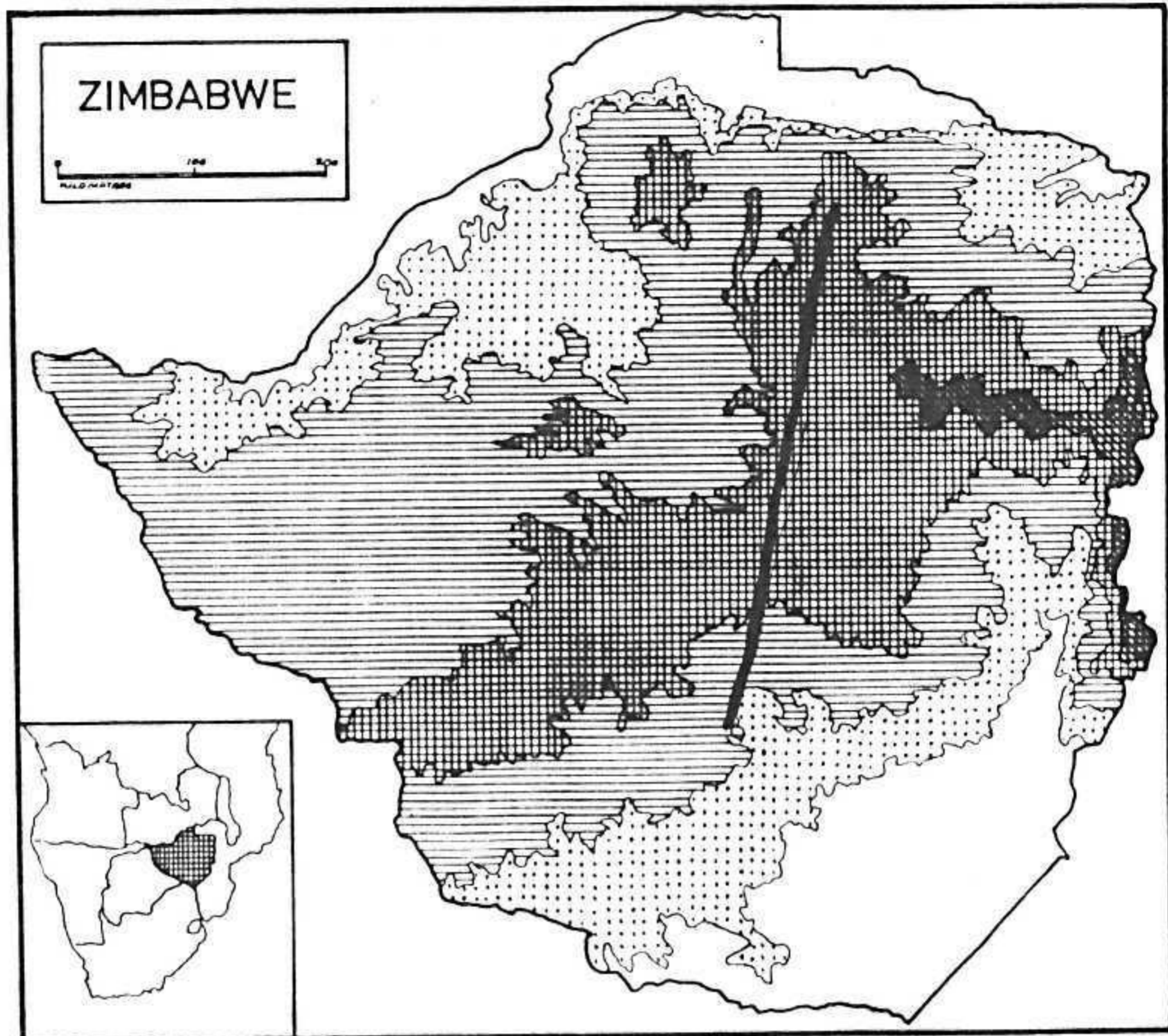
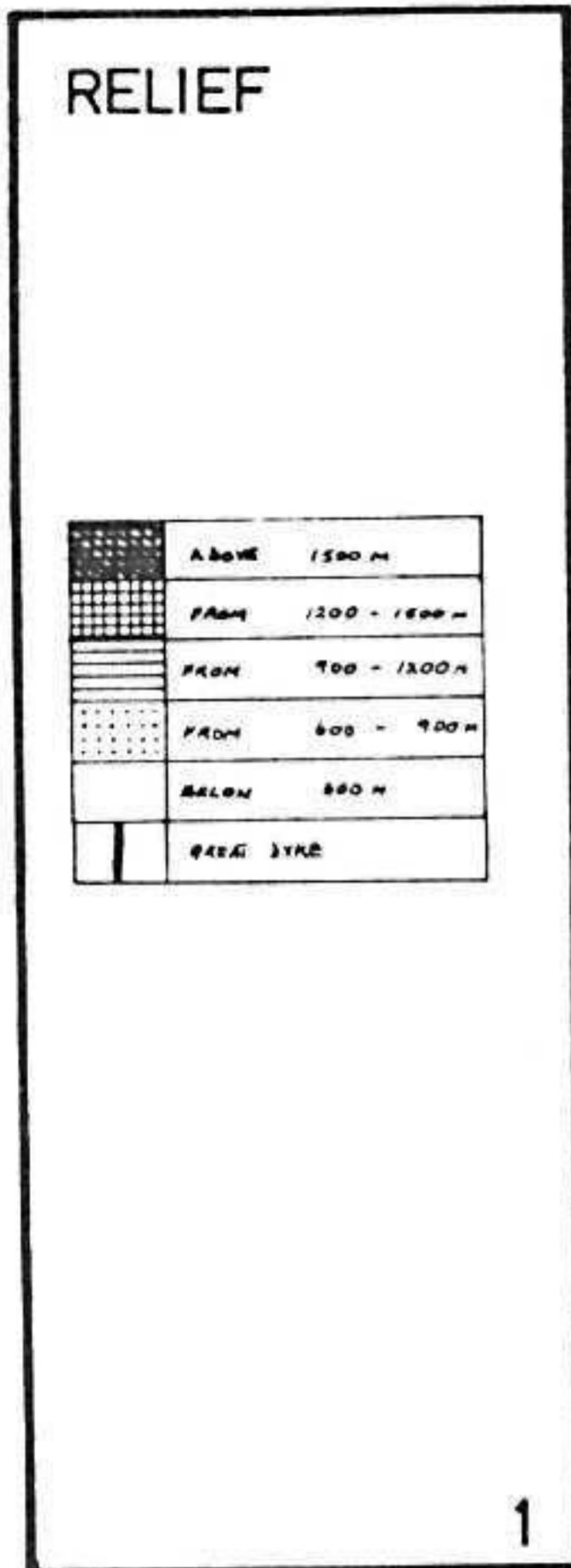
The highveld forms a watershed which gives rise to the major hydrological zones, draining into the Zambezi River on the northern border, the Limpopo River on the southern border and the Sabi which drains from the eastern highlands into Mocambique.

All the major infrastructural development, urban centres, roads and rail networks run along this highveld water-shed. The highveld is characterised by pleasant climatic conditions, relatively high agricultural potential, especially in the north, and by sub-tropical *Brachystegia* savanna woodland.

The third and fourth topographical regions are the middleveld and lowveld. The lowveld comprises those areas below 600 meters which can become uncomfortably hot in the summer months, particularly in the Zambezi Valley (Map 3). In the south eastern lowveld conditions are also usually very dry with a mean annual rainfall of less than 600 mm. The dominant vegetation type is savanna and shrub, predominantly Baobab, Mopane and Acacia. These areas, some distance from the main watershed, are the most remote and least developed in the country. Perhaps their only agricultural potential lies in cattle ranching; otherwise, they are given over to National Game Parks.

Geologically, Zimbabwe comprises 2 main areas. The north eastern part is generally made up of Precambrian basement complex: granite and gneiss. The south western part has younger, sedimentary rocks at the surface.







Climatically, 3 distinct seasonal periods can be identified:

- a warm wet season (summer) from mid November to March;
- a cool dry season (winter) from April to September;
- and
- a hot dry season from October to mid November.

Although some rainfall is convective, rainfall in Zimbabwe (*Map 2*) is mainly associated with the Inter Tropical Convergence Zone. Moist warm tropical air flows from the north east to converge with the cooler south-easterly air stream. This convergence together with orographic conditions causes high precipitation mainly in the northern parts of the country and along areas of high ground.

The highest rainfall is recorded in January, but there is a critical mid-season drought in February which can adversely affect crops - maize in particular. It should also be noted that there is a high correlation between the amount of rainfall and the reliability of rainfall. In other words, those areas with the least mean annual rainfall are also likely to have the most unreliable rainfall patterns.

Taking into account these topographical, geological and climatic factors, as well as pedological and hydrological considerations, Vincent and Thomas (1961) were able to classify the country into 5 Natural or Agro-ecological Regions (*Map 4*) which have since been an extremely useful guide to the constraints and development potential of the agrarian economy of the communal lands.

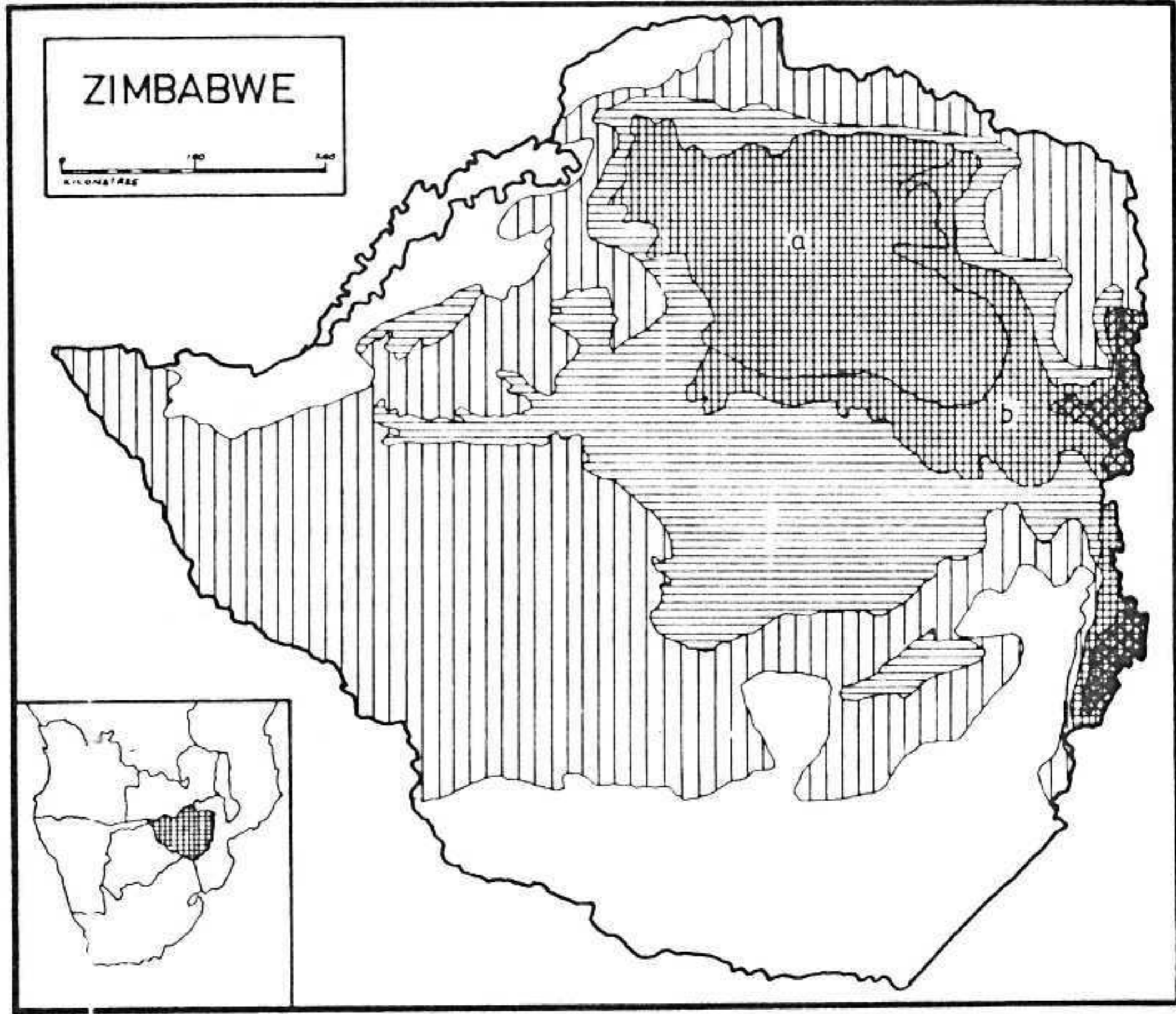
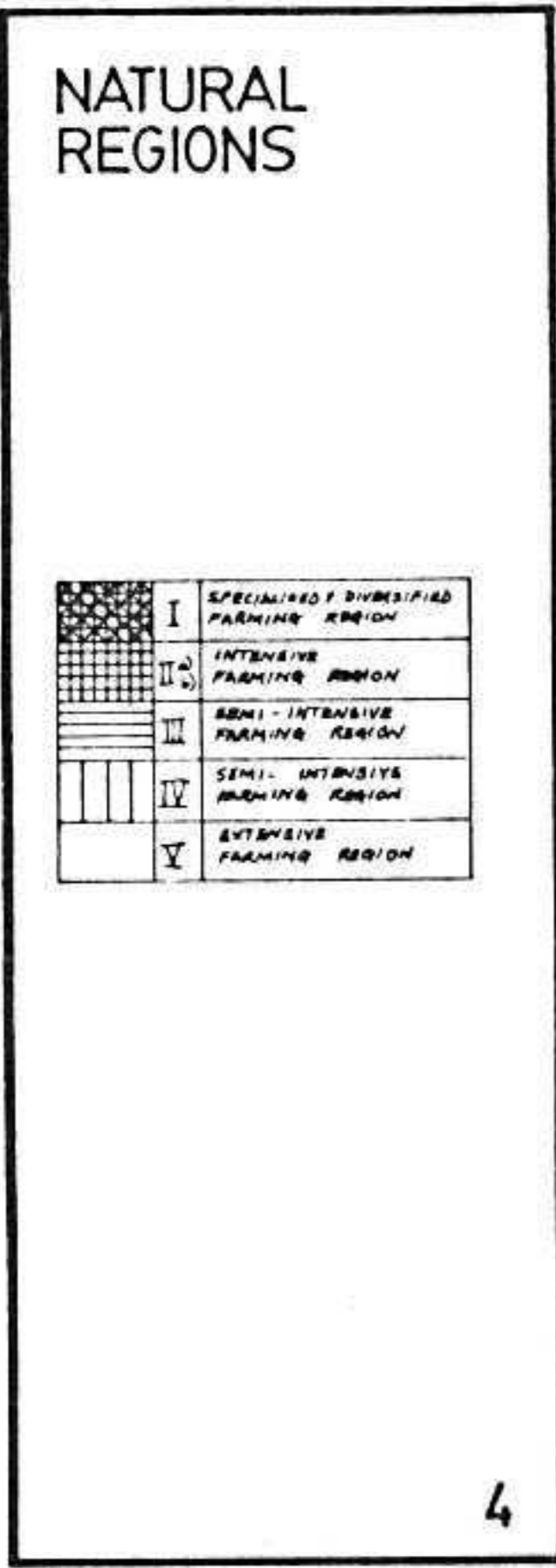
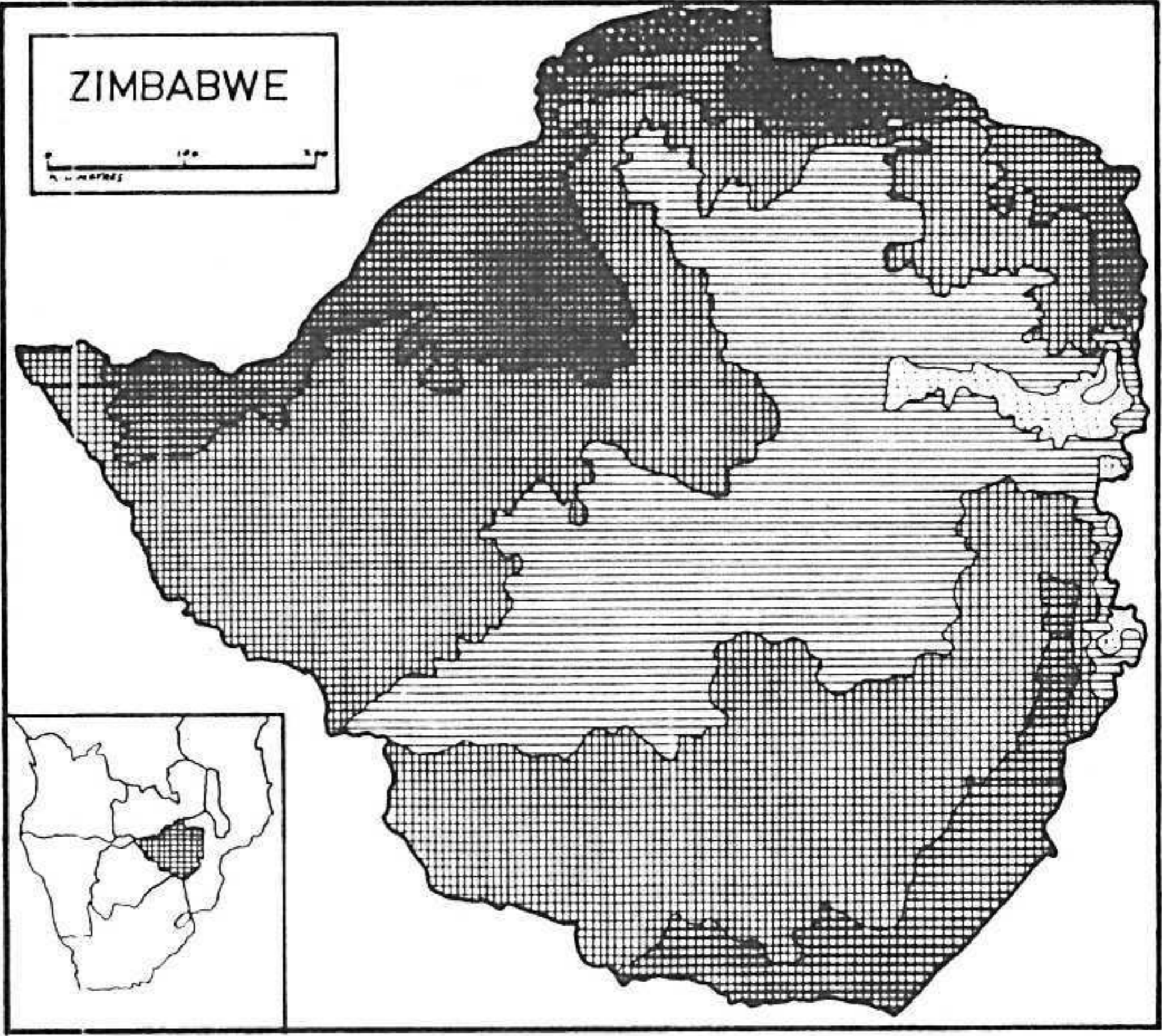
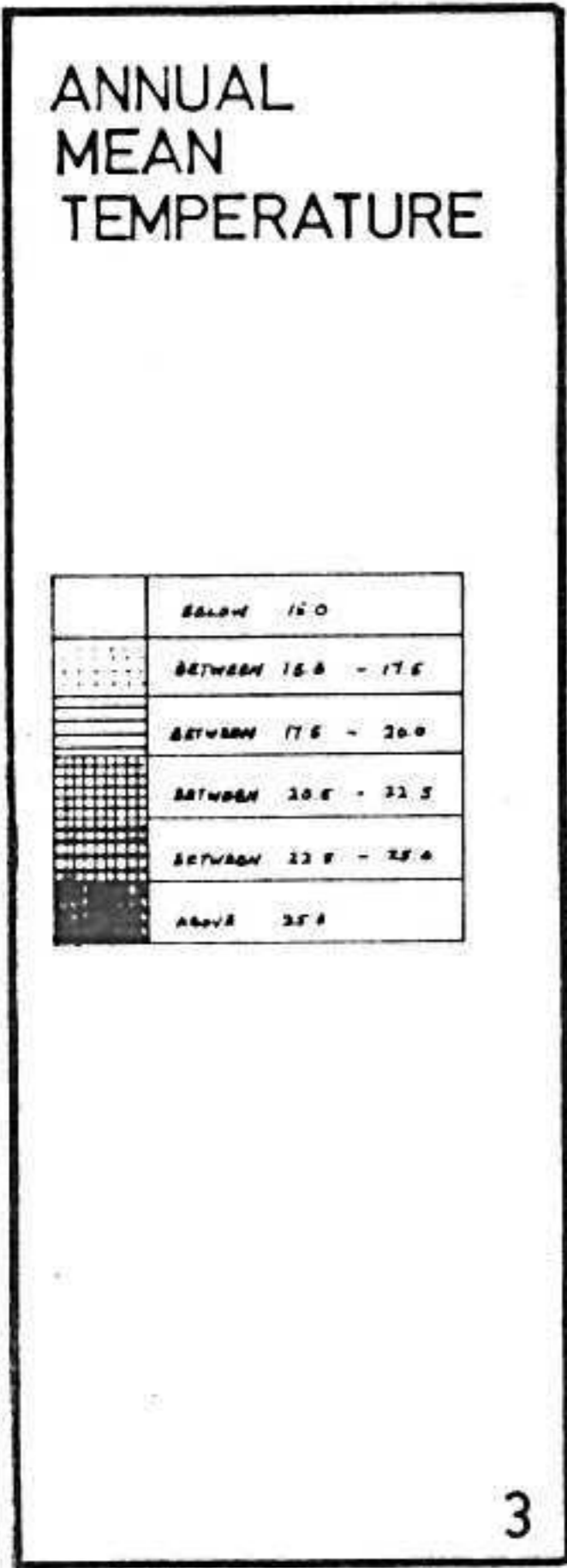
From *Map 4* the following agro-ecological regions can be identified:

#### 1. Specialized and Diversified Farming Region

Rainfall in this region is high (more than 1 000mm per annum in areas below 1 700m altitude, and more than 900 mm per annum at greater altitudes), normally with some precipitation in all months of the year. Temperatures are normally comparatively low and rainfall is consequently highly effective enabling afforestation, fruit and intensive livestock production to be practiced. In frost-free areas plantation crops such as tea, coffee and macadamia nuts are grown; where the mean annual rainfall is below 1 400 mm, supplementary irrigation of these plantation crops is required for top yields.

NOTE: A rainy pentad is defined as the centre one of three five-day periods (*pentads*) which together receive more than 40 mm rainfall and two of which receive at least 8 mm of rainfall.







## **2. Intensive Farming Regions**

Rainfall is confined to summer and is moderately high (750-1000mm). Two sub-regions have been defined.

Sub-region IIa receives an average of at least 18 rainy pentads per season and normally enjoys reliable conditions, rarely experiencing severe dry spells in summer. The region is suitable for intensive systems of farming based on crops and/or livestock production.

Sub-region IIb receives an average of 16-18 rainy pentads per season and is subject either to rather more severe dry spells during the rainy season or to the occurrence of relatively short rainy seasons. In either event, crop yields in certain years will be affected, but not sufficiently frequently to change the overall utilization from intensive systems of farming.

## **3. Semi-Intensive Farming Region**

Rainfall in this region is moderate in total amount (650-800 mm), but, because much of it occurs as infrequent heavy falls and temperatures are generally high, its effectiveness is reduced. This region will receive an average of 14-16 rainy pentads per season. The region is also subject to fairly severe mid-season dry spells and therefore is marginal for maize, tobacco and cotton production, or for enterprises based on crop production alone. The farming systems, in conformity with the natural conditioning factors, should therefore be based on both livestock (assisted by the production of fodder crops) and cash crops under good management on soils of high available moisture potential.

## **4. Semi-Extensive Farming Region**

This region experiences fairly low total rainfall (450-650 mm) and is subject to periodic seasonal droughts and severe dry spells during the rainy season. The rainfall is too low and uncertain for cash cropping except in certain very favourable localities, where limited drought-resistant crops can afford a sideline. The farming system, in accord with natural factors, should be based on livestock production, but it can be intensified to some extent by the growing of drought-resistant fodder crops.

## **5. Extensive Farming Region**

The rainfall in this region is too low and erratic for the reliable production of even drought-resistant fodder and grain crops, and farming has to be based on the utilization of the veld alone. The extensive form of cattle ranching or game ranching is the only sound farming system for this region. Included in this region are areas of below 900 mm altitude, where the mean rainfall is below 650 mm in the Zambezi Valley and below 600 mm in the Sabi-Limpopo Valleys.



### 3.2 Infrastructural development

There are, at present, marked inequalities between communal lands and the remainder of the country with respect to social facilities and economic opportunities.

The division of land in Zimbabwe before Independence, between commercial and communal land, (*Map 5*), created a sharply polarized pattern of development. On the one hand, the 'line of rail' development along the main watershed created a sound economy in the commercial areas together with a well developed infrastructure in terms of urban growth, transport, communication, energy and natural resources development. On the other hand, the communal lands, where individual land tenure on a freehold basis is not permitted, received only a small portion of infrastructural development. Prior to Independence 97% of total national investment was allocated to commercial areas and only 3% remained for communal land development. Of particular significance is the fact that not one of the 20 largest towns are situated in the communal areas (*Heath, 1978*).

The communal areas have no towns, only small scattered 'business centres' comprised mainly of retail shops, butcheries and grinding mills which are individually sited along each side of the main gravel roads. These roads form an important transport network, especially for trucks and buses serving the rural areas. Local communities are rarely served by electricity and telephone services but these are, in some cases, extended to mission schools, clinics and growth points.

The present Government of Zimbabwe has set about correcting this imbalance by re-allocating resources in an effort to rehabilitate, reconstruct and develop the communal lands. This policy has been implemented in conjunction with the principle of self-help. Many schools as well as health centres have been built through such co-operation between local communities and the Government.

The focal points for much of this development have been the growth points and rural service centres. Most of these have already been planned by the Department of Physical Planning who provide guidelines for inputs by other Ministries.

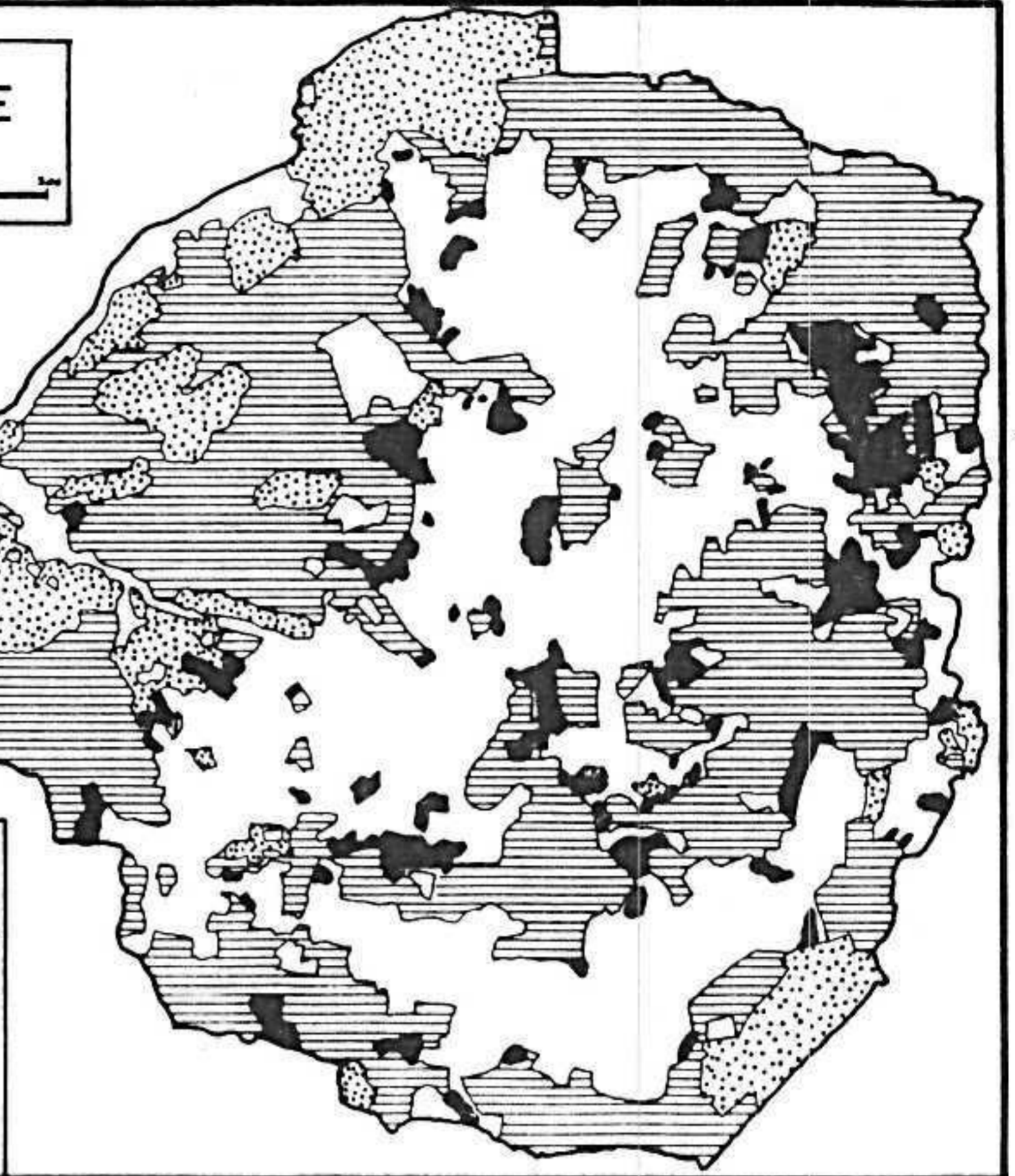
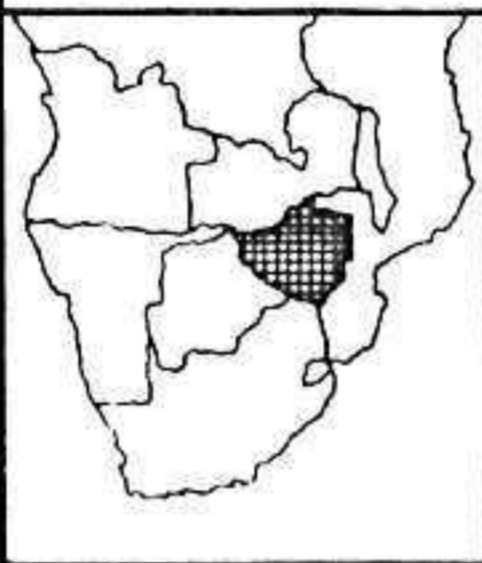
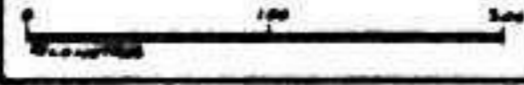


# LAND CLASSIFICATION

	INDIVIDUAL AREAS
	COMMERCIAL FARMING AREAS
	NATIONAL PARKS ETC.
	RESSETTLEMENT AREAS

5

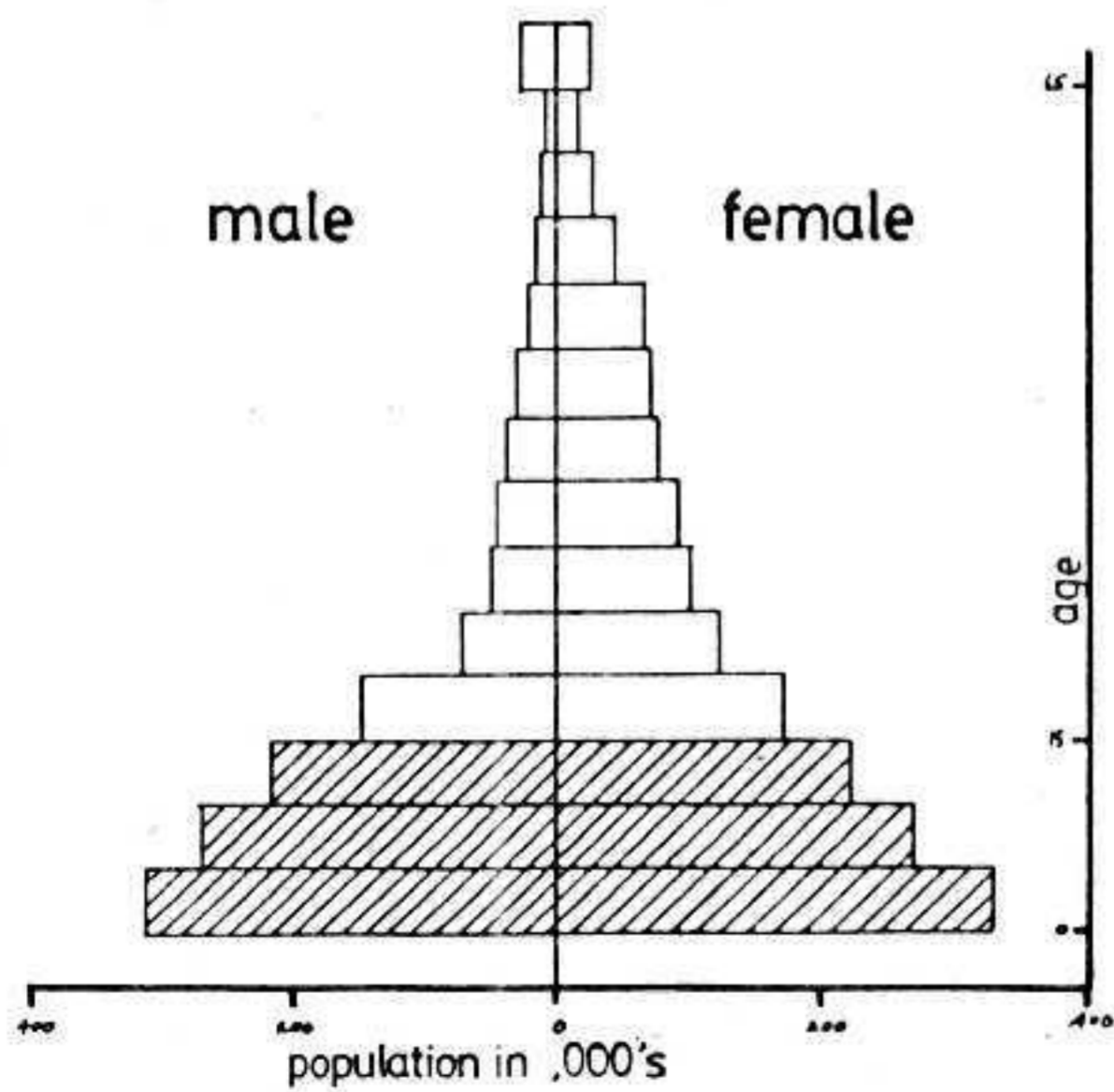
# ZIMBABWE



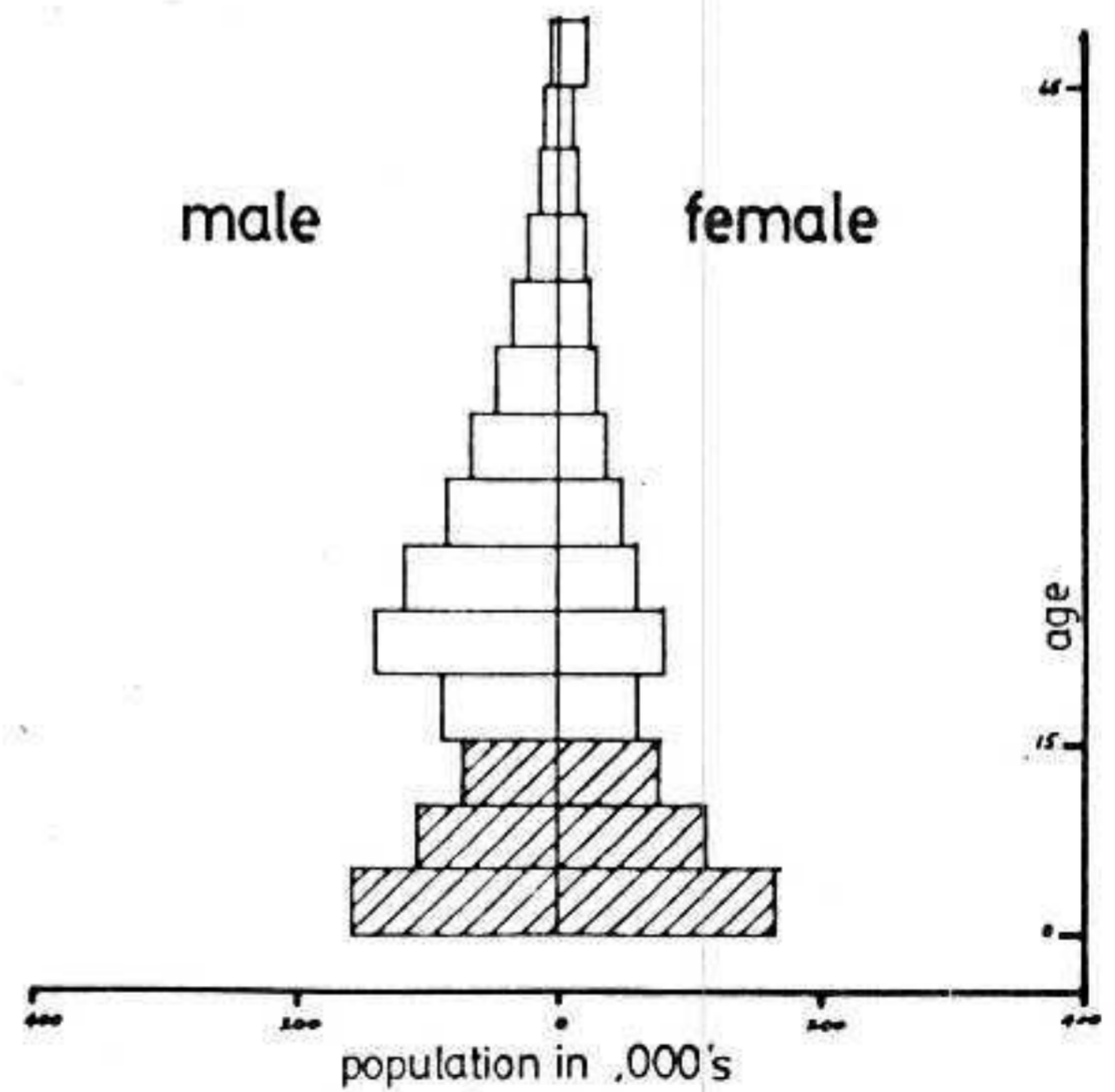
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## AGE/SEX DISTRIBUTION & DEPENDENCY LOAD OF THE AFRICAN POPULATION

### COMMUNAL LANDS



### URBAN AREAS



Source : Whitsun Foundation (1978)



### 3.3 Socio-economic background

In common with other Third World countries, the communal areas of Zimbabwe are afflicted by:

- high population growth and dependency burdens;
- excessive population and livestock pressures;
- overgrazing, deforestation and environmental degradation; and
- low levels of productivity and incomes.

The first post-Independence population census in Zimbabwe was undertaken in August 1982. The population enumerated then was just over 7,5 million which represents a high population growth rate of 3.1% per annum between 1969 and 1983.

Asians, Coloureds and Europeans represent only 4% of the total population and are mainly urban based. Those living outside the main urban centres are usually stationed at mines or live on large scale commercial farms. The African population, in contrast, is mainly rural based. Whilst the proportion of the African population living in rural areas remained at approximately 80%, there has been a pronounced movement into urban areas and onto resettlement schemes.

Settlement in the communal areas is dictated by the need to be close to either natural resources, such as water and wood, or near to infrastructural facilities, such as roads and business centres.

In remoter areas where traditional water supplies are used, people generally settle along areas of high ground near rivers. In other more developed areas a distinctive settlement pattern alongside the main roads is evident. This pattern of settlement is in part an imprint left by attempts in the 1950s to rationalize the use of land in the communal areas. The impetus for this development, however, dissipated with the advent of African nationalism when political objections arose to this land use plan. Today, there is again a move by the people themselves to institute some form of land use planning, most notably in Mwenezi District, where areas for cultivation, cattle grazing and settlement have been demarcated.

Whilst just over half of all the designated land in Zimbabwe was allocated to what are now the communal areas and small scale commercial farming areas, only 10% of this land is distributed in the more favourable natural farming regions I and II.

The Government's resettlement programme is specifically designed to change these inadequacies in respect of land. To date, 28 000 families have been re-settled on former commercial farming land. (Map 5)

Typically, the Zimbabwean communal land peasant farmer has a few hectares of land to cultivate, about 10 head of cattle, and lives in a traditional pole-and-dagga dwelling set within a rural village or kraal.



At any given time, however, about half of the better educated, able bodied and ambitious younger men will live away from their families to seek work on commercial farms or in towns.

This demographic imbalance, illustrated in diagram 6, with its preponderance of children, women and older people in the rural areas, and the deprivation of some of its more talented members, places strains on local cultural and social institutions. It also makes the development task in the rural areas more difficult and urgent.

This development task is the top priority of the Zimbabwean Government. Accordingly, a Programme of Reconstruction and Development in the communal areas was set in motion soon after Independence, the focus of this development being the growth points and rural service centres. This strategy attempts to create opportunities to improve the quality of lives in the rural areas and to stem the flow of migration to large urban centres.

Some communal areas have very high population densities which result in the extensive cultivation of available land (*Map 7*). Traditional farming methods, lack of fertilizer and soil erosion caused by over-grazing and deforestation all contribute towards the diminishing productivity and incomes in the communal lands.

Within these areas, land designated as being suitable only for grazing has been gradually turned over to cultivation. By 1977, seventeen times as much land was being cultivated as was ecologically desirable (*Riddell, 1981*). Overall, the communal lands have populations three times in excess of its safe carrying capacity. However, in some areas particularly in the Masvingo Province, the population pressure is as much as 5 to 8 times greater than the safe carrying capacity of the land. These areas of extreme land pressure are shown on *Map 8*. As wood is the only source of fuel, the population pressure in these areas has caused severe deforestation.

Evidence suggests that the urban-rural inter-dependency is fragmenting, but it still remains an important facet of economic and social life for both rural and urban areas. Many rural families depend heavily on remittances from relatives working in urban centres and, conversely, urban workers still rely - in the event of unemployment, retirement or old age - on their rural kin and land holding in communal areas for their ultimate security.

In an effort to develop the communal areas the Government has encouraged the formation and growth of agricultural co-operatives in communal areas which now account for some 80% of the 1 320 registered co-operatives and collectives throughout the country.

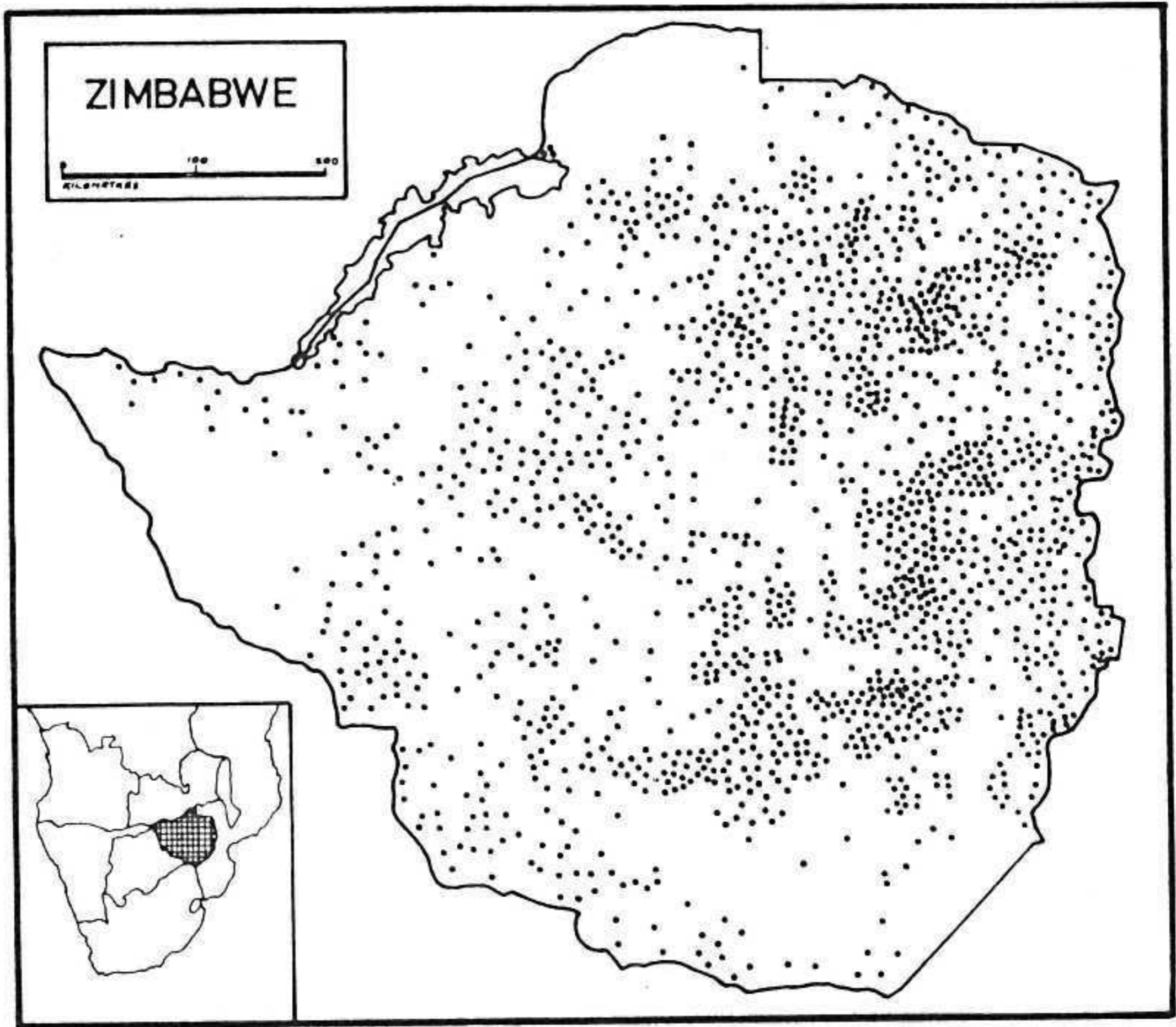
By far the most important economic activity in the communal land is agriculture. Typically, the peasant farmer will grow a few hectares of maize, rapoko or mhunga, as well as ground nuts. In some areas there has been a strong move of peasant farmers into the cash economy; for example, a great deal of cotton is now grown in Gokwe District, whilst 3000 communal-land burley tobacco growers, mainly from Chiweshi, produce a quarter of the national crop.



POPULATION DISTRIBUTION

• ONE DOT REPRESENTS 2500 PEOPLE

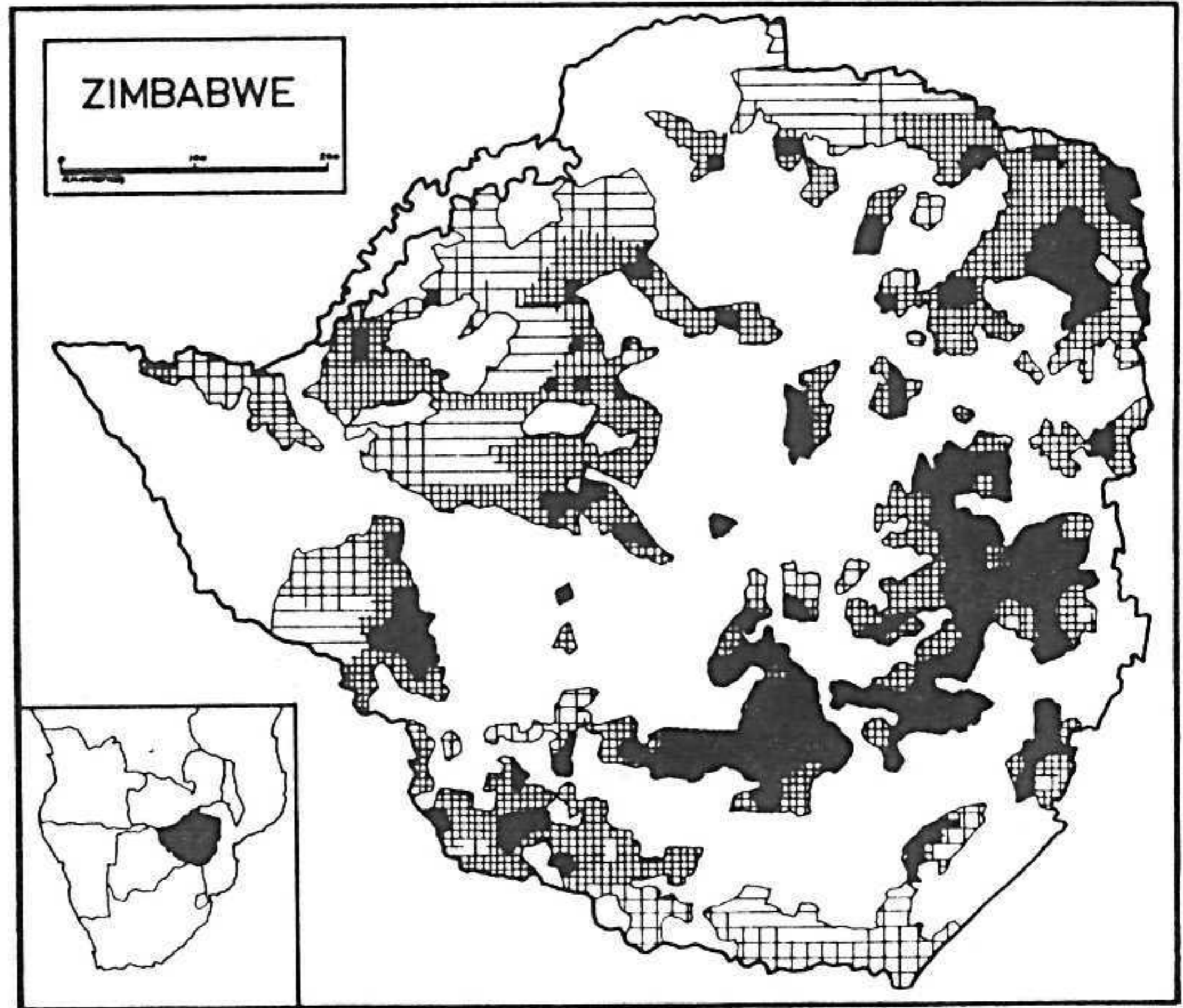
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POPULATION PRESSURE ON LAND IN COMMUNAL AREAS

■ GROSSLY OVER-POPULATED  
 ▨ OVER-POPULATED  
 ▩ OPTIMUM POPULATION  
 □ UNDER-POPULATED

8





In addition to cattle, some farmers own small livestock such as rabbits and free-range chickens. Small vegetable gardens are common where there is an adequate supply of water.

Traditionally, there is a division of economic activities in the communal areas based on sex. The men's duties usually include house-building; the minding, watering and dipping of cattle; constructing cattle kraals and fencing, and the ploughing of land. Women's activities, on the other hand, include the onerous tasks of collecting firewood and water as well as housekeeping, cooking, and washing clothes and dishes. Obviously women are also responsible for child-care and rearing but, due to the migrant labour system women may, in addition to their usual activities, perform some of those tasks normally undertaken by men.

### 3.4 Health, sanitation and water-related diseases

In common with other developing countries, 80% of the significant disease problems in Zimbabwe are nutritional deficiencies and communicable diseases which are those associated with low standards of living and which usually affect children. Of all disabilities, 41% occur during the first four years of life, most of them caused by preventable diseases such as measles, polio and trachoma.

Among faecally transmitted and water-related diseases, the most common are typhoid, diarrhoeal diseases, trachoma and scabies. Cases of typhoid have shown an increase during the period of the drought, but outbreaks of cholera have been few, confined mainly to the eastern districts and brought quickly under control.

Table One Common types of infective diseases related to water in Zimbabwe and water improvements to which the diseases characteristically respond

<u>Category</u>	<u>Disease</u>	<u>Water Improvement Required to Reduce Prevalance</u>
Waterborne	cholera, typhoid; diarrhoeas, dysenteries and amoebiasis; infectious hepatitis, poliomyelitis; and intestinal worms	improved quality
Water -washed	trachoma, scabies skin infections	increased quantity
Water-based	bilharzia	improved quality
Water-related insect vectors	malaria	improved protection and facilities of site



Source: adapted from Gilmurray J *et al*, 1979, Figure 2, p.10 and White G , pp 162-176.

Table One above shows those water-related diseases which are most common in communal areas, and the types of water improvement to which they characteristically respond.

Vector-borne diseases include malaria and bilharzia. Malaria is endemic in approximately 70% of rural areas and has its highest incidence in the lowveld areas of the Zambezi valley and in the south-east of the country. Bilharzia is widespread, having perhaps a prevalence of between 40% and 60% in the rural population and as high as 100% amongst rural children (*Gilmurray, et al., 1979*).

Diarrhoeal diseases are a major cause of morbidity and mortality, particularly amongst children and may account for up to 15% of deaths in children under 5 years (*WHO, 1981*). Health advisors are currently telling mothers to use an oral rehydration solution to promote the early home management of diarrhoea. Trachoma is a major cause of both total and partial visual impairment, and visual disability is the most common type of disability in the country.

Since infective diseases are related to water, any reduction in its overall prevalence in Zimbabwe requires an improvement in quality and quantity of water as well as improvements to facilities at protected water sources. It has frequently been demonstrated, however, that the improvement in levels of water-related diseases arise out of a combination of water supply, sanitation and hygiene improvement.

Although there has been a large increase in the number of improved water sources, particularly in the last couple of years, it is evident that the majority of the communal area population relies on rivers and streams for drinking, cooking and washing water.

The initial impetus to improve primary water supplies came from the Ministry of Health which, before the war, set about upgrading unprotected wells and springs. Today the main focus of that Ministry is to extend primary health care to the rural population and it now has the widest coverage and largest number of extension workers of any Ministry.

The training of Village Health Workers (VHW) started in 1981 and there are now 1500 in the field. The target is to have one Health Assistant in every ward and one VHW to every 200 families. The VHW are not Government employees but persons selected by the villagers themselves. Their main function is to provide comprehensive primary health care and mobilize the community in preventive measures - the most important of these being the installation of protected wells and ventilated Blair toilets.



Health education in hygiene and sanitation is seen as a prerequisite for health benefits to accrue from improved water supplies and as the essential link between such improved supplies and their effectiveness in reducing disease levels.

Health education coverage, especially in relation to nutrition, has been extended to include supplementary feeding programmes which operate in most areas of the country.

Breast-feeding is actively encouraged and an extended programme of immunization was launched in 1981. Maternal and child health has thus been the main focus of the Ministry's programme, although it is estimated that about 70% of births in rural areas are still delivered at home with traditional birth attendants. The overall infant mortality rate for Zimbabwe is 120 per 1000, but in the communal areas this may be as high as 200 to 300 per 1000.

Historically, the health care system was biased towards the developed urban areas and concerned with curative rather than preventive services. All major hospitals, for example, are in urban centres and curative services consume about 80% of the health budget.

Today, health services are becoming orientated towards small low-cost health centres at the local level. These centres, 766 of which are planned, will be located so that all people are within 10 kilometres of one. The referral system operates from these health centres to district hospitals, to provincial hospitals, through to the major referral hospitals, such as Mpilo in Bulawayo and Parirenyatwa in Harare. Although the health sector suffers from a shortage of staff at all levels, this is particularly true of doctors. At the end of 1983, there were 491 practicing doctors in the country, 82% of whom were based in urban areas.

### 3.5 Politics and Administration

During the war of liberation (the period of UDI), the two major African nationalist parties, Zimbabwe African People's Union (ZAPU), led by Joshua Nkomo, and the Zimbabwe African Nationalist Union (ZANU), under the leadership of Robert Mugabe, fought the Rhodesian forces under the banner of the Patriotic Front.

By the infiltration of the armed wings of the parties (ZIPRA and ZANLA) into the communal areas, strong political bases were established. Support for ZAPU comes mainly from Matabeleland and support for ZANU mainly from the other provinces which are dominated by Shona speaking people.



The Independence Elections resulted in the election of ZANU (PF) to office although ZAPU maintained a strong political base in Matebeleland. The former ruling party, the UANC, was virtually eliminated from representation in parliament.

The dissident problem manifested itself in Matebeleland which resulted in the imposition of a curfew, which has since been lifted and a relative calm has returned.

Soon after Independence, the local political structure of ZANU (PF) was re-organized and strengthened in communal areas where they traditionally had support, although the level of political activity varies considerably between districts. In areas with a high level of political activity, party officials and ZANU (PF) Youth and Women's League enjoy a high status in the community and often play a leading role in development projects.

In Matebeleland, recognised local administrative structures are the main channels of representation, as well as the main agencies for local development projects.

In February 1984, the Prime Minister inaugurated the restructuring of the administrative system in the communal lands by appointing Governors in each of Zimbabwe's eight provinces. The proposed structure has a 2-tier representative system at the district and provincial level, and a 4-tier structure of development committees:

- a Village Development Committee (VIDCO);
- the Ward Development Committee (WARDCO);
- the District Development Committee
- the Provincial Development Committee.

These 2 latter Development Committees are sub-committees of the District and Provincial Councils.

The main purpose of the new administrative and development structure is to involve the local communities in the planning and development process and to bring about a much closer co-ordination between the various Ministries which will be represented in the District and Provincial Development Committees. The new structure will also stimulate and facilitate dialogue between representatives of the various Ministries and those of the local communities.



### 3.6 The impact of the drought

Of the last three years of drought, 1982/83 was the worst for 80 years. Two-thirds of the country received less than 60% of normal rainfall and one-fifth less than 40%. Much of the rain that did fall was too irregular, however, to have much agricultural value.

The effects of the drought are widespread, but they are particularly noticeable in Matebeleland, Masvingo, and the southern parts of Midlands and Manicaland Provinces. The drop in the water table has caused many rivers, boreholes and wells to dry up. This has meant that some people have had to walk long distances - up to 10 kilometers - to fetch water. Some rural schools have even had to close due to the shortage of water.

As a result, the Ministry of Energy & Water Resources Development has initiated the construction of medium-sized dams, piped water supplies for villages and has assisted in the well deepening and digging programmes through the involvement of international aid organizations such as UNICEF and the Lutheran World Federation.

In June 1984, the Minister of State (Water Resources and Development) reported that the Government had spent over \$18 million on rural water supplies and had reconstructed and installed nearly 6 000 boreholes throughout the communal lands since Independence.

The effect on the quality of life for rural people is profound, as it is for the national economy. By March 1984, \$56 million designated for development projects had to be used, instead, for drought relief. Loss of earnings from maize and wheat sales have been strongly felt, as has the need for imports costing approximately \$131 million - increasing the balance of payments deficit by nearly 20%. On top of this, the cattle rescue plan alone cost approximately \$10 million.

As a member of SADCC, Zimbabwe has joined member countries in appealing for \$226 million from donor countries to offset the effects of the drought. By October 1983 drought relief food supplies had been distributed to some 2 million rural people. The excessive cost of the drought relief programme led to the launching of the food-for-work campaign in early 1984, where those who were on drought relief were, instead, paid \$2 a day for working on community development projects.



## 4. SURVEY, QUESTIONNAIRE AND SAMPLING DESIGN

### 4.1 Survey design

The survey was designed, firstly, on the basis of an in-depth study of a limited number of households - given in the Terms of Reference as 400.

Secondly, the comprehensive nature of the Terms of Reference required an integrated approach to the survey using different methodologies. This facilitates a fuller understanding of the behaviour patterns set in a rural socio-economic environment, as well as the functioning, status and impact of the water supply programme.

It was decided, therefore, that the following survey techniques would be used:

- a structured household questionnaire to be administered to over 400 respondents drawn from the target populations;
- a structured, but open-ended interview with local community leaders;
- an observational field study to gather background information and verify questionnaire findings; and
- an interview with District Officials to review constraints and strengths of DDF's water supply programme.

The survey design also had to take account of a contradiction in the Terms of Reference as well as delays in receiving a list of improved water supplies.

A footnote to the original Terms of Reference stated that the household survey was required to cover households with access to improved water supplies, through the DDF, since July 1981. This, however, contradicted paragraph 3.1.5 relating to the utilization of water which required the consultants to '*indicate significant differences between users of traditional and improved water supplies*'. This contradiction was settled by including users of traditional water sources in the household sample.

Another requirement was that the survey should include households with improved water supplies covered by Interconsult A/S in the Water Master Plan Study. While trying to obtain this list of schemes, arrangements had to be made for interviews, sampling methods had to be designed and logistics for field work considered - so not to delay the project. The list finally arrived on the day of departure for the field survey, by which time it was too late to use.

However, an alternative sampling technique was devised which satisfied the condition that water supply points were surveyed by Zimconsult which had been improved or installed through DDF since July 1981.



#### 4.2 Questionnaire design

The questionnaire addresses itself to the major requirements contained in section 3.1 of the Terms of Reference. Accordingly, the questionnaire was divided into the following sections:

- A. Household information;
- B. Access and collection of water;
- C. Uses and conservation of water;
- D. Community participation : water supply;
- E. Community participation : sanitation;
- F. Operation and maintenance;
- G. Health.

In addition, the questionnaire was designed to allow data to be captured directly from the questionnaire into the computer.

Once the questionnaire had been drawn up in draft it was reviewed by various consultants, including Zimconsult's sociologist. Before it was finalised, a draft copy was sent to the co-ordinator for his review and comments. Happily, few changes were required.

During this draft stage the opportunity was taken to carry out pilot surveys both to test the questionnaire and to train enumerators in the field. This was a most fruitful exercise in that certain inconsistencies were removed and some questions were more meaningfully structured.

In the meantime, an outline for the field observation study and questions for the review of DDF activities were drawn up. Essentially the observational study covered those elements in the Terms of Reference which appeared under section 3.1, 3.1.7 and 3.2, while the DDF review covered sections 3.1.8, 3.1.9 and 3.3

#### 4.3 Sampling design

Although the Terms of Reference indicated that the sample of improved water supplies should be divided equally between piped water schemes and boreholes, it was decided after some discussion to vary this requirement. As piped water schemes represented only a small proportion of the total number of improved water supplies, it was decided to reduce the number of piped water schemes visited to a quarter of the sample.

In the absence of a list of schemes covered by Interconsult from which to draw a sample, an alternative method of selecting samples had to be devised and adopted.



The survey and sampling techniques were designed around a number of constraints; which included:

- a time constraint: the survey was required to be completed within 3 to 4 weeks;
- a logistical constraint: the need to move quickly around the country with the minimum of disruption;
- a coverage constraint: the need to visit as many places as possible while having a meaningful sample in each area.
- budgetary constraint: to meet the field survey objectives within the given budget.

Given these constraints, it was decided to employ 6 enumerators who would be required to complete 4 questionnaires each day. Thus, 24 questionnaires would be completed for each improved water scheme visited. Since at least 400 questionnaires were to be completed, 17 sites had to be surveyed. (Table 2).

Having established the basic structure of the survey, stratified random samples were selected. As a quarter of the points were to be piped water schemes, 4 piped schemes were randomly selected from each of the 4 drier provinces - Matebeleland (North and South), Masvingo and Midlands. Then, as at least one sample of a borehole was to be selected from each province, 8 boreholes were selected - one from each province. The remaining 5 boreholes were then selected from all provinces, excluding Mashonaland, as it was understood that only a small proportion of DDF funds had been spent in these 3 provinces.

The selection of survey points initially presented a problem in that DDF did not have information immediately available on the exact location of either piped water schemes or boreholes. In addition, the number of boreholes scattered throughout the communal areas were so numerous that an alternative, but equally valid, selection procedure had to be adopted.

As such, the selection of boreholes was carried out by the following procedure:

- within each province, one district was randomly selected;
- from this district, one communal land was randomly selected;
- within this communal land, all grid intersections on a 1:250 000 map were marked and numbered;
- finally the borehole closest to this intersection which had been reconstructed or installed by DDF since July 1981 was deemed to be the sample site for the survey.

In those provinces where 2 boreholes were to be selected, the procedure was simply repeated.



A similar, but somewhat simpler procedure was adopted for the selection of piped water schemes:

- within each of the 4 provinces, one district was randomly selected;
- from this district, one piped water scheme was randomly selected.

It must be noted, however, that some districts did not have a piped water scheme and were thus excluded from the sample.

As it was considered that distance from the improved water point would materially influence responses to the questionnaire, it was decided to stratify the household sample according to the distance they lived from the improved water point. Four zones which corresponded to the questionnaire were therefore demarcated:

- Zone 1: within 200m of the water source;
- Zone 2: between 200m and 500m of the water source;
- Zone 3: between 500m and 1 km of the water source;
- Zone 4: non-recipients of improved water supply living over 1 km from the water source.

Each enumerating team comprised 3 men and 3 women who were required to operate in pairs. The first pair were to operate in zones 1 and 4. One enumerator would interview in zone 1 while the other interviewed in zone 4, and then alternate in the next survey area. The other 2 pairs were to operate in zones 2 and 3.

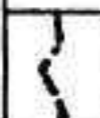

Guidelines were also given on the sequence of households that enumerators should visit. In zone 2 and 3 they were advised, if possible, to visit every second household, while in zones 1 and 4 they were asked to visit every third household and every single household, respectively. This decision was taken because the further an enumerator went from the water point the larger the area he or she had to cover. It was also to ensure that the number of households and area of each enumerating zone were consistent.

Due to the personal nature of some of the questions and to ensure that the sexes were equally sampled, enumerators were instructed to interview only household members of the same sex. In addition they were asked to interview someone of at least 16 years of age who in turn was requested to answer questions, not simply in a personal capacity, but for the whole household.

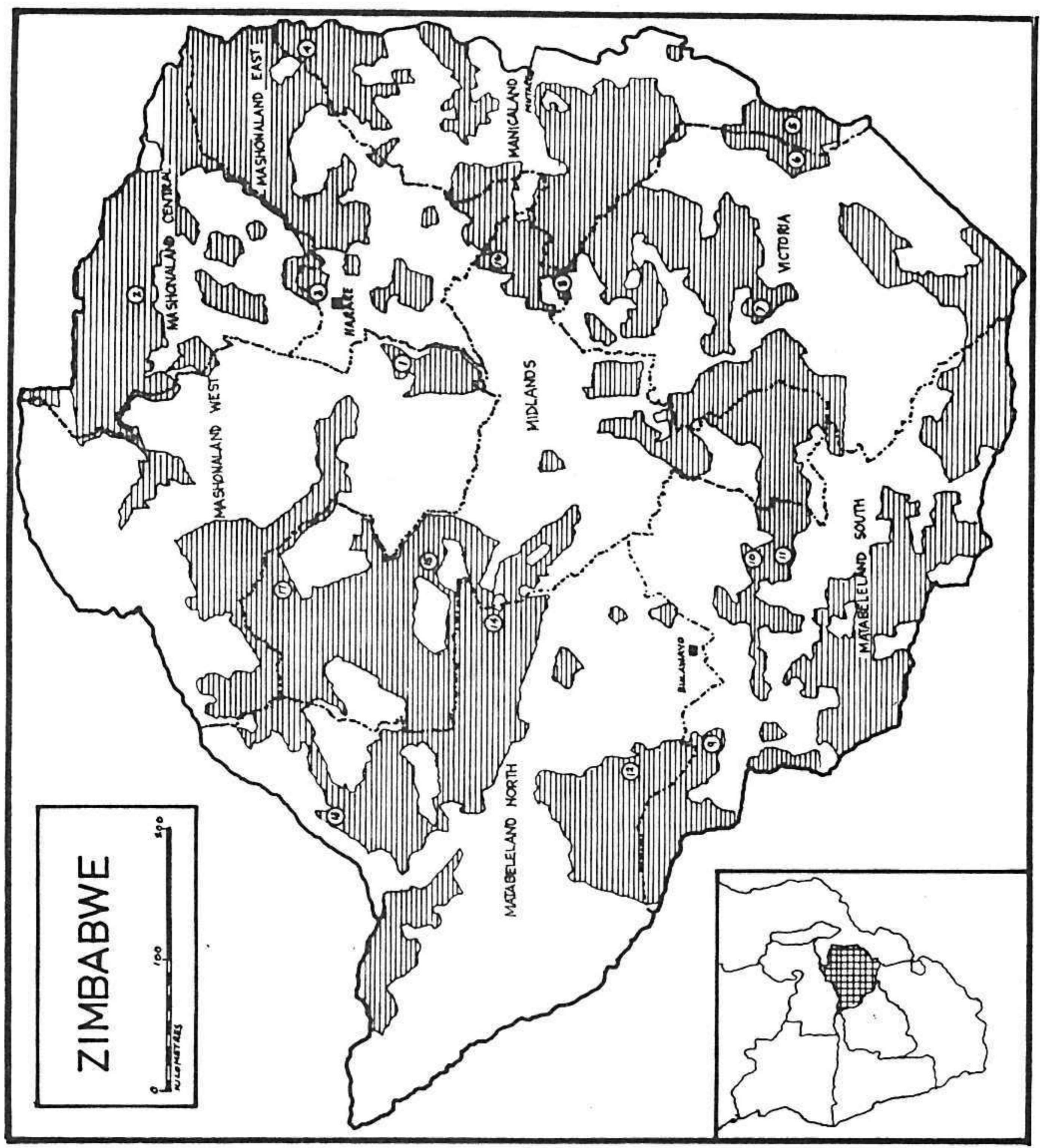
In the design of the survey it was assumed (wrongly, as it turned out) that most, if not all, people within 1 km of the improved water point would use this improved supply. In order to determine the threshold distance from the improved water supply where households would decide to use an alternative (traditional) source of water, the enumerator operating in the 4th zone was required to interview a non-recipient at this threshold point and estimate and record the distance from the improved water supply. If the enumerator could not find a non-recipient within 3 kms of the improved water supply, he was simply requested to interview any recipient in zone 4.



# AREAS VISITED

	PROVINCIAL BOUNDARIES
	COMMUNAL LAND

①	MHONDORO
②	MUZARABANI
③	CHINAMORA
④	ST SWITHINS
⑤	NDOWOYO
⑥	SANGWE
⑦	NYAJENA
⑧	DENHERE
⑨	NATA
⑩	GLASS BLOCK
⑪	INSIZA
⑫	TSHOLOTSHO
⑬	MANJOLO
⑭	NKAI
⑮	ZHOMBE
⑯	SABI NORTH
⑰	SEBUNGWE



# ZIMBABWE





Table 2 Areas visited and persons interviewed by field survey team.

PROVINCE	DISTRICT	DDF Official Interviewed	Position	COMMUNAL LAND	VILLAGE	Local Community Leader		Scheme	Household survey Q'naire
						Interviewed	Position		
MASHONALAND WEST	Chegutu	Mr Zengeni	F.O.	1 Mhondoro	Marowa	-	-	borehole	28
	Centenary	Mr Muryoro	D.A.	2 Muzarabani	Warabwa	Mr P Kanengoni	Councillor	borehole	20
	Goromonzi	Mr Sithole	D.A.	3 Chinamora	Mungati	Mr Murape	Headman	borehole	17
MANICALAND	Nyanga	Mr Chingosho	D.A.	4 St Switins	Matara	Mr P Chari	Councillor	borehole	27
	Chipinge	Mr Ziyaduma	F.O.	5 Ndownoye	Chisumbanje (Matikwa)	Mr E Matikwa	Kraalhead	borehole	20
MASVINGO	Chiredzi	Mr Maposa	D.A.	6 Sangwe	Lisenga	Mr T Maluleke	Council Chairman	borehole	30
	Masvingo	Mr W Nyengera	A.A.	7 Nyajena	Musvosvi School	-	-	piped scheme	29
	Gutu	Mr C A Rwafa	A.A.	8 Denhere	Chimombe	Mr R Upari	Councillor	borehole	19
MATEBELELAND SOUTH	Bulalima - Mangwe	Mr Gumedede	A.A.	9 Nata	Mlonwe School	Mr Khumalo	Headmaster	borehole	21
	Insiza	Mr L Luphahla	F.O.	10 Glassblock	Maholehole	Mr S Phiri	Councillor	borehole	31
	Insiza	Mr L Luphahla	F.O.	11 Insiza	Sibasa	Mrs Ncenge	Women's Advisor	borehole	24
	Nyamandhlovu	Mr M Ndondo	D.A.	12 Tsholotsho	Godzo	Mr J Mabunda	Party Chairman	borehole	27
	Binga	Mr P Siachimbo	Snr. clk.	13 Manjolo	Manjolo	-	-	piped scheme	25
MATEBELELAND NORTH	Nkai	Mr Maposa	D.A.	14 Nkai	Kwava	Mr Kwava	Kraalhead	borehole	22
	Kwe Kwe	Mr Ndanga	D.A.	15 Zhombe	Mavule	Mr M Ngwenya	Kraalhead	piped scheme	23
MIDLANDS	Chivhu	Mr Mhandire	A.A.	16 Sabi North	Kwenda	Mr T Madzivanyika	Headmaster	borehole	20
	Gokwe	Mr Mafodza	D.A.	17 Sebungwe	Ziurawa	Mr M Mupambiwa	Political Commissar	borehole & engine	26

Abbreviation: F.O. - Field Officer ; A.A. - Assistant Administrator;  
D.A. - District Administrator



## 5. FIELD WORK

Once the areas to be visited had been selected, requests were sent to the districts to identify the borehole or piped water scheme closest to the particular grid intersection (by way of a grid reference) which had been installed or reconstructed by DDF since July 1981. At the same time dates, indicating when the survey team was due to arrive, were given to the District Administrator.

In the meantime the survey team was being recruited and subsequently trained on pilot surveys carried out near Harare. The final survey team consisted of the following personnel:

- a project manager to review DDF's activities;
- a sociologist (community medicine) to conduct the observational study;
- 6 enumerators to interview local community leaders;
- an assistant to secure vehicles and equipment as well as assist with cooking and washing.

Two trucks, one with a trailer, were loaded with equipment and provisions before setting out. For the most part, the team travelled together, except when the project manager left the remainder of the team in the field to interview the District Administrator or other DDF representative.

An itinerary had been drawn up which was to guide the movements and timing of the teams, the target being to visit and conduct the field work in a different area each day. The first area visited was Chinamora (3) near Harare (*map 7 and Table 2*), after which the team set off for St. Swithins (4) and Ncwoyo (5) in Manicaland, working their way through Masvingo Province where surveys were carried out at Sangwe (6) and Nyajena (7).

The team then cut across country to Glassblock (10), Insiza (11) and Nata (9) in Matebeleland South and up to Tsholotsho (12) and Manjolo (13) in Matebeleland North. Nkai (14) was the last place visited by the survey team before returning to Harare.

Thereafter, day excursions were made to Mhondoro (1) and Muzarabani (2) and 2-day excursions made, first to Denhere (8) and Sabi North (16), and then to Zhombe (15) and Sebungwe (17).

On arrival at the District Administrator's office, the exact position of the improved water supply to be surveyed would be identified and a Field Officer seconded to travel with the team to the site. Once the team had departed, the project manager would interview the District Administrator and make arrangements for accommodation for the night. Whenever possible the project manager would then meet the survey team at the survey site.



When on site the supervisor first made contact with a local community leader before giving final instructions to the enumerators, who would move out to their respective zones - except the zone 4 enumerator who would be dropped off by car.

The supervisor would then return to interview the local community leader, who was usually a kraalhead or councillor. During this time the sociologist would be making a field study of the area and, in particular, recording information about the collection of water at the borehole or piped scheme. After the supervisor had completed his interview with a local leader, he and the sociologist would try to find a Health Assistant, Village Health Worker or Women's Advisor with whom health matters in the area could be discussed.

The time taken for completing each questionnaire interview was about 30 to 45 minutes and, given the time to walk between households, the total time taken in the field was about 4 hours. When visiting sensitive security areas in Nata, Tsholotsho, Manjolo and Nkai, 2 armed escorts travelled with and protected the enumerators in the field.

It was not unusual for the team to arrive late in the afternoon at the accommodation provided, have supper, check their questionnaires late into the evening, and be up before 5 o'clock the following morning preparing for the day ahead. By the time they had repacked and loaded the vehicles, the team could expect to travel on bumpy and dusty roads for hundreds of kilometers before they would again be at a water point and begin the questionnaire survey again. It was a great credit to the survey team that they were able, under considerable pressure, to meet their targets and visit all sites, even in sensitive security areas. In view of these difficulties, their resourcefulness and their pleasant demeanour deserves special mention.

There were, however, problems. Field work, as it turns out, is neither as neat nor tidy as the survey designed and planned in an office.

The first problem was the identification of sites, particularly piped water schemes. In Chiredzi, where it had been reported that there were 2 schemes which had been improved, they could not be identified. (The DDF had in fact a number of piped schemes in this area which had been reconstructed from the installation of 'protected villages'.) In Insiza district, where another 2 schemes had supposedly been completed, there were no such schemes, only planned improvements. In Manjolo, the improved scheme had been built in the late 1950s and was barely operational, whilst the scheme at Zhombe, ostensibly belonging to the DDF, turned out to be operated and maintained by the Ministry of Water Resource Development.



Even after some explanation, there appeared to be some confusion at the district level as to the purpose of the survey and precisely which scheme the team was required to visit: that is, one which had been installed since July 1981 with DDF funds, closest to the selected grid intersection. Even Field Officers were uncertain whether the borehole had been reconstructed or whether it had always been working, or whether new installations were part of the drought relief programme or regular DDF installations.

On other occasions, at Chiredzi and Insiza, for example, boreholes had to be surveyed in the absence of identifiable piped water scheme, whilst at Nyajona the converse applied.

Another problem encountered was that settlement patterns around a borehole did not always fit neatly into the delineated zones, nor could enumerators gauge exactly how far away they were from the water point. As such, the zones cannot be separated with any precision and have to be seen in the light of field conditions.

Although enumerators were briefed as thoroughly as possible, it became apparent that persons operating in zone 4 did not fully understand that a threshold had to be determined. Nor was it envisaged that non-recipients would be found in zones 1, 2 and 3, for whom thresholds have also been estimated. They were, nevertheless, still interviewed.

Finally, an effort was made to send completed questionnaires back to Harare by local courier during the field survey in an attempt to speed up the processing. This was done from Masvingo and Bulawayo.

## 6. DATA PROCESSING AND ANALYSIS

### 6.1 Data Processing

The data gathered and recorded on the questionnaire forms were punched directly onto the ICL 2946 mainframe computer at the University of Zimbabwe.

Before the data were ready for analysis, it had to be checked and verified. This was done by identifying errors made either in recording or punching, and comparing these with the original survey forms. Once the error had been found, the forms were appropriately amended.

The data was then run through a series of programmes written in 'Statistical Package for the Social Services' (SPSS) language to obtain, initially, frequency distributions and means. This information was then sent to the co-ordinator who passed it onto the sociologist of the NORAD evaluation mission. From those frequencies, certain cross-tabulations and other statistical analyses were required to evaluate and draw conclusions from the processed information.

### 6.2 Statistical analysis

The Terms of Reference required the consultant not only to make specific measures of certain variables, but also to make more global comparisons; for example, to contrast the level of access to water with socio-economic characteristics. Accordingly indices were constructed for:

- A - Index of wealth (socio-economic status);
- B - Index of access to water;
- C - Index of priorities;
- E - Index of sanitation;
- G - Index of hygiene ;
- H - Index of water related diseases.

All indices were constructed to have a minimum value of zero and a maximum value of 100, and then grouped into a four-value categorical variable:

That is:

- Zero - if the index was between 0 and 24;
- One - if the index was between 25 and 49;
- Two - if the index was between 50 and 74;
- Three - if the index was between 75 and 100.

The cross tabulations exhibited were all done using these categorical variables. In each case zero was taken to be the least favourable end of the range and value 3 the most preferred or most favourable end represented by the index. One common way of constructing an index of socio-economic status is to undertake a Principal Component Analysis.



Although valid, such an approach is extremely time-consuming, both in actual and computer time.

In view of the time constraints involved, it was, instead, decided to utilize the index of wealth constructed by Resource Studies (du Toit, *et al*, 1984) from their socio-economic data collected in a similar recent survey. Their in-depth analysis revealed that their index of wealth was the only really valid measure of socio-economic status.

The Resource Studies wealth index, obtained from a Principal Component Analysis, used the standardized log transforms of the following variables, multiplied by the following factor scores.

<u>Question</u>	<u>Variable</u>	<u>Factor Score</u>
A10 01	No of cattle owned	0,40
02	No of bicycles	0,20
03	No of scotchcarts	0,31
04	No of ploughs	0,41
05	No of radios	0,03
06	No of cars/tractors	0,25

The index was then weighted to lie between zero and 100 and used to produce the four-value categorical variables. In constructing this index, it was initially considered that variables A9-1 (land for crops); A12 (type of dwelling); and A14 (cash income received last month) would also be good measures of wealth. However when correlating each of these measures with A10 only small positive correlations were produced. As such, they have not been included in the wealth index (A). There was, however, a significant relationship between incomes (A14) and type of dwelling (A12).

The variables included in the index of access to water (B) were:

- Q-zone : zone of respondent;
- B3 : perceived difficulty of water collection (non-recipients);
- B6 : perceived difficulty of water collection (recipients);
- B11 : distance to water source;
- B13 : time taken for collection;
- B15 : number of collection trips per day;
- B17 : queueing time for water.

The last two variables were considered to indicate an inverse degree of access and were therefore subtracted from the index, but still given an equal weighting.

The index of sanitation (E) consisted of responses to question E1 only: that is, whether or not a household used a latrine.



All of the following variables included in the index of hygiene (G) were equally weighted:

- G2 : covering of stored water;
- G3 : boiling of drinking water;
- G401 : use of river for bathing;
- G402 : use of river for washing of clothes ;
- G5 : cattle using the source of water;
- G6 : use of pot rack or 'dara'.

Depending on whether the variable was positively or negatively related to hygiene, they were respectively added to or subtracted from the index. All variable were given an equal weighting.

In view of their relative importance and the unreliability of self diagnosis of major diseases, the last 2 variables, below, (G9 and G11) were given 3 times the weighting of the first 3 variables (G8.02-4) when constructing the index of water-related diseases (H). The index included the following variables:

- G8.02 : presence in last 3 years of bilharzia;
- G8.03 : presence in last 3 years of malaria;
- G8.04 : presence in last 3 years of tuberculosis;
- G9 : frequency of diarrhoea;
- G11 : incidence of diarrhoea last month.

In the construction of the index of priorities (C), a separate variable was created for each possible value of questions C5.01 and C5.02 in which respondents were asked to give their first and second preference, respectively, for usage of water if more was available. These variables took the values 0, 1, 2 or 3 depending on the respondents pattern of preference regarding that particular option. Thus, for example, the priorities variable for bathing took the value zero if the respondents did not mention this option as either a first or second preference; the variable would be 1 if bathing was expressed as the second preference, 2 if it was the first preference; and 3 if it was expressed as both first and second preference.

The values of these priority variables were then aggregated across the entire sample. Thus, the more frequently a particular option was expressed as a preference, the larger this number would become. Using these variables, therefore, the relative importance of the corresponding option can be compared, the larger one being the more preferred.

Total estimated weekly water consumption (in litres) for each activity was obtained by combining responses to questions C2 and C3. A new variable, estimated water usage for each activity, was created by multiplying C3 by weighted factor obtained from C2.



This gave a weekly consumption estimate which was calculated according to the following table:

Value of C2	Estimated factor (litres)	Value of C3	Weighting usage (litres)
03	14	03	0
04	7	04	2,5
05	3,5	05	7,5
06	1	06	15
07	0,5	07	35
08	0,25	08	75
09	0,042	09	150
10	0,021	10	0
11	0,01	88	0
12	0		
88	0		

Thus, for example, if a respondent said that he bathed once a day (i.e. C2-04 = 04) and that each time he bathed, he used between 5 and 10 litres of water (i.e. that C3.04 = 05), then estimated weekly usage for bathing was estimated at  $7 \times 7,5 = 52,5$  litres.

### 6.3 Data analysis

The frequencies, the construction of indices, and estimates of water usage formed a data base on which various relationships could be hypothesized and tested by means of cross-tabulations.

To ensure that the data collected (by means of the questionnaire, observations, research and interviews) covered all the elements in the Terms of Reference, a simple schedule which has been titled a '*Data Reference Guide*' was drawn up which related the data collected to the Terms of Reference.

This then laid the foundation for the perusal and interpretation of results and the presentation of findings in the following chapter.

## 7 SURVEY RESULTS

Earlier, a note of caution was sounded in attempting to extrapolate survey results based on a very small sample to draw general conclusions. In addition, the results presented here must be seen in the light of 3 years of drought in Zimbabwe as well as the time of year the survey was undertaken.

### 7.1 Socio-economic characteristics of households:

#### Demographic characteristics.

The average number of members in each household was between 6 and 7 members, although 15% of households had more than 11 members, and at the other end of the scale, a third of respondents had less than 5 members present. It was not uncommon to find households with up to 3 children under the age of five and/or up to 4 children between the ages of 5 and 16.

Polygamous marriages were prevalent, but most common in Ndowoyo where the incidence of such marriages was reported by a Community Development Worker to be almost 100 per cent, with men sometimes having more than 2 wives and as many as 20 children. It was said that this tendency was evident in areas where the traditional Christian Apostolic and Zionist Churches were most active.

#### Religion and education

The religion of the household was significantly related to socio-economic status; that is, Roman Catholics, Methodists and Salvation Army households tended to fall significantly more often in the 2 higher percentile categories of the wealth index compared to traditional and indigenous Christian religions.

This relationship probably arose due to the preponderance of various Christian Missionaries who set up schools in the communal areas before Independence. This education imposed a religious affiliation and enabled the more educated person to earn higher incomes. This seems to be borne out by the fact that there is also a significant relationship between the schooling of both the respondent and the head of the household with religious affiliation.

Although more female respondents than males had education in the first three years of schooling, the men, thereafter, tended to be significantly better educated than women. One reason for this may be that expenditure on secondary schooling for boys is considered a more 'economic' investment as they are probably perceived to be more likely to find employment than girls.



### Community activities

Community activities were quite advanced in 4 areas particularly around business centres, and less so in another 8. Those areas with dispersed settlement patterns had virtually no community activities. Where in existence community activities centred around Women's League, Youth Brigade and Party meetings. There were also farmers' clubs, women's clubs involved in sewing, cooking, poultry keeping, etc., and one area (Sangwe) also had sports, music, gardening and traditional dancing clubs. Although membership of clubs was generally low, 22% of households belonged to a co-operative and 18% to a farmers' club.

### Economic status and income

The depressed socio-economic conditions prevailing in the survey areas was reflected in the economic situation of individual households. In the month prior to the survey 24% of respondents reported that they had not received any income in cash, whilst just under a third received no more than \$24,00.

The extreme poverty of Ndowoyo and Manjolo was demonstrated by the fact that respondents in these remote areas alone accounted for exactly a quarter of all households which had received no cash income. Only 12% of households received more than \$100-00 in cash the previous month, and these were concentrated mainly in Zhombe, Chinamora and Muzarabani.

Agricultural production was the single most important source of cash income, accounting for 45% of all cash income received. In normal years, when the effects of drought are not as debilitating, the percentage of income derived from agriculture would be much higher, possibly double. Remittances from working household members (typically characteristic of a dependent rural economy) was the most important source of cash income in Mhondoro.

This may be accounted for by the fact that this drought-affected district is relatively close to Harare. In Insiza, wages were the most important source of cash income. Wages from employment were equally important as remittances sent from relatives working elsewhere for those households (23%) which had received more than \$60-00.

Drought relief was the most important source of income in kind in 10 areas, and as expected, this was particularly important to those households which received no cash income. Generally, land holdings are rather small and comparable to estimates of per capita land holdings in all communal areas (*Stoneman, 1981*). Thirty seven percent of households had between 1 - 2 hectares for cultivation and 42% had been between 3-5 hectares.



It is very uncommon for land to be allocated for cattle grazing because they are normally grazed on communally owned land. Although the average number of cattle owned by households was 9, just under a third of respondents owned no cattle at all.

Again, the survey results are comparable to national statistics (Steele, 1981).

Although houses were generally kept in good repair, these were usually of the traditional pole-and-dagga type. In some areas, particularly when sited near a business centre, housing was of thatch-on-brick. In a few instances, modern tin- or asbestos-on-brick houses had been built.

Not unexpectedly, most households owned a plough. Nearly half the households owned a bicycle or a scotch-cart, but of all households only 5% owned a car or tractor. Of the 14 local community leaders interviewed, 5 had a car or tractor of whom 4 were wage earners. A high and regular source of income is essential for vehicle ownership.

To give some indication of the wealth status between areas visited, these have been ranked in Table 17. At the top end of the scale, nearly 80% of respondents fall into the two higher wealth brackets while in Binga, which was ranked last, had 80% of respondents in the two lower income brackets.

Most heads of household were men aged between 46 and 60 years of age with little or no education, a few of whom enjoyed some status in the community.

There was a significant relationship between socio-economic status of households (wealth index) and the position held at the community level by heads of households, which is illustrated in table 3, below:

Table 3 : Wealth and social position of heads of household at village level

SOCIAL POSITION IN VILLAGE	INDEX OF WEALTH			
	Bottom 25%	2nd 25%	3rd 25%	Top 25%
Position held	7	12	21	26
No position	96	90	81	76

(Chi sq = 16,2 with 3 degrees of freedom.  
Significance = 0,0010)

Seventy-one per cent of heads of households with positions at village and ward level were in the third and top percentiles of the wealth index and, whereas participation at the village level was mainly in a traditional advisory capacity, positions held at the ward and district level were usually administrative.



### Settlement and migration

In remoter areas where traditional water supplies were used, people settled along areas of high ground near rivers. This, for example, was the case in Muzarabani where due to the drought, the rivers have dried out and people were moving out of the Zambezi Valley to areas where water is more accessible. In Insiza, a characteristic linear settlement pattern along the main road was particularly distinctive.

Although villagers do not hold title to property in the communal areas, there is a very real sense of spiritual identity and security which has resulted in stable communities whose settlement in particular areas are often of long duration. This is exemplified by the fact that over 60% of respondents had lived in their area for over 20 years. From the interviews of local community leaders, it was found that the average period of residence of elected councillors and traditional kraalheads was 45 years.

In spite of this, at any given time, up to half of the male adults are absent from their rural homes seeking employment in towns and commercial farms. This trend is apparent in the survey areas where two-thirds of households reported members absent. The only exception to this rule was Manjolo in Binga District.

### Rural infrastructure

In general, the remoteness and lack of development in terms of health care facilities, electricity, adequate roads and the presence of extension workers, was evident in most areas visited.

In 12 cases, the water points under observation were located near a business centre. Several stores, a butchery and one or two grinding mills were typically found at such centres. There were primary schools near all the sites, and secondary schools near some of them. In Nata and Manjolo the boreholes and water tanks were, respectively, located on school premises.

In 11 cases, the water scheme was sited in a community which had relatively easy access to a clinic and/or rural (mission) hospital, that is, within 15 kilometers of a health facility. Of all respondents, 70% reported being within 10 kilometres of a health centre. In Denhere and Muzarabani the boreholes had been installed as much for clinic use as for the community.

An approximately equal number of men and women were interviewed in each of the 4 zones which demarcated the distances the respondents were from their improved water supplies. Of these, nearly 70% drew their water from improved water supplies. These will be referred to as 'recipients', whilst the remaining 30% of the respondents drawing water from traditional sources are referred to as 'non-recipients'. The unintended fact that 'non-recipients' were found in zones other than zone 4 (Table 6) meant that statistical comparisons between the 2 groups was considerably improved.



## 7.2 Access to and collection of water

The reconstruction and installation of improved water supplies has brought water nearer to a significant number of people in the survey area and has, in terms of distance travelled and time taken to collect water, dramatically improved access to water.

### Traditional and improved water supplies

Of all respondents, 70% collected their water from improved water supplies, three-quarters of whom used a borehole, whilst the remainder used community taps from a piped water scheme. These recipients had, before the improvement in their water supply, most often used unprotected wells and springs in the dry season and rivers in the wet season.

Table 4 shows that a similar pattern pertains to the non-recipients, except that they most often used an unprotected well or spring in both the dry and wet season. Rivers also play a very important role, however, either as a direct source of water during the wet season or for a 'mufuku' during the dry season. A mufuku is a water hole dug in a river bed.

Table 4 Percentages of recipients/non-recipients using various sources of water supply prior to improvement, by season:

WATER SOURCE	RECIPIENTS		NON-RECIPIENTS	
	Dry season	Wet season	Dry season	Wet season
Borehole/tap	14,4	13,4		
Protected well	4,9	4,9	7,1	9,9
Unprotected well or spring	32,5	31,8	49,2	46,8
River/mufuku	25,7	36,3	31,7	35,7
Dam	7,4	4,9	8,7	5,3
Other	11,3	3,8	3,3	2,3
Missing data	3,8	4,9		

### Access to improved water supply

Perhaps the most direct (if subjective) measure of access to water is to simply compare the perceived degree of difficulty in collecting water of recipients and non-recipients. Table 5 shows quite clearly that recipients are much more likely than non-recipients to describe water collection as being easy or very easy.



Table 5 Perception of recipients and non-recipients of the degree of difficulty in collecting water

Degree of difficulty collecting	Recipients (%)	Non-recipients (%)
easy	60	37
fairly easy	19	14
difficult	20	33
very difficult	1	16

Eighty per cent of recipients found water collection easy or fairly easy, three-quarters of whom said that this was because the water point was nearer. Distance was thus perceived as a very important factor in the degree of difficulty in collecting water.

A more objective measure of access is the measurement of distance travelled to the improved source and the time taken to collect water.

#### Distance

Due to the assumed impact of distance on the use of improved water supplies, the sample of households interviewed was stratified according to zones on the basis of this criterion.

This assumption, as the results show, was correct. In table 6 below the percentage of recipients and non-recipients in each zone clearly demonstrates this relationship of distance and use of improved water supplies.

Table 6 Percentage of recipients and non-recipients in each of the 4 questionnaire zones.

Household	Zone 1 0-200m	Zone 2 200-500m	Zone 3 500m-1 km	Zone 4 1-3 km
recipients	23	39	30	8
non-recipients	2	20	38	40

(Chi sq. = 99,1 with 4 degrees of freedom;  
significance 0,0000)

The further the improved water source was from the household, therefore, the more likely members were to utilize a traditional or alternative source.

Recipients of improved water supplies reported that whereas 7% of their household members travelled less than 500 metres to their water source (see table 7), only 27% of households were within this radius before improvements. There was little seasonal variation in these percentages.

Table 7

Distance travelled by recipients  
/non-recipients to collect water,  
by season.

ZONE	DISTANCE TRAVELLED	DRY SEASON (%)		WET SEASON (%)	
		recip.	non-recip.	recip.	non-recip.
1	0-200m	40	38	41	49
2	200-500m	31	21	31	16
3	500-1 km	22	11	22	6
4	1 km +	7	30	6	29

Table 7 also shows that whilst both recipients and non-recipients had similar access to a water source up to 500 metres, only 7% of recipients had to walk more than 1 km to collect water, whereas 30% of non-recipients had to walk further than 1 km to their traditional sources of water. These percentages, given for the dry season, are almost identical to percentages for the rainy season. In spite of these findings, however, the number of non-recipients found in zones 2 and 3 remains a disquieting factor.

Time.

As expected, the time taken to collect water varies according to the type of water supply.

Table 8 Time taken to collect water before and after improvements to the water supply, by season.

TIME TAKEN	DRY SEASON		WET SEASON	
	before imp't	after imp't	before imp't	after imp't
	%	%	%	%
Less than 30 min	23	52	25	58
30 min to 2 hrs	38	39	42	37
over 2 hrs	39	9	32	5

The results contained in table 8 shows that there is not a large seasonal difference in the time taken to collect water. However, it supports the data on distance in that more than 4 times as many households spent more than 2 hours collecting water before an improvement in the water supply, than after. Likewise, half the number of households took less than 30 minutes to collect water before improvements compared with the number after improvements.

When the borehole rather than the household is taken as the point of reference, collection of water is not as easy as suggested by the household questionnaire data. For example, the average time spent collecting water according to the questionnaire is less than 10 minutes, but observations showed that, on average, more than half an hour was spent on this activity. In keeping with this observation, the average distance travelled according to questionnaire data was less than 200 metres. Observations put this figure at about 1 kilometer.



It should also be noted that the sampling strategy did not take account of those households whose members travelled further than 3 kilometers to their water source and who, as a result of the drought, have suffered terribly. Those District Administrators who reported people walking between 3 and 7 kilometers for daily water supplies were at Insiza, Binga and Mhondoro. In Chipinge, Chiredzi, Nyamandlovu, KweKwe and Gokwe, they were reported to be walking up to 15 kms. Such hardships have been substantiated by newspaper reports. For example the national daily newspaper, "The Herald" of 24 September 1984 reported villagers in Sanyati having to walk 10 kilometers daily to fetch water. One woman said that every day, she woke up at 4 a.m. to queue for water and only got back late in the evening, leaving little time for household chores or preparing fields for the coming season.

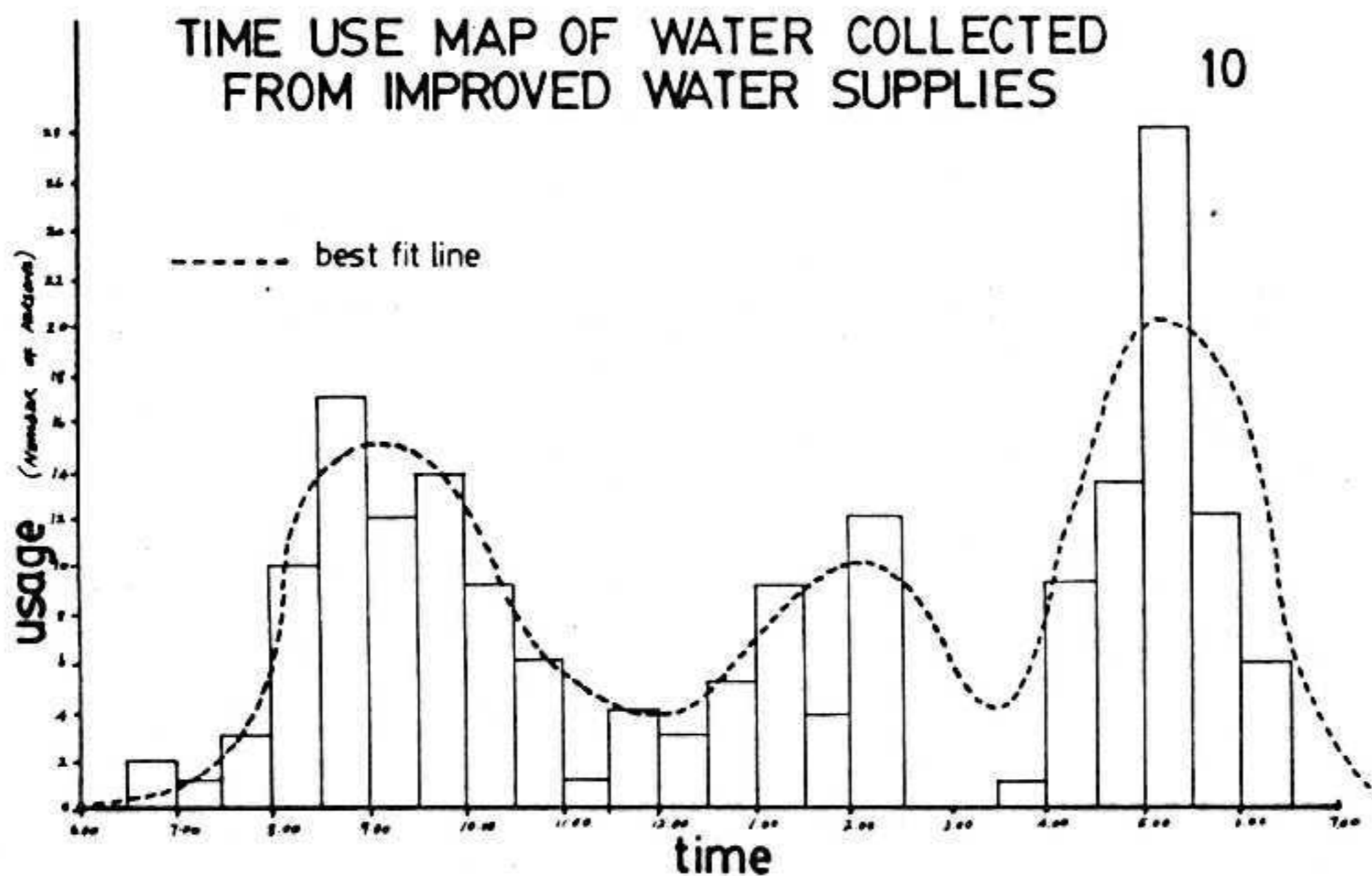
In 3 areas water was transported by bowser to acutely dry areas. In KweKwe only the clinic was supplied because the District Administration could not afford to transport sufficient water to meet general demand. In Mhondoro the Field Officer said: "*At the moment, to these 19 points, we (DDF) are carting water by water bowser.*" A similar situation obtained in Muzarabani where water bowsers transported supplies to villagers whose supplies had dried up. This was costing DDF over \$4 000,00 a month, for which each household received a bucket of water a day.

#### Water collection and storage

Women are traditionally the household members responsible for the collection of water. Indeed, the results of this survey show this to be true, in all areas, regardless of whether improved or traditional water supplies were used. Virtually all households reported 2 or more trips being made per day to collect water. The usual pattern of trips is one in the morning and another between 4 p.m. and sunset. On this basis, questionnaire data suggests that women spend about 1 hour a day collecting water, whilst field observation suggest that they spend a minimum of 2 hours on this activity each day.

Observations were made at 14 water supply points, 7 in the morning and 7 in the afternoon, the average time spent recording data being over 2 hours at each site.

The information gathered on-site has been translated into a time-use graph (*fig.10 below*) showing those times that the households most frequently collect water from improved water supplies. It shows that water is collected mainly in the mornings (9.00 a.m.) and evenings (5.00 p.m.), and that there is also a small mid-day peak.



In some areas, Mhondoro and Binga in particular, water collection was also a social occasion. In part, this was due to the gross overuse of these water points, and much of the women's time is taken up with queueing.

In addition, notably in Mhondoro, a number of women did their washing on site. In Binga, most women brought plates to wash as well as clothes. Women would also help each other with pumping, with the cleaning out of containers and taking it in turns to keep goats, cattle and donkeys away from the borehole or tap.

The number of children, up to the age of 7 or 8, collecting water, increased markedly once the school vacation started. They usually carried small plastic 5-litre bottles, whilst women and older children normally collected water in 20- and 25-litre tins which they carried on their heads. Household members reported little usage of scotch-carts for water portage.



Many women prevented spillage by carrying water on their heads. Binga women, for instance, placed their plates on top of their filled buckets whilst the most common method elsewhere was the use of various types of leaves which were thought not to affect the water or, some said, to sweeten the water.

The volume of water collected per household per day was about 40 to 50 litres. Of this no more than 10 litres was stored overnight in collector containers or clay pots as few households owned large drums or tanks.

Not much reliance could be placed on estimates of the number of households using improved water supplies. However, some places such as Gokwe, Ndowoyo and Mhondoro have boreholes which possibly serve as many as 400 households. It was estimated that each borehole generally served at least 100 families.

It should be noted that there was no statistically significant difference of socio-economic status and householders' access to water, either between different households or between different boreholes. This seems to be confirmed by Table 17 which shows that only Chinamora, Nata and Sebungwe had similar rankings on both wealth and access indices.

### 7.3 Use and conservation of water

#### Water usage.

Survey results showed that water collected was, by far, most commonly used for domestic purposes. Table 9 shows that cooking and drinking and bathing required the greatest amount of water, followed by the washing of clothes and dishes.

Table 9 Water usage for domestic purposes.

(Average water usage for domestic purposes per family per week in litres)

cooking and drinking	25
bathing	277
washing dishes	154
washing clothes	146
	---
Total	870
	---

Although the washing of clothes may be done at the improved water point, these results do not take into account that half of all households reported that they sometimes wash their clothes at a river. Similarly, a third of households reported swimming and bathing in a river.

Table 10 Average usage for domestic purposes, gardens and cattle, by family size and number of children per household (litres per week)

WATER USE	TOTAL SAMPLE	FAMILY SIZE			NO. OF CHILDREN	
		-5	6-10	11+	NIL	1+
Domestic	870	700	842	1392	435	908
Irrigation	148	138	140	197	117	150
Cattle	183	148	161	347	18	198
TOTAL	1201	985	1143	1936	570	1256

From the table above, it is evident that for all households, an average of 183 and 148 litres was calculated to have been used each week for the watering of livestock and gardens/crops, respectively. The difficulty of estimating these quantities, even for the household, should be borne in mind. As such, these results should be treated with caution.

Water usage for different purposes showed no significant relationship to the sex of the head of household or the socio-economic status of the household; that is, to the wealth index. However, as expected, table 10 shows that the amount of water used was clearly related to the number of members in the household. Also, the number of children in the household greatly increased expenditure of water on cattle and may underline the importance of boys as cattle minders (table 10).

Surprisingly, recipients used slightly less water than non-recipients, nor was any discernable pattern of water usage for various purposes found between households in different zones.

#### Conservation of water

Only 2% of respondents said that they were restricted in the amount of water they could collect and use, although 43% said that they were using less this year.

Whereas the most serious consequence of a cut-back in water usage was considered to be the effect on cattle, most households felt that water could most easily be saved by using less water for gardens. This may be because cattle are considered, traditionally, as an investment whose loss would be viewed as a decline in wealth. Cattle are also vital for draught power in the communal lands.

Fifteen percent of respondents thought repairs to pumps and taps would effectively save water, whilst 24% thought that children should be prevented from playing with water.

Poor design of pump headworks, absence of concrete surrounds, run-offs and troughs caused not only inevitable wastage, but muddy and unhygienic surrounds.



#### 7.4 Problems and Priorities

The single most important priority, given an improvement and increase in water supplies, is for the watering of gardens.

##### Priorities

Whereas the water supply was considered to be sufficient by most households to cater for domestic needs, 80% of respondents felt that it was inadequate for watering gardens and irrigating crops. Almost the same proportion of households (75%) felt that the supply was also inadequate for watering cattle. Significantly more men than women felt that the water supply for domestic purposes was inadequate. Although the reasons are not clear, it is suggested that this is because women have to bear the burden of collecting water.

Households were asked what they would use water for (if they had access to more water) and were asked to specify their first and second choice. The method of weighting these priorities has been discussed in section 5.2.

Overall, the first priority of 69% of households was for the watering of gardens and 31% indicated the irrigation of crops as their second choice.

Aggregate scores of water usage were then computed and priorities ranked for each of the following categories:

- each survey area;
- each questionnaire zone;
- each percentile on the wealth and access to water indices;
- recipients and non-recipients;
- male and female respondents;
- heads of households;
- households of different sizes and those with/without children;

Again, without exception the watering of gardens was seen as the top priority and, for all but 7 of the 40 categories, irrigating crops was seen as the second priority.

This priority was confirmed by local community leaders who unanimously agreed that the main priority was for watering gardens.

Scores for Nkai and Zhombe and zone-4 respondents generally showed that watering cattle was their second priority. For Manjolo, Sebungwe and female heads of households, water for bathing was given second priority and in Chinamona water for cooking and drinking was given second priority.

While seasonal factors and the implications of the drought must be taken into account when examining these stated priorities, the very real need for more water for gardens should not be neglected. Although households were clearly managing to cover their domestic needs, this was only achieved at the expense of watering gardens - as it was shown in the previous section that water was first conserved for this use. The shortage of water for gardens will therefore continue to have an adverse effect on nutrition, health and incomes in the rural areas.

### Problems

Significantly more recipients than non-recipients were satisfied with their water supply, the major complaints amongst the non-recipients being the dirtiness of the water and the long distances they had to walk to their source of water supply. Since water collection is a woman's activity, it was natural that they were more concerned than their male counterparts about the distance to the water source.

Less than half (44%) of all respondents felt that the water supply was inadequate, mainly because of an insufficient supply of water. Nearly two-thirds of households said they would like to see improvements in their water supply, although non-recipients were, understandably, significantly more in favour of improvements than recipients. Rising expectations are also apparent, in that recipients of borehole water are more likely to want community taps, whilst non-recipients would more often be satisfied simply with a borehole.

Alternative sources of water were used by both recipients and non-recipients for laundry and bathing because an alternative source may be more convenient for these activities. Such alternative sources may also be used for domestic purposes when, as in Glassblock, borehole water was described as sour (brackish) and oily.

Of the 70% of households who commented on their water supply after the interview, very few made any positive remarks. Just under a third said that their water was too far away, whilst a similar proportion mentioned the need for more boreholes. Some also expressed a desire for other types of water supply facilities, including wells, piped water and dams.

Many of the problems relating to the facilities themselves are discussed in section 6.7.



## 7.5 Health, Hygiene and Sanitation

Sanitation was significantly related to the index of wealth and, given the willingness of households to build their own latrines, the availability of material inputs required for construction and advice on building latrines, the scope for improvement in sanitation is vast.

Hygiene as measured by the index, was significantly related to sanitation, water related diseases and whether a household used an improved water supply or not.

The incidence of water related diseases was significantly related to whether a household used traditional or an improved source of water.

### Water collection and storage

Although not many people said that their cattle drank from water collections points, livestock were constantly present at a number of water supply points - drinking, defecating and wallowing in muddy surroundings. Note should also be made that special facilities such as drinking troughs for animals at water points were uncommon and since there was seldom any fencing, domestic animals usually made use of water sources intended for villagers. Stagnant water at some sites was also a potential breeding ground for insect vectors such as mosquitoes.

Most people covered their stored water overnight. However, according to Interconsult's sociologist, this practice is now believed to make little difference to the quality of the water and of more concern is the length of time the water is left standing and stagnant.

### Personal hygiene

The infrequency of water being boiled, reported as being 85%, may be accounted for by the fact that most respondents felt that their water supply was reasonably clean. Non-recipients, however, more often reported that their water was dirty and, as such, were significantly more likely to boil their water. Another explanation for the infrequency of boiling water, and one accepted by health workers, was the lack of firewood and time to boil water.

Usage was often made of possibly contaminated traditional water sources as some of the households said they bathed and washed their dishes and clothes in the rivers. (Table 11). In 6 areas women were using contaminated water in spite of their knowledge that it was a possible source of ill-health. Washing was being done at an unprotected spring at Mungati and from a dam at Nyajana.



At Mungati they were not allowed to use the borehole for washing and at Nyajena the stand-pipe was so close to the road it was impossible to wash clothes. Women in Binga, however said that they did not wash their clothes or bath frequently because of the scarcity of water.

Most households had racks on which to put their cleaned pots and dishes.

As the washing of hands is customary in African tradition, this question was not put to the respondents. Although the effectiveness of washing hands by the traditional method is difficult to measure, the sociologist from Interconsult said that recent investigations indicated that it did not have much effect on bacterial counts.

Table 11 below shows the proportion of households with poor hygienic practices.

Table 11 Proportion of households with poor hygienic practices

Proportion using water perceived to be:	
very dirty	2%
dirty	15%
Proportion of households:	
not covering water at night	25%
never boiling drinking water	65%
with members swimming in river	32%
washing clothes in river	49%
washing plates at river	2%
sharing water source with cattle	22%
without pot racks	17%

Although the top priorities for more water, discussed in the previous section, were for the watering of gardens and irrigating crops, the third most common response by women was for water for bathing.

### Latrines

Sanitation, simply measured by whether a latrine was used or not, was significantly related to socio-economic status, as measured by the wealth index.

Although only 30% of households used a latrine, this fact disguised a significant difference between districts of the percentage of ownership of latrines. In Chinamora for example, 94% of respondents owned a latrine whereas, on the other hand, not a single toilet was owned by a respondent in either Nkai or Binga which ranked third last and last, respectively, on the wealth index (table 17).

Since over a third of latrines were built before independence they are unventilated and some were reported to smell badly. Not surprising, therefore, the most common improvement to their latrine that respondents wished to make was to add a ventilation pipe.



Latrines were usually constructed by a household member on the advice of a health worker because it was considered to be hygienic. Whilst a few latrines had been poorly constructed by local builders, most latrines which were reported to have been badly constructed were built by the households themselves. Of those who wanted to build a new latrine, only slightly more said they wanted one with ventilated piping as opposed to the conventional pit latrine. Overall, there were twice as many latrines which were not ventilated as there were the more hygienic Blair ventilated latrines.

#### Willingness to improve facilities

Those without toilets said that they either did not have the money to build one or that they did not know how to build one. However, their willingness to improve their sanitary conditions is clearly spelt out in section 7.6 where they were particularly keen to contribute their labour to improve facilities.

Households are required to dig their own pits and, on the advice of Health Assistants, to build the walls. Supplies of cement and wire mesh were provided through the Ministry of Health, but in 1983 these inputs were discontinued. The Medical Health Inspector in Masvingo said many people had dug their holes and were simply awaiting supplies from the Ministry.

The local community leaders, especially those who already had toilets in their areas, urged Government to continue to provide cement for the building of ventilated latrines as the cement shortage was seen as the major constraint in the construction of more toilets.

#### Water related diseases

Nearly half the households reported that a member of the household had been diagnosed within the past 3 years as having bilharzia and malaria. (Table 12). Malaria and diarrhoea were the most frequently mentioned illnesses which were believed to be common health problems for members of the village. Malaria was reported as a major problem in 6 areas. In the two areas it was seen to be decreasing, this was attributed to the dispensing of prophylactic medicines by village health workers.

Table 12 Percentage of households diagnosed with various illnesses in last 3 years.

ILLNESS	
Malaria	47
Bilharzia	47
Worms	27
Kwashiokor	17
Tuberculosis	10



The rates for diagnosis of bilharzia reported seem very low, but this may be because rural clinics and hospitals are without laboratory facilities to diagnose bilharzia, except when it is far enough advanced for the classic symptoms of blood in the urine or faeces to be present.

It was found that the incidence of water related diseases was significantly related to whether a household used traditional or an improved supply of water, the incidence being significantly lower for recipients. It was also significantly lower for those with good access to water. Recent cases of diarrhoea were accordingly reported significantly more often in zones 3 and 4 than in zones 1 and 2 where its incidence in children under 5 in the last month was 72% and 54% respectively. These relationships clearly demonstrate the impact of improved water supplies on water related diseases and, given a more integrated health approach, the continuing need for the DDF programme.

The same proportion of both male and female respondents gave reasons for the causes of diarrhoea in children, but as table 13 shows, women were significantly more likely correctly to identify 'dirty water' as the cause of diarrhoea in adults rather than in children.

Table 13 Women's responses to causes of diarrhoea

Causes of diarrhoea	Dirty Water	False Reason
in children	9	24
in adults	22	6

Children were more frequently reported than adults as having at least occasional episodes of diarrhoea, 26% of whom had had diarrhoea in the month prior to the interview. This, however, conceals a wide variation in its incidence between districts.

Dirty water was the most commonly perceived cause of diarrhoea in adults, but only the third most common cause in children. Poor diet and teething were considered to be the main causes of diarrhoea in children.

A quarter of all respondents said that a child under the age of 5 had died in the household, of whom 42% reported that the child had had diarrhoea or a sunken fontanelle. Other sources (*de Zoysa, 1984*) found a higher proportion of reports of causes of diarrhoea associated with traditional beliefs in general and particularly in respect of sunken fontanelle.

Whilst health workers in 6 areas considered it to be endemic, the majority of health workers felt that diarrhoea was a major problem for community. However, Chinamora, Mhondoro and Sabi North reported a decrease in cases of diarrhoea in children at health care establishments. This they attributed to the training given to mothers in the use of oral hydration solutions.



Table 14 Respondents' perceptions of whether contaminated water caused various illnesses

ILLNESS	Yes	No	Don't know
	%	%	%
Diarrhoea	90	2	8
Bilharzia	88	3	9
Abdominal pain	87	4	9
Malaria	78	10	12
Worms	74	10	16
Measles	37	43	20
Kwashiokor	28	46	26
Tuberculosis	25	53	22
Venereal diseases	11	62	27
High blood pressure	9	64	27

Table 14 shows that respondents had a fairly broad understanding of the causative role of dirty water. Venereal diseases and measles were included in the list to test inversely respondents' knowledge, as these are amongst the most prevalent non-water related conditions.

#### Health education

All areas visited except Ndownoyo, had a Village Health Worker (VHW). This person, trained by the Ministry of Health most frequently gave advice on toilets, rubbish pits, nutrition, personal hygiene and water supply. The clinic and hospital staff who were interviewed invariably attributed improvements in hygiene and sanitation to the VHW's educational and preventative health-care role. Since the advice given by VHWs reaches at least as twice as many villagers as hospitals' or clinics' health education programmes, the potential of VHWs to create awareness at the community level is considerable.

Just under a third of household members who had received health education within the last 2 years were, in order, most frequently taught health topics on: personal hygiene, nutrition, family planning and ante-natal care, and the use of water.

The importance of health education was amply demonstrated by the significant relationships between advice on various topics and the incidence of diarrhoea. Apart from the significant relationship between health education attendance and the causes of diarrhoea in children, there was also a significant relationship between advice on personal hygiene, specific illnesses and general health problems, and the causes of diarrhoea in both adults and children. Most important, however, was the highly significant relationship between advice on water supply and causes of diarrhoea in adults.

Table 15 Proportion of households falling in third and top percentiles on the indices of hygiene and sanitation and proportion of households receiving advice on water supplies, and toilets from Village Health Workers, by area

	Index of hygiene		Advice on water supply		Index of sanitation		Advice on toilets	
	%	rank	%	rank	%	rank	%	rank
1. Mhondoro	50	10	54	10	29	8	79	8
2. Muzarabani	60	4	74	3	70	2	95	3
3. Chinamora	47	11	44	12	94	1	75	12
4. St. Swithins	52	9	68	7	26	10	76	11
5. Ndowoyo	60	4	67	8	35	7	77	10
6. Sangwe	60	4	85	2	27	9	85	7
7. Nyajena	72	1	69	6	55	3	100	1
8. Denhere	32	14	72	4	53	4	94	4
9. Nata	57	7	33	15	10	15	56	15
10. Glassblock	55	8	59	9	19	11	89	5
11. Insiza	33	13	86	1	42	5	95	2
12. Tsholotsho	44	12	48	11	19	12	58	14
13. Manjolo	24	17	22	17	0	17	13	17
14. Nkai	73	2	36	13	0	17	27	16
15. Zhombe	30	15	29	16	17	13	70	13
16. Sabi North	70	3	72	4	17	13	89	6
17. Sebungwe	27	16	35	14	12	14	77	9

Table 15 shows the positive relationship between health education and the standard and ranking of hygiene and sanitation, by area, for those households falling into the third and top percentiles. The number of households with toilets and those given advice on toilets is particularly evident

Local community leaders felt that the main benefit of health education was the advice and provision of cement to build toilets. The kraalhead of Nkai was unaware of any form of health education in his area while the respondents from Nata and Tsholotsho said that their VHWs had not benefited their communities.

Asked to describe their own health, two-thirds of interviewees described their health as good, a quarter described it as satisfactory, whilst only 8% considered themselves to be in poor health. Amongst the health problems mentioned by those with satisfactory or poor health, only 13% of conditions were those which might be described as water-related.



## 7.6 Community Participation

The District Administration, local community leaders, and a high proportion of households expressed their enthusiasm and willingness to participate in community health projects. Households were especially keen to contribute their labour towards water supply schemes and sanitation projects, but could not afford to make cash contributions.

As local communities are not involved in the construction and maintenance of boreholes, they show little identification with boreholes as community based utilities.

Community involvement has ranged from the moulding of bricks for schools and clinics to digging of shallow wells, and from the construction by households of their own latrines to voting for a village health representative.

Such participation in the building of latrines and the provision of water has been most actively encouraged by the Ministry of Health, the Lutheran World Federation and UNICEF.

### Participation in health projects

The unanimous conviction of all DDF officials that the local communities have enthusiastically endorsed the concept of self-help was verified by the finding of the household questionnaire which showed that 80% of respondents offered to contribute cash and/or labour towards an improved water supply. Of these, 65% were prepared to contribute labour only, two-thirds of whom said they were prepared to provide labour for at least one day per week. Of the remainder, who said that they would make cash contributions, nearly 80% said that they would be prepared to make monthly contributions of up to \$5.

Certain misgivings have been expressed, however, of the technique used in the survey of responses to the direct question of willingness to pay. Interconsult in an in-depth study used a 'last positive response' technique. This entailed suggesting higher cash amounts after the initial response until there was positive resistance to any higher amount suggested. This cut-off point or threshold apparently represents a more realistic estimate of willingness to pay by members of a community for a utility such as water and it is often significantly higher than the initial direct response.

Compared to the households' willingness to contribute towards their water supplies, it was found that only a small proportion of their actual contributions towards community projects had been for water supplies. Clearly, then, there exists an excess capacity of participatory potential which could be harnessed for the provision of appropriate water supplies.

In this regard it should be noted that the community cannot participate to any large extent in the installation of boreholes, but could play a role in constructing improvements at water points.



They have already, in some areas, demonstrated their willingness to contribute their labour for constructing dams, digging kilometers of trenches for piped water schemes and digging wells.

A similar degree of willingness of households to build their own latrines was also apparent. Two thirds of households wanted to improve their latrine or build a new one, and of these households nearly 80% said that they would be prepared to construct the entire latrines themselves. In addition, 11% of households had latrines which they felt were adequate and did not require improvement.

An interesting result was that nearly twice as many men than women said that they did not want a latrine. It is suggested that because women tend to frequent clinics more often, with their young children, they are likely to receive more advice on health matters than their male counterparts.

Although the average cost of building a latrine was reported as \$16-17, the present cost is actually much higher and only a few households who wanted a new or improved latrine said that they could afford more than \$10. However, this indication should also be seen in the light of the 'last position response' technique described above. Generally, however, it was clear that most households preferred to contribute a substantial part of their labour rather than pay for a latrine.

The District Administrator of Nkai said that he tried to discourage cash contributions because it induced a crisis of expectations in that whatever little cash a poor community could afford, much more was expected from their contribution than the money could buy. He believed that their labour was a much sounder investment because it was not only worth more, but it encouraged participation, engendered a community *esprit de corps* and gave the under-employed meaningful work to do.

Table 16 Willingness to contribute cash or labour to water supply projects and latrine construction

CONTRIBUTION	WATER		LATRINE	
	yes	no	yes	no
Cash	2	11	1	12
Labour	13	0	12	0

(Source: Interview with local community leaders)

At interviews with local community leaders, every single respondent said that their communities would welcome the opportunity to contribute their labour towards self-help water supply and sanitation projects. But, due to the impoverishment of the communal areas as a result of the drought, only a few respondents said that communities were prepared to contribute cash. The replies of community leaders are set down in table 16, above.



### Planning and decision making

Of the 9 boreholes reported by the local community leaders to have been correctly positioned, 5 leaders said that they had been consulted and had participated in the siting; whilst of the 4 boreholes said to have been incorrectly positioned, only 1 leader had been consulted, but was not involved in the location of the borehole.

Although boreholes are sometimes inconveniently located because of the location of underground water (for example, at Denhere), in Mungati the borehole was inappropriately located near a graveyard and in Muzarabani it was sunk at the end of the village which had the fewest houses. This underlines the need to consult local community leaders on the location of boreholes.

In spite of the fact that at present there seem to be little consultation with the people themselves about the siting of the boreholes, most recipients were happy about their boreholes' locations. Whereas only 7% had been consulted, 84% thought that the borehole/piped scheme had been well located. An even higher proportion of people thought that the water supply was well constructed (93%), properly maintained (88%) and 79% of respondents thought that the supplies were properly repaired. Usually the boreholes are sited near schools, clinics and areas of large concentrations of people where water is relatively scarce.

Representation is presently made by local (ward) councillors to the District Council over which the District Administrator presides. Locations and priorities are determined for the installation of boreholes by District Councils at their meetings.

With the advent of the proposed administrative structures discussed in section 7.7, the forging of even stronger links between the Administration, various Ministries and the local communities should result in greater consultation, decision making and community participation in projects at village, ward and district level.

### Identification with schemes

Members of the community and local leaders were asked to whom the borehole/water scheme belonged to determine their degree of identification with the water supply as a community-based utility. Most people thought it belonged to the kraalhead or Government, whilst local leaders felt that the water supply belonged to the DDF because they repaired it. Thus, there was little evidence of people viewing the borehole as an intrinsic utility of the community.

This lack of identification is probably attributed to the fact that there is little participation by the people themselves regarding the decision of the type of water supply or its location in their area. Secondly, the technical nature of installing boreholes precludes community participation in its installation and, thirdly, maintenance has not been community-based but carried out almost entirely by the DDF.

Measures are now apparently being taken to include the community in maintenance by the selection of a local pump caretaker who will undertake simple preventative maintenance.

Attention, however, needs to be drawn to the fact that only boreholes were surveyed and that the identification of communities with other water supply technologies may differ considerably. Where villages themselves have been involved in the digging of wells and trenches, and the construction of dams, there is every likelihood that the community identification with the water supply will be much stronger. Where the community itself has responsibility for the operation and maintenance of the water supply, identification in such cases will almost be complete.



## 2.7 Operation, maintenance and training

The increase in the number of boreholes installed, inadequate maintenance funds and the shortage of well trained maintenance staff have made it increasingly difficult for DDF to maintain boreholes and piped schemes in good order.

The upgrading of facilities at water points would considerably improve sanitary conditions.

Local caretakers trained in preventative maintenance would minimise breakdowns, take pressure off DDF maintenance teams, and instill a sense of identification of boreholes as a community based utility.

### Use of scheme

Through field observation, it was found that some pumps were difficult to use or did not function properly. Unless seals are replaced and preventative measures taken, bush pumps are likely to become increasingly inefficient. It is understood, however, that repairs are undertaken by DDF only when the pump actually breaks down. Many of the boreholes observed were also too high or heavy for children to operate. In some cases the outlet pipe was positioned too low, making the position of collecting receptacles awkward.

The lack of facilities at many schemes was another problem. Only 2 boreholes (at Ndownoye and Sangwe) were fenced, while those at Sangwe and Zhombe had washing slabs provided adjacent to the supply point.

Most boreholes had a concrete apron at the base of the headworks, but run-offs were inadequate at all sites, except Zhombe and Chinamora, resulting in unsightly, muddy and unhygienic surrounds. Six schemes had cattle troughs, only one of which (Sebungwe) contained any water. Livestock were constantly present at the water supply points despite attempts to chase them away.

Many of these problems are exacerbated by the drought, but others are related to design faults, inadequate allocation of resources for facilities at water points and a general disregard for community perceptions. If and when normal rains and conditions return, these problems may give rise to rural communities reverting to their traditional water supplies which are, for some activities, preferable to the improved supply.

### Breakdowns and reporting

Most districts appear to have only a few boreholes which are not functioning. In the drier areas problems have recently been experienced with the lowering of the water table, which has resulted in boreholes drying up. In Tsholotsho, for example, most of the 50 boreholes reported as "not working" had in fact simply dried up.



With the exception of Ndowoyo, 86% of respondents said that boreholes never or only occasionally broke down and that they were generally repaired within a week. Local community leaders reported that it took between 1 and 10 days to repair a breakdown, the average time taken being 5 days.

Since the drought, however, the frequency of breakdowns has increased. Due to the drying up of rivers, boreholes and wells, villagers have to collect water from the nearest borehole. This invariably results in the overuse of existing schemes and, consequently, a higher incidence of breakdowns.

The usual reporting procedure in the case of a breakdown is for a village representative to report to the councillor who would bring it to the attention of the District Administrator. He in turn would instruct the Field Officer to repair the pump in question. Quite often the report would simply be made directly to the Field Officer who would then repair the pump.

#### Maintenance of water supply

From all reports, the DDF does an good job in maintaining pumps, but a serious question mark hangs over their ability to continue to provide this level of service in view of the increasing number of breakdowns reported and the installation of many more boreholes.

In KweKwe the District Administrator suggested that they needed another 3 maintenance gangs in addition to the 3 already operating; but he did concede that, with local caretakers, this may not be necessary. In Gokwe, the District Administrator considered that 10 maintenance gangs, as opposed to the 4 they have now, would be more appropriate for the present work load.

The already stretched ground maintenance crews will become even more pressed as existing facilities become more intensively used and as new boreholes are installed. Although the maintenance pressure will not be felt immediately for newly installed boreholes, appropriate steps should be taken now to ensure that an adequate level of service is maintained in the future. The recruitment and training of additional DDF field-staff and the involvement of local caretakers for decentralized preventative maintenance should go a long way towards upholding the service level in all areas.

At present the DDF is responsible for both preventative maintenance and all repairs. Views, at district level, differ to a marked degree on the extent to which preventative maintenance should be decentralized to village level. Support for decentralisation comes mainly from the larger districts whose maintenance crews are stretched more thinly on the ground. From the review of opinions, it is considered that the decentralisation of preventative maintenance should only be carried out if the following conditions are met:

- the caretaker should be a voluntary worker elected by the village development committee and perhaps screened and paid an allowance by DDF;
- the caretaker should receive simple but thorough instructions, including a clear understanding of his



limitations and reporting procedure for DDF to carry out repairs;

- the caretaker duties should include the maintenance of facilities at the water point if and when they are provided by DDF.

Once simple maintenance duties such as cleaning, greasing and tightening bolts have been mastered, further training could be given to the caretaker later. It is clear that, at this stage, all major repairs should be carried out by DDF personnel.

Local pump attendants, who had not received training, were reported by local community leaders to perform their jobs well. A few leaders thought that a local attendant was not necessary until a diesel pump had been installed, whilst 3 others felt that training would be beneficial.

At the District level, it was generally felt that there were inadequate funds for both spares and maintenance personnel. The availability of additional funds would enable the DDF to hold stocks of spares so that maintenance personnel could respond more promptly to calls for their services, and secondly, additional maintenance gangs could ensure that delays in reaching trouble spots could be avoided. Spares for boreholes were obtainable locally.

#### Water quality

Interconsult found that the chemical quality of water treated from boreholes was generally good in terms of World Health Organization and local standards. A rather higher salinity level was evident in the Omay and Binga Districts and the fluoride levels in localised areas in Gokwe District were relatively high.

Bacteriological tests showed that poorly constructed boreholes and unprotected wells showed much higher faecal *E.coli* counts than well constructed boreholes and wells.

Blair Research Laboratories have tested the quality of water in the Epworth area near Harare for 3 different types of wells. The average faecal *E.coli* counts from a 100 ml sample of each type of the following types of well, were:

- unprotected 'traditional' wells - 590;
- bucket pumps (tube wells) - 32;
- wells fitted with hand pumps - 11.

Although the hand pumps yield water of a higher quality than bucket pumps, the difference is marginal. Both the bucket and hand-pumps fitted to wells considerably improve the quality of water.

Initial tests suggest that dams have a high degree of contamination, perhaps as much as 1 000 counts of faecal *E.coli* but further testing is required before a positive statement can be made on water quality from dams.

The tests that have been made so far give a good general indication that protected water supplies had good quality water compared with traditional water sources which are usually contaminated.



## CONCLUSION

Although an improvement in rural water supplies showed that significant health benefits accrued to users and that access to sanitary water was markedly improved, there is still a high incidence of water related diseases and widespread use of contaminated sources of water in the communal lands.

There is undoubtedly, therefore, a need for DDF's continued involvement in the provision of rural water supplies and, indeed, a reorientation in their approach to their installation and maintenance programme.

### Integrated water supply programme

In order to be effective, water supplies need to be integrated firstly with other health components, including health education, sanitation, hygiene and nutrition and, secondly, with other water supply technologies such as wells, piped schemes and dams.

As health education in hygiene and sanitation is a pre-requisite for maximum health benefits to accrue from improved water supplies (*Feachem, 1978*), these elements need to be integrated into a 'sanitation package' where each element must be implemented if the total benefit of the package is to be realised (*McGarvy, 1977*). The need for such an integrated approach could not have been more clearly demonstrated by the survey.

Although poor hygiene, sanitation and water-borne diseases can contribute towards high infant mortality rates, it is malnutrition above all which lowers a child's resistance and increases its susceptibility to disease. As it is estimated that 80% of children in rural areas are malnourished, nutritional factors should form an integral part of any health package.

Borehole pumps presently play a valuable role in the overall water supply strategy, but these should be integrated with other water supply techniques such as wells, piped schemes and dams. Simple, inexpensive and safe water supply technologies such as protected wells and springs have been shown to have increased social relevance and are more appropriate in that they give more control over the functioning of water supplies to the users (*Isley, 1978*). They also lend themselves admirably to community participation in construction and therefore engender greater identification with the water supply as a community based activity. Further, they should be co-ordinated to ensure that their application within a particular social, economic and geographic setting is appropriate and that the water supply programme is integrated with the overall context of land use planning of a district.



### Improvement in water supplies

The improvement in water supplies can be seen in terms of the quantity and quality of water as well as the facilities related to activities of water supply sites.

Obviously, the provision of various types of water supply technology - boreholes, wells, dams, piped schemes, will substantially increase the quantity of water and where such sources are adequately protected, meaningful improvements of the water quality will be realised.

Presently, however, there is a particular problem of facilities at water points which could negate the benefits of improved water supplies. There is an urgent need for fencing of the water point and construction of run-offs from cattle drinking troughs to prevent contamination of water and insect vectors breeding in stagnant pools of water. In addition, facilities such as washing slabs and bathing cubicles would encourage people to use clean water from protected sites as opposed to rivers.

To discourage villagers from using alternative sites when improved supplies of water are available, the following conditions should apply:

- facilities related to water activities should be provided;
- access to improved supplies should be such that they do not have to resort to alternative sources;
- the total water supply should be adequate to serve the entire village;
- villagers should understand, through health education the dangers of using alternative sources.

### Water for gardens

The overwhelming perception of the need for water for gardens and their impact on income, nutrition and health clearly indicate a priority to which water supplies in future should be directed. In this regard the most important pre-requisite would be the improvement in the quantity of water provided.

It is suggested that this may be achieved by the increased utilization of ground water by upgrading boreholes by installing appropriate pumping devices on those known to be prolific in their delivery of water. The pump could be driven by a conventional diesel engine or alternatively by animal, solar or wind pump, depending on the local conditions.

The development of these alternative technologies has already reached an advanced experimental stage in Zimbabwe. A locally manufactured low-lift, high volume hand pump (Bumi pump) suitable for pumping from dams, rivers and wells for small scale irrigation schemes is already being used in the country.



When dams are to be constructed and water pumped to collective gardens or crops, DDF would need to work in close co-operation with Agritex and the Ministry of Energy and Water Resources Development on the siting and construction of dams, protection of the catchment area and basin, as well as the identification of suitable land for irrigation.

### Sanitation

When health is viewed as an integrated package, the lack of latrines in some areas is of major concern. (Table 17). Given the willingness of households to build their own latrines and the provision of material inputs required for their construction, however, the scope for improvement in sanitation is vast. But as sanitation is significantly related to socio-economic status, it is unlikely that those most in need of materials to build latrines would be able to afford the inputs. As the Government, under the current economic constraints, will find it difficult to increase its allocation to the Ministry of Health for cement, the potential for improvements in sanitation may not be realised.

Sanitary indicators, together with the other main indices of health, have been summarised and ranked in Table 17 and used to derive an overall health index. When the wealth index is then taken into account, the result is an approximate measure of the development status of each area. Despite the somewhat gross nature of the ranking process, it does give a useful comparative indication of the conditions encountered by the survey team.

### Community participation

The technical nature of borehole drinking and pump installation mitigates against community participation in this type of water supply technology. Successful community participation and co-operation between DDF and local communities, however, has been achieved in the digging of wells. The Lutheran World Federation has had similar success with wells, but has presently extended its activities, involving the community, in dam building.

Survey results indicate that under the present difficult economic circumstances, labour contributions should be encouraged rather than cash contributions.

In cases where preventative maintenance duties can be handed over to a locally appointed caretaker, this could minimise breakdowns as well as strengthen the communities sense of identification with the water supply scheme. It also has the advantage of lightening the maintenance burden of DDF on whom the communities would become less dependent. Presently, there is every possibility that there will be a large measure of participation by local communities in the provision of their own water supplies.



The reasons for this optimism, are as follows:

- there is an enormous reserve of enthusiasm in local communities to involve themselves in self-help projects,
- the Ministry of Health has a sound structure which penetrates to village level and assists communities in well digging projects and building latrines;
- the proposed administrative structure at village, ward and district level will allow villagers to become involved in their own development process.
- DDF has the technical back-up facilities: transport, storage space, equipment - to support local participatory initiatives.

#### Maintenance and operation

If the DDF is to maintain its capacity and service level in the communal areas, then more funds will have to be allocated for the maintenance of existing and recently installed borehole pumps.

There is also an apparent need for more consideration to be given to the design and installation of borehole headworks and facilities to ensure not only that they function properly, but also that they are easy to handle and use.

Although the maintenance pressure for the more recently installed pumps may not be felt immediately, appropriate steps should be taken now to ensure that an adequate level of service is maintained in the future. The recruitment and training of additional DDF field staff and the involvement of local caretakers for decentralised preventative maintenance should go a long way towards maintaining the service level in all areas.

Table 17 Overall socio-economic characteristics of areas visited

Communal Land	Sanitation (Latrines)		Water Related Diseases		Hygiene		Access to Water		Overall Health Index		Wealth Status		Development Status	
	%	rank	%	rank	%	rank	%	rank	%	rank	%	rank	%	rank
1 Mhondoro	29	8	61	3	50	10	39	12	45	8	54	8	46	7
2 Muzarabani	70	2	45	10	60	4	65	4	60	3	40	13	56	3
3 Chinamora	94	1	59	4	47	11	71	3	67	1	65	4	67	1
4 St. Swithins	26	10	41	12	52	9	26	16	36	15	48	10	38	14
5 Ndowoyo	35	7	40	13	60	4	50	9	46	6	40	13	45	9
6 Sangwe	27	9	40	13	60	4	47	11	43	9	50	9	45	9
7 Nyajena	55	3	55	7	72	1	72	2	64	2	59	7	63	2
8 Denhere	53	4	63	2	32	14	53	8	50	5	79	1	56	4
9 Nata	10	15	57	5	57	7	38	13	40	11	43	12	41	13
10 Glassblock	19	11	77	1	55	8	61	6	53	4	29	16	48	4
11 Insiza	42	5	54	8	33	13	29	15	40	13	63	5	44	12
12 Tsholotsho	19	12	52	9	44	12	48	10	41	10	59	6	44	11
13 Manjolo	0	17	36	15	24	17	64	5	31	16	20	17	29	17
14 Nkai	0	17	32	16	73	2	55	7	40	12	32	15	38	15
15 Zhombe	17	13	57	6	30	15	78	1	46	7	56	3	48	5
16 Sabi North	17	13	45	10	70	3	25	17	39	14	70	2	45	7
17 Sebungwe	16	14	31	17	27	16	35	14	26	17	46	11	30	16

Note: percentages represent third and top percentiles of each scale







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