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PIPED WATER SUPPLIES FOR SMALL COMMUNITIES

AN OVERVIEW & FORWARD PERSPECTIVE FOR ZIMBABWE

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Blair Research Laboratory

MINISTRY OF HEALTH

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PIPED WATER SUPPLIES FOR SMALL COMMUNITIES IN ZIMBABWE:

AN OVERVIEW AND FORWARD PERSPECTIVE

by

Julian Sturgeon and Felix Chawira

Study supported by IRC, the International Reference Centre

for Community Water Supply and Sanitation

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The major source of reference for the desk study was the National Master Water Plan. Although other reports and publications were used, the Master Plan, recently published, is now a primary resource document for rural water supplies and sanitation in Zimbabwe. It is in the final stages of being adopted as official Government policy.

A special word of thanks is addressed to Dr. Peter Morgan of the Blair Research Laboratory, Ministry of Health, whose assistance was invaluable.

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List of Abbreviations used

BRL	-	Blair Research Laboratory
CA	-	Communal Area
CFA	-	Commercial Farming Area
CWP	-	Communal Water Point
DDF	-	District Development Fund
DDC	-	District Development Committee
DHI	-	District Health Inspector
DA	-	District Administrator
DOPP	-	Department of Physical Planning
GOZ	-	Government of Zimbabwe
IDWSSD	-	International Drinking Water Supply and Sanitation Decade
IRC	-	International Reference Centre for Community Water Supply and Sanitation
MOH	-	Ministry of Health
MEWRD	-	Ministry of Energy, Water Resources and Development
MLGRUD	-	Ministry of Local Government, Rural and Urban Development
MCDWA	-	Ministry of Community Development and Women's Affairs
MFEPD	-	Ministry of Finance, Economic Planning and Development
NMWP	-	National Master Water Plan
NAC	-	National Action Committee
O & M	-	Operation and Maintenance
PHA	-	Principal Health Assistant
PSSCP	-	Piped Supplies for Small Communities Programme
PSWS	-	Public Standpost Water Supplies

List of Abbreviations (Cont'd)

PDC	-	Provincial Development Committee
PWE	-	Provincial Water Engineer
RA	-	Resettlement Area
RSC	-	Rural Service Centre
RWSP	-	Rural Water Supply Programme
SHA	-	Senior Health Assistant
UNDP	-	United Nations Development Programme
VIDCO	-	Village Development Committee
WARDCO	-	Ward Development Committee

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as at November 1987

Definitions (In Zimbabwe usage:)

A Primary Water Supply is a protected, point source fitted with a hand pump, concrete apron, spillway and soakaway pit.

A Piped Water Supply consists of a water source fitted with a motorised pump leading to one or more taps.

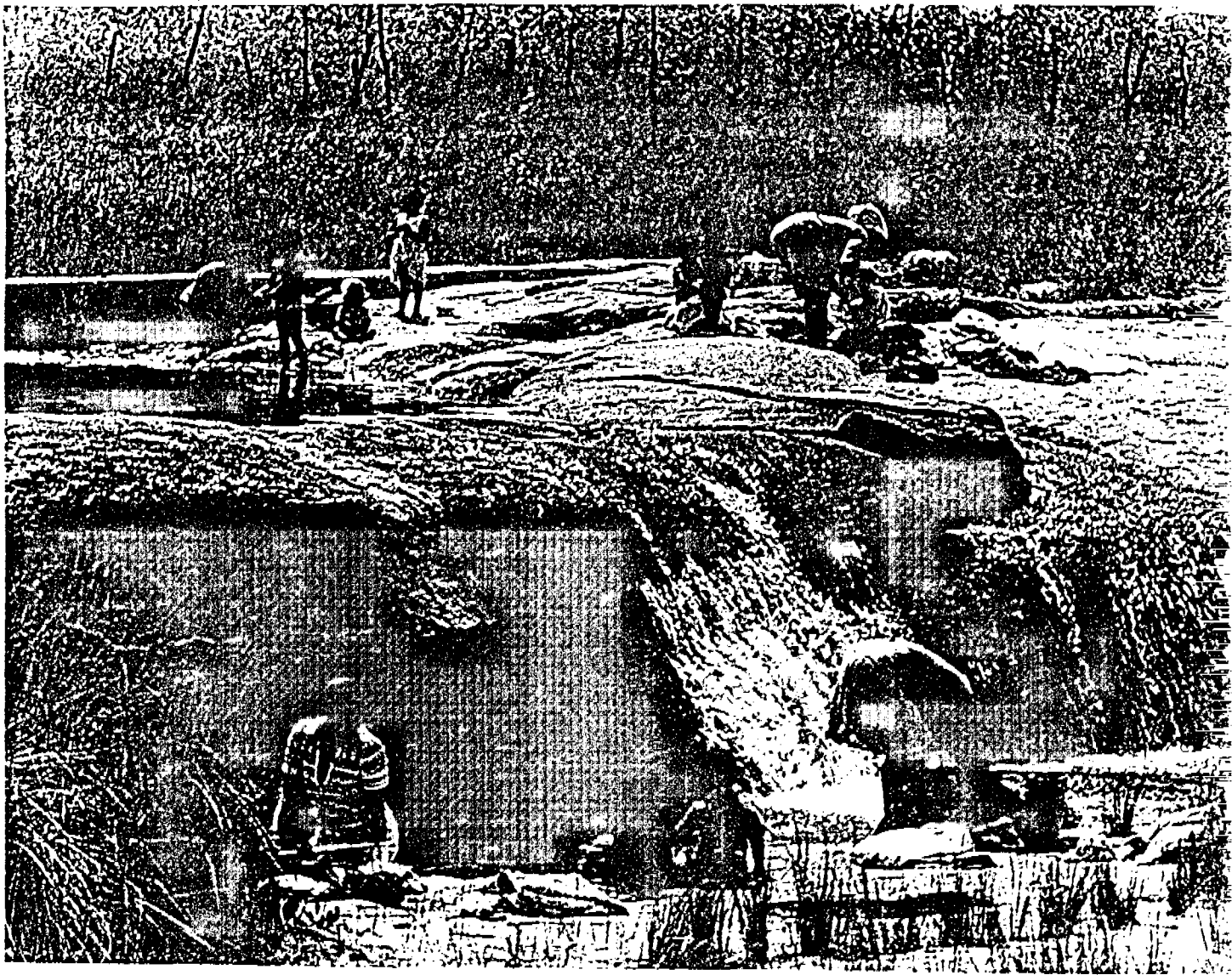
INTRODUCTION

This report sets out the results of a preliminary investigation into the policies, practices, potential and information needs pertaining to piped water supplies in Zimbabwe. Attention is focused on piped supplies for small communities living in the Communal Areas (CA's), on resettlement schemes, commercial farms and in peri-urban areas. The types of schemes investigated range in sophistication from public standpost outlets to in-house connections. The study terms of reference call for a review of past policies, the present situation and its immediate problems, and the likely future of piped water schemes.

Present day policies and practices have been shaped by a variety of factors. Chief among these are pre-independence policies, the new ideals and objectives of the post-independence government and the commissioning of the National Master Water Plan (NMWP). A review of the history of piped water supplies is therefore included, and the NMWP is used as a major source of reference.

This study was conducted with the agreement, and under the auspices of the Blair Research Laboratory (BRL) of the Zimbabwe Ministry of Health (MOH). Although the MOH is not the lead ministry in village water supply, the BRL has conducted a great deal of research into water supply and sanitation. The MOH does play an important role in health education and in community mobilisation and is therefore linked to water supplies at the village level. It has close ties with the Ministry of Energy, Water Resources and Development (MEWRD), and with Ministry of Local Government Rural and Urban Development (MLGRUD), which is the designated lead ministry. Together with its implementing arm, the District Development Fund (DDF), MLGRUD plays a pivotal role in all village water supply schemes. To complete the partnership, the Ministry of Community Development & Women's Affairs (MCDWA) is gradually assuming the lead role in community mobilisation and participation. A ministry created after independence, it is intended to fulfill this vitally important function, and is in the process of taking over the management of Village Health Workers, who are the frontline extension workers in Zimbabwe.

This study was financially assisted by the International Reference Centre for Community Water Supply and Sanitation (IRC) as part of the IRC-supported Public Standpost Water Supplies (PSWS) Project, which is nearing completion in two Southern African and two Asian countries. Following interest from several countries, a new programme is planned in the Southern African region, the Piped Supplies for Small Communities (PSSC) Programme, in which Zimbabwe is a potential participant. This programme will seek to support national institutions to develop projects featuring community-based demonstration schemes which reflect a progressive development of service levels within a single system. This approach is based on the fact that most



Washing clothes at a streambank in Epworth near Harare

pipd supply systems in small rural communities are part of a mix of piped and non-piped supplies, and that piped supplies in both peri-urban and rural areas range in levels of service from public standpipes to in-house connections. The IRC also places great emphasis on community participation, not only in the implementation of projects and their future operation and maintenance, but also in the planning of such projects. The community-based approach is also espoused by Zimbabwe's newly evolved policies, and this study therefore attempts to spell out some of the complexities of community participation, particularly in regard to the planning phase.

This study was designed to provide an appropriate starting point for a potential demonstration project in Zimbabwe, and to share with other interested countries Zimbabwe's own experiences and practices in piped water supplies.

PART A

MAJOR FINDINGS OF THE STUDY

SECTION ONE : PAST POLICIES AND EXPERIENCES

1.1 HISTORICAL PERSPECTIVES

Zimbabwe is a newly-independent (1980) country which had been under British colonial rule for over 80 years. It is a middle-income economy, recently industrialised, and land distribution remains much as it was under the settler colonial government.

Communal Areas (CA's) constitute 42% of the land area and contain 60% of the population, commercial farming areas (CFA's) constitute 43% of the land area and contain 19% of the population. The newly-developing Resettlement Areas (RA's) constitute 5,6% of the land, and contain roughly 2,2% of the population (See Section 5).

1.2 PRE-INDEPENDENCE WATER SUPPLY POLICIES IN RURAL AREAS

The Ministry of Water Development was responsible for all government water installations prior to independence. Water supplies ranged from boreholes with hand pumps to piped water supplies with in-house connections. The Ministry provided all services, from borehole siting, planning, construction, to operation and maintenance. However, unprotected sources like wells, springs and rivers remained, and remain, the major source of water for rural communities. Table 2 (page 12) tabulates the results of the NMWP survey, conducted in 1984, of the various types of water sources used by the rural population. In the dry season, 61,4% of people used unprotected sources, 26,2% used boreholes and 5,6% used piped water.

Government piped water supplies were provided in rural areas in certain specific circumstances. These were:

- (i) local government stations - communal standposts for lower grade government workers, in-house connections for civil servants
- (ii) hospitals and clinics
- (iii) protected villages - all built during the bush war of the 70's.
- (iv) military barracks

Community participation was not a feature of government policy. All maintenance was carried out by the Ministry of Water Development, and in the sixties, the African Development Fund (fore-

runner of the District Development Fund) began to play a small part in maintenance. Water for rural communities was free, except in the case of in-house connections for civil servants, where a small fee was charged.

1.3 OTHER PIPED WATER SCHEMES

Piped water was also supplied by many commercial farmers to their workers on farm compounds. There are no records of the numbers built on the 5400-odd farms in Zimbabwe, but it is fair to say that there are 1,7 million people living on commercial farms, using water sources which range from in-house connections to unprotected river sources.

Church missions built piped water schemes throughout Zimbabwe's rural areas, usually to serve the mission itself, a school or hospital. Some of these have been taken over by Government, but many remain under the control of the churches, who operate and maintain them. A small number of piped water schemes were also constructed with support from non-governmental agencies.

SECTION TWO : PRESENT SITUATION AND LIKELY FUTURE

2.1 THE NATIONAL MASTER WATER PLAN

The National Master Water Plan (NMWP) is a major source of reference on policy and planning in rural water supplies and sanitation. It covers the Communal and Resettlement Areas (but not Commercial Farming Areas), and contains an inventory of existing piped and non-piped water supplies, a socio-economic study, a hydrogeological study and a sanitation study. Included in its terms of reference is the Rural Water Supply Programme, designed to meet the rural water demand for the period 1985 to 2005, and covering policy, implementation strategies, engineering design, and maintenance.

Community participation is a dominant theme in Zimbabwe's rural development policy, and this is reflected in the NMWP. The integration of water supply, sanitation and health education is another key policy recommendation of the NMWP. In order to implement the NMWP a number of significant changes have been made within government. The Ministry of Health (MOH) has expanded its Environmental Health division, training and deploying several hundred Health Assistants and Health Inspectors. Some 5 000 Village Health Workers have also been deployed, as part of the MOH's Primary Health Care policy. The District Development Fund (DDF) has created a new water division, responsible for implementing the new three-tier maintenance system. A National Co-ordination Unit has been set up in the Ministry of Local Government, Rural and Urban Development (MLGRUD), and this unit will primarily be responsible for co-ordinating and integrating the institutional effort in the water and sanitation sector. The National Action Committee for the International Drinking Water Supply and Sanitation Decade (IDWSSD) has been restructured and is now the primary policy-making body for the sector.

A new ministry, Community Development and Women's Affairs (MCDWA) has been created. It is responsible for community mobilisation, and it is intended that the MOH's Village Health Workers will in due course move over to MCDWA, where they will be known as Village Community Workers. This ministry will play an increasingly important part in implementing the NMWP. The task of mobilising rural communities will in large part be carried out by this ministry's extension workers, who are deployed at village, ward and district level. Section Six gives more details of this and other participating ministries.

Local government administration has been restructured in order to meet the demands of Zimbabwe's rural development effort, and this too has major implications for the water and sanitation sector. New Development Committees have been created at village, ward, district and provincial levels in order to facilitate community participation. Figure 3 (page 32) shows the new structures and

their relationship to project planning. The long-term intention here is decentralisation of administration and authority.

2.2 LIKELY FUTURE OF PIPED WATER SUPPLIES

Small-scale water supplies will in future differ in a number of ways from existing schemes. Zimbabwe's new policies aim to bring about self-sustaining rural piped water supplies operated by local authorities and maintained by means of the three-tier system, i.e. at village, ward and district level. Plans for extension and upgrading of piped supplies will be initiated more and more at these levels. This is a long-term objective, but the first steps towards it will reflect a number of key features. Some of these are listed below:

- (i) All piped water outlets to be metered.
- (ii) The establishment of a tariff for piped water.
- (iii) Fee collection, with a possible role for the District Council, or other local authority.
- (iv) Shared group connections.
- (v) A mix of service levels from shared, yard connections to in-house connections.
- (vi) Operation and maintenance conducted increasingly at district level, with community participation, as spelt out by the three-tier system.
- (vii) Community participation in the planning and implementing of piped water projects.

Sustainability of piped schemes will be an important issue in the selection of project sites, and in the extent and design of the scheme. The economic growth potential of a community, and the impact of a piped water scheme on that potential, will therefore be a prime consideration.

Decentralisation of government administration is another important trend. It has implications both for the planning and implementation phase of piped water projects, as well as for future operation and maintenance. The immediate effects of this trend will be seen in the greater degree of responsibility assumed by district-level administrators, but the ultimate objective is for locally-elected bodies, such as district councils, to become the responsible authority in planning, financing, implementing, maintaining and upgrading of piped water schemes.

SECTION THREE : CURRENT ISSUES AND SOME RECOMMENDATIONS

3.1 CURRENT ISSUES IN SMALL-SCALE PIPED SUPPLIES

The Rural Water Supply Programme (RWSP) has planned some twenty-five piped schemes in rural service centres for the period 1986 - 1990 (see Figure 2, page 23). A number of projects are presently in the design stage. The NMWP provides the essential framework for project planning, but planners will have to formulate solutions to a number of issues of which Zimbabwe has little or no experience, such as fee collection and the shared group connection policy. More familiar problems, such as maintenance, will have to be addressed from the new perspective of community participation.

Section Two has listed a number of features that new government schemes are likely to incorporate. In order to bring them about, certain issues will have to be addressed, such as:

- (i) Establishment of a tariff for piped water consumers, to recover operation and maintenance costs. This will imply metering on communal standpipes, and fee collection. Consumer resistance to this added financial burden, and genuine inability to pay, will have to be carefully considered. There is a potential role here for a local authority.
- (ii) The shared group connection policy. This is proposed as a partial solution to the tariff issue, but it raises problems of its own. For instance, individual members of a group will have different water demands and consumption rates. Appropriate accounting and fee collection systems, suitable for village-level operation, will have to be devised. Again, the local authority can play a significant role.
- (iii) Community participation in planning. How will this be effected?
- (iv) Village-level maintenance. The three-tier system proposed by the NMWP has never been applied to piped water schemes, and will need restructuring.
- (v) Selection criteria for project sites. Sustainability is the most important issue here, and will demand a feasibility study in each case.
- (vi) Sanitation and health education will be linked to piped water supplies. The Blair latrine is the obvious technology choice, but health education material on piped supplies must still be developed.

- (vii) Technology. The design of water treatment plants; communal standpipes, taps, drains and washing stands will have to be reviewed in the light of village-level operation and maintenance.
- (viii) Management of piped water projects at the planning, construction and operational phase will depend upon new institutions; the District Development Committees, Ward Development Committees and Village Development Committees. More specifically, the Water and Sanitation Sub-committees at those levels will be the principal management bodies. A considerable training effort will be necessary to impart the necessary skills to these new institutions.

3.2 SOME RECOMMENDATIONS FOR FUTURE PROJECTS

Future piped water projects will be planned for rural service centres (RSC), for rural areas where groundwater sources for non-piped supplies are inadequate (part of the MEWRD's Rural Village Water Supply Programme, e.g. Maganyani, section 8.5), and for private schemes, such as a commercial farm. The first two categories are accommodated by the NMWP; the third one, commercial farms, are outside its terms of reference. Nevertheless, many of the features of new government schemes will have application on commercial farm projects, especially the concept of community participation. In order to assist farmers, and to ensure the promotion of government policy, steps should be taken to establish planning guidelines for such projects. The local authorities for commercial farming areas, Rural Councils, should be encouraged by their ministry, MLGRUD, to set up Water and Sanitation Sub-committees and to seek guidance on planning from the Provincial Development Committees.

Table 1 lists a number of current issues, with some suggestions on how to address the problems related to these issues.

Table 1 : Current issues and some suggested solutions

ISSUES	POSSIBLE SOLUTIONS	RESPONSIBLE AGENCY
1. Establishment of water tariff	Economic feasibility study in project area. Establishment of water and sanitation sub-committees. Training of sub-committees.	MLGRUD MLGRUD MCDWA/DDF
2. Group Connection policy	Consumer groups or water co-operatives established. Taps fitted with locks. Water-related income-generating projects. District Council/Local Authority to promote local management of this policy.	MCDWA MEWRD/DDF MCDWA MLGRUD
3. Community participation in planning	Economic feasibility study. Village-level inventory survey of existing resources. Establishment of water and sanitation sub-committees.	MLGRUD DDF MLGRUD
4. Village-level operation and maintenance	Modification of 3-tier maintenance system. Maintenance training for VIDCOs. Management training for VIDCOs.	DDF DDF MCDWA
5. Sustainability of scheme	Economic feasibility study Income generating projects	MLGRUD MCDWA
6. Sanitation and health education	Health education intensified. New training materials developed.	MOH MOH

PART B

SECTION FOUR : PIPED WATER SUPPLIES FOR SMALL COMMUNITIES IN ZIMBABWE

4.1 BACKGROUND

Zimbabwe achieved its independence in April 1980 and the International Drinking Water Supply and Sanitation Decade (IDWSSD) was launched in Zimbabwe in November 1982. Shortly thereafter, the preparation of a National Master Plan for Rural Water Supply and Sanitation was commissioned by MEWRD. This plan, referred to hereafter as the Master Plan, was designed to provide the Government of Zimbabwe (GOZ) with firm recommendations for the immediate and longer term development of rural water supply and sanitation for rural areas and resettlement schemes throughout the country. A second objective was the development of a Rural Water Supply Programme (RWSP) to satisfy the water demand of the rural population over a 20 year period, 1985 to 2005. In addition, a Rural Water Supply Programme Computer Package was to be developed and submitted along with the Master Plan.

The Master Plan is therefore a major source of data and policy. Its recommendations in regard to objectives, technology, planning systems, implementation strategy, water tariffs, cost recovery and financial control, training inputs, health education and community participation are in the final stages of adoption by the GOZ.

A restructured National Action Committee (NAC), responsible for Decade activities in Zimbabwe, will provide the forum for inter-departmental co-operation and co-ordination in implementing the recommendations of the Master Plan.

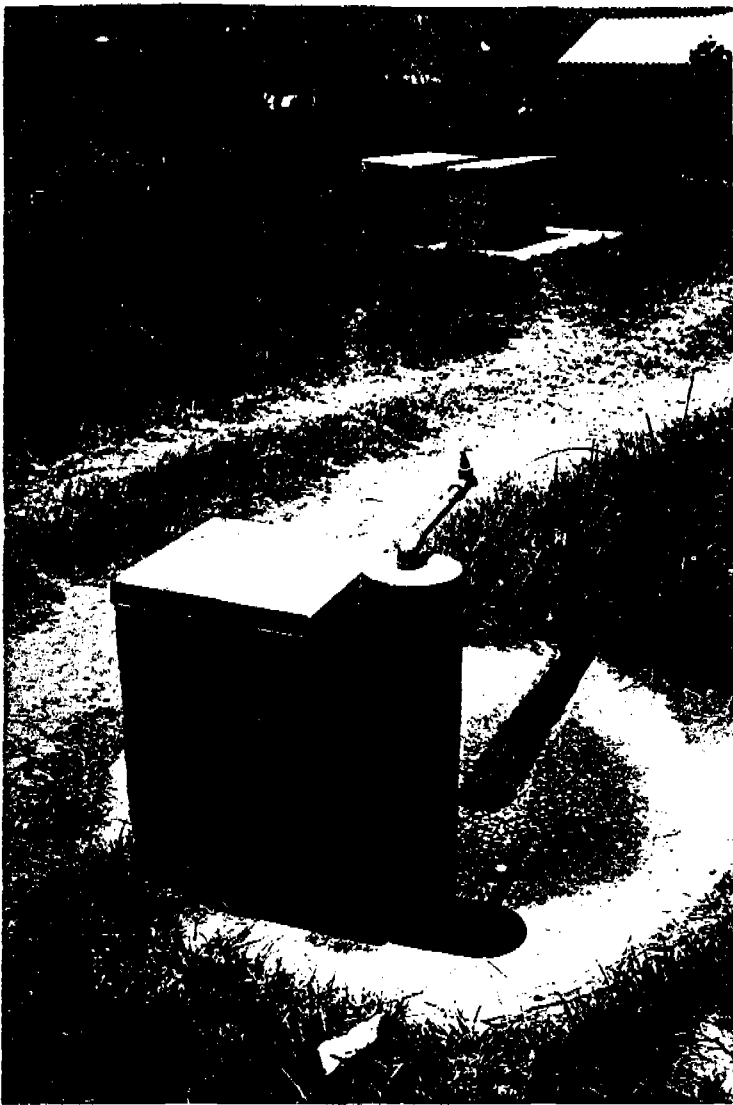
4.2 METHODOLOGY

The methods used in compiling this report were:

- (i) discussions with key informants in MEWRD, MLGRUD, MOH and the Ministry of Community Development and Women's Affairs (MCDWA), ranging from Deputy Secretaries to part-time standpost attendants (see Appendix 3).
- (ii) interviews with users of piped water, with the aid of a simple questionnaire (see Appendix 4). The number of respondents was small and the results have no statistical validity, the intention being to elicit the opinions of users, and to gain an insight into their perceptions of piped water supplies, their advantages and their problems.
- (iii) Field visits to selected schemes throughout the country (see Appendix 5). Photographs were taken of

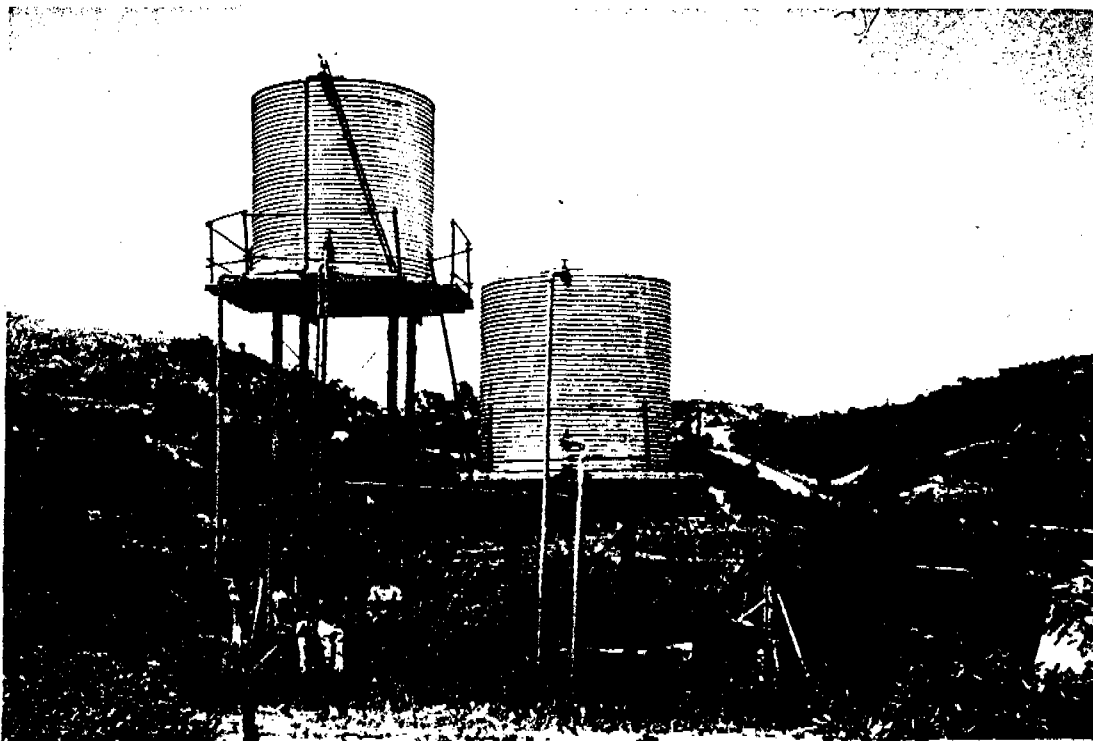
- various aspects of schemes, and discussions held with users and officials.
- (iv) Review of existing literature and documentation (see Appendix 6).

The research and preparation of the document was undertaken as a collaborative effort between members of the BRL and a local consultant who also served as a resource person.



A standpost at Shumba Piped Water Scheme, with washing slabs in the background. The users have kept the standpost in good condition, without an organised village-level maintenance system. Eight standposts serve about 500 people.

The twin-tank water treatment and filtration system at Shumba, which requires a trained operator.



SECTION FIVE : HISTORICAL PERSPECTIVES

Zimbabwe is a newly independent (1980) country which had been under British colonial rule for over 80 years. It is a middle-income economy, recently industrialised, and marked by a dualistic development pattern. Land distribution remains much as it was under the settler colonial government. Communal Areas (CA's) constitute 42% of the land area and contain 60% of the population. Commercial Farming Areas (CFA's) constitute 43% of the land area (some 5 400 large-scale farms) and contain 19% of the population (1). The total population was estimated in 1985 to be 8,4 million. (2)

Table 2

Distribution of Drinking and Domestic Water Sources by type of source in the CAs (sample of 3340 CA households)

Source	Wet Season %	Dry Season %
<u>Improved</u>		
Household tap	0,9	0,8
Communal tap	4,6	4,8
Protected Well	7,4	6,3
Borehole	19,0	26,2
Protected Spring	0,7	0,6
<u>Unprotected</u>		
Unprotected Well	41,4	31,4
Unprotected Spring	7,0	7,5
River	10,5	9,2
Dam	1,6	3,5
Rainwater Collection	0,2	0
Sand Abstraction	5,5	3,3
Other	1,3	1,5
	100,0	100,0

(Source: NMWP, National Socio-economic Study.)

The GOZ has embarked on a resettlement programme designed to relocate landless CA dwellers on commercial farms bought for that purpose. The original intention was to resettle some 162 000 families (850 to 900 thousand people) over a 3-year period, up to and including 1984/85. To date, only about 25 000 families (188 000 people) have been resettled in 63 Resettlement Schemes

and 31 Model B Co-operatives, which constitute 5,6% of Zimbabwe's land area.(3)

5.1 WATER DEVELOPMENT IN HISTORICAL PERSPECTIVE

Water development has followed a similar dualistic pattern. Whilst in urban areas, there is virtually complete provision of improved water supplies (some 70% have in-house connections), in the CAs, only one third of the rural population has access to some type of improved supply, and less than one percent has an in-house connection(4) (see Table 1.)

5.2 PRE-INDEPENDENCE WATER SUPPLY POLICIES IN CAs

The MEWRD is the primary authority for the provision of piped and non-piped supplies in the CAs (formerly known as the Tribal Trust Lands), and has been for many years. However, in the 1960s, the African Development Fund (now District Development Fund or DDF) was established for the purpose of developing the infrastructure of the CAs, and it too became responsible for water supplies.

The basic policy of the colonial government was to provide piped water for administrative centres (government stations), hospitals and clinics through boreholes drilled by the MEWRD. For this reason, boreholes and unprotected wells (dug by the villagers) are still the major source of water supply (see Table 2).

As far as piped supplies were concerned, the Ministry of Water Development (as it was then) provided all necessary services ranging from project planning, implementation, operation and maintenance, to determining when upgrading was required. The engineering input was usually of a high standard and most water connections were in-house. The users were all government employees and water was metered and paid for by the relevant ministry to the MEWRD. A small charge for water usage was levied by each ministry to each of its employees with a metered connection.

These piped water schemes usually included a line with communal standpipes or shared connections into the compound or 'location' used by low-grade government workers. For example, road workers in the Ministry of Transport had access to standpipes in their compound in a given rural administrative centre. The supply was metered, and paid for by that ministry. The consumers were not charged.

The reticulation was strictly within the boundaries of the government station and did not extend to rural villages or business centres. Boreholes were the basic water supply points for villagers.

5.3 OTHER PIPED WATER SCHEMES

Piped water was also supplied by many commercial farmers to workers on farm compounds. The extent of this is impossible to determine without a physical inspection of every farm in the country since there are no records kept of this kind of development. However, it is fair to say that there are about 1,7 million people living in the CFAs in conditions ranging from very poor (unprotected wells and river sources) to very good (in-house and shared yard connections).

The development of water supplies generally in CFAs is highly problematic. All workers' compounds are built on the farmers' private property and do not fall under the jurisdiction of any one government ministry as yet. The MOH has access to farm compounds by virtue of the powers of its Health Inspectorate to inspect and either approve or condemn water and sanitation facilities. However, the co-operation of the farmer is an important factor.

Piped water schemes were also built by church missions all over the rural areas. They were usually built to serve mission hospitals and schools, and were operated by the mission. In many cases these schemes have been taken over by MLGRUD or MEWRD, or else incorporated into larger service centre schemes. A number of piped water schemes were also constructed with support from non-governmental organisations. Shumba Piped Water Supply (see Section 8.1) is such an example. However, such schemes are not common, church missions being the most significant contributors to independent piped schemes.

SECTION SIX : THE NATIONAL MASTER WATER PLAN

6.1 GENERAL RECOMMENDATIONS

The Master Plan has made recommendations on a wide range of issues. Insofar as planning is concerned, it has made a number of broad policy recommendations, which have all been adopted.

- (i) Integration of water, sanitation and health education for maximum health benefits to the rural population.
- (ii) Integrated district and provincial planning: sectoral planning at locality, district, provincial and national level need to integrate all forms of water provision to make the best use of available sources.
- (iii) Piped and primary water supply mix: generally piped supplies will be constructed at service centres, growth points and selected resettlement areas. Primary water supplies will supply the remainder of the CAs and Resettlement Areas population.
- (iv) Primary water supply mix: hand-dug wells and boreholes are the major primary water supplies. Priority is given to hand-dug wells over boreholes where possible.
- (v) Community participation is recommended as the strategy of choice in primary water supply and sanitation programmes.
- (vi) Payment and community contributions for water and sanitation: rural consumers should contribute to the development costs of water and sanitation provision. Complete or near-complete recovery of recurrent costs is recommended. This will require:
 - increasing general tariff on piped water to 50 cents per cubic metre, plus the creation of user groups for tariff collections at shared connections.
 - annual payment of Z\$1 per household per annum for access to primary supplies.
 - community contribution of voluntary labour in provision of local building materials and construction work.
 - government to cover the bulk of capital costs (with donor assistance) of water supply development.

(vii) Operation and maintenance: a 3-tiered maintenance structure is proposed for primary water supplies:

- at village level: voluntary pump attendants and specialised water and sanitation sub-committees of Village Development Committees (VIDCOs).
- at ward level: paid DDF pump minders.
- at district level: DDF maintenance units.

6.2 RECOMMENDATIONS ON PIPED WATER SUPPLIES POLICY

6.2.1 Provision of piped water supplies:

The Master Plan has recommended that piped water be supplied only at service centres and growth points in the CA's, and selected resettlement areas (see 6.5.1 for definition). Water will be metered and charged for, though the revenue from water supply stations will not cover the costs of operation and maintenance for a considerable period.

6.2.2 Group connection policy:

Water supply stations in service centres will normally supply only government institutions and a few private consumers who can afford individual connections. The Master Plan recommends against the provision of free communal standpipes in townships and villages on the grounds that Government could not afford the large, continuing subsidy. Instead, a policy of group-owned connections is recommended, whereby water user groups are formed, who pay for a connection, own it and pay for water on a metered basis. This will, hopefully, solve the problem of rate collection from communal consumers.

6.2.3 Water supply station pricing policy:

The Master Plan has endorsed the MEWRD policy of setting a rate that covers operations and maintenance, but not capital costs. It also recommends that the general water rate be increased to 50 cents per cubic metre, with adjustment for inflation every 2 years.

6.2.4 Rural Village Water Supply Policy:

The MEWRD has built a number of piped water schemes for villages which are not designated service centres. Water is provided free of charge through communal standpipes. These schemes are therefore quite distinct from normal water supply stations, which operate on a metered basis with in-house or shared connections. These were built shortly after independence and are operated,

maintained and paid for by MEWRD, under the Rural Village Supply Programme.

The Master Plan recommends that no more of these supplies be built until revenue from existing piped water supplies covers 60% of recurrent costs. The reasons for this are:

- (i) construction costs of piped village water supplies are estimated at Z\$ 160,00 per capita, as compared to Z\$32 for boreholes and Z\$15,00 for wells.
- (ii) per capita annual operation and maintenance costs of piped supplies is over Z\$5,00 compared to Z\$0,75 to Z\$1,00 for wells and boreholes.
- (iii) the potential for village-level maintenance is higher for primary than piped supplies.
- (iv) the provision of lower-cost technologies for a wider social benefit should take priority over the reinforcement of existing inequalities in access to basic facilities.

6.3 INVENTORY OF EXISTING PIPED SUPPLIES

A major component of the Master Plan was the inventory of existing water facilities throughout the country. Piped water supplies number 385 (excluding CFAs), and a distinction is drawn between those supplies located in designated service centres, and those which are not. The inventory was conducted in June 1984.

Definition of a piped water supply

Some of these piped supplies are rudimentary, consisting of a source, a motorised pump and a single tap, and serving very few people. The MEWRD definition of a piped supply does not include a distribution system or reservoir, with the result that the NMWP inventory includes water supply systems consisting only of the barest essentials, i.e. source, pump, pipeline and tap.

6.3.1 Piped supplies at rural service centres

There are 476 designated rural service centres, district service centres and growth points. The Physical Planning Department of MLGRUD is responsible for selecting these centres (see 6.5.1). Of the 476 service centres, 197 have piped supplies (see Table 3).

Table 3: Service Centres with Piped Supplies

	Total No. of Service Centres	No. of Service Centres with piped supplies	% with piped supplies
Manicaland	80	37	46
Mashonaland Central	50	19	38
Mashonaland East	71	32	45
Mashonaland West	51	11	22
Matabeleland North	33	19	58
Matabeleland South	41	23	56
Midlands	78	22	28
Masvingo	72	84	47
Zimbabwe	476	197	41% ave.

(Source: NMWP Vol. 3.3)

6.3.2 Piped supplies at other centres

There are 188 piped supplies at centres not designated as service centres. They are found at mines, clinics, schools, army barracks and at villages and rural business centres.

Those at villages and rural business centres are most likely to have been built by MEWRD, and presently operated by them. This is part of the Rural Village Water Supply Programme. The remainder of schools, clinics, etc. are operated by DDF or a District Council.

A number of locations where MEWRD built Rural Village Water Supply stations were subsequently classified as service centres. Table 4 summarises the numbers of such stations that are inside or outside a service centre, as well as listing the main system operator.

Table 4: Summary of piped supplies outside service centres

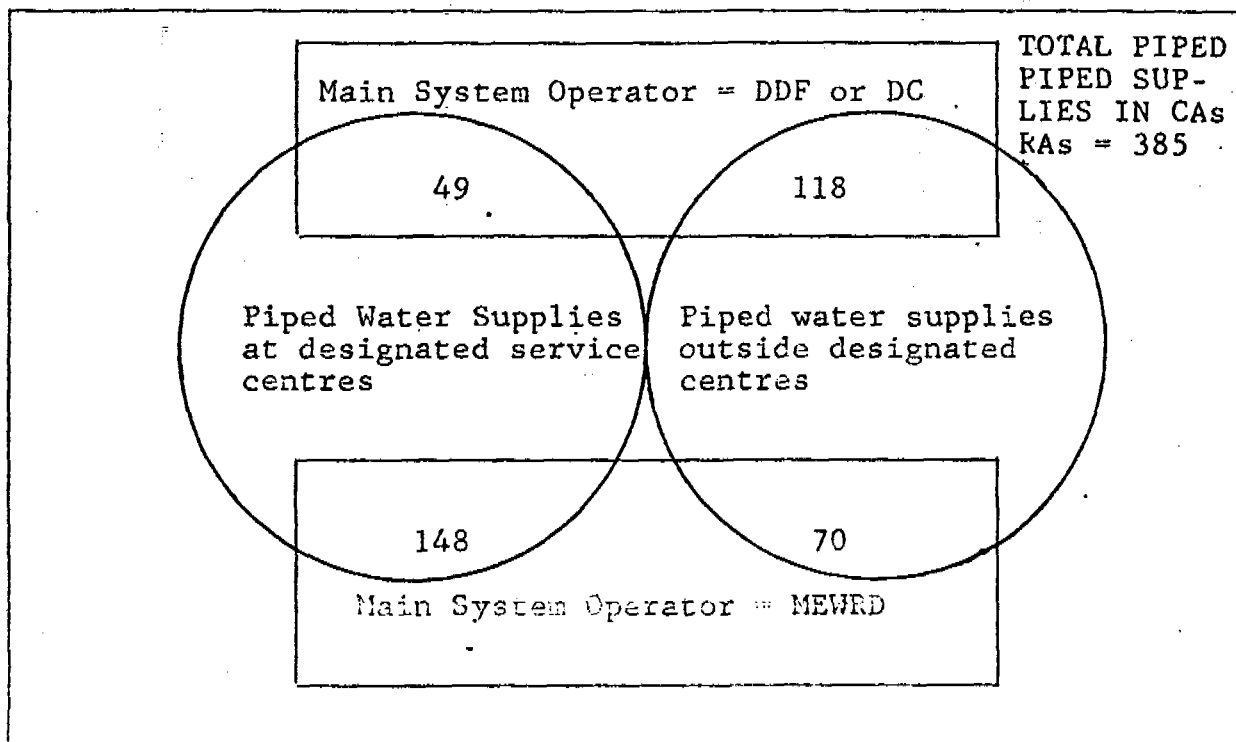
Province	MEWRD-Operated Rural Village Water Supplies			Operated by DDF or District Council outside service centre	Total outside centres
	Total built	Within service centre	Outside service centre		
Manicaland	22	8	14	21	35
Mashonaland:	30	6	24	32	56
East				6	
Central				25	
West				1	
Matabeleland	15	9	6	36	42
North				15	
South				21	
Midlands	15	4	11	6	17
Masvingo	24	9	15	23	38
Zimbabwe	106	36	70	118	188

(Source: NMWF, Vol. 3.3)

Thus, of the 106 schemes built by MEWRD, 36 were subsequently classified as being within a designated service centre and 70 remain outside that classification. In addition to the 70, DDF, a District Council or a Rural Council operates a further 118, usually at schools, mines, clinics, etc., making up the total of 188 (see Fig. 1).

Fig. 1. Diagram showing breakdown of piped water scheme operators in CAs and RAs

(Source: NMWP)



6.4 THE RURAL WATER SUPPLY PROGRAMME

The RWSP sets out objectives and strategies for water development over the short, medium and long term. A major planning tool is the computer programme developed alongside the water programme, which is designed to enable planners to prepare detailed development schedules at district, provincial and national levels.

A detailed description of the Rural Water Supply Programme is presented in Volume 3 of the National Master Water Plan. Below is a summary of its major recommendations.

- (i) complete coverage of CA and RA populations and their livestock with potable water supplies by 2005.
- (ii) provision/upgrading of 576 piped supplies to 476 service centres and 100 resettlement areas.
- (iii) the remainder of the population to be served by approximately 36 000 primary supplies.

2005. Below are some of the important parameters that will determine the direction and overall capacity of the RWSP.

(i) Phasing of piped and primary supplies

A choice must be made between developing and upgrading piped supplies at service centres as a spur to economic growth, versus the provision of primary supplies to a greater number of rural people on the grounds of social equity.

Because of the far lower costs of primary supplies, the low effective demand for piped water at service centres based on residents' inability to pay, and the disappointing benefits to economic growth revealed by impact studies on piped schemes elsewhere in the world, the Master Plan has recommended that emphasis be placed on primary rather than piped supplies. A limited number of piped supplies should be built in the period 1985-1995, and the remainder should be built in 1995-2005.

The resettlement areas have been given a high priority as far as piped supplies is concerned meaning that very few schemes will be built at service centres in the medium term. Figure 2 shows the projected annual rate of construction of piped supplies recommended by the Master Plan. In the period 1990-1995 between 15 and 20 supplies should be built/upgraded per annum, thereafter increasing to around 35 per annum.

(ii) Extent and level of service for piped supplies

It is recommended that the design capacity of piped supplies should allow for communal consumption. The main reason is the low additional costs owing to economies of scale, but in addition, the shared group connection policy may be successful and thus take up this extra capacity. Furthermore, certain district councils may be able and willing to pay for water distributed via free communal standpipes.

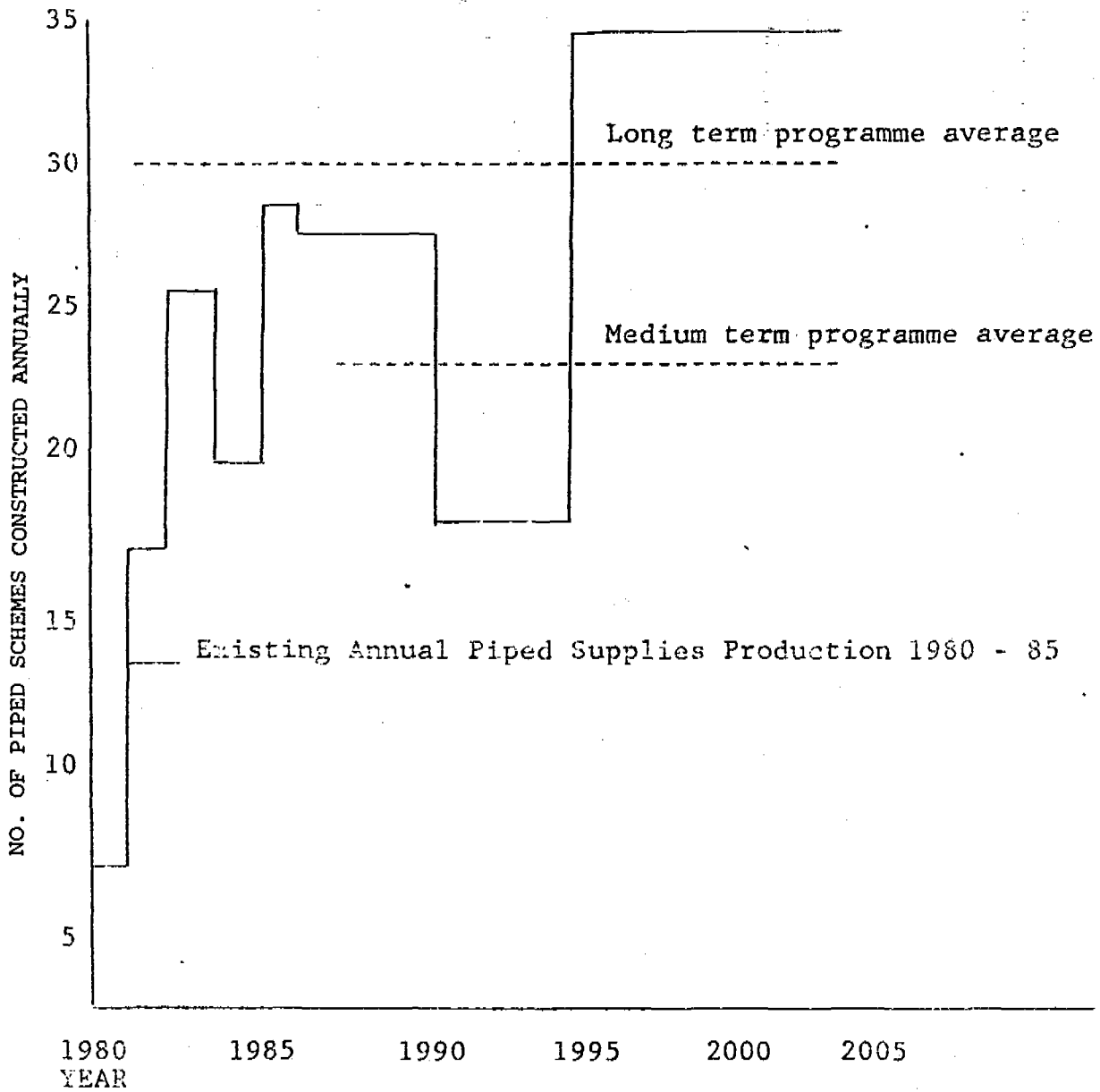
(iii) Extent of the reticulation system at Service Centre Supplies

For reasons of cost the Master Plan recommends that, in general, the reticulation system should not be extended beyond the boundaries of the service centre into nearby villages. Two exceptions, where it may be appropriate to extend the system in specific locations are:

- (a) areas where primary sources may be difficult or impossible to develop (e.g. Maganyani, see Section 8.5).
- (b) where a real demand for shared group connections has developed.

FIGURE 2. Projected Annual Rate of Construction of Piped Supplies 1985-2005

(Source: NMWP Vol. 1)



6.5 POLICY IN THE MINISTRY OF ENERGY, WATER RESOURCES AND DEVELOPMENT

The principles and objectives of the GOZ water policy with regard to piped water supplies in CAs and RAs is summarised below. Generally speaking, all water, other than private water, is

vested in the state and apart from certain inherent rights to the use of public (surface) water for primary purposes - mainly by riverbank dwellers - the use of public water for any other purposes requires specific authority in terms of the Water Act.

6.5.1 Water development in the Communal and Resettlement Areas

The vast majority of areas for which MEWRD is responsible for water provision, are under the control of District Councils, of which there are 55, grouped into 8 provinces. Water policy is based on the rural development strategy adopted by GOZ, which is to develop rural settlement infrastructure in district and rural service centres. The hierarchy of the settlement system in Zimbabwe has been defined by the Department of Physical Planning (1985) as a 7-tier hierarchy comprising:

- a) consolidated villages
- b) business centres
- c) rural service centres
- d) district service centres
- e) growth points
- f) existing towns
- g) existing cities

This hierarchy constitutes the operational framework through which policies are implemented.

Three key definitions should be noted.

i) Rural Service Centre:

A rural service centre is designed to integrate the functions of lower order settlements such as consolidated villages and business centres. Each service centre will serve up to 10 000 people, none of whom have to travel more than 20 km to the nearest service. These centres will contain shops, secondary schools, health clinics, ward development centres, local markets and co-operatives. Major roads, piped water supplies and telephones are located here.

ii) District Service Centre:

These centres offer similar but higher level services to those at district service centres. They are the administrative capitals of their district and also provide district services - Council Administration, District Hospital, training and information centres. District service centres will also serve to decentralise the agro-processing industry away from the main centres. From 10 - 50 000 people are served by such a centre.

iii) Growth Point:

A growth point is a service centre with an identifiable resource base capable of stimulating specific production and marketing activities. Such a resource base might be a mine or irrigation scheme. Growth points are meant to serve a regional economic function and are therefore located 40 to 60kms from an established urban centre. Water supplies must be adequate not only for domestic use but also for economic growth to occur.

Numbers of growth points and service centres

Growth points	8
District service centres	52*
Rural service centres	416

*There are 55 districts and thus 55 District Service Centres. Three growth points are also District Service Centres, making a total of 55.

6.5.2 Government Water Supply Stations

The policy of GOZ is that, in principle, every service centre is eligible for a piped supply. The Master Plan has made recommendations on the construction and upgrading of such supplies (see 6.3.1).

Generally speaking, larger service centres and growth points will be provided from Government Water Supply Stations financed through the Water Supply Trading Account. The purpose of a Government Water Supply is to provide and maintain domestic and industrial supplies in areas where no local authority has accepted responsibility for the supply. The ultimate goal is for a local authority such as a District Council to assume this responsibility.

Water Supply Stations at service centres operate on the basis of individual connections and metering, with a small extra capacity for commercial supplies. Communal supplies are provided on the basis of shared group connections and metering. Free communal standpipes will be provided only where the District Council assumes the cost burden. In other words, MEWRD will not pay for free water supplies at water stations. This is in contrast to Rural Village Water Supplies, where communal standpipes supplies are financed by MEWRD, e.g. Maganyani, Section 8.5. This is discussed further in Section 6.5.3.

Water supply stations are divided into 3 categories:

6.5.2.1 General Rate Stations

These are stations where consumption by private consumers (as opposed to government officials) is less than 60% of total water

consumption. These stations range from small departmental consumers such as road camps, rural hospitals, police camps, etc. through medium size stations such as townships, to large consumer stations. The water pricing rate is fixed to cover only the cost of O and M. Stations like these will be transferred to Special Rate Stations when the consumption by private consumers exceeds 60% of the total.

6.5.2.2 Special Rate Stations

When a General Rate Station has grown to the point where private consumers use more than 60% of total consumption, rates are fixed so that:

- i) at stations which provide bulk water supply to a local authority or non-government consumer, the water rate includes capital redemption charges as well as O and M charges.
- ii) at government institutions where water is purchased from another authority and has to be handled by MEWRD, the rate covers MEWRD handling costs in addition to the purchase price of the water.

6.5.2.3 Non-domestic stations

These refer to stock-watering schemes where untreated water is sold at a rate to cover O and M.

6.5.3 Rural Village Water Supplies

Prior to the adoption of the Master Plan, and immediately after independence, the MEWRD embarked upon the construction of piped supplies to rural villages. Water was distributed free via standpipes (see Section 8.1, Shumba Piped Water Scheme).

This policy has now been discontinued on the basis of the Master Plan's recommendations. No more piped village water supplies should be built until the Water Supply Trading Account, (see 6.5.5), which receives revenue from Government Water Supply Stations, begins to move out of deficit - a situation which is unlikely to occur for at least 10 years and possibly longer.

The GOZ Service Centre/Growth Point policy took a little longer to evolve after independence. When the country's service centres were designated in 1985, a number of villages with piped supplies found themselves classified as service centres, and thus entitled to a government water supply station. However, quite a number were not classified as centres, which has given rise to an anomalous situation where small and economically unimportant villages have piped water. Moreover, the cost of this water

provision must be borne by MEWRD as part of its Rural Village Water Supply vote.

Present policy is that Rural Village Water Supply deals only with non-piped supplies, and is mainly concerned with the sinking of boreholes.

However, there are certain cases where MEWRD is obliged to provide piped water, as in the case where ground water sources are impossible or very expensive to develop (e.g. Maganyani, see Section 3.5).

As far as the provision of piped supplies is concerned, the MEWRD is the sole authority for their construction. MEWRD provides all necessary services ranging from project planning, implementation, O and M, monitoring of water treatment supplies and other equipment, and upgrading.

The selection of areas to be provided with piped supplies is not the responsibility of MEWRD. This is most usually done by the MLGRUD and its departments, DDF and the Physical Planning Department, or by a local authority such as a District Council.

Planning Protocol

The usual channel of communication for project preparation and planning, leading to project implementation, is as follows:

VIDCO and WARDCO
District Development Committee (DDC)
Provincial Development Committee (PDC)
Provincial Water Engineer (PWE)
MEWRD Operations Division

MEWRD has no representatives at District level, other than maintenance personnel at water supply stations. The PWE is a member of the PDC and receives requests for new supplies or upgrading of existing supplies in this forum. The PWE is then responsible for evaluating the project and prioritising it in accordance with the provincial budget. Once this stage is done, the project proposal is taken to MEWRD Operations Division for final approval.

Implementation is done either by MEWRD itself, through its provincial office, or by a contractor.

6.5.4 Planning systems in MEWRD

The MEWRD comprises a Planning Division, a Designs Division, an Operations Division and 5 Provincial Branches (Mashonaland, Matabeleland, Manicaland, Masvingo and Midlands).

6.5.4.1 Planning Division

(A) Planning Branch

This branch is responsible for overall water resource development planning. Its functions include:

- (i) aerial and ground surveys, mapping and site investigation.
- (ii) evaluation of projects and preparation of detailed project reports.
- (iii) overall Head Office administration and control of government water rights.
- (iv) legislation.
- (v) preparation of estimates for the Public Section Investment Programme.

(B) Hydrological Branch

This branch deals with the collection, processing and analysis of hydrological and hydrogeological data, which includes the investigation of ground water sources.

6.5.4.2 Designs Division

This division is responsible for the investigation, design, construction and surveillance of government dams and water works. Dam construction is a major function.

6.5.4.3 Operations Division

Responsibilities include:

- (i) co-ordination of construction and maintenance work undertaken by provinces.
- (ii) overall control and administration of the construction, operation and maintenance of Government Water Stations.
- (iii) co-ordination and Head Office control of work done by Provinces.
- (iv) liaison with other ministries, departments, parastatals.
- (v) rural and urban water supply programmes, planning and execution.

- (vi) negotiating with donor agencies.
- (vii) preparation of project documents for funding.
- (viii) vetting engineering designs from Provinces.
- (ix) designing large projects beyond the scope of Provinces.
- (x) water pollution control.

6.5.4.4 Provincial Branches

Provincial branches are responsible for carrying out the functions of MEWRD at regional level, which include:

- (i) investigation, design, construction, operation and maintenance of Government Water Supply Stations.
- (ii) design and construction of dams in CAs.
- (iii) administration and control of diamond drilling and other exploratory investigations.
- (iv) water boring.
- (v) administration of water rights.

6.5.4.5 Planning tools in MEWRD

The Master Plan, the Rural Water Supply Programme and the RWSP computer programme are now the major planning tools in the MEWRD. They provide a framework for long, medium and short-term planning at national level. This type of planning relates only in a broad sense to the type of detailed planning required at provincial, district, ward and village level. Also, community participation, while it is the standard form of implementation for water projects in general, is not much more than a planning concept in MEWRD. The MEWRD does not function at a grass-roots level, or even at district level. Community participation is more properly the function of a number of other ministries, and will be discussed in detail later in this report.

To assist the MEWRD to implement the Master Plan recommendations, a Master Plan office is to be set up in the ministry. This office will liaise with the National Action Committee (chaired by MLGRUD) and with the National Co-ordination Unit in the MLGRUD.

6.5.5 Financial Controls in MEWRD

A significant proportion of the Ministry's functions and activities are devoted to the provision of services to other ministries and departments, such as MLGRUD, DDF, Department of

Physical Planning, Ministry of Health, Ministry of Lands, Agriculture and Rural Resettlement, Ministry of Education, etc. Work is also carried out for private consumers on a lower priority basis.

Water Supply Trading Account and Working Account

The balancing of revenue from government stations, and expenditures related to operations and maintenance is done through an account known as the Water Supply Trading Account. This account, together with various accounts for mechanical units, labour, workshops, stores and transport, forms what is called the Working Account.

The account is debited with all O and M costs, depreciation of fixed assets, rental and interest on loans. It is credited with charges raised for work done, as well as revenue accruing from the sale of water at government stations.

Payments between ministries are effected by the Central Payments Office of the Ministry of Finance, Economic Planning and Development. Accounts and ledgers are maintained by the Computer Bureau.

6.5.6 Operations and maintenance

Government Water Supply Stations

All stations in the CAs and RAs are operated and maintained by MEWRD. Maintenance personnel are employees of the ministry and have little or no contact with the local authority (e.g. District Council) or the consumers.

Meter Reading

The maintenance personnel are responsible for the monthly metering of bulk water supplied by the station to the service centre. All stations are metered monthly, and returns go to the relevant Provincial Water Engineer's office. Each PWE processes these returns, which are then passed on to Head Office. From there, they go to the Computer Bureau, which produces a monthly ledger giving details of bulk amounts consumed by each ministry. Payments from consumer ministries are then effected by the Central Payments Office into the MEWRD's Water Supply Trading Account.

Consumer ministries, such as the MLGRUD, are responsible for recovering their costs from individual consumers, whether they be government employees, private consumers or District Councils. The MLGRUD has a department, the Central Rates Fund, which carries out this function.

Rural Village Water Supplies

All piped Rural Village Water Supplies are operated and maintained by MEWRD. The maintenance employee is usually a local villager, and is responsible for simple pump maintenance, water purification and chemical treatment, and standpipe maintenance.

Community participation is not a feature of the ministry's policy in regard to O and M. Standpipes are maintained by MEWRD's employee, for example, and it is often the case that poor drainage results in large standing pools around the standpipes. The maintenance personnel interviewed by the consultants did not seem to regard this as a serious problem, claiming that Village Health Workers from MOH were responsible for motivating consumers to look after the standpipes.

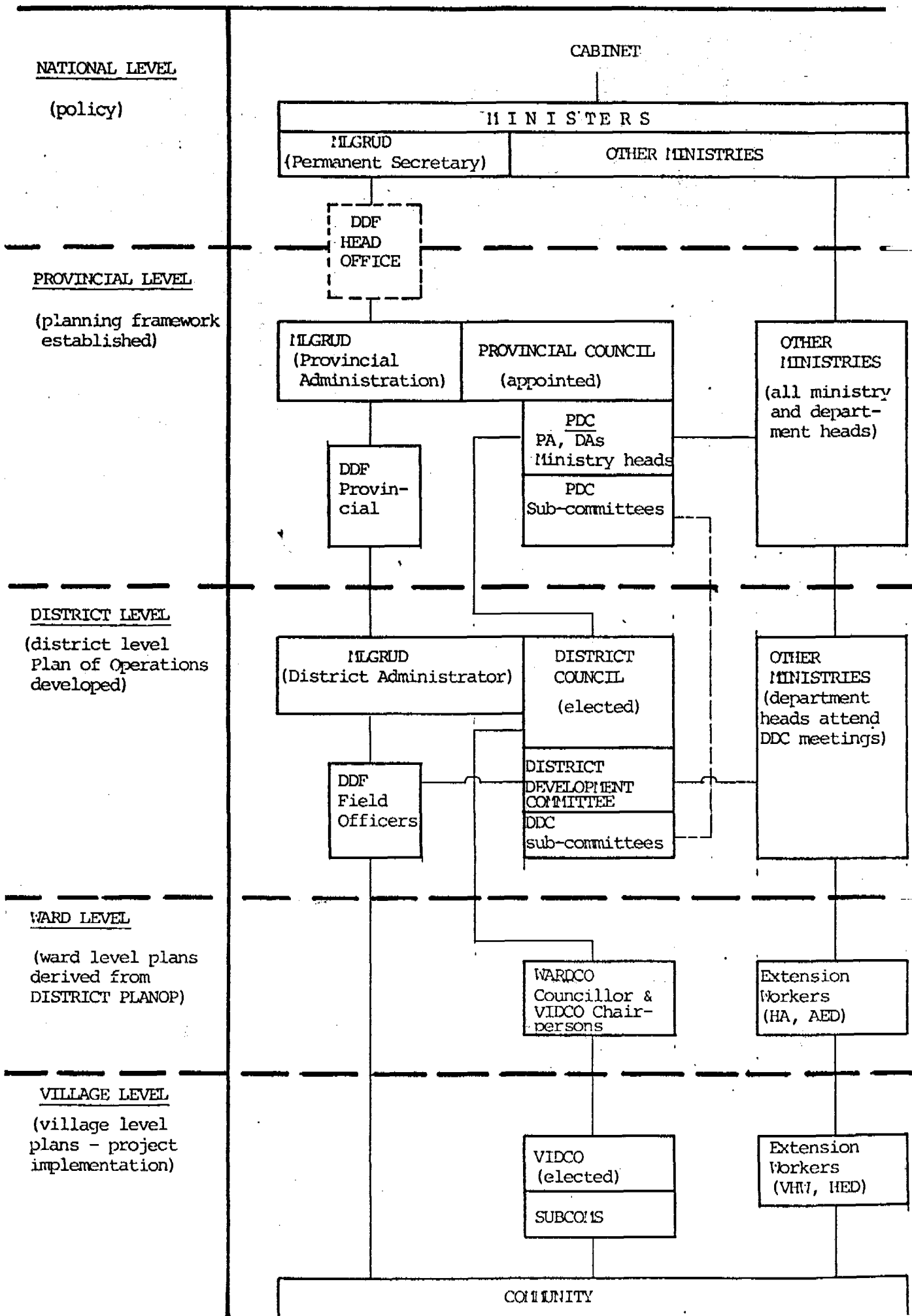
The maintenance person does monthly meter readings in order to record bulk usage, and then reports to the PWE. There is no rate collection at these water supply schemes, all costs being borne by the MEWRD Working Account.

6.6 WATER POLICY IN THE MINISTRY OF LOCAL GOVERNMENT

The MLGRUD is responsible for local government administration in the CAs and RAs and is thus directly involved in all rural development projects, ranging from water supplies, roads and telephones to small village-level community projects.

As far as water supplies are concerned, MLGRUD plays a key role at national level, right down to village level. The functions of this ministry are summarised below:

- (i) provide chairmanship of, and act as secretariat to, the National Action Committee for Decade activities
- (ii) prepare plans for rural, infrastructural development in all 55 districts, including provision for piped water supplies, sewage mains, etc. This is done by the Physical Planning Department.
- (iii) provide chairmanship of Provincial Development Committee through Provincial Administrators. The PDC is the forum for integrated planning proposals to be accepted. Liaison occurs between PDC and technical ministries such as MOH, MEWRD.
- (iv) administer all 55 districts through District Administrators. The DA is Chief Executive Officer of the District Council, but remains a ministry employee. DA chairs District Development Committee, the forum for district-level plans, sectoral and integrated, to be developed.



- (v) through DDF, is responsible for maintenance of all primary water supplies in Zimbabwe, and supplies all manpower and training requirements for such maintenance. It is, however, not responsible for maintenance of piped supplies, which remains the responsibility of MEWRD.
- (vi) is partly responsible for community mobilisation in community-based project work. It has close contact with village-level leadership through Local Government Promotion Officers (LGPO).
- (vii) is responsible for the establishment of Ward Development Committees and Village Development Committees in each district, and is also expected to provide management and skills training to support these structures.

The MLGRUD is both a planning and an administrative ministry. For this reason, it is indirectly involved in the provision of piped water supplies, although in theory it plays no part in their construction, operation and maintenance. It has a hand in the planning process at district, provincial and national level, through its chairmanship of District and Provincial Development Committees, and of the National Action Committee.

National Co-ordination Unit

A National Co-ordination Unit has been established in MLGRUD to improve sectoral planning and co-ordination in terms of the Master Plan recommendations. The functions of the unit will include:

- (i) prepare sector plans and budgets based on district, provincial and national plans, for presentation to the NAC.
- (ii) to provide overall co-ordination of programming, planning design and construction with all departments and organisations involved in the water sector.
- (iii) to assist in securing donor support.

6.6.1 Financial administration in MLGRUD

The purchasing of bulk water from MEWRD's water supply stations is administered by the Central Rates Fund (CRF). The MLGRUD is the largest purchaser of water from MEWRD, along with all other ministries that use water for their employees at service centres. The CRF operates at some 80 water stations in the CAs and RAs.

The CRF is invoiced by MEWRD for bulk usage at all stations on a monthly basis. Payments are effected from the CRF into MEWRD's Working Account by the Central Payments Office in the Ministry of Finance, Economic Planning and Development.

CRF recovers revenue from individual users at water stations by invoicing them on a monthly basis for metered usage.

The CRF presently acts on behalf of local government administration (such as a District Council), which has not yet assumed responsibility for this function. However, the CRF's role will increase before it decreases, as the number of piped water supplies increases.

6.7 COMMUNITY PARTICIPATION

Community participation is a key concept in the GOZ's development policies. The thrust to develop the communal areas is not only an attempt to promote higher service levels and economic growth outside established centres, it is also an attempt to correct historical imbalances in the country's development pattern. Community development is seen as the only economically viable, as well as ideologically sound approach to achieve that end.

In order to promote community participation as an active development strategy, a number of steps have been taken:

- (i) establishment of Ministry of Community Development and Women's Affairs (MCDWA)
- (ii) restructuring of rural administration
- (iii) the promotion of co-operatives, especially in RAs
- (iv) service centre/growth centre policy
- (v) public works programme
- (vi) primary health care adopted as official MOH policy.

6.7.1 Establishment of MCDWA

This Ministry was established post-independence with the specific intention of promoting community-based development projects. Women are perceived as crucial actors in this process. The Ministry is geared for extension work but still suffers from a shortage of suitably skilled personnel, and transport. It has, however, been concentrating on training programmes for its staff, and is represented in every district. A District Community Development Officer (DCDO) is supported by a Family Planning

Adviser plus several Home Economics Demonstrators and Community Extension Workers.

MCDWA will, in due course, assume control of the MOH's Village Health Workers, who will be known as Village Community Workers. The MOH will take the role of a technical ministry, and will participate less in the process of community mobilisation. It is therefore clear that the Government's intention is to extend the role of MCDWA as an agent for community participation.

6.7.2 The MCDWA's role in integrated water supply projects

The MCDWA has now been designated as the ministry responsible for community mobilisation in water supply projects. All community water supply projects are now linked to sanitation and health education, and MCDWA is a fully participating ministry, along with the MOH, MLGRUD and the MEWRD. Water supply projects will most probably form a major part of the ministry's activities. A study is currently under way within the ministry to analyse and articulate its' functions and responsibilities in the water and sanitation sector.

6.7.3 Other factors affecting community participation

Growth centre policy is now firmly established, and has been described in Section 6.5.1 of this report. The promotion of co-operatives is an ongoing exercise, linked also to the resettlement programme. The issue of public works programmes as a strategy for community development is under debate. A public works programme in the financial year 1984/85 operated in all districts, initially linked to a drought relief programme. It proved to be very popular with local government administrators, who found it easier to promote "self-help" projects, such as road making and dam building, when they had locally administered funds to pay a minimum wage for unskilled labour. There are many quarters in government pressing for a re-introduction of a public works programme.

Two other important policy issues in community participation are Primary Health Care, and the restructuring of rural administration. The adoption of Primary Health Care as an instrument of policy has led to the deployment of Health Assistants and Village Health Workers at ward and village level respectively, as health extension workers. Health education and community mobilisation are central functions for these cadres, and this has undoubtedly had an impact on rural people insofar as water and sanitation projects are concerned, and of course in other areas as well. For a fuller discussion of MOH policy, see Section 6.8.

6.7.4 Restructuring of rural administration

The Prime Minister's Directive of 27th February, 1984, dealt with the creation of new institutions that would facilitate and



A standpost at Machaya Piped Water Scheme, Muzarabani. The standpost, circled, is poorly drained, reflecting the absence of village-level maintenance.

formalise the process of community participation. Ward and village development committees (WARDCO's and VIDCO's) are designed to enable communities to liaise with government and its extension workers.

VIDCO's are the basic unit of village-level organisation, representing about 100 families. Two members (women's and youth representatives) are appointed and 4 elected. WARDCO's usually represent 6 VIDCO's and are made up of a District Councillor, all VIDCO chairpersons plus 2 appointed members. Ward and Village-level extension workers may be co-opted onto the committees. The functions of these committees may be summarised as follows:

- (i) identify and articulate village and ward needs.
- (ii) plan local development activities.
- (iii) manage local labour input to village-level projects.
- (iv) carry out maintenance.

WARDCO's are the link between villages and the District Council, the next step up in the administrative hierarchy. The District Development Committee is composed of representatives from Council, from every government ministry and department operating at district level, and is chaired by the DA. It is responsible for vetting WARDCC plans and drawing up district plans, which then go up to the Provincial Development Committee.

6.7.5 Community Participation and Piped Supplies

Community participation is now the accepted strategy in rural water development projects. The structures exist for making community participation a working reality, and the development and training of extension workers by the Ministries of Health and of Community Development and Women's Affairs is a recognised priority. Primary Health Care has also been an important instrument in the promotion of community participation as a working event in village life.

Community participation can occur at village, ward and district level through VIDCO's, WARDCO's and DDC's. At the provincial and national level, the process of water development moves into the hands of planners, engineers and administrators.

6.7.5.1 Types of piped water schemes

Piped water schemes have in the past been developed by a number of ministries and agencies, and this will certainly continue to

be the case in future. Below is a list of possible types of piped water schemes that will be built, following the publication of the NMWP.

(i) Rural Service Centres

Between 25 and 30 piped water supplies at rural service centres are planned for the period 1985 - 1990. These will be fully integrated schemes involving MEWRD, MLGRUD, MOH and MCDWA. The shared group connection policy will be followed, meaning that all water will be metered and paid for. This will require community participation.

Communal standposts will be installed only if the water is metered and paid for. This will most probably involve the participation of a District or Rural Council, which may undertake responsibility for payment of water consumed by residents of a rural service centre. A levy imposed by the Council may be necessary if it is to recoup its costs, and this would involve participation by WARDCO's and VIDCO's.

A further issue concerns the rural service centre boundary. Outside the boundary, residents will have to rely upon groundwater sources fitted with handpumps. However, it is clear that such users will prefer, in some cases, to draw their water from the communal standposts inside the service centre. This matter will have to be resolved at the community level.

(ii) Rural Village Water Supplies

These schemes were built by MEWRD prior to the NMWP, and water is distributed free via communal standposts. No more of these will be built, but the problem of fee-collection remains in the existing schemes. Expansion of existing schemes will also require a solution to the fee-collection problems (see Section 8.1, Shumba Piped Water Supply).

(iii) Rural Water Supply Programme

The RWSP is geared for the provision of primary supplies in the CA's and RA's. However, where groundwater sources are inadequate, a piped water supply is the only solution (see Section 8.5, Maganyani Piped Water Supply). A method of fee-collection will have to be worked out with the District Council and the VIDCO's when MEWRD decides to impose a fee for water.

(iv) NGO-supported Schemes

A number of non-governmental organisations are helping to provide piped water for rural clinics and schools. These schemes may include communal standposts as well. The arrangements for planning, implementation, operation and maintenance will be made with the District Development Committee, and will have to comply with the provisions of the NMWP.

(v) Commercial farm schemes

Private schemes on commercial farms will certainly be built, and will use farm labour to do so. Such schemes would certainly benefit from a planned community input, especially from the point of view of maintenance. Although the NMWP does not apply to CFA's, many of its recommendations will be applicable.

6.7.5.2 Community inputs

(i) At village level

Planning

A community planning input can occur in a rural service centre scheme, a Rural Village Water Supply Scheme, a Rural Water Supply Programme Scheme, and NGO-supported schemes. The best way to achieve this input is to conduct a feasibility study and/or inventory survey aimed at VIDCOs in the project area. The community's planning input would take the form of estimation of need, choice of locality, number of standpipes, etc.

Further activities at VIDCO level could be:

- (a) form water and sanitation sub-committee.
- (b) public meetings to articulate community needs. Extension workers would attend.
- (c) VIDCO formulates local plans based on feasibility study/survey, assisted by extension workers. These plans would cover choice of locality, number of connections, length of piping, positioning of standpipes.
- (d) VIDCO manages community-labour input.
- (e) VIDCO develops a system of fee collection based on the group connection policy. The formation of water co-operatives should be considered.

Construction

Community construction of piped water supplies can occur in the following areas:

- (a) trench digging and pipe laying
- (b) bricklaying and concrete work (soakaway pits, communal standposts)
- (c) collection of building sand and gravel
- (d) plumbing (where those skills are available)
- (e) construction of Blair latrines.

In many cases a building contractor will be hired to carry out the construction work by MEWRD. In such cases community participation will have to be very carefully planned, given that private building contractors in Zimbabwe are unaccustomed to working with communities in this manner.

Operation and maintenance

The VIDCO and its Water sub-committee could participate in O and M in a number of ways. A few suggestions are:

- (a) shared group connection policy - organisation of group payment
- (b) operation of communal standpipes - opening and closing of taps, the use of padlocks
- (c) fee collection of Z\$1,00 per head per annum for access to communal standpipes
- (d) preventive maintenance, care of soakaways, reporting of breakdowns
- (e) health education.

The maintenance of pumps, engines, valves, reservoirs, taps and piping remains the responsibility of the MEWRD attendant. This person is also responsible for all chemical treatment and filtration of the water supply. It is possible that some of these duties could in time be assumed by the VIDCO, but at the present moment, MEWRD policy is to employ a part-time attendant.

(ii) At Ward Level

Community participation at ward level differs in content from village-level participation. In planning, construction and O & M the WARDCO plays far more of a co-ordinating role.

The WARDCO represents up to 6 VIDCO's or 600 families, and is chaired by the councillor elected by the ward to the District Council. It consists of all VIDCO chairpersons plus two nominated members representing women and youth, and may co-opt ward level extension workers, particularly the MOH Health Assistant (HA). The HA is primarily responsible for community mobilisation and health education and is thus a key person in all water supply projects.

The WARDCO is the instrument for community participation at ward level. Contact with the people themselves occurs at the VIDCO level, and the WARDCO's prime role is to support the activities of the VIDCO. It can do this in the following ways:

- draw up concise ward plans (e.g. for village piped water supply) which can be understood by VIDCO personnel;
- channel information to the VIDCO's and communities;
- articulate VIDCO ideas and needs and direct them up to the District Council;
- organise village-level training programmes, e.g for maintenance of water supply, record keeping, systems of fee collection etc.
- provide logistical support in project implementation;
- provide administrative support to VIDCO's.

(iii) At District Level

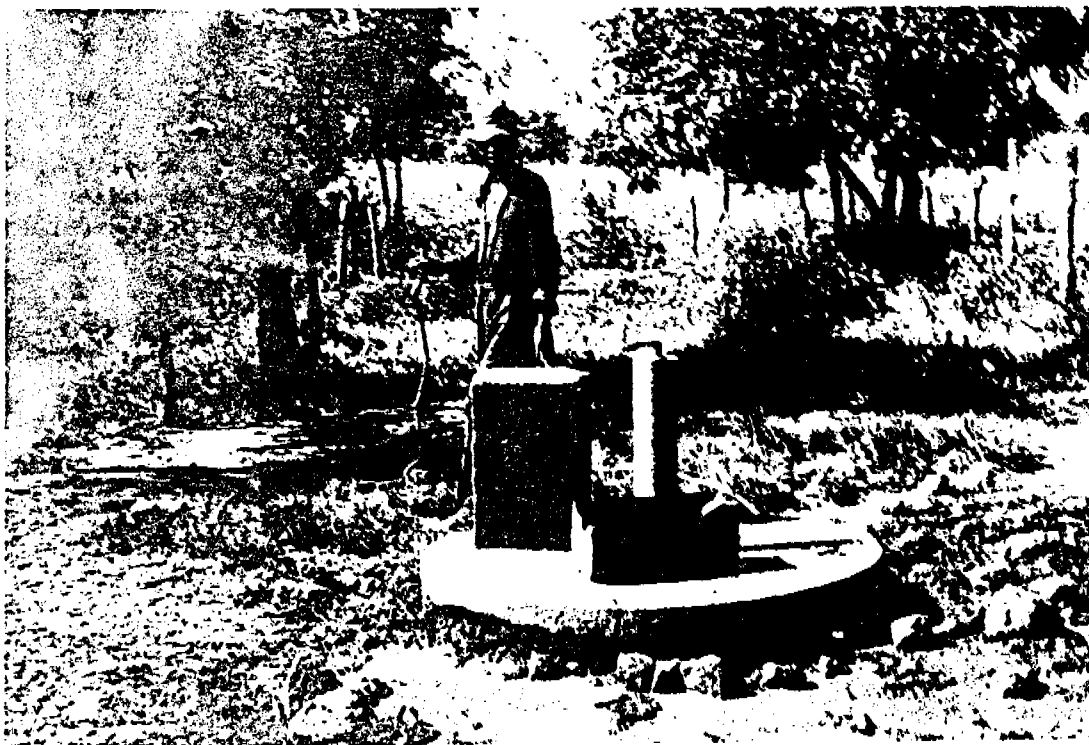
Development plans at district level either emanate from or are channelled downwards through the District Development Committee (DDC). WARDCO plans thus go up to the DDC for evaluation. They will usually form a part of a larger, district plan and will be processed as such. In this new format, they will go up to the Provincial Development Committee.

The DDC is the next level up from the WARDCO, but as a committee it is weighted in favour of professional government personnel rather than representatives of the District Council. It is chaired by the District Administrator and comprises heads of all ministries and departments that function at district level. The District Council has representation on the committee, but is in a minority.

The DDC serves as both a planning and an implementing forum. It is during the implementation phase of a project that the DDC can also draw up appropriate plans to promote community participation. This will include training programmes, assistance to WARDCO's to draw up ward level plans and work schedules, co-ordination of transport, etc. District level planning is the key to effective community participation.



Maganyani Piped Water Supply: mending a tyre at one of the standposts. The soil erosion and lack of a fence are signs of poor village-level maintenance .



A standpost at Maganyani showing poor village level maintenance. Eight standposts serve about 5000 people.

6.8 POLICY IN THE MINISTRY OF HEALTH

The main instrument of policy in the MOH is Primary Health Care. Environmental health is one of eight components of PHC, and has been a high priority in MOH activities since independence. It is true to say that water and sanitation activities by the MOH have had a major impact on rural consciousness. The Blair latrine is known and recognised throughout Zimbabwe, for example. When asked by one of the authors what was the biggest change in his life since independence, a VIDCO chairman from Kariba District replied: "The Blair Latrine". The concept of preventive health care has been well publicised, and has contributed significantly to the process of community participation.

The MOH's extension workers at ward and village level are the Health Assistant and the Village Health Worker respectively. The latter cadre is in the process of being transferred from MOH to the Ministry of Community Development and Women's Affairs, when they will be known as Village Community Workers. Their actual daily routines will remain much as before, and they will continue to make reports to the Health Assistant and the Rural Health Centre.

6.8.1 Health Education policy in the MOH

The MOH's approach to health education is built around the roles of HA's and VHW's. Health education focuses on immunisation, mother and child health care, nutrition and environmental health. Safe water supplies and adequate sanitary disposal facilities are linked together in the cycle of water related diseases, and environmental health projects invariably promote the construction of water supplies and latrines simultaneously.

The role of the HA in Health Education

The HA can promote health education in the following ways:

- (i) public meetings about environmental health projects, organised with the VIDCO
- (ii) demonstration projects
- (iii) training programmes that impart project-specific skills, e.g. latrine building
- (iv) posters and literature
- (v) flip charts
- (vi) movies about health care.

All the HA's activities should be co-ordinated with the VIDCO and the WARDCO, of which he/she is a co-opted member. Support for the HA comes from the Senior Health Assistant (SHA), the Principal Health Assistant (PHA) and the District Health Inspector (DHI). They provide work schedules, monitoring of goal achievements, supplies of posters and media material, logistical planning for project implementation, as well as refresher training courses.

The role of the VHW in Health Education

The VHW sphere of activity is the village and health education activity occurs basically through house visits and discussions with householders. The VHW is also a co-opted member of the VIDCO and is able to promote new ideas and practices in this forum. Sanitation is a major focus for the VHW, and the Blair latrine is promoted as a health intervention in the cycle of water related diseases.

The VHW can also play an important role in water supplies, particularly with regard to the proper maintenance of water points. The construction of adequate drainage facilities, for primary and piped supplies, is an obvious area for VHW intervention, but this also requires support from the HA and district-level workers.

The VHW makes monthly reports both to the HA in the ward and to the nearest Rural Health Centre. The HA is an important link for the VHW, and can make the difference between a successful community-based worker and a mediocre one.

The MOH is therefore linked to piped water supplies at the village and ward level through its extension workers. It will also play a part in planning and co-ordination through its presence on the DDC and PDC. Its primary role, however, is to assist the process of community mobilisation and organisation, and to carry out health education and latrine construction.

6.9 PIPED WATER SCHEMES ON COMMERCIAL FARMS

Piped water schemes on commercial farms are very common, but it is impossible to determine the exact number without a survey of all the 5000-odd farms in the country. The two piped schemes visited by the authors were fairly small, not more than two standpipes, plus a reservoir, a pump and a borehole. In the case of both farms, the piped water was an addition to the farmers' own domestic supply. A third farm without a piped scheme was also visited, and the farmer discussed his plans for building one.

Maintenance by the recipient community was limited to ensuring that taps are closed and that standing pools of water are not allowed to form. Both farmers relied upon the Workers' Committee

to perform this role, and organised repairs through the same committee when necessary. There was no evidence of any organised, preventive maintenance routines in operation.

The Government has made it clear, through numerous public announcements, that it wishes to see an improved living standard for farm workers, through the provision of better housing, sanitation and protected water sources. Piped water is regarded as an ideal, but primary water sources fitted with a handpump are an acceptable alternative.

It has not been possible to mount a campaign or to launch a project that links up with farmers in an effort to force the pace of upgrading of standards. There are many problems associated with this question. Firstly, all farms are privately owned and each one has its own system of water supply. Secondly, most farms have a large, fluctuating worker population which may range from 10 families to well over a hundred. (Roughly, 1,7 million people live in the CFA's, though that figure fluctuates with seasonal labour.) Thirdly, the workers and their families lack representative institutions which can articulate their needs, although the Workers' Committees now established on most farms seem to have provided a basis for such institutions to develop.

Piped water supplies on farms are thus a complex issue. There is very little data on their status, the recipient population has very little experience of community participation (which is essentially a political process), and there exists no clear method of operation for tackling the problem of upgrading.

6.9.1 The Farm Health Worker Programme

The only serious attempt to tackle the issue of farm worker living conditions is the Farm Health Worker Programme. It is essentially a project which aims to train and deploy health extension workers from the worker community. They are a parallel to Village Health Workers, and one of their functions is to promote the improvement of environmental health.

The scheme is operated by the MOH with assistance from Save the Children Fund (UK) and the United Nations Development Programme. The first scheme was begun on 60 farms in Mashonaland Central, with active participation of the farmers, the Rural Council, the recipient communities and the Provincial Medical Director's office.

The scheme has attracted a lot of attention, and is currently expanding. It employs a consensus approach to health care problems, and has been well received by the majority of farmers. As yet, the project has not developed plans for promoting water and sanitation activities, but this is an obvious step forward.

SECTION SEVEN : TECHNOLOGY AND DESIGN CRITERIA IN PIPED SUPPLIES

Volume 8.1 of the NMWP provides a full description of design criteria, materials, parts and schematic layouts of pumping, storage and reticulation systems. The design of communal stand-pipes is also covered. These recommendations have now been accepted by MEWRD, and this report will attempt to summarise the important features.

7.1 WATER DEMAND CRITERIA

Table 6 sets out the recommended design capacities for water demand in various situations.

Table 6: Design capacities for water supplies

<u>CATEGORY</u>	<u>WATER DEMAND</u>
<u>Residential</u>	
- individual or communal tap or well, walking distance 50 m	60 litres/day
- communal tap or well walking distance 50 - 300 m	40 litres/day
- communal tap or well, walking distance 300m	25 litres/day
<u>Institutional/Commercial</u>	
- schools (day students)	10 litres/day
- schools (boarding)	80 litres/day
- rural health centre (out-patients)	10 litres/day
- rural health centre (in-patients)	100 litres/day
- rural health centre, total	7.5 cubic metres/day
- hospital	200 litres/day/bed
- offices and shops	30 litres/day/employee
- offices and shops, total	1.0 cubic metres/day
<u>Livestock/Garden</u>	
- cattle	40 litres/day/animal
- dip tank	min. 3000 litres/week/tank max. 6000 litres/week/tank
- garden watering	1200 litres/day/CWP
<u>For piped schemes, 15% should be added for losses in reticulation mains.</u>	

Source: NMWP, Vol. 8.1

7.2 PIPED WATER SCHEME LAYOUTS

The evaluation of 25 piped water schemes by the NMWP consultants showed 4 basic lay-outs (see Figs. 5 and 6). The distribution was as follows:

Method 1A	8 schemes
1B	10
2	3
3	4
—	—
	25
—	—

The survey showed that 10 schemes (using Method 1B) used separate rising and reticulation mains. This avoids pressure fluctuations during stop-start pumping, and also ensures circulation of the potable water.

However, the NMWP consultants felt that neither of these reasons is sufficient to justify the extra expense of separate mains, and recommends Method 2 (see Fig. 6) as the optimal schematic layout.

A given supply area may be served by one large scheme or by several small schemes, depending on the nature and number of sources. When a groundwater source is chosen, an analysis should be carried out to see if a standby borehole is needed. This borehole can be sited some distance from the main one (see Fig. 7).

Recommendation of the NMWP

The NMWP recommends that the layout of piped water supplies should be in accordance with those shown in Figures 8 and 9.

7.3 FILTRATION AND CHEMICAL TREATMENT

The authors visited 5 government water supplies comprising 8 separate piped schemes (see Appendix 5). Two private schemes were also visited. Neither of these had any filtration system or chemical treatment, and of the 8 government schemes, 4 had filtration and chemical treatment, 4 did not.

The NMWP consultant on design visited 25 plants of which 14 had no treatment of any kind. It is usually the practice in Zimbabwe not to chemically treat water from groundwater sources. However, the NMWP strongly recommends that all piped schemes treat their water.

11 of the 25 plants had some kind of treatment.

- chemical treatment with rapid sand filters:
 - conventional concrete settling tank 4
 - plate type settling tank 4
 - twin tank system 2

These types represent the basic treatment principles presently used in Zimbabwe. Aluminium sulphate is added for flocculation and settling, followed by the addition of chlorine for disinfection. This is usually done by hand, although some systems employ an automatic drip-feed for chlorine.

7.4 PUMPS AND ENGINES

The Monopump is the most commonly used pump, both for low and highlift pumping, and there is a wide variety of intake structures. The Monopump is manufactured in Zimbabwe, and 9 other makes are registered.

Diesel engines (usually Listers) and electric motors are the most common form of pump-driving motors, either with a belt drive or direct coupling.

Volume 8.1 of the NMWP covers pumps, engines and intakes in great detail.

7.5 PIPES AND MATERIALS

The most commonly used pipe materials in Zimbabwe are asbestos cement (AC), polyvinylchloride (PVC) and galvanised steel (GI). All three are used for pumping mains as well as for reticulation, though galvanised steel is preferred for small dimensions.

All three types are manufactured in Zimbabwe. Asbestos cement pipes are the subject of international concern regarding the carcinogenic material that they may release in soft water, but are still in use.

PVC pipes are made in Zimbabwe but require foreign currency since they are oil-based. However, their use is widespread because of their many advantages. Pipes are produced with sockets, and jointing is done with rubber sealing rings and a solvent.

Galvanised steel pipes are commonly used for small dimension piping, being uneconomical in larger diameters. Large diameter G.I. pipes are used in special installations like road crossings, above-ground use, etc., where PVC is unsuitable.

7.5.1 COMMUNAL WATER POINTS AND TAPS

Communal water points occur in a number of designs (see Fig. 9 for typical designs). A washing slab is not usual, though they are found.

The most common tap seen by the authors was of the brass faucet type. No spring-loaded automatic taps were seen.

Fig. 4 Some typical layouts for piped water schemes in Zimbabwe (Source: NMWP)

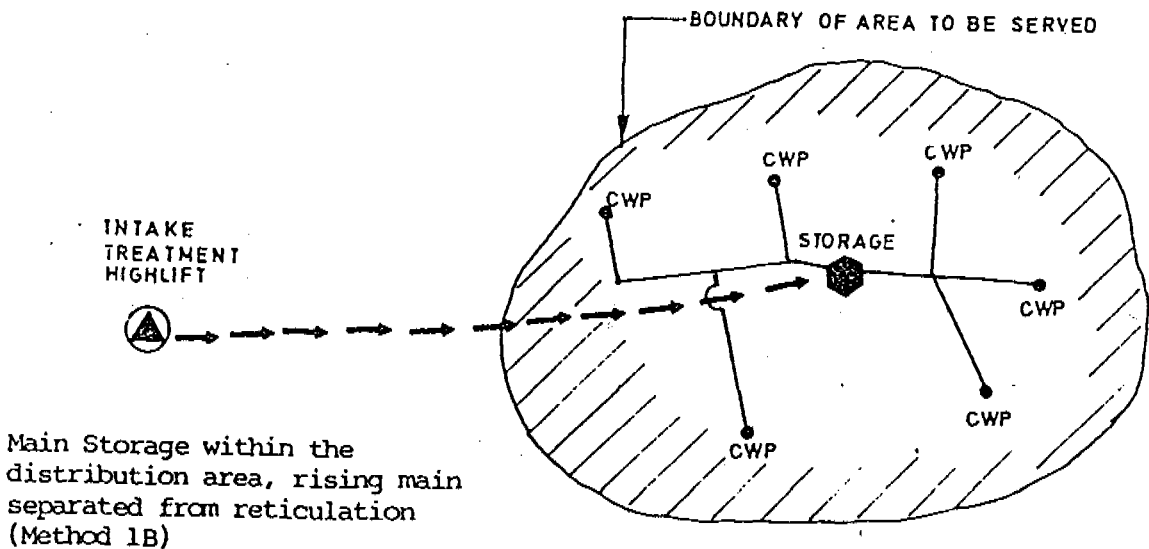
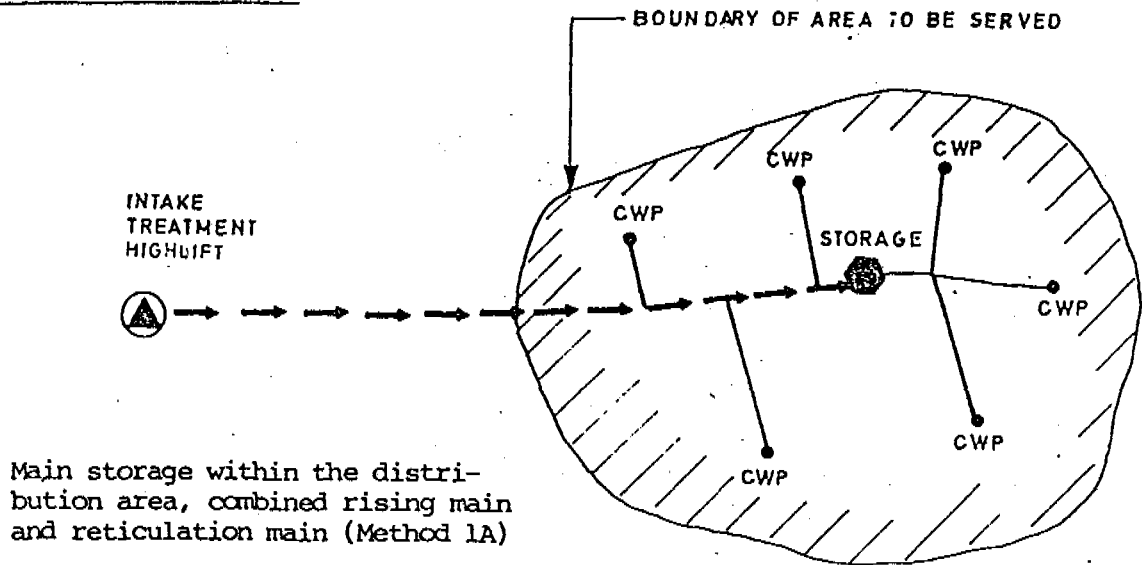
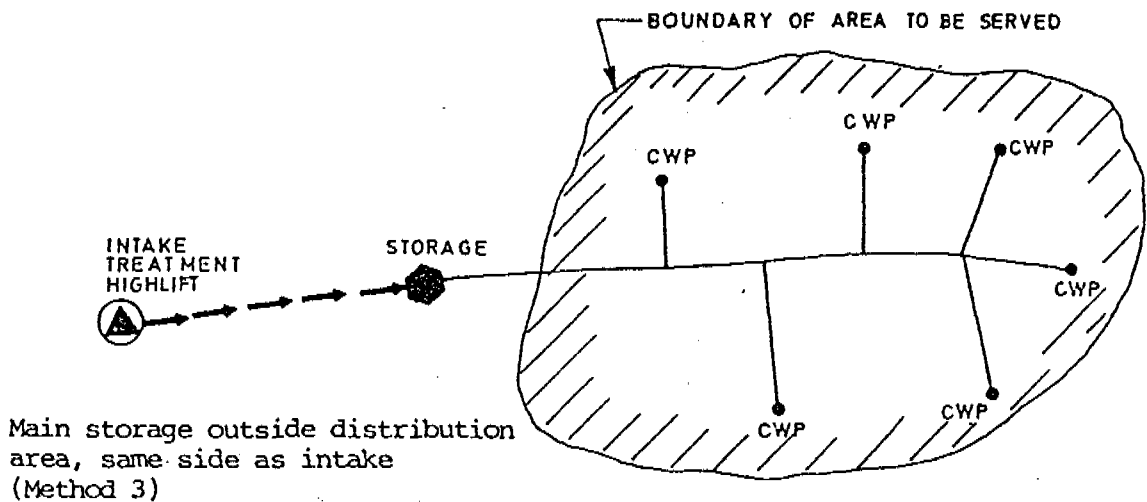
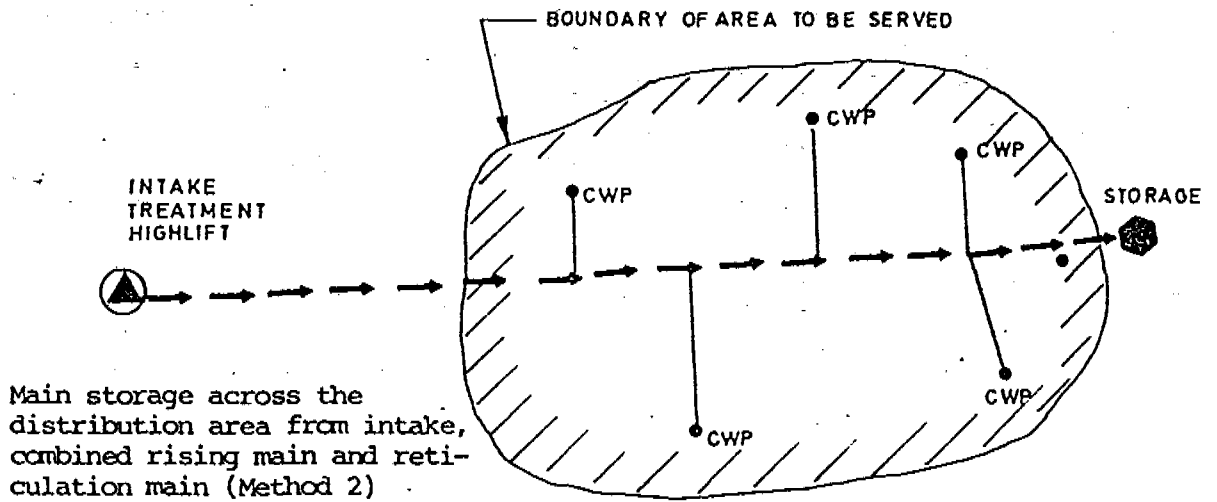


Fig. 5 Some typical layouts for piped water schemes in Zimbabwe (Source: NMWP)



The survey showed the following distribution:

- Method 1A - 8 nos.
- Method 1B - 10 nos.
- Method 2 - 3 nos.
- Method 3 - 4 nos.

Figure 6
Layout showing
standby borehole

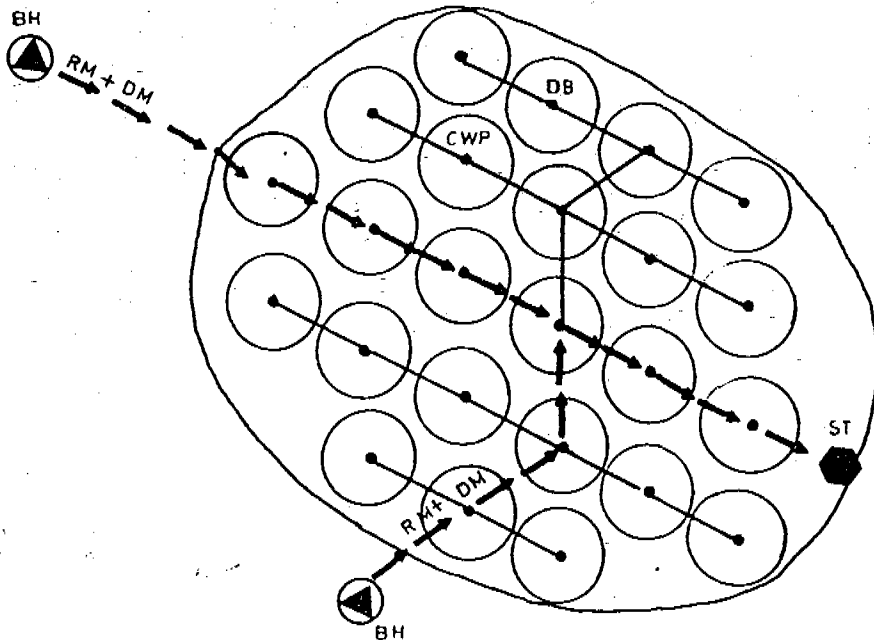
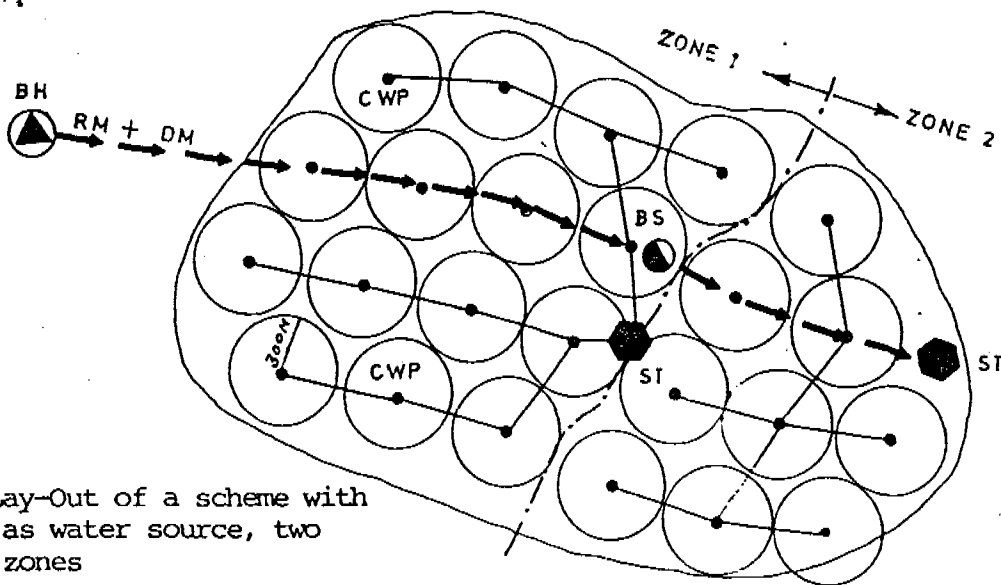
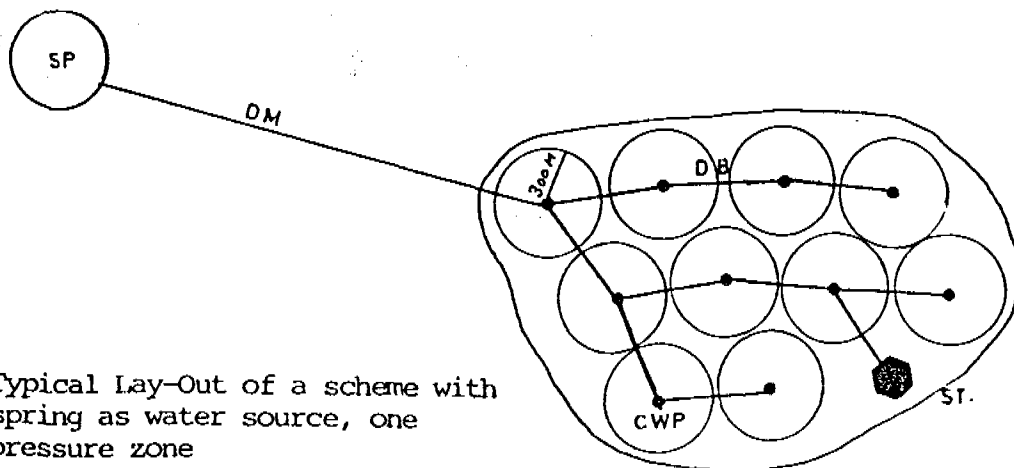


Figure 7 NMWP recommended layouts

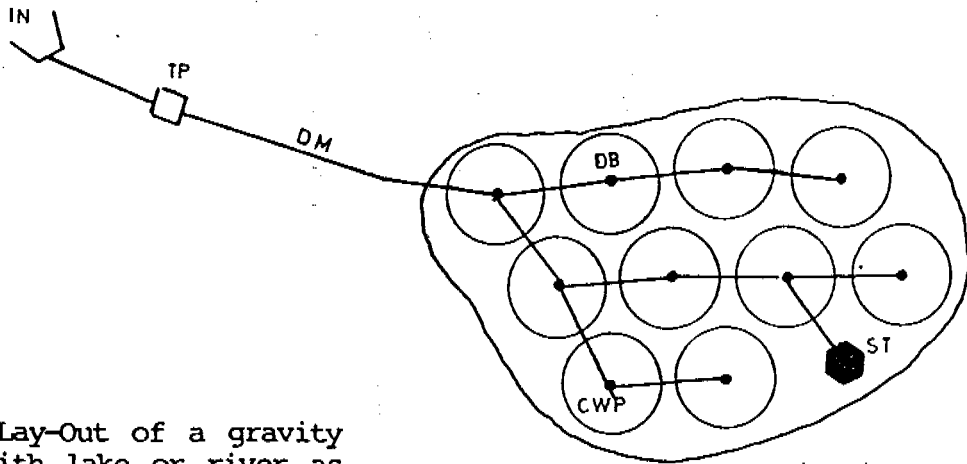


Typical Lay-Out of a scheme with
borehole as water source, two
pressure zones



Typical Lay-Out of a scheme with
spring as water source, one
pressure zone

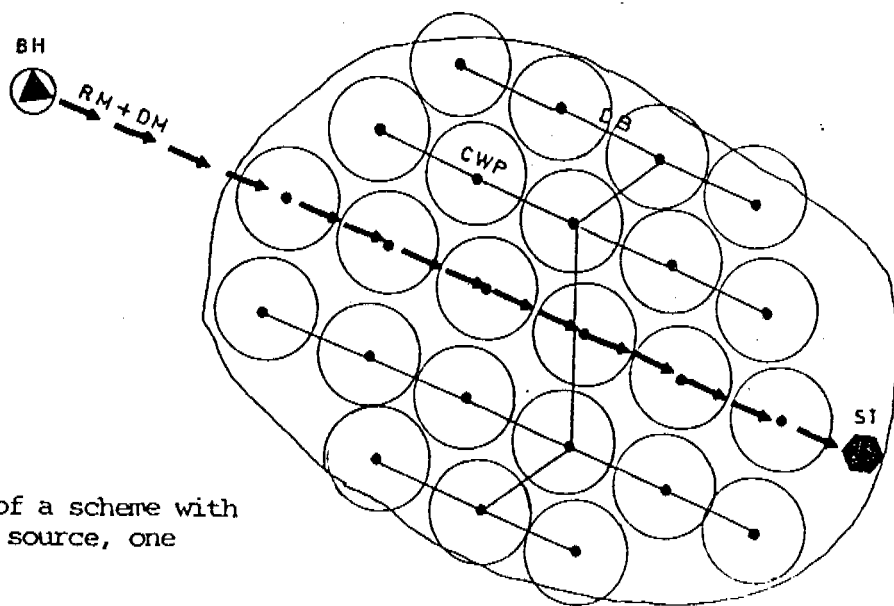
Fig. 8 NMWP recommended layouts



Typical Lay-Out of a gravity scheme with lake or river as water source, one pressure zone.

Note that:

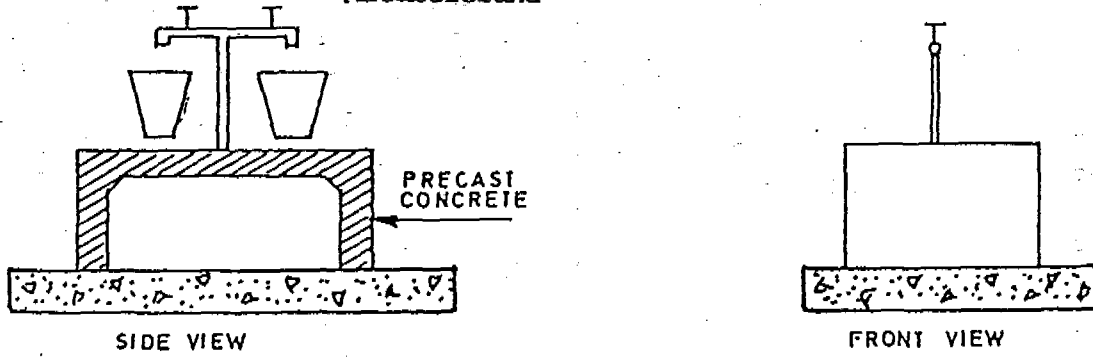
- BH - borehole
- CWP - communal water point
- ST - storage tank
- BS - booster station
- RM - rising main
- DM - distribution main
- DB - distribution branch
- SP - spring
- TP - treatment plant
- IN - intake in river or



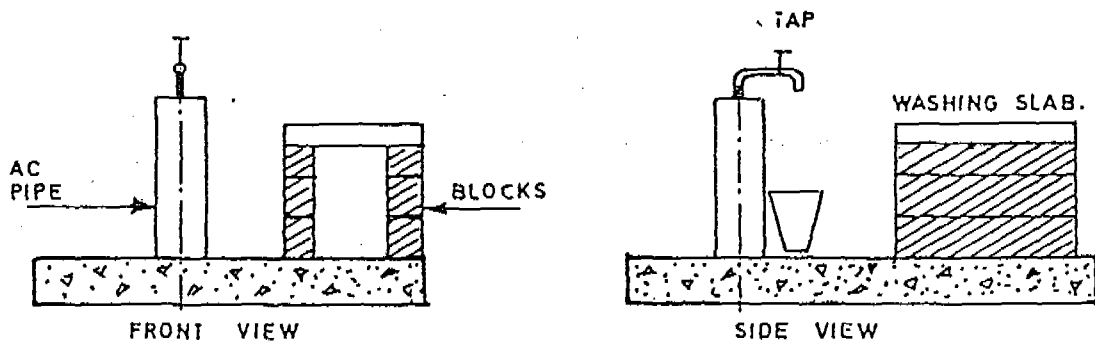
Typical Lay-Out of a scheme with borehole as water source, one pressure zone

Fig. 9 Typical communal water points in Zimbabwe

Typical CWP - Midlands and Matabeleland



Typical CWP - Mashonaland



Typical CWP - Masvingo and Manicaland

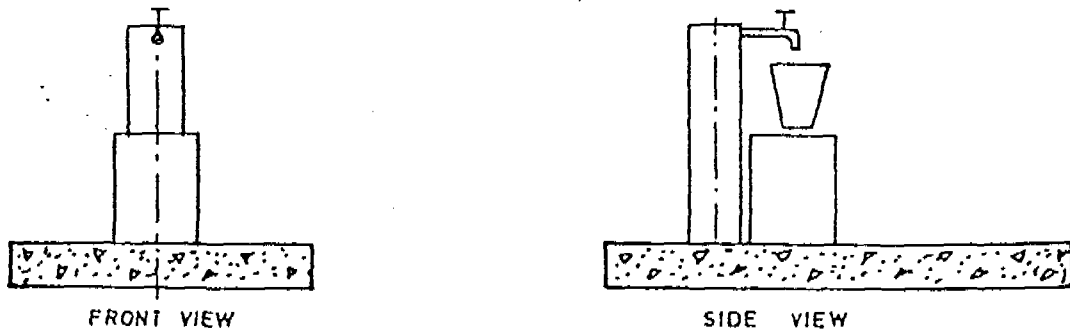
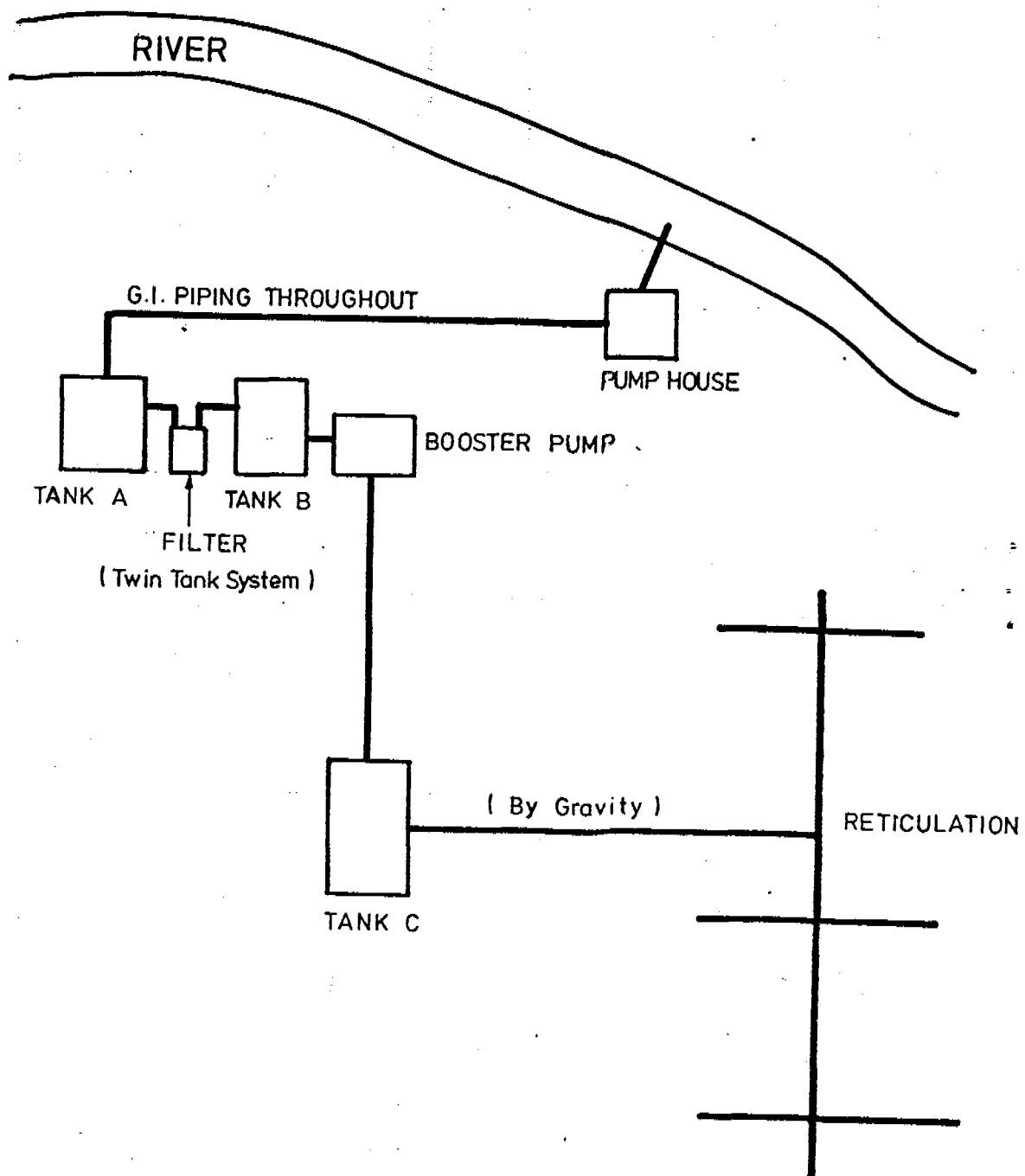


Fig. 10 Layout of Shumba piped water supply



SECTION EIGHT : FIELD TRIPS

The authors made 11 separate field trips to 8 piped water schemes. Three commercial farms were visited. Two had piped water in their workers' compounds, and the third farmer was drawing up plans to build a housing complex with piped water. The rest were government or mission operated schemes.

A questionnaire was drawn up, (see Appendix 4) to aid in-depth discussions with users and officials. However, after a few visits to the field it became easier to elicit the same information in a more informal manner. The data yielded by the questionnaires had no statistical relevance since the sample was very small, and they were not used further.

The field visits are described in chronological order.

8.1 Shumba Piped Water Supply

Visited ; 13th January 1987.

Location : Shumba Ward, Goromonzi District, Mashonaland East Province.

NMWP Computer Code Index : not listed

Main System Operator : MEWRD

Number of people served : 500

Number of communal standpipes : 8 (Plus 1 tap in MOH Clinic)

Source : Nyaure River

Filtration : Twin Tank with rapid sand filtration

Storage : Galvanised steel tank, GI, 7 000 litres.

The Shumba piped water supply was built in 1982 by MEWRD as part of its Rural Village Water Supply Programme. It was not built at a service centre, and Shumba was not designated as a service centre when that policy was introduced. It is operated and paid for by MEWRD out of its Water Supply Trading Account. There is no system of cost recovery from users and the District Council plays no part in the operation and maintenance.

Operation and Maintenance

The MEWRD employs a part-time pump attendant, Mr Timothy Mugabe to operate and maintain the water supply. He is assisted by a Water Committee, of which he is the Secretary, and which is a sub-committee of the VIDCO.

Mr Mugabe's duties include:-

- Turning the two source pumps on and off (electric motors)
- Pumping water from source to Tank A (see Fig. 11), 7 000 litre capacity. When tank is three-quarters full, he adds 1 kg aluminium sulphate and siphons water through a sand filter (steel tank) to Tank B. After 4 hours he adds chlorine to Tank B.
- Switches booster pump on when there is sufficient pressure at inlet pipe. Pumps water to Tank C on hill, 500 metres distant.
- Water reticulates by gravity to 8 communal standpipes and 1 tap at clinic, about 1 km distant.

Mr. Mugabe reports any mechanical breakdowns to MEWRD. All maintenance and repair jobs are done by the Provincial Water Engineer's office, Mashonaland. A repair team is sent from Harare, some 40 km away.

Mr Mugabe does not look after the standpipes other than to replace washers on taps. Neither the Water Committee nor the users follow any preventive maintenance routines such as keeping the standpipes clean or ensuring that there is proper drainage.

Community Participation

Mr Philemon Shumba, the councillor of the ward, told us that when the scheme was built there was no consultation with the community. They were surprised to see work commencing on the scheme in 1982. They wanted water for irrigation rather than drinking, since many people grow vegetables in Shumba Ward for sale in Harare. Asked if people were prepared to pay for the water he replied with a categorical 'No'. However he said, they would be prepared to pay for untreated irrigation water.

The background to this situation is that in 1977/8, a private charitable organisation, the Whitsun Foundation, began a project with the community to build an irrigation supply. The community seemed to have participated fully, and dug all the trenches for a water supply system consisting of a pump, a reservoir and reticulation, for irrigation purposes. The project was then abandoned, owing to the war situation.

In 1982 MEWRD decided to build a drinking water supply, and used all the trenches previously dug by the community. The community would have preferred irrigation water, but were nonetheless pleased with the good drinking water. However, they were not prepared to pay for it, he said. During the dry months people come from distant villages to collect water in donkey carts, since it is free.

Observations

The standpipes were in generally good condition, with no standing pools of water (see photograph) and no dirt. The washing slabs were regularly used, we were told.

Nurse Gora at the clinic believed that there were fewer cases of diarrhoea, and showed us her records to prove the point.

Mr Mugabe reported that he had great difficulty relating to the user community, who were not willing to listen to his requests for co-operation. One complaint, he said, was that MEWRD officials refused to talk to the community, preferring to deal only with him.

There seemed to be about 3 breakdowns a year, which were repaired in a day or less.

The VHW, who was not available on the day we visited, appeared to have discussed water-related diseases with her community at some length. All our respondents reported that the VHW always stressed the issue of clean water and adequate sanitation. Surprisingly, no new Blair latrines were seen, only unventilated pits with a slab. Sanitation was generally of poor standard.

Overall, the scheme appeared to be very well run and maintained. However, the issue of cost recovery will become more serious with time. This is a classic example of poor planning and lack of community participation in the decision making process. Firstly, the community would have preferred an irrigation supply for which they were prepared to pay. Secondly, having been given a drinking water supply, they are not prepared to pay for it.

The authors estimate bulk usage at 10 to 15 cubic metres per day. At the NMWP recommended pricing policy of 50 cents per cubic metre, that works out to a Z\$1 825,00 - Z\$2 737,50 range of cost annually. There are 70 such MEWRD schemes outside service centres, for which MEWRD must pay O and M costs. It will be difficult to impose a fee on the users now that they are accustomed to free water.

A second visit was made by one of the authors to conduct further interviews with users. (see questionnaires).

8.2 Mr Thorne's farm, Glendale, Mashonaland Central Province.

Visited : 20th January, 1987.

Technical details : borehole source, with 2HP submersible pump, open-ended into a brick reservoir, 5 HP Braemar booster pump with 300 litres pressure tank and pressure-activated switch. 20 mm inch polyethylene piping, about 800 m, serving 2 standpipes and

1 line to farm clinic, to 2 000 litres brick reservoir at far end of reticulation.

No. of users : 40 families (200 people plus), in brick compound with small individual plots.
 Sanitation : Kit-form Blair type, but lacking the vent pipes, Poor standard.
 Maintenance : Mr Thorne had established a compound committee after independence, which was responsible for opening and closing of taps, replacement of washers, and digging drainage canals.

Mr Thorne had installed the piped supply 4 years ago, extending it his own domestic borehole supply. He estimated present replacement costs at between Z\$11 000 - 12 000.

The scheme appeared to be well maintained. Minor repairs were effected by the compound committee, but all major repairs were done by the farmer or his foreman, who was not a member of the committee.

Drainage was adequate but could be improved. There were no people drawing water when we visited the farm in mid-morning. Water was drawn early in the morning and at dusk.

We were unable to talk to any users since workers were in the fields and there were very few women present in the compound.

Mr Thorne was happy with the condition of the water supply, and was obviously concerned about the living standards of his workers. He enquired about Blair latrines, and complained that the kit-form latrines (a commercially available Blair-type latrine) he had bought had proved to be of poor quality.

Observations

We were generally impressed by the standard of the water supply, although we felt there should be more standpipes. The farmer disagreed with this, claiming that he had never seen queues at the taps.

Although Mr Thorne had a very positive attitude towards his staff, which was praiseworthy, he seemed unwilling to accept the notion of community participation, or even consultation.

He had a Farm Health Worker in the compound, part of the Bindura Farm Health Worker Programme, and he had built a small clinic with a tap. He was pleased with the work she was doing. He could not say whether it had resulted in better health and hygiene standards, but believed it was a step in the right direction.



The intake of the Makumbi Mission Piped Water Supply.

8.3 Mr Arkell's farm, Glendale, Mashonaland Central Province

Visited : 21st January, 1987

Mr Arkell is Mr Thorne's neighbour. His piped supply is very similar to Mr Thorne's, differing only in the use of 50 mm PVC piping and GI reservoir. He had 4 standpipes serving 43 families.

Sanitation : Open pit with slabs, unventilated, no superstructure apart from a wood and grass wall. 1 pit per family.

Mr Arkell's compound was very neatly laid out, and he was building 5 brick houses of high standard, with 2 bedrooms, for his senior staff.

He told us that he relied heavily on his Workers' Committee, who maintained the taps and ensured that drainage pits were dug and kept clean. He organised any major repairs.

He also had a Farm Health Worker, and generally had a very positive attitude to upgrading the living conditions of his workers.

8.4 Makumbi Mission School

Visited : 16th February, 1987.

Location : Chinamora Rural Service Centre, Goromonzi District, Mashonaland East Province.

NMWP Computer Code Index: 2.01.02. 1.305 (MEWRD)
Main System operators: Catholic Mission and MEWRD

There are two separate water supplies, side by side, one built, operated and maintained by MEWRD, and the other by the Mission. Both were constructed in 1965.

(i) Makumbi Mission Scheme

Source : weir on Nyarurangwe River. This is a perennial river, with serious siltation problems. Water is badly discoloured during rainy season.

Technical details: 2 pumps with electric motors, 25 gals/minute. 3km rising main, 3 inch GI, not buried because of rocky conditions. Large concrete sedimentation tank, aluminium sulphate added by hand, rapid sand filter with second tank and drip-feed chlorinator. Booster pump to 2 000 gal. header tank, then to reticulation. All in-house connections.

No. of people served: 660 secondary school pupils, 25 teachers
plus their families, about 900 people

Operation and maintenance

The entire scheme is very carefully maintained by the Mission's estate manager, Brother Andrew. All costs are met by the Mission, and capital renewal is also undertaken by them. The main pumps were renewed in 1985 at a cost of US\$7 000.00, which was donated to the Mission.

Serious breakdowns occur on average once a year, according to Brother Andrew, and leaks on the main pipeline occur regularly, since it is badly corroded. It is 3 km long and will shortly need replacing.

The filtration and treatment plant worked very well, according to Brother Andrew.

Sanitation was all water borne, with a sewage treatment plant on the premises.

Brother Andrew said that the Mission had no plans to relinquish control to the District Council, and was in fact planning to expand it. A borehole had been sited, and this was to be the source for drinking water in future. The river source would be used for untreated irrigation water.

(ii) MEWRD Scheme

The computer code index refers to this scheme, which is alongside the Mission Scheme, drawing its water 50 m upstream.

Technical details: 1 pump (electric motor), 14 cu. m. per hour plus a small standby pump. Water pumped 3 km to GI, settlement tank, treated with Alum, to sand filter by gravity, to a second tank (sump), where chlorine is added by hand, then to storage reservoir by gravity, then to reticulation by gravity. All in-house connections.

No. of people served: 189 bed hospital comprising a TB referral hospital and Goromonzi District Hospital.

System operator: MEWRD, with 2 maintenance personnel,
Mr Lameck Kamuka and Mr K Muterere.

The scheme was built in 1965 for MOH, who pays monthly water accounts to MEWRD Working Account. Average bills seem to range from Z\$360 - Z\$400, according to the Matron, Mrs Bganya, who showed us the hospital accounts.

The average usage is 55 cu. m per day, rising as high as 70 cu. m. There is one metre on the main storage tank.

The maintenance personnel were obviously well trained and understood water-related diseases and their transmission. All serious breakdowns (1 or 2 per year) were handled by the MEWRD, from the PWE office in Harare.

The scheme had no standpipes and was generally of a very high standard.

8.5 Sanyati Piped Water Scheme

Visited : 17th February, 1987.

Location : Sanyati Growth Point, Mashonaland West Province.

NMWP Computer Code Index. Sanyati: 3.05 01 1. 200

Wozhele: 3.05.01.1.100

Maganyani: not listed

Main system operator : All three schemes operated by Central Rates Fund.

Although this scheme is called the Sanyati Piped Water Supply, it consists of 3 linked schemes called Sanyati, Wozhele and Maganyani. Sanyati is one of 8 growth points in Zimbabwe, based on an irrigation scheme growing cotton. Sanyati is both a growth point and a District Service Centre, housing the Sanyati District Council and Administration.

The scheme was built by MEWRD before independence and then expanded at various times. It began as a large irrigation scheme and drinking water supply, and today serves perhaps 8 000 people. Its source is the Munyati River, which is perennial:

(i) Sanyati

The Sanyati Piped Water Supply is designed to service the growth point. It has at present 132 metered outlets to homes, shops and offices, plus 2 further mains, one to Maganyani and another to Wozhele/Sanyati Mission. According to Mr George Kabvure, an Assistant Executive Officer in the Central Rates Fund Department of MLGRUD, who lives in Sanyati, there are over 100 applications for new house connections. All users are individually metered and invoiced by CRF. There are meters on both mains to Maganyani and Wozhele.

Operations and maintenance

The Sanyati Water Supply is operated by the District Council, through its Central Rates Fund. It is essentially a municipal

supply, and all connections are in-house. Maintenance is done by the CRF, although major repairs are done by a MEWRD contractor, based in Kadoma town, 130 km away. It is expected that the scheme will continue to grow, and according to Mr Kabvure, the source is able to cope with the expansion.

Technical Details

The scheme was designed and built by MEWRD. Water is pumped from the river to a twin-tank treatment plant with rapid sand filter and automatic chemical feed. There are 2 storage reservoirs, estimated to be 30 000 gallon capacity each but the authors could not confirm this.

(ii) Wozhele Piped Supply

Wozhele is a District Service Centre some 5 km from Sanyati. A water main from Sanyati water supply runs past Wozhele to Sanyati Mission, a further 5 km away. There is a meter on both the Wozhele and the mission branch lines. The mission is invoiced monthly by CRF and provides water for a primary school and a mission hospital. All connections are in-house.

Wozhele is a small township, and its water supply consists of 2 metered, in-house connections (2 shops), and a public standpipe, now closed off by MEWRD. The in-house connections are invoiced monthly by CRF, and the balance of water used via the public standpipe was paid by MEWRD Working Account. Because people came from miles around to collect free water, MEWRD decided to close it, costs being too high.

(iii) Maganyani Piped Water Supply

This was the interesting component of the Sanyati scheme. It was built, with community participation, at the instigation of the District Council. Maganyani is a consolidated rural village 11 km distant from Sanyati Service Centre. There are no groundwater sources in the area, and people have relied upon the Munyati River and other, seasonal rivers, for water.

MEWRD financed the construction of the supply out of its Rural Village Water Supply Programme. Theoretically, this is a borehole programme, but piped water is normally provided in the absence of groundwater sources, and paid for by that programme account. CRF bills MEWRD monthly for water used by Manganyani, some 4 - 5 000 people.

The recipient community dug the trenches and helped with the siting of the 8 standpipes. Most of the organisation seemed to have been the work of the councillor who motivated the community to assist with the construction. A Water Committee has been

formed, but unfortunately, the authors were unable to meet any of its members.

Operation and maintenance

MEWRD is in theory meant to maintain the main pipeline and standpipes. In practice, however, CRF maintenance personnel do most of the maintenance and repair work. Mr Kabvure told us that because the water was treated, the CRF was anxious to avoid wastage, and therefore took pains to ensure rapid repair of breakdowns.

Observations

As far as could be determined, there was no community participation in the maintenance of the water supply. It was also clear that there is a serious water shortage around Maganyani since people collect water from the standpipes using donkey carts. The scheme will need to be expanded to meet the increasing demand.

Maganyani could be a suitable village for a demonstration project which reflects grass-roots community participation and a progressive development of service levels. The positive features of village-level maintenance, such as lowering the operation and maintenance costs currently incurred by MEWRD, could be demonstrated.

A second field trip was made to Sanyati in order to spend time in Maganyani and to take photographs.

8.6 Muzarabani Piped Water Supply

Visited: 23rd February, 1987.

Location: Muzarabani District Service Centre, Mashonaland Central Province.

NMWP Computer Code Index: 1.05.01.1.160.

Main System Operator: MEWRD.

Muzarabani is in the Zambezi Valley, below the escarpment, and is the site of a medium sized irrigated cotton scheme. It is a district service centre, but not a growth point. There is a MEWRD-operated scheme in the Service Centre, and two more, smaller piped water supplies run by the District Council (not the Central Rates Fund).

(i) Muzarabani Piped Water Supply

The Muzarabani piped water scheme draws its water from a borehole 2 km away from the service centre. Water is pumped to a large concrete reservoir (est. 20 000 gallons) and then feeds by gravity to the reticulation network, which is entirely in-house

connected. There appeared to be no filtration plant or chemical treatment of the water, but we were unable to confirm this. Despite the efforts of the authors and the District Council Projects Officer, Mr. Karambakuwa, we were unable to locate the MEWRD maintenance man.

We therefore felt that, because the scheme was built, operated and maintained by MEWRD, and had no standpipes, we should concentrate on the other two schemes. We were able to determine that all in-house connections were individually metered and paid for by the consumers, but the District Council officials we spoke to could tell us nothing more.

(ii) Muringazuva School Piped Water Supply

This water supply was built during the war as a protected village water supply, and converted to a council-operated community water scheme after independence.

Technical Details

Source: Sowe River on the escarpment. Small weir built some 5 km away, 50 metres elevation. 3 inch G.I. for main line.

Storage: 3 concrete reservoirs and one 2000 litre G.I. tank on steel frame, 5 m head. All fed by gravity, sited between the source and the reticulation. 20 mm PVC piping for reticulation.

Treatment: None.

No. of people served: 200 school children, 5 staff houses, all by in-house connections. There are also 4 communal standpipes used by people living in or around the service centre, estimated by Council Projects Officer at 3 - 4000. We felt this was much too high, putting it at 1000.

Maintenance: DDF (no community maintenance).

Sanitation: 12 Blair VIP's at the school. In good condition.

The supply appeared to be in good working order, and the communal standpipe that we saw was clean, though surrounded by tall grass. There was no water committee, and the users appeared to be urban dwellers. All repairs are done by DDF, which has its workshop 500 m from the school. According to the Projects Officer, the scheme always worked well, and repairs were carried out quickly. The source is perennial, being one of the many streams rising on

the escarpment and draining into the Zambezi 50 km away. The water was clear and tasted good.

There were no plans to expand the scheme or to put in more standpipes, since the demand for water was adequately met, according to the Projects Officer.

(iii) Machaya Piped Water Supply

Technical Details

Source: Utete River on the escarpment. A small weir sited some 5 km from the service centre, 50 m elevation. Six inch perforated G.I. pipe for intake, 3 inch G.I. pipe for main line.

Storage: 4 x 2000 litre G.I. tanks sited at intervals along main supply line which terminates at Health Centre, with No. 4 tank on premises.

Reticulation: 11 kms of 3-inch G.I. piping running along the line of road. Half-inch G.I. piping from tanks to 23 communal standpipes sited at consolidated villages. 1 tap at RHC.

Maintenance: DDF and some community maintenance.

Treatment: None.

No. of people served: 1000.

This water supply was built in 1984/85 to serve the many village settlements at the foot of the escarpment. The District Council initiated the development work and raised funds from the Norwegian Government for its construction. The DA told us the scheme cost Z\$ 86 000, and there were plans to extend the main pipeline a further 10 kms down the road, to serve the villages lying further away from the service centre. At present, the scheme ends at the Health Centre, some 16 kms from the service centre.

The supply did not appear to be very well maintained by the community. The two standpipes we saw (see photograph) had large standing pools of water, and cattle were drinking from around one standpipe.

Because of the settlement pattern there are 23 standpipes serving about 1000 people who live in small villages along the road. This is possibly a reason why community maintenance is poorly organised. There would be 23 caretakers needed, who would be answerable to more than 1 VIDCO. Some standpipes were well maintained, we were told, but the majority were not, and the community input was limited to informing DDF of a breakdown.

These occurred about once a month, and were all taken care of by DDF.

Observations

This District Council-operated scheme will continue to expand, and could benefit from a community input. Village-level maintenance is poor but with participatory planning methods could easily be improved. This is a potential site for a demonstration scheme in any potential IRC-supported project. By working through the Council and the DDC, it is possible to develop a district-level plan that has been scrutinised and approved by the ward and village level.

8.7 Mount St. Mary's Mission, Wedza

Visited: 28th February, 1987.

Location: Wedza District Service Centre, Mashonaland East.

NMWP Code Index: 2.08.01.1.100.

Main system operator: Mission.

No. of people served: Mission, hospital, 2 schools - about 2000.
2 standpipes in school fields, all other connections in-house, with individual metres - users invoiced monthly by Mission.

Source: 1 borehole and 1 river source.

Treatment: Slow sand filter for river source.
None for borehole source.

Storage: Concrete tank for river source, then gravity-fed to filter, reticulation tank for borehole source, then gravity fed to reticulation.

Maintenance: Mission estate manager.

This scheme was built in 1966 by the Mission. The original scheme used a river source and a sand filter next to the storage tank. In 1982/83, MEWRD drilled a borehole, which now supplies the drinking water, untreated but apparently of good quality. The river water is still pumped, but used only for irrigation of the school and mission gardens.

The Mission operates and maintains the scheme, as well as issuing water bills to consumers.

Observations

The scheme functioned well, and was obviously well maintained by the Mission. Since it was built to serve the hospital, mission and schools, which are now established institutions, the scheme is unlikely to undergo any major expansions.

Storage tank with tap on a commercial farm. This communal water point could benefit from user-maintenance



Schoolgirls in the vegetable garden at Epworth Primary School. They are using piped water for their agriculture project.



8.8 Mr. Gericke's farm, Marondera

Mr. Gericke did not have a piped water supply but was planning to build one. When the author met him, he was building the first house in a new workers' compound. He planned to pump water from the nearby river and reticulate by gravity to a series of shared yard connections. However, his initial step, he said, was to dig several wells, on account of the high costs of a piped supply.

Mr. Gericke said that he planned to build a large compound, with community facilities, and to service it with a piped water supply for the 50-odd families that would live there. This would take him about 5 years, he thought. All construction work would be planned and carried out by himself, his farm manager and his staff.

He pointed out that he would receive no assistance from the Rural Council, or the government, and that he would not charge anything for the water. In his view this was the only way to do it. He had a Workers' Committee, which he said was functioning well, and which relieved his manager of certain managerial functions. He believed workers could participate in the planning, as well as the building of a piped water supply.

There is no Farm Health Worker Scheme in the Marondera area, but Mr. Gericke knew about the Bindura FHW Project and expressed an interest in promoting such a project in Marondera.

8.9 Epworth Primary School

Visited: 27th March, 1987.

The authors could find no peri-urban piped water schemes to visit. Finally, we visited Epworth Primary School in Harare South, which had a piped supply led from a municipal branch line several kilometres away. The supply served the school's bathrooms and there was one tap in the school vegetable garden (see photograph). The school paid monthly water bills to the City of Harare.

Epworth has now been incorporated into the Harare Municipality, and any future piped supplies will be built by an engineering contractor, to municipal standards, i.e. in-house connections and individual metering.

The Matthew Rusike Childrens' Home, 2 km from Epworth School, had a piped supply drawn from the same branch line. The pipe had been laid over 15 years ago and was maintained by the municipality.

Appendix 1. Notes

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|----|--------------------------------------|------|
| 1. | National Master Water Plan. Vol. 4.2 | p.8 |
| 2. | Vol. 4.2 | p.5 |
| 3. | Vol. 3.3 | p.21 |
| 4. | Vol. 4.2 | p.52 |

Appendix 2. Terms of Reference

1. The study will comprise carrying out a preliminary investigation into piped supplies for small communities in Zimbabwe.
2. The method of approach will include discussions with key informants, an outline review of literature, selected Field visits, and incorporation of comments on output.
3. The study will include the following aspects:
 - History: Review of past experiences with piped supplies in Zimbabwe.
 - current problems: Identification of key issues which a future demonstration project might address.
 - likely future: Assessment of potential need and appropriate uses for small piped supplies in Zimbabwe.
4. The study will cover piped supplies for rural growth centres, commercial farms and low-cost urban housing developments. Emphasis will be given to those schemes where there is or would have been potential for community inputs to (and joint responsibility for) planning, implementation, operation and financing.
5. The study will be carried out in full liaison and consultation with nationals involved in planning the proposed IRC-supported PSSC project in Zimbabwe (to be separately advised).

Appendix 3. List of Informants

Dr. P. Morgan	BRL
P. Cross	Water and Sanitation Advisor, MOH
J. Holland	MEWRD (Mechanical Engineer)
Mr. Mukwaira	DA, Goromonzi
T. Mugabe	MEWRD Pump Attendant, Secretary of Water Committee, Shumba Piped Water Supply Councillor, Shumba Ward, Goromonzi
P. Shumba	Goromonzi District Council official
Mr. Mubako	Community Nurse, Nyaure Clinic, Shumba
Nurse Gora	Department of Physical Planning (Mashonaland) MLGRUD
J. Jogi	Glendale farmer
C. Thorne	Glendale farmer
R. Arkell	Interconsult Zimbabwe
F. Kvaerneng	Water Supplies Engineer, PWE Office Mashonaland
D. Mazvidza	Water Pollution Control Officer, MEWRD HO
Ms. E. Khaka	Deputy Secretary, MEWRD
K. Landing	Under Secretary, MCDWA
Mr. Tichagwa	Permanent Secretary, MCDWA
Ms. T. Bare	Headmaster, Makumbi Mission School
Mr. Pasipanodya	Estate Manager, Makumbi Mission
Brother Andrew	Matron, Makumbi Hospital
Sr. Bganya	Headmaster, Sanyati Baptist School
Mr. Maya	Assistant Executive Officer, Central Rates Fund Department, Kadoma
G. Kabvure	Building Operative, Central Rates Fund, Kadoma
E. Baye	Planning Officer, Dept. of Physical Planning
Ms. C. Butcher	Regional Planning Officer, DOPP
S. Chimuti	Executive Officer, Muzarabani District Council
A. Chipadza	DDF Field Officer, Muzarabani
S. Banda	Muzarabani D.C. Projects Officer
K. Karambakuwa	Farm Manager, Marondera
H. Barnes	Farmer, Marondera
M. Gericke	Headmaster, Wedza Secondary School
Mr. Tome	Headmaster, Wedza Primary School
Mr. Makwinda	Boarding Master, Wedza Secondary School
Mr. Nyahuye	Chief Executive Officer, Finance, MLGRUD
P.P. Tshuma	Senior Executive Officer, Accounts, MEWRD
L. Kuvirimirwa	Senior Executive Officer, Central Payments Office
Mrs. Homwe	Senior Programmer, Computer Bureau, MFEPD
Ms. A. Mhene	Headmaster, Epworth Primary School
T. Dube	Teacher, Matthew Rusike Childrens Home
M. Tazvivinga	Users of piped water schemes were also interviewed. The questionnaires used are annexed to this report.

Appendix 4. Piped Water SuppliesQuestionnaire for Research Study

by BLAIR RESEARCH LABORATORY,
 Ministry of Health,
 P.O. Box 8204,
 CAUSEWAY,
 Harare,
 Zimbabwe.

DISTRICT:PROVINCE:INFORMANT:NAME OF SCHEME:TYPE OF SOURCE:BRIEF DESCRIPTION OF SYSTEM:SYSTEM OPERATOR:

1. Who installed the scheme? When?
2. Did the community participate at all in the planning and installation of the scheme?
3. Do you have a water committee?
4. How many people are served by the scheme?
5. How far from the water outlet are you?
6. How many water outlets are there?
7. Is there enough water?

8. Do breakdowns occur?
9. Who repairs it?
10. Do you pay for water?
11. Does the water taste good?
12. Do you have a latrine? What kind?
13. Have you been visited by a health worker?
Did the health worker talk about water supply?
What did you learn from the health worker?

OBSERVATIONS BY RESEARCHERS

General observations and comments on drainage, water wastage, type of tap, etc...

This study is supported by the International Reference Centre for Community Water and Sanitation, P.O. Box 93190, 2509 AD, The Hague, Netherlands.

Appendix 5. List of Schemes Visited

1. Shumba Piped Water Supply, Goromonzi District
2. Mr. Thorne's farm, Glendale.
3. Mr. Arkell's farm, Glendale.
4. Makumbi Mission, Goromonzi.
5. Sanyati Piped Water Supply, Sanyati District.
6. Muzarabani Piped Water Supply, Muzarabani District.
7. Mount St. Mary's Mission, Wedza District.
8. Mr. Gericke's farm, Marondera.
9. Epworth Primary School.

Appendix 6. List of Source Materials Used.

1. National Master Water Plan, Volumes: 1, 3, 3.1, 3.4, 4.1, 4.2, 5, 6, 8, 8.1.
2. Policy document from MEWRD: "Functions, Objectives and Policy", May 1984.
3. K. Wekwete. "Growth Centre Policy in Zimbabwe: a focus on District Centres", Univ. of Zimbabwe, Department of Rural and Urban Planning, occasional paper, January 1987.
4. Transitional National Development Plan 1982/3 - 1984/5, Volumes 1 and 2.