REPUBLIC OF ZIMBABWE

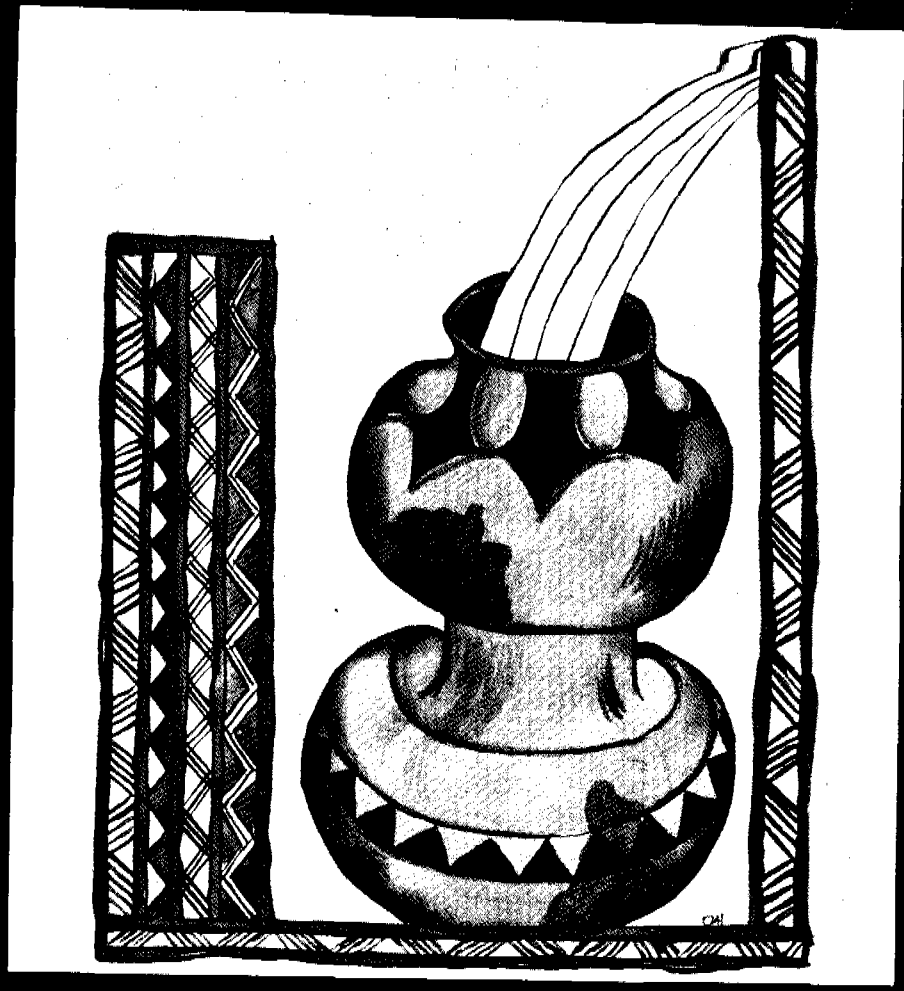
Ministry of Energy and Water Resources and Development

National Master Plan for Rural Water Supply and Sanitation

7849

Volume 1

Executive Summary



INTERCONSULT AS

CONSULTING ENGINEERS - ZIMBABWE - NORWAY

NORAD
Norwegian Agency for International Development

Executive Summary

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ERRATA

On pp. III and 29, there are errors in the numbering and description of Figures 4.1 and 4.2.

The correct numbering is as follows:
Figure 4.1 should be numbered 4.2 and vice versa

The correct description of renumbered Figure 4.1 is:
Annual Costs of the Recommended Rural Water Supply Programme (1985 Prices)

The correct description of renumbered Figure 4.2 is:
Annual Costs of the Recommended Rural Water Supply Programme (Future Prices)

On p. VIII, Section S.7, line 4, and p.38, Section 6.1, line 17, the figure of Z$836 million should read: Z$906 million.

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PREFACE

The International Drinking Water Supply and Sanitation Decade was inaugurated by a resolution of the General Assembly of the United Nations Organization on 10 November 1980. The Decade was launched in Zimbabwe on 10 November 1982 with the adoption of national goals and methods proposed for their fulfillment.

Interconsult A/S has been engaged by the Ministry of Energy and Water Resources and Development to prepare a National Master Plan for Rural Water Supply and Sanitation in accordance with Decade objectives. The contract for the study was signed in July 1983 and later elaborated on in the Inception Report of November 1983. The draft reports were submitted in the period February to May 1985, and a thorough evaluation of the reports by all concerned Ministries took place from February through to August 1985. An inter-ministerial Review Panel collated individual agency comments and reviewed the entire draft at sucessive meetings from June to September 1985. The final reports were completed in 1986.

The Master Plan primarily covers the communal and the resettlement areas of the country. The overall objective of the Master Plan is to provide the Government of Zimbabwe with recommendations for the immediate and longer-term development of domestic rural water supply and sanitation throughout these rural areas, including provision at service centres and growth points. Several volumes provide information for national planning of sector resources. The recommendations also cover water for livestock and village gardens.

During the liberation war, numerous rural water supply installations and other service facilities were extensively damaged. Since Independence, Zimbabwe has been through a period of intensive reconstruction and rehabilitation of these facilities and resettlement of the population displaced by the war. The Government now faces the formidable task of developing rural water supply and sanitation facilities in formerly neglected areas of the country.

This challenge is probably beyond Zimbabwe's internal financial resources. The international community is expected to assist in future development by continuing to provide considerable financial support as well as technical assistance to support Government initiatives.

Interconsult A/C sincerely hopes that this National Master Plan for Rural Water Supply and Sanitation will be a useful tool for the Government of Zimbabwe in its struggle to provide basic services to all Zimbabweans.

ACKNOWLEDGEMENTS

The development of a Master Plan in a sector as diverse and fundamental as water supply necessarily requires the collaboration of a great many persons and institutions. Zimbabwe is happily endowed with a talented array of concerned Government officers in the wide range of disciplines needed in the sector.

The Consultants acknowledge their appreciation and gratitude for the assistance provided by Government officers, diplomats, academics, politicians, concerned individuals, specialists and members of the rural community too numerous to mention by name, who have worked with us to produce the National Master Plan for Rural Water Supply and Sanitation for Zimbabwe.

Summary

S.1

OBJECTIVES

The National Master Plan for Rural Water Supply and Sanitation proposes a cost-efficient plan of investment in rural water and sanitation facilities, with the goal of providing the entire communal and resettlement area population with access to safe and adequate facilities by the year 2005.

The purpose of this Plan, commonly referred to as the 'Master Plan', is to lay the foundations for long-term development of rural domestic water supply and sanitation facilities in previously neglected communal and resettlement areas of the country.

The recommendations of the Master Plan seek to:

(i) Provide a framework within which specific programme plans can be developed

(ii) Optimize use of available resources

(iii) Establish appropriate institutional structures and financial and manpower plans for programme implementation, and

(iv) Define a policy framework to achieve enhanced health, social and economic benefits from sectoral investment.

S.2

DIVISION OF INSTITUTIONAL RESPONSIBILITIES

An immediate problem is the establishment of a rational division of responsibilities for the sector to avoid duplication and to make the best use of Zimbabwe's limited resources. A spirit of co-operation needs to be established between sector agencies so that co-ordination mechanisms can work effectively. The recommendations with regard to strengthening existing institutions are as follows:

(i) The Ministry of Local Government, Rural and Urban Development takes on the pivotal role of sector co-ordinator through a National Co-ordination Unit, and is responsible for the development of integrated regional plans.

(ii) The Ministry of Energy and Water Resources and Development will retain its position as primarily a technical and professional engineering agency, responsible for overall technical design and technical advice in the exploitation of water resources. The Ministry will be responsible for implementation of piped water schemes and siting and drilling of water points. Its future role in operating supplies and implementing community-based programmes will remain limited, but it would develop a Master Plan Office to administer the updating of the Master Plan.

(iii) The District Development Fund, through a strengthened Water Division, will retain major responsibility for primary water supply development and maintenance of rural water supplies.

(iv) The Ministry of Health will remain the lead agency for health education and rural sanitation and will continue to play a major role in the implementation of hand-dug wells and other smaller sector rural water supply programmes.

(v) The Ministry of Community Development and Women's Affairs will have the responsibility for community mobilization and training.

(iv) The National Action Committee will be restructured under the chairmanship of the Ministry of Local Government, Rural and Urban Development, and will provide the forum for inter-agency co-operation and co-ordination.

S.3

PLANNING TOOLS

Master Plan studies review existing resources and their future availability in Zimbabwe, make policy recommendations, where appropriate, for their future provision and define the parameters within which detailed water and sanitation plans will be developed. Resources reviewed include:

(i) Water resources, including hydrology, hydrogeology and water quality

(ii) Existing levels of rural water supply and sanitation provision

(iii) Rural water and sanitation technologies

(iv) Human resources, including social and cultural aspects, population, manpower development and educational needs

(v) Health risks

(vi) Environmental concerns, including soil and water conservation and livestock watering

(vii) Existing rural water and sanitation programmes, and

(viii) Institutional and financial resources.

In addition to providing a review of resources the plan develops key planning tools for use in developing more detailed plans. A 'Rural Water Supply Programme Computer Package' will be developed and submitted by the Consultants with the Master Plan. The computer programme contains an inventory of existing supplies which can be updated. This data base allows planning

variables to be altered for forecasting and plan projections.

A variety of other planning tools has also been developed, including national hydrogeological maps, techniques for dam siltation measurement, standard engineering design criteria, a design manual and social study feasibility techniques.

S.4

POLICY ISSUES IN PROGRAMME PLANNING

The Master Plan proposes a variety of policy recommendations with regard to programme planning and implementation. These include:

(i) Integration of Water, Sanitation and Health Education: Water, sanitation and health education need to be integrated to achieve maximum health benefits.

(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 resources.

(iii) Piped/Primary Water Supply Mix: District, provincial and national level plans should make optimum use of available water resources. Generally, piped supplies will be constructed at service centres growth points and, selected resettlement areas, while primary water supplies will supply the remainder of the communal and resettlement area population.

(iv) Primary Water Supply Mix: Hand-dug wells and boreholes are the major primary water supplies suited to rural Zimbabwe. While local-level plans will contain a mix of hand-dug wells and boreholes, for reasons of cost, proximity and ease of maintenance, priority should be given, where appropriate, to well-sinking.

(v) Community Participation: It is recommended that community participation be the implementation strategy of choice in rural primary water supply and sanitation programmes. Professional implementation of this policy will entail re-orientation in methods of project generation, in project management techniques and in administrative training and support.

Community management of facilities is to be effected through trained specialist sub-committees of Village Development Committees.

(vi) Payment and Community Contributions for Water and Sanitation: It is recommended that rural consumers should contribute to the cost of rural water and sanitation to reduce the enormous costs to be incurred by the Government, and to enhance local responsibility for services. Complete, or near complete, recovery of recurrent costs is recommended as a policy objective. In practice, in the short run, this will require:

- Increasing the general water tariff of piped water to fifty cents per cubic metre and the creation of user groups for tariff collection at shared connections.
- An annual payment of Z$1 per household per annum for access to primary supplies.
- Community contribution of voluntary labour in well-sinking and latrine and headworks construction and provision of local building materials.
- Notwithstanding these contributions by beneficiaries, it is proposed that Government (with donor assistance) cover the bulk of the capital costs of rural water supply development and subsidize the provision of locally unobtainable materials for rural sanitation programmes.

(vii) Operation and Maintenance: Inadequate support for operations and maintenance can result in a massive wastage of investment, and there is an urgent need to give this the highest consideration in future programmes. Operation and maintenance of all rural water supplies require manpower development and a high level of support.

A three-tiered structure is proposed to cater for the greatly expanded need for maintenance of primary supplies. These tiers comprise:

- At Village Level: Specialized water or sanitation sub-committees of Village Development Committees and voluntary pump caretakers
- At Ward Level: Paid District Development Fund pump minders
- At District Level: District Development Fund maintenance units.

S.5

THE RURAL WATER SUPPLY PROGRAMME

A projected Rural Water Supply Programme for communal and resettlement areas to achieve complete coverage by the year 2005 is presented. This Programme, together with the Rural Sanitation Programme, serves to provide an overall indication of capacity, general direction and order of magnitude, and does not presume to replace the need for detailed national planning.

The Rural Water Supply Programme proposes the phased construction or upgrading of 576 piped supplies to service centres, growth points and selected resettlement areas and approximately 36 000 primary supplies. This will service 330 000 people with piped water and 8,6 million with access to primary supplies.

The twenty-year total annual investment cost is estimated to be Z$333 million (in 1985 prices) and, including operating, maintenance and all support costs, Z$699 million (in 1985 prices). Over the Master Plan period, a major and increasing shift of resources to operation and maintenance will be required. The recommended Programme will require a high, though gradually diminishing, level of donor assistance.

S.6

THE RURAL SANITATION PROGRAMME

To provide the entire population of communal and resettlement areas with access to adequate sanitation will require the construction of a total of 1,4 million Ventilated Improved Pit Latrines (Blair Latrines) by 2005. To achieve this target, the recommended programme will have to build up implementation capacity to around 80 000 latrines per year for an extended period. The total cost of the proposed Rural Sanitation Programme is estimated to be Z$207 million (in 1985 prices) of which the local contribution is estimated to constitute sixty eight per cent.

S.7

OVERALL FINANCIAL AND MANPOWER REQUIREMENTS

The total overall cost, over the next twenty years, of both of the Rural Water Supply and Sanitation Programmes is estimated to be Z$836 million (in 1985 prices). Cost projections are given, designating the distribution of this cost between Government, donors and beneficiaries and with optimistic and pessimistic assumptions.

Implementation of proposed programmes will require not only considerable Government investment and continuing reliance upon donor assistance, but also a greatly enhanced manpower supply. The Consultant's projections demonstrate a critical situation in some areas, particularly at senior, professional and technical levels. Recommended manpower development strategies include: systematic career planning measures to inhibit the drift from public to private sector employment; an accelerated recruitment campaign; and close monitoring of manpower development to link manpower improvements to the implementation rate of water and sanitation programmes.

S.8

STEPS IN IMPLEMENTATION

After Government approval of the Master Plan, key steps in implementation are identified for each of the six major Government agencies involved. These steps include:

(i) Restructuring of the National Action Committee
(ii) Establishment of the National Co-ordination Unit in the Ministry of Local Government, Rural and Urban Development
(iii) Establishment of the Master Plan Office in the Ministry of Energy and Water Resources and Development.
(iv) Each agency to give active support to the National Action Committee and to follow the lead of the Ministry of Local Government, Rural and Urban Development
(v) Development of sector programmes and plans, using Master Plan guidelines
(vi) Implementation of sector programmes.

1. Introduction and Objectives

1.1 INTRODUCTION

This report represents the highlights of the National Master Plan for Rural Water Supply and Sanitation in a few pages. It does not attempt to summarize all the findings and recommendations made in individual studies, but presents the principal conclusions and describes the overall framework, key policy issues and the projected costs of the recommended programmes.

The Executive Summary is intended to be of interest to those who require a concise and simplified overview of the plan. Policy makers and specialists requiring more detailed information are directed to the individual volumes.

The Master Plan is a multi-disciplinary study covering a number of fields related to rural water supply and sanitation. The data, results and recommendations derived from the study are presented in a number of volumes covering the different subjects within the Master Plan. In order to assist the reader to decide which other reports are likely to be of further interest, an annotated bibliography, which lists and presents a brief summary of each of the eighteen volumes and ten seperately published annexes in the series, is presented in Appendix 2. This Appendix also contains an alphabetical index of the main subjects covered cross-referenced to appropriate volumes or annexes.

1.2 GENERAL OBJECTIVES

The general objective of the National Master Plan for Rural Water Supply and Sanitation is to define the framework for rural domestic water and sanitation development in communal and resettlement areas of Zimbabwe. By establishing the planning parameters across the range of disciplines in the sector the objective of the plan is:

(i) To assist in optimum use of available resources
(ii) To increase sectoral capacity by providing an overall framework within which donors and ministries can design specific development projects, and
(iii) Through the development of an integrated approach, to create the potential for enhanced health, social and economic benefits from sectoral investment.

1.3 SPECIFIC OBJECTIVES

Specific objectives of the planning exercise have been to:

(i) Review available information with respect to national water resources; water and sanitation technologies; human, institutional and financial resources; and environmental and national health considerations
(ii) Review existing rural water and sanitation programmes and the constraints in programme implementation
(iii) Recommend sectoral goals and policies and programmes required to achieve these goals
(iv) Prepare an inventory of rural water resources and existing water and sanitation facilities
(v) Assess water demand for domestic, institutional, gardening and livestock consumption
(vi) Undertake a national socio-economic survey to assess willingness and ability to pay for rural services, and to provide the basis for programme design
(vii) Develop standard guidelines and criteria for the design of rural water supply and sanitation facilities, and
(viii) Develop proposals for sectoral management, human resource development and operation and maintenance in order to implement recommended programmes

1.4 LIMITATIONS OF SCOPE

The usefulness of the Master Plan will be enhanced by a clear understanding of the limitations of its scope:

(i) **Communal and Resettlement Areas:** The terms of reference limit the Master Plan to these areas, though some studies are national in scope.

(ii) **Domestic Provision:** The plan is limited in its terms of reference to provision of domestic services, and

excludes full consideration, for example, of irrigation

(iii) **Sectoral Planning Frame:** The plan is intended to define the framework within which specific projects will be developed. The plan is for use at the highest planning levels and will not replace the need for individual project planning

(iv) **Start of a Continuous Process:** The plan provides, in the areas specified in its terms of reference, a compilation of existing and some new information gathered in the period 1983 to 1985. This information may soon be outdated by changes in cost, attitudes, government policies and availability of finance and the plan will need continuous updating and improvement. These volumes represent a stage in a continuous process of building up of knowledge and improvement of decisions in the sector.

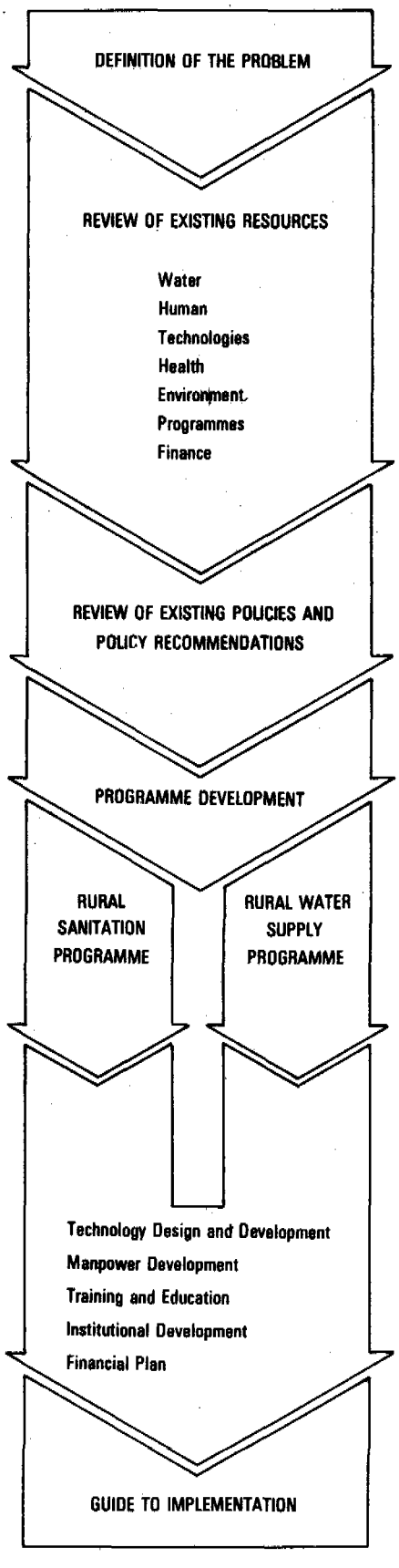
1.5 MASTER PLAN PROCEDURES

The logical steps taken in developing the Master Plan are illustrated in Figure 1.1.

After definition of the problem and elaboration of study objectives, a review of existing resources and policies was undertaken. Existing resources were compared with sector objectives and policy recommendations developed.

Finally, phased programmes of action were designed over short, medium and long-term planning periods, which incorporate recommendations from sectoral studies and represent optimal paths to achieving objectives.

Figure 1.1
Steps in Master Plan Preparation



2. Review of Existing Resources

The purpose of this section is to summarize the principal findings of the studies and reviews of existing resources relevant to the Master Plan.

2.1 WATER RESOURCES

2.1.1

Hydrology

A review of extensive hydrological and meteorological records in Zimbabwe (see Volume 2.1) indicates that surface water sources are less suitable for domestic rural water supply. A district-based classification of surface water potential illustrates those areas where use of surface water supplies is most viable.

2.1.2

Hydrogeology

By contrast, the potential for the development of hydrogeological sources for rural domestic water supplies is considerable. The regional study of ground water resources and the detailed classification and mapping of hydrogeological zones (see Volume 2.2) demonstrate that virtually all areas of the country have some potential for the development of single point primary water supplies.

Other hydrogeological units in communal areas, particularly parts of Matabeleland North, the northern Midlands, and the lower Sabi River valley, indicate potential for more extensive exploitation for piped supplies or irrigation schemes. Optimum choice technologies in most parts of the country are dug-wells and boreholes.

2.1.3

Water Quality

Water quality studies (see Volume 2.3) indicate that ground water quality is generally good throughout Zimbabwe, apart from isolated pockets where mineral or fluoride levels are high. Existing bacteriological data on water quality in Zimbabwe demonstrate high levels of pollution in unprotected water sources and hence the importance of adequate protection of improved sources.

Studies of the quality of water after collection (see Volume 4.2) indicate considerable pollution from sources within the household.

2.2 EXISTING WATER AND SANITATION FACILITIES

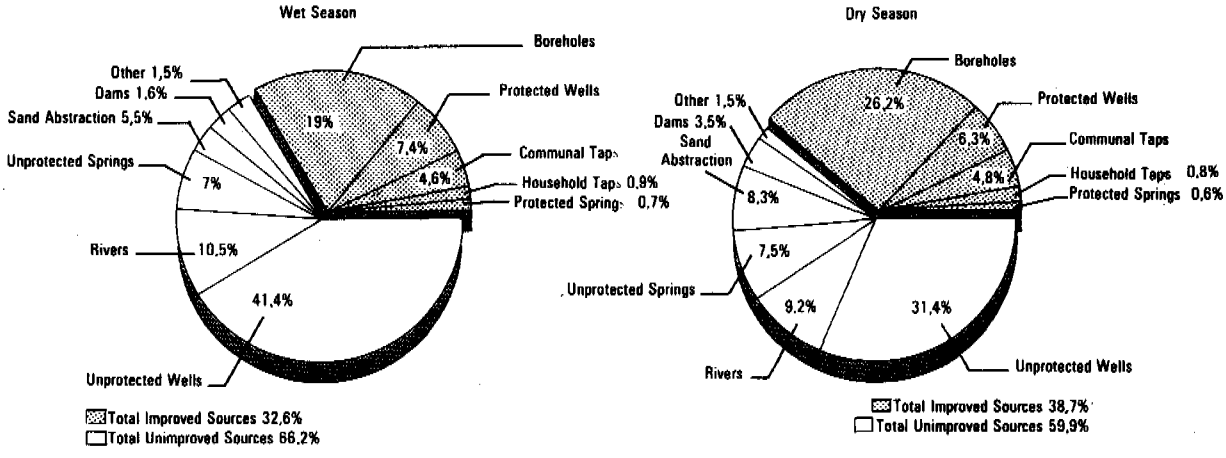
2.2.1

Water Sources

A national sample survey of existing patterns of water use (see Volume 4.2) reveals that only one third of the population in communal areas at present perennially collects water for domestic use from an improved supply. Figure 2.1 illustrates the percentage distribution of access to domestic water sources showing the variation between wet and dry seasons. Approximately sixty six per cent of the communal areas and resettlement population, or 3,1 million people, presently draw water from unimproved water sources.

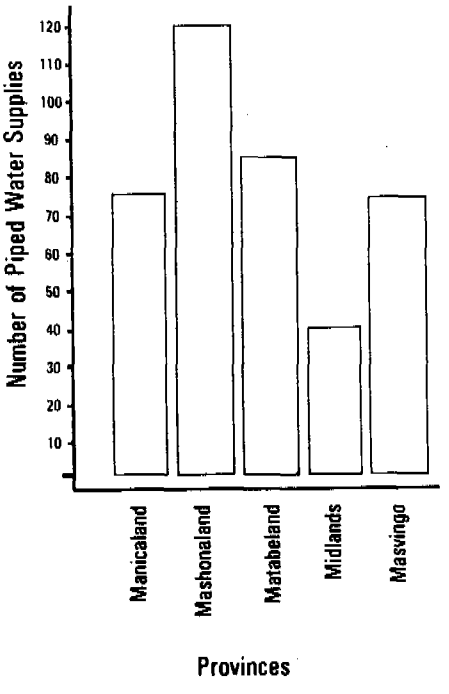
Figure 2.1

Pie Charts of Existing Levels of Access to Domestic Water Sources in Communal Areas



A computerized inventory of water supplies constructed in communal and resettlement areas has also been developed (see Volume 3.3). The information, gathered from provincial district reports, refers to fully-functioning facilities at July 1984. The great importance of the Inventory is that it has been developed to be updated as more information becomes available and more supplies are built. The orders of magnitude of the first Inventory of existing, fully-functioning supplies indicated some 400 piped supplies, 9 000 boreholes and a great many hand-dug wells. Figures 2.2 and 2.3 illustrate the provincial breakdown of the Inventory for piped supplies and boreholes.

Figure 2.2
Bar Chart of Provincial* Distribution of Existing Piped Water Supplies



Note: * Based on Department of Water Resources and Development's five provinces.

2.2.2
Sanitation Facilities

At present only approximately fifteen per cent of communal and resettlement residents have access to an adequate latrine, and approximately four million people in these areas are presently unsupplied. The current estimated latrine requirement for these areas is approximately 767 000. This requirement is continually increasing with population growth.

Figure 2.4 illustrates the percentage distribution of access to adequate sanitation in Master Plan areas.

Figure 2.3
Bar Chart of Provincial Distribution of Existing Functioning Boreholes

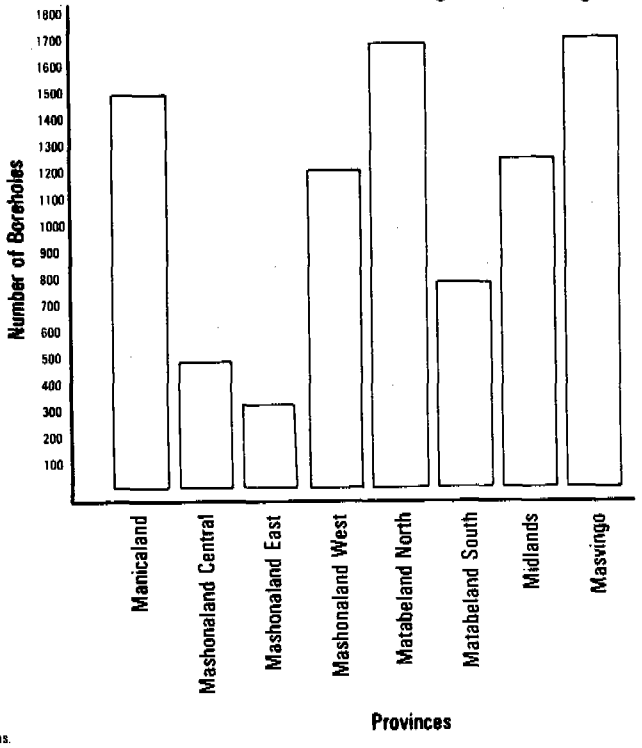
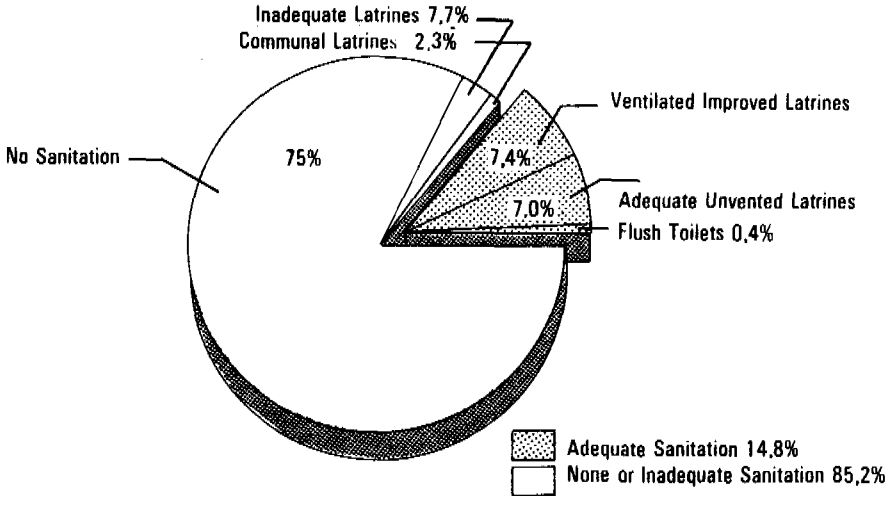


Figure 2.4
Pie Chart of Levels of Access to Sanitation Facilities in Communal Areas



2.3 TECHNOLOGY

2.3.1

Water Technologies

A review of existing rural water technologies, including a detailed study of twenty five piped supply schemes and a great many boreholes and dug-wells (see Volume 8.1), demonstrates the generally high standards of water technology development in Zimbabwe.

Areas identified which require further attention include:

(i) Standardization of hand pump options
(ii) Sanitary protection of boreholes and wells
(iii) Pump manufacturing standards, and
(iv) Tap design and waste water disposal at communal standposts.

2.3.2

Sanitation Technology

A review of existing rural sanitation technologies in Zimbabwe (see Volume 4.4) endorses the Blair Latrine (a ventilated improved pit latrine) as the technology of choice for Zimbabwe (see Figure 2.5). A review of technology options in other countries confirms Zimbabwe's leading role in international thinking and practice with regard to the development of affordable sanitation technologies.

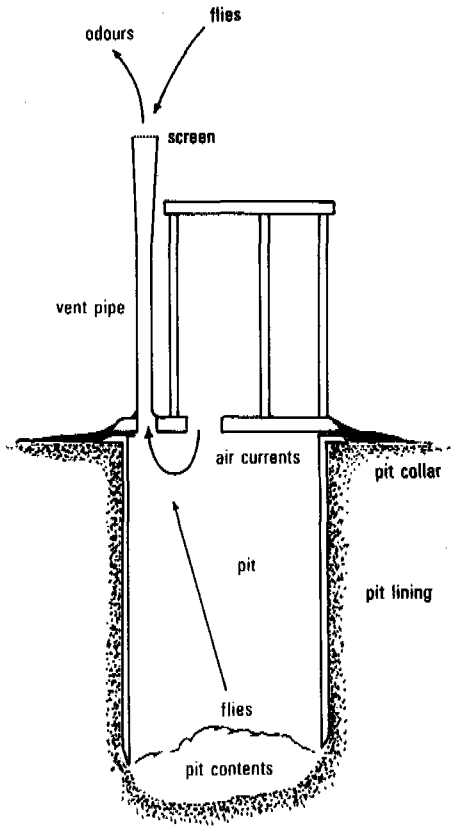


Figure 2.5
Schematic diagram of a Ventilated Improved Pit Latrine (Blair Latrine)

Recommendations made include:

(i) A rationalization of alternative designs according to cost
(ii) Emphasis to be given to key principles in construction and promotion
(iii) Improvement of construction standards, and
(iv) Emphasis on design options which do not encourage deforestation.

HUMAN RESOURCES 2.4

2.4.1

Social and Cultural Issues

The social studies undertaken in the course of preparation of the Master Plan (see Volume 4.2) examine a variety of social parameters in sector planning. These include the social circumstances of rural Zimbabwe; beneficiaries' aspirations and needs; the acceptibility and patterns of usage of water and sanitation technologies; and behaviours affecting transmission of water-related diseases.

Rural Zimbabwe is linguistically and culturally heterogeneous and development initiatives need to take account of local preferences and social distinctions. Communal areas are historically characterized by underdevelopment and social deprivation. Since Independence development expectations and willingness to contribute to rural development programmes have been heightened.

(i) Water

Domestic water supplies are regarded as a priority need amongst communal area families, primarily by women, to ease their burdensome task of water collection. The mean roundtrip water collection journey varies between 1,4 kilometres in the wet season to just under 2 kilometres in the dry season. The pattern of water usage is somewhat eclectic, even in households with access to improved supplies, and very few households use only a single source.

Water has many longstanding cultural associations, customs and beliefs which need to be taken into consideration in rural water development, particularly when upgrading traditional sources such as springs or wells. Water is traditionally a common resource: in developing domestic water sources in communal areas careful formulation of community management authorities is necessary to ensure that water development does not privatize resources whose traditionally public access was clearly defined.

(ii) Sanitation

Sanitation is perceived as an important facility in rural areas, if less urgently required than improved water supplies. Demand has increased in the wake of the Ministry of Health's extensive promotion efforts and latrine subsidies, and is probably also related to the growth of rural deforestation which destroys the privacy of traditional defecation sites. Latrine ownership remains clearly associated with educational status and wealth. Strategies need to be adopted to reach entire communities to share benefits more equally and for greater public health impact. Levels of usage of Blair Latrines, with the exception of young children, are high.

(iii) Hygiene

Behavioural studies demonstrated the following common hygiene risks: pollution of stored water; disposal of waste water within the household courtyard; clothes washing and bathing at rivers; infrequent handwashing after defecation and insufficient use of soap in handwashing; and inadequate disposal of infants' and young children's faeces.

2.4.2

Population

The population studies provide a framework for the formulation of rural water and sanitation programmes (see Volume 3.1). A review of the 1982 population census data and previous censuses indicates the following population characteristics:

(i) The total 1985 population is estimated at 8,4 million people, of which 4,9 million are in communal or resettlement areas
(ii) The present annual population growth is estimated at a high 3,6 per cent, largely as a result of natural increase
(iii) The proportion of children in the population is high and increasing (half under the age of fifteen years)
(iv) Population distribution is historically skewed such that communal areas constitute approximately sixty per cent of the population and only forty two per cent of the land. Population densities in communal areas are higher than in commercial farming areas but vary considerably (twenty to forty two per square kilometre) depending on the natural region
(v) The mean national household size is 4,7 people, but it is generally higher (5,4) in communal areas.

Based on these characteristics and other trends the population is estimated for the Master Plan periods. Summary figures, presented in Table 2.1, show that the total communal and resettlement area population is estimated to reach 9,2 million by 2005.

Table 2.1

Population Estimates for Master Plan Periods (000 s)

Year / Area	1985	1990	1995	2005
Rural Communal Areas	4 481	5 008	5 659	7 555
Communal Area Centres	166	246	308	481
Total Communal Areas	4 647	5 254	5 967	8 036
Resettlement Areas	306	576	852	1 146
Model B Co-operatives	30	37	45	54
TOTAL	4 983	5 867	6 864	9 236

2.4.3

Manpower

A review of human resources in the sector (see Volume 7) indicates that, amongst the key ministries, there is a short-term shortage of engineers, although the long-term perspective is reasonably sound. There is a substantial short to medium-term insufficiency of middle-level cadres, of the order of fifty per cent; capacity within Zimbabwe to generate this manpower is, however, basically adequate. The output of sub-professionals is satisfactory, although there are specific needs for enhanced training. Standards and qualifications across all levels are considered to be good to very good. In the fields of health and community work, and administration and management, the need is not so much for supply, but rather for specialized training; specific skills in the planning, monitoring and evaluation of water and sanitation programmes require to be developed.

2.5 *HEALTH AND HEALTH EDUCATION*

2.5.1

Health Profile

A review of the status and significance of water and excreta-related diseases in Zimbabwe was undertaken, based on available statistics at national, provincial, district, and health centre level. Notwithstanding the limitations of existing data, it is evident that, as a group, these diseases are a major public health problem in Zimbabwe, and constitute a very significant proportion of morbidity and mortality especially amongst children under five years of age.

Diarrhoeal diseases are estimated to kill 25 000 children each year; schistosomiasis is endemic in Zimbabwe and especially prevalent in the north-east and east of the country; malaria is hyperendemic in areas below 600 metres; intestinal parasites are widespread; typhoid is a problem in certain seasons; cholera has appeared in Zimbabwe in the past and the risk of further seasonal outbreaks is ever present; and skin and eye diseases are very common. Water-related diseases are of particular concern on irrigation schemes, and amongst commercial farm workers.

The review also examines the institutional capacity and health information system in the Ministry of Health, and makes recommendations with regard to enhancing the health benefits of water and sanitation facilities (see Volume 4.1)

2.5.2

Health Education

The review of health education in the context of rural water supply and sanitation (see Volume 4.3) concludes that existing health educational structures in the Ministry of Health are well established. Existing capacity is, however, limited, and requires strengthening and greater co-ordination, if educational support is to be well integrated into all sector programmes. A review of the information-sharing process commends the sharing of technical information at project level, but identifies the need for:

(i) A clearer definition of key information for project development
(ii) A target-group focus for materials and training programmes
(iii) A more innovative mix of media
(iv) More emphasis on community-level materials and educational approaches, and
(v) Close attention to be given to timing and follow-up of educational and promotional inputs in project implementation.

2.6 *ENVIRONMENTAL CONCERNS*

2.6.1

Soil and Water Conservation

The development of certain water sources can lead to severe disturbances in the ecology, characterized by increased soil erosion, siltation of dams and impoverishment of vegetation. The Master Plan included a Siltation and Soil Erosion Survey of thirty dams in order to determine the extent of these ecological problems.

The survey found a wide range of sediment yields from 10 to 700 tonnes per square kilometre per annum, owing largely to the variation in erosion in different parts of the country. An encouraging finding was that, in general, the high veld and the low veld are relatively well conserved, and have only a minor siltation risk. However, in the middle veld, the area where a number of large, densely populated communal areas are situated, levels of erosion and siltation are high. In these areas a large number of small dams built on relatively large, badly-conserved catchments have silted up rapidly.

2.6.2

Livestock Watering

Livestock watering practices were examined by field-surveys, to determine water demand and their relation to domestic water provision.

The present practice of livestock husbandry in the communal areas is largely based on free access to communal grazing and communal water. Shortage of livestock watering is largely a seasonal problem, but is one that is perceived by many villages to be of great importance. At critical times of the year when all surface-water sources have dried up, this shortage often results in livestock using the same ground-water sources as humans. Given the limited yield from hand pumps, people and livestock are forced to compete for scarce water, which leads to a rapid spoiling and pollution of headworks facilities, and can lead to breakdowns.

Given the high mobility of livestock and low productivity levels of grassland in the communal areas, grazing is scarcer than water. Land which is undergrazed because of lack of water hardly exists in these areas. Most cattle get sufficient water to survive: cattle die, not from thirst, but from lack of adequate grazing. While water development, combined with uncontrolled grazing practices, has caused ecological decline, new water development is unlikely seriously to worsen present trends as the growth of herds is mainly controlled by the availability of grazing.

2.7 EXISTING SECTOR PROGRAMMES

2.7.1

Rural Domestic Water Programmes

Since Independence Government has embarked upon a range of rural water development programmes, emmanating from several ministries to redress previous imbalances in sectoral investment. Government has committed itself to continuing piped-water supply construction and extensive borehole and well programmes. In general, these programmes have been characterized by:

(i) A lack of comprehensive and logical programme planning, including an absence of input from communities, local authorities and complementary ministries and an *ad hoc* approach to programme location

(ii) Lack of standardization of approach in programme strategy, design criteria and technology choice

(iii) Lack of integration into other development activities and, in particular, into other environmental health interventions, and

(v) And absence of coherent policy on cost recovery.

A considerable number of governmental agencies are presently trying to redress these problems.

Perhaps the most fundamental need for the future development of water programmes is the adoption of a logical division of ministerial responsibilities and a framework for co-ordination of water programmes. To this end, a review of institutional capacities was undertaken and several possible options considered for allocating water programme responsibilities (see Volume 6).

2.7.2

Rural Sanitation Programmes

The Ministry of Health has developed a sound and integrated approach to rural sanitation implementation, whereby water, sanitation and education go hand in hand in self-help programmes, supported by a small subsidy for materials. This approach has been successfully demonstrated in three large pilot projects from which extended implementation programmes have developed.

Many other rural sanitation programmes were studied (see Volume 4.4) and, while these provided an increasing number of facilities, the sector as a whole is characterized by:

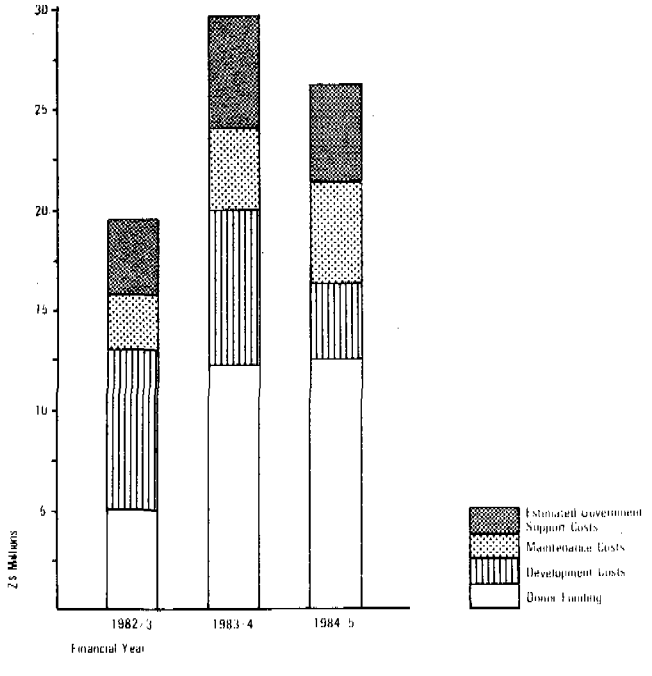


Figure 2.6

Total Rural Water Supply Expenditure in Communal Areas 1982- 5

(i) An uneven mix of development strategies
(ii) A lack of logical planning, poor management and a lack of educational or maintenance follow-up, and
(iii) Many substantial non-governmental projects have been implemented in isolation from Government, so precluding institution-building.

2.8 FINANCIAL RESOURCES

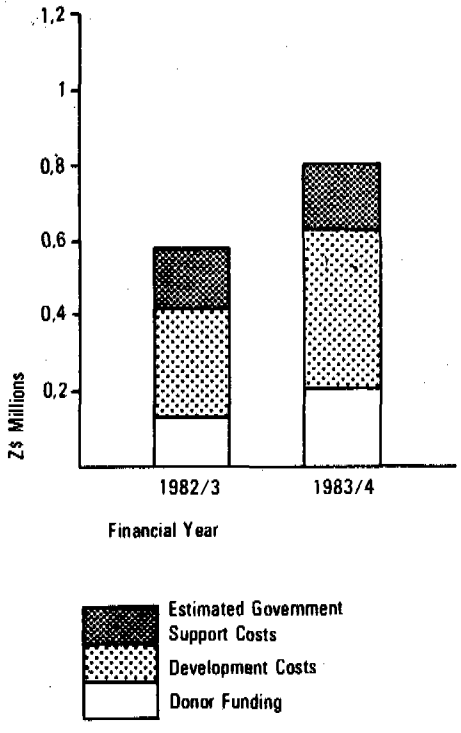
Existing financial resources for water are reviewed in Volumes 3 and 3.4, and for sanitation in Volume 4.4.

It is estimated that, excluding special drought relief or reconstruction programmes, total direct water supply expenditure in Master Plan areas is currently approximately Z$18 million (in 1984/5 values). Figure 2.6 illustrates total water supply expenditure (including support costs and reconstruction and drought relief programmes) in 1982-5 (in actual costs). The Figure also demonstrates that water development in communal and resettlement areas is heavily dependent upon external assistance. In 1984/5 donors contributed sixty eight per cent of direct development costs. Government's contributions have been the short fall in development costs, and support costs for the sector. These are estimated to be approximately Z$15,3 million for 1983/4.

A review of present water tariff collection at Ministry of Energy and Water Resources and Development water supply stations shows that cost escalation has far outstripped revenue increases, and that Government has had to make up the deficits (up to Z$2,8 million in 1983/4) from annual grants to the water trading account.

Total estimates of expenditure on rural sanitation in Master Plan areas for 1983-4 are presented in Figure 2.7. In 1983-4 total direct expenditure is estimated to be approximately Z$0,6 million, of which Z$0,2 million were donor contributions. Government funding comes largely from general disease prevention 'field votes', made available by the Ministry of Health through provincial offices.

Figure 2.7
Total Rural Sanitation Expenditure 1982 - 4



3. Policy Issues and Recommendations

The purpose of this section is to highlight the major policy recommendations and constituent elements of the National Master Plan for Rural Water Supply and Sanitation.

3.1 PRIORITY FOR DOMESTIC SERVICES

Rural water supplies are basic developmental needs necessary for the improvement of health and living conditions, and should remain fundamental components in long-term rural development programmes. Improved water and sanitation facilities are especially needed in previously neglected communal areas and resettlement areas, and the central intention of the plan is to improve service levels in these areas. A summary of data on existing service levels in these areas is presented in Section 2 (for details see Volumes 3.3 and 4.2).

Improved domestic water and sanitation provision in these areas are needed for:

(i) Reducing the burden and time devoted to carrying water by rural women and children, and
(ii) Limiting water and excreta-related diseases.

The importance of domestic provision in neglected areas is evident historically and from analyses of rural expectations (see Volume 4.2), and should be accorded a high priority in rural development activities. In assessing demand, however, close attention should be given to the potential for livestock watering and irrigation to stimulate food production and rural incomes.

3.2 MANAGEMENT AND CO-ORDINATION

Rural water supply and sanitation are adjuncts to an interdisciplinary sector requiring the involvement of several different agencies. Efficient co-ordination and management of the sector are, therefore, crucial to achieve objectives.

3.2.1 Division of Responsibilities

Table 3.1 presents a matrix of the proposed division of responsibilities in the sector.

Ministry of Local Government , Rural and Urban Development : It is proposed that the Ministry of Local Government, Rural and Urban Development be given the overall responsibility for national co-ordination and management in the sector. The Ministry of Local Government, Rural and Urban Development is represented at all levels in the new structure for local government administration, and plays a key role in the development of district and provincial plans. In this enhanced position the Ministry of Local Government, Rural and Urban Development will adopt the chairmanship of the National Action Committee. To undertake these important sectoral duties it is proposed to

Table 3.1
Division of Technical Responsibilities for Water Supply and Sanitation in Communal Areas

	Dams		Boreholes	Piped Schemes		Wells		Sanitation
Activities	Large and Medium Dams	Small Dams	Boreholes and Sand Abstraction Schemes	Large	Small	Shallow Hand Dug or Hand Augered	Deep or Requiring Blasting	Pit Latrine And Roof Catchment
Technical Planning and Design	Ministry of Energy and Water Resouces and Development	Ministry of Energy and Water Resouces and Development	Ministry of Energy and Water Resouces and Development /DDF	Ministry of Energy and Water Resouces and Development	Ministry of Energy and Water Resouces and Development	Ministry of Health/District Development Fund	District Development Fund	Ministry of Health
Construction Supervision	Ministry of Energy and Water Resouces and Development	District Development Fund	Ministry of Energy and Water Resouces and Development /DDF	Ministry of Energy and Water Resouces and Development	District Development Fund	Ministry of Health/District Development Fund**	District Development Fund	Ministry of Health
Improvements or Maintenance	Ministry of Energy and Water Resouces and Development	District Development Fund	Local Communities/ District Development Fund	DDF/ MEWRD *	MEWRD*	Local Communities/ District Development Fund		—

*Until local authorities/DDF are capable of taking over all supplies
**Responsible for support

MEWRD — Ministry of Energy and Water Resources and Development
DDF — District Development Fund

establish a National Co-ordination Unit, staffed initially by a National Co-ordinator.

District Development Fund: The District Development Fund, as the the technical arm of the Ministry of Local Government, Rural and Urban Development, will strengthen its water division and undertake the major technical responsibilities for developing primary water supplies and maintaining all rural supplies.

Ministry of Energy and Water Resources and Development: The Ministry of Energy and Water Resources and Development is primarily a technical and professional engineering ministry which acts on behalf of other Government ministries and departments on water resource development. It has no representative below provincial level who could be used for low-level planning, and is not in favour of expanding to district-level; nor does it wish to play a major role in community participation projects.

The main functions of the Ministry of Energy and Water Resources and Development in the rural water supply sector will be to:

(i) Provide technical advice
(ii) Site water points
(iii) Drill boreholes
(iv) Investigate, design and construct piped supplies on behalf of the Ministry of Local Government, Rural and Urban Development, and
(v) Establish an information and planning office for water-related activities.

It will also continue to play a role in operating piped water supplies, but only until local authorities can take them over. Furthermore, the handover to local authorities of water supply stations should be encouraged more vigorously than in the past and village supplies should be handed over very soon. Within the rural water supply sector, the Ministry should be regarded as a service ministry rather than a leader and co-ordinator.

Volume 6 presents detailed recommendations on management aspects relevant to the Ministry of Energy and Water Resources and Development. These include recommendations on: budgeting, financial control, improved management and planning, revenue collection, vehicles, stores and procurement.

Ministry of Health: The Ministry of Health will remain the lead agency for health education and rural sanitation, and will continue to play a major role in hand-dug well development, supported by the District Development Fund, as well as promotion of spring protection and roof catchment, where appropriate.

Ministry of Community Development and Women's Affairs: The Ministry of Community Development and Women's Affairs will have the responsibility of motivating and mobilizing the people for planning and implementing water supply and sanitation activities.

It is envisaged that communities will be playing an increasingly important role in planning, developing and monitoring water supplies and the Ministry of Community Development and Women's Affairs should participate with the technical ministries in the National Action Committee to ensure that the roles being assigned to the people, and hence the programmes, are attainable.

Local Authorities: In principle the responsibility for operation and maintenance of piped supplies will belong to local authorities, although in practice the District Development Fund will probably have to maintain many supplies on their behalf for a considerable period. The take-over of piped supplies of the Ministry of Energy and Water Resources and Development will have to be in line with the capability of local authorities to maintain them.

Local Communities: Local Communities are expected to play an increasingly important role in planning supplies, and a primary role in the maintenance and recurrent financing of their own supplies, with support from the District Development Fund.

3.2.2 Co-ordination

In both programme planning and policy matters the Ministry of Local Government, Rural and Urban Development should be advised by a restructured National Action Committee, which the Ministry of Local Government Rural and Urban Development should chair, and whose membership should be restricted to the key agencies:

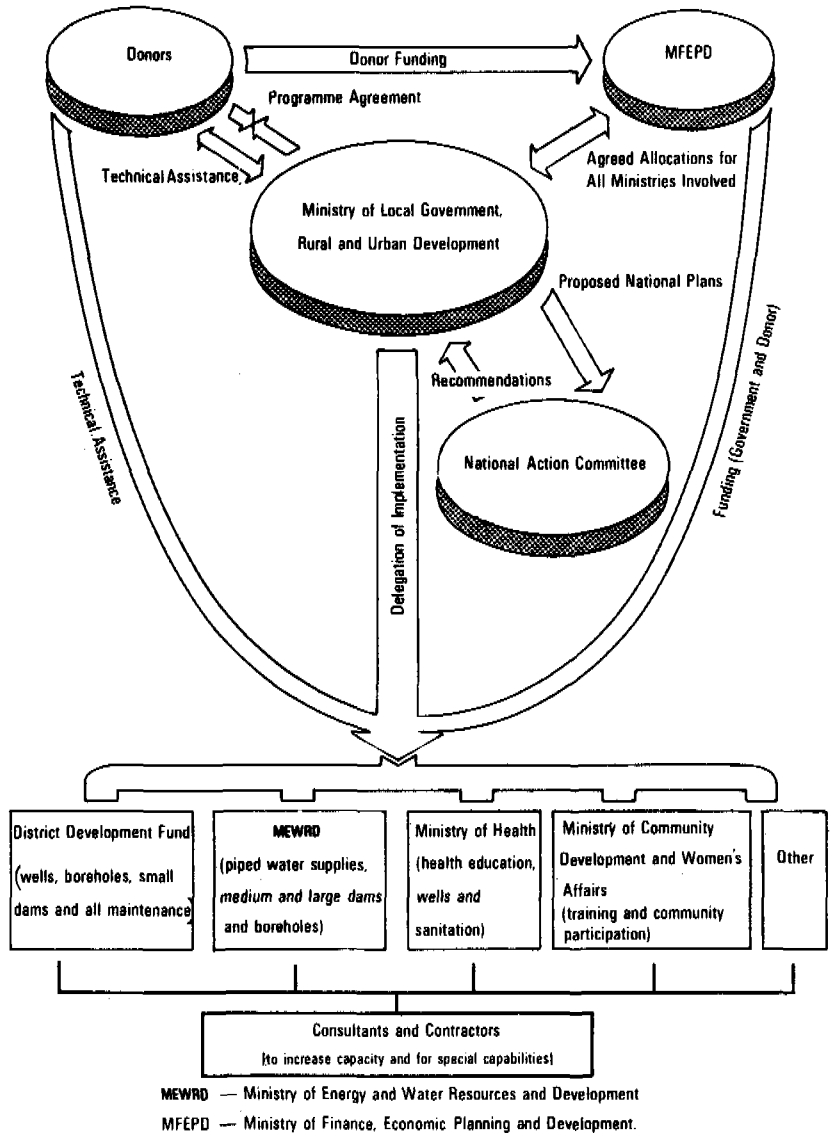
(i) Ministry of Local Government, Rural and Urban Development
(ii) District Development Fund
(iii) Ministry of Energy and Water Resources and Development
(iv) Ministry of Health
(v) Ministry of Community Development and Women's Affairs
(vi) Ministry of Lands, Agriculture and Rural Resettlement, and
(vii) Ministry of Finance, Economic Planning and Development.

3.3 PROGRAMME PLANNING

Detailed plans for rural water and sanitation will be planned and budgeted for by local authorities following requests by local communities, Village Development Committees, Ward Development Committees and District Councils. District and provincial water and sanitation plans will be a composite of micro-plans taking into account local priorities and specific water needs, and will contain an appropriate and cost-efficient mix of water and sanitation technologies to achieve optimum use of available resources. Through this planning procedure water and sanitation projects will become closely integrated and interlinked to other components of district and provincial development plans.

National Plans will finally be developed by the Ministry of Local Government, Rural and Urban Development through the National Co-ordination Unit in co-operation with the other sector agencies. These plans should be based on provincial plans, on updated parameters in the Master Plan, budgetary constraints and other national planning considerations. The national plan will be presented to Treasury for financial approval. This method of plan preparation incorporates local community priorities, provincial and district priorities, and national policies. Figure 3.1 presents the proposed implementation structure for the Master Plan.

Figure 3.1 Proposed National-Level Structure for Rural Water Supply and Sanitation Implementation



3.4 COMMUNITY PARTICIPATION

In line with the existing rural development policy it is recommended that community participation be the implementation strategy of choice in rural primary water supply and sanitation programmes. Serious and professional adoption of the policy will entail considerable re-orientation in the method of sector project generation, in management techniques and in administrative training and support. All sector project planners, particularly those in the Ministry of Local Government, Rural and Urban Development (particularly the District Development Fund, water division) and the Ministry of Energy and Water Resources and Development should develop an orientation towards community-based projects.

To this end the Ministry of Community Development and Women's Affairs, the lead ministry in support of community participation, should fully brief technical ministries regarding the communities role and the support available for community-based water and sanitation projects. Recommendations to increase the efficiency and effectiveness of community participation in sector programmes include:

(i) Training of Extension Workers: Effective community participation depends heavily on the calibre of extension workers. It is recommended that refresher training courses on the principles and techniques of community liaison be undertaken by Ministry of Community Development and Women's Affairs

(ii) Training for Community Management and Community Financing: Training of village development committees and water or sanitation sub-committees is vital to support effective community management of facilities. This should cover technical aspects of water supplies and sanitation facilities, committee functions and responsibilities; the operation of community financing schemes to cover operating and maintenance costs, where appropriate; and simple management techniques

(iii) The Establishment of Water and Sanitation Sub-committees under Village Development Committees: It is recommended that rural water and sanitation provision by community participation should be implemented through the new administrative structure originating with Village Development Committees. These committees may find it necessary to establish special purpose water or sanitation sub-committees, comprising user associations or shared tap user groups. Sub-committee members would be chosen by the local group of beneficiaries of a particular resource, for a socially and spatially precise community management.

(iv) Community Participation in Planning and Design: Project planning cycles need to incorporate community views and preferences. This is essential in upgrading programmes, and important in all forms of new rural water and sanitation provision.

(v) Creation of a Community-level Maintenance Capability: The creation of a community-level maintenance capability within village development committees' water or sanitation sub-committees is recommended for preventative and simple maintenance. This voluntary level would be supported by paid technicians and a full back-up maintenance and repair service.

(vi) Community Payment for Water: Proposals for payment by rural communities for water are described below in Section 3.16

3.5 INTEGRATION OF WATER, SANITATION AND HEALTH EDUCATION

To complement water and sanitation provision, health and hygiene education is vital to ensure correct and hygienic usage, and to limit transmission of water and excreta-related diseases by other means. Effective hygiene education requires a target planning focus, and specific targets are proposed in Volumes 4.1 and 4.2.

Hygiene education is a sub-activity of a more general category of support to develop better communication within water and sanitation projects. Communication support components (i.e. the dissemination of information to programme staff and beneficiaries, promotion of technologies, education for use and maintenance, etc.) need to be integrated into project design and implementation, and specific budgetary allocation must be made for them. Educational support is necessary at national, provincial, district, field worker, community and user levels; and is required for skill training, mobilization, hygiene promotion and to ensure proper use and maintenance.

Existing health educational capacity in the Ministry of Health requires strengthening and improved co-ordination to integrate educational support into all sectoral projects. Recommendations to achieve this include strengthening the National Action Committee and its sub-committees and the creation of a national co-ordinating body for health education.

3.6 PROVINCIAL AND DISTRICT PLANNING STRATEGIES

Other strategies recommended to be adopted in planning and implementing provincial and district-level integrated water and sanitation plans include the following points.

3.6.1

Appropriate Technical Solutions

Integrated rural water and sanitation plans developed by local authorities will contain a mix of technologies including, where appropriate, protected wells, springs, boreholes, piped supplies and small and medium dams. Technical skills at local authority level require upgrading to assist in rational planning of water and sanitation technologies at this level.

3.6.2

Back-up Sources

Zimbabwe is a drought-prone region and plans need to anticipate periods of drought and the lowering of ground-water levels. Where seasonal wells and springs are the most appropriate technical solution it is recommended that a network of boreholes and deep wells be provided at less frequent intervals as 'back-up' sources.

3.6.3

Geographic Concentration of Resources

Selecting priority localities for water provision according to need alone can result in a less efficient use of implementation resources and a high unit cost. It is recommended that, while allocating some proportion of district budgets to especial needs, better value for money will be achieved by concentrating services in a series of geographically adjacent blocks which saturate demand in these areas. This approach will greatly reduce unit cost and so allow more units to be provided. A concentration of resources will also allow for easier local participation and will lessen construction time.

3.6.4

Selection of Priority Areas

The allocation of priority areas within the country for water and sanitation can be made on several criteria, including expressed need, developmental impact, political influence, resource availability, administrative ease, cost, health risk, ability to attract donor funding, etc.

Several volumes of the Master Plan provide information which assist in selecting priorities. These include: the Inventory (Volume 3.3) and population studies (Volume 3.1), from which can be derived population densities per water supply; the national socio-economic study (Volume 4.2), which also provides information for provincial comparison; the health profile (Volume 4.1) which identifies health risk areas; and hydrogeological studies (Volume 2.2) which map hydrogeological units.

The Master Plan is not intended itself to develop regional programme plans, but to provide the tools by which regional priorities can be decided by rational planning methods. It is recommended, however, that the Inventory, at this preliminary stage, should not be taken in isolation from other considerations.

3.6.5

Upgrading Existing Facilities

Upgrading or rehabilitating existing resources is often the most cost-efficient method of providing facilities. Provincial and district plans should give high priority to rehabilitaion of existing piped supplies, boreholes and wells, and to upgrading unprotected wells and unventilated latrines.

3.7 DESIGN CRITERIA

The review of water and sanitation technologies (see Volume 4.4, 8 and 8.1) developed a series of standard technical design-criteria for planning and design of facilities. Table A1.1 in Appendix 1 summarizes basic design criteria for water supplies.

Technical considerations are only one component of an appropriate programme strategy. Technical success cannot be equated with real success, and may in fact represent failure. If water is produced where people do not need it, or for example, if borehole siters give too much weight to a very high rate of technical success and ignore consumers' need for proximity of access, supplies may be under-utilized. Similarly, if the people are not prepared to play their expected role, for example, failing to take over day-to-day maintenance within a limited period, the recurrent costs will be greater than necessary, and the project may be a partial failure.

Socio-economic considerations must, therefore, be taken fully into consideration in technology choice, such as in the well/borehole choice described below in Section 3.13, as well as in design.

3.8 ANCILLARY FACILITIES

In order to enhance the health benefits derived from water and sanitation provision, ancillary facilities which maximize water and sanitation use should be constructed. At every rural water

point for domestic use the following should be considered:

(i) Concrete apron and run-off channel
(ii) Clothes washing facilities
(iii) Cattle-proof fencing
(iv) An hygienic area round the water point and an adequate method of disposing of waste water, and
(v) Rubbish pits for solid waste disposal.

It is also recommended that the feasibility of washing and bathing facilities at improved sources should be tested.

Every rural water point for livestock should comprise:

(i) Cattle-proof fencing around the pump
(ii) A means of delivering water away from the water source
(iii) Adequate livestock watering troughs, and
(iv) An hygienic area surrounding troughs.

To support sanitation provision the following facilities should be encouraged:

(i) Convenient hand-washing facilities for post defecation hygiene
(ii) Facilities to promote the use of latrines, bathrooms and hygiene in the latrine
(iii) Squat-hole inserts to encourage latrine usage by children, and
(iv) Provision of latrine mosquito traps.

3.9 PROXIMITY OF ACCESS

It is recommended that proximity to users be the primary criterion for rural water provision. This is reflected in water supply design criteria discussed in Volumes 3 and 4.2. The reasons for adopting this strategy include:

(i) Proximity of access is the users' priority need
(ii) Proximity of access promotes consumption of a greater quantity of water. The importance of water-washed diseases in Zimbabwe means that the optimum health intervention is to increase the quantity of water used by beneficiaries
(iii) Proximity of access will have the greatest impact on the time and energy spent by women and children in water collection, and
(iv) The Master Plan studies indicate a highly eclectic pattern of water use. Users will only restrict their water collection to improved sources when they are within easy reach of home.

LIVESTOCK WATERING 3.10

Improvement in provision of livestock watering in communal areas is highly necessary, but must be provided within an overall water supply plan including human domestic demand, and within the context of appropriate land-use management systems.

To limit the seasonal competition for water between humans and livestock it is recommended that, where possible, quite separate provision be made for livestock and human watering, with full provision of appropriate headworks facilities as described above. Provision for separate livestock water points sited in grazing lands needs to be made in the development of micro water plans as described in Section 3.3.

Given the relationship between grazing and livestock watering, new water development programmes should be introduced within the context of land-use management plans. No separate livestock watering programmes should be developed outside a grazing scheme framework. Where agreements on controlled grazing are accepted, separate water development programmes for livestock in the communal areas are to be encouraged.

SOIL EROSION AND SILTATION 3.11

While the risks of dam siltation identified in the Siltation and Soil Erosion Survey can to a certain extent be resolved through improved engineering and design, albeit at considerable financial cost, the real problem to be tackled is erosion. It is, therefore, recommended that integrated soil and water conservation programmes be carried out with priority being given to small catchments. These would reduce soil erosion and sediment yields. Water development should thus be seen as one possible catalyst towards controlling soil erosion.

The institutional tools for carrying out such a strategy are available in Zimbabwe, but require some strengthening. It is, therefore, recommended that:

(i) The Department of Natural Resources, in conjunction with the Department of Agricultural Technical and Extension Services, develop its research and monitoring ability by means of manpower development, reorganization and additional finance
(ii) The Natural Resources Board should develop procedures to increase investments in catchment conservation in combination with water development programmes

(iii) Consideration be given by Government to the establishment of River Valley Authorities to plan and control all conservation-related activities on a river catchment basis, and

(iv) A siltation and soil erosion monitoring programme be established under the control of Natural Resources Board in collaboration with the Hydrology Branch of the Ministry of Energy and Water Resources and Development. Its aim would be to broaden the present data base, thereby providing factual data for the planning of district and local conservation strategies.

Detailed recommendations are presented in Volume 3.2.

3.12 PIPED WATER SUPPLY POLICIES

This section summarizes key policy issues with regard to piped water supplies. Further details can be obtained from Volumes 3 and 3.4.

3.12.1
Where Should Piped Water Supplies Be Provided?

It is recommended that piped water be provided only at service centres, growth points and selected resettlement areas.

It will be a considerable period before the revenue from piped supplies in these centres will meet the costs of operation and maintenance. However, the development of service centres is an essential element of Government's policy for achieving a more even spread of development, and for this reason, it is believed that the provision of piped water at service centres is justified, even though these supplies will not be financially viable in the short term. In the context of the water supplies trading account the level of subsidization will be low.

3.12.2
Should Water Supply Stations Provide Water to Communal Consumers?

Water supply stations in service centres generally supply only Government institutions and a few consumers who can afford individual connections, i.e. they exclude many of the nearby population.

The problem that would arise from the extension of water supply stations as a communal service is 'Who should pay?'. If attempts to enforce monthly water rates on communal consumers are unsuccessful, Government, either central or local, would have to pay the costs of the water, as occurs today at piped village water supplies. However, if the provision of free communal water is extended to water supply stations, Government would have to face a large, continuing subsidy.

In general the Consultants are not in favour of free communal standpipes in the townships and propose that such facilities should not be provided. In their place the encouragement of group-owned connections is recommended (see below).

3.12.3
Water Supply Station Pricing Policy

In general, the pricing policy of the Ministry of Energy and Water Resources and Development at its water supply stations is endorsed. The policy is that the rate should be set so that revenue covers the costs of operation and maintenance, but that no contribution to capital cost recovery can be expected. The main problem is that rates have fallen well behind inflation and the Ministry of Energy and Water Resources and Development is failing to meet its own objective. It is, therefore, recommended that the general water rate be increased to fifty cents per cubic metre.

It is also recommended that special rates be abandoned, but that the Ministry of Energy and Water Resources and Development should sell water to intermediary consumers (i.e. those consumers who resell the water to the actual users) at forty cents per cubic metre, to allow them a profit margin of ten cents per cubic metre to meet their own costs. These rates should mean that the water supplies trading account will break even over 1986/7, but further increases in line with inflation will be required in 1988/9 and every second year thereafter.

3.12.4
Should Consumers Be Charged for Communal Standpipe Access?

It is believed that it could prove very difficult, if not impossible, to find a solution to the problem of rate collection from communal standpipe consumers. The limited ability of the poorer sections of the rural population to pay means that rates must be very low if a significant minority of the rural population is not to be excluded from access.

It is estimated that the revenue gain from charging consumers would meet less than ten per cent of Government's costs. Moreover, if rate payment enforcement is not strictly applied, the end result would be free communal standpipes. If strict enforcement is applied, the end result may be closed standpipes and non-functioning supplies. Hence consumers would

be denied access even though the investments had been made. Therefore, it is recommended that the Ministry of Energy and Water Resources and Development choose between free communal standpipes or a shared group-connection policy.

3.12.5

Group-owned Connections

Although the difficulties of collecting revenue from communal water points make them inappropriate from a financial point of view, they nevertheless have considerable social merit. It is proposed that this conflict should be solved by the formation of water user groups which would pay for a connection, own it, and pay for consumption on a metered basis. One individual should be deemed to be 'the consumer'. He will be responsible for paying the monthly water bill and for collecting contributions from other members of the water user group. The arrangements for the collection of the individuals' contributions and the division of the bill between members would be the responsibility of the group.

3.12.6

Recommended Piped Village Water Supply Development Strategy

It is recommended that no more village water supplies should be constructed until revenue collected from existing piped supplies covers sixty per cent of their recurrent costs. The reasons for this are:

(i) The approximate construction costs of piped village water supplies are a high Z$160 per capita, as compared to Z$32 for boreholes and Z$15 for protected wells

(ii) The per capita annual operation and maintenance of piped village water supplies is approximately six times greater than those for primary supplies, over Z$5 compared to Z$0,75 to Z$1

(iii) Given the financial constraints facing Government, subsidies to the rural water sector cannot be allowed to become disproportionately large. Unless there is a very good reason, the cheaper supply strategy should be selected

(iv) When consumers use communal standpipes the realized benefits of a piped supply may not be much greater than those from primary supplies

(v) The potential for effective community management of day-to-day maintenance and simple repairs is far greater at primary than piped supplies, and

(vi) An equitable distribution of sector investments between service centres and the rest of the rural areas is desirable. 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.

The sixty per cent target is likely to be achieved only by the successful introduction of the group-owned connection policy. In the case of failure of this policy the construction of piped village supplies should not recommence until the entire rural population has access to a satisfactory improved primary supply.

If the sixty per cent level of collection is achieved construction should recommence. The income generated will have served to demonstrate the high value of the piped supplies to the consumers, thus justifying resources for their construction even before the entire rural population has access to a safe water supply.

PRIMARY WATER SUPPLY POLICIES 3.13

This section summarizes key policy issues with regard to primary water supplies.

3.13.1

Where Should Primary Water Supplies Be Provided?

Primary water supplies are recommended in all communal and resettlement areas (outside of areas supplied by piped supplies), where there are domestic or livestock watering needs.

3.13.2

Primary Water Supply Technical Choice

The diverse hydrogeological, hydrological, climatological and social environments in rural Zimbabwe require the development of a mix of water technologies in rural water supply provision.

While spring protection, rainwater collection and sand abstraction have their place in Zimbabwe's rural water supply development, and will have particular local application, the major choice for primary supplies rests between dug wells (shallow or deep) or machine-drilled boreholes. Experience with hand-augered boreholes (or tubewells) at the time of writing is too limited to evaluate their long-term role.

In virtually all hydrogeological zones identified in Volume 2.2 the ratio of wells to boreholes technically possible varies greatly. In many cases it would be possible to choose between nearly all wells or nearly all boreholes. Hence the choice between wells and boreholes can often be made on other criteria, although the appropriate proportions will naturally vary

regionally.

The advantages of hand-dug wells include:

(i) Lower cost per consumer (Z$15 per capita as compared with Z$32 per capita for borehole users)
(ii) Since the average planned number of consumers per well will be less than that per borehole, the average distance that a consumer has to travel to a well is less than that to a borehole (Section 3.9 details the merit of proximity)
(iii)Technically they are more amenable to community participation both for construction and maintenance. Furthermore, since the number of consumers will be smaller the beneficiary groups may be more cohesive
(iv) They can be operated by simpler pumping devices which is important in areas where pumps cannot be maintained properly, and
(v) Well-sinking programmes involve labour-intensive techniques, traditional skills, less costly siting procedures, and do not utilize expensive drilling equipment.

However, wells may be more prone to yield fluctuations and to contamination than boreholes. For wells to be effective throughout the country all well-sinking programmes require a blasting capability.

On economic and sociological criteria, the Consultants tend to favour dug-wells as the primary water supply of choice. But boreholes must be constructed:

(i) In areas where wells are technically inappropriate, and
(ii) On a more limited scale to provide the necessary back-up in areas where the dry season yield of shallow wells providing the bulk of water requirements may fall below the level needed to supply the minimum basic requirements.

While recognizing that the appropriate ratio will vary regionally (see Volume 2.2), the Consultants suggest that nationally a two-thirds wells, one-third boreholes division, is the approximate appropriate order of magnitude ratio.

The proportion of boreholes in the Rural Water Supply Programme is considerably greater than thirty three per cent of all primary supplies. This higher ratio did not constitute a policy recommendation, but was a means of being conservative in costing the rural water supply programme since per capita costs are greater than for wells. *Inter alia,* this provides flexibility to increase the number of wells if it is found that community participation is able to generate successful development, thereby reducing the number of consumers per well and increasing the proximity of water to consumers.

3.13.3

Primary Water Supply Community Contribution Policy

The limited willingness of consumers to pay for primary water supplies, combined with the administrative problems associated with collection, means that attempts to raise revenue from consumers, which are divorced from community participation, will probably fail. However, primary supplies are amenable to community participation, and a clear policy choice exists between:

(i) Free water, which while having considerable merit, implies a very large continuing Government subsidy for maintenance, and
(ii) A real community participation input by consumers.

The Government is moving towards the latter alternative and this policy is endorsed.

It is recommended that local communities should be responsible for day-to-day maintenance and simple repairs. In addition small cash payments, initially Z$1 per household per annum, should be collected from all members of the user community. It is estimated that these contributions could reduce Government's direct maintenance costs by two-thirds.

However, it will take a few years before communities are able to achieve the level of direct-cost saving for Government. Furthermore, it is evident that effective community participation will in itself entail Government expenditure, since considerable manpower and financial resources are required to support local communities in the early years of a project. During this period the community participation costs can be at least as great as the direct maintenance cost savings.

It is likely, therefore, that if community participation is undertaken properly, there will be little or no recurrent cost saving for Government during the first three years of a new supply. But thereafter, as Government's community participation inputs and direct maintenance costs are reduced, its overall recurrent costs will fall. It is estimated that while the primary water supply programme will be expensive and direct cost recovery unrealistic in the early years, effective community participation could reduce Government's recurrent costs by half in the

long run.

3.14 MANPOWER DEVELOPMENT

Approximately one-fifth to one-quarter of the overall cost of the Rural Water Supply Programme will be devoted to manpower. There are major benefits here in terms of employment opportunities, enhancing skills from the community level to senior professionals in the formal sector, and spread effects into rural productivity. The long-term outlook for a fully localized manpower cadre in water and sanitation is good. In the short term, however, local resources will not be sufficient. Strategies to meet this are examined below in Section 6.

There is a basic policy choice required on how to proceed, given this crucial constraint. Three basic scenarios may be identified:

(i) Subordinate the implementation schedule fully to the rate of supply of local manpower
(ii) Undertake a crash programme of implementation based on imported technical assistance, or
(iii) Link the rate of implementation to success in local recruitment on the basis of systematic measures, or with a planned and judicious campaign of international recruitment.

The Consultants consider that (i) will in the end prove the most costly; essentially it means postponing completion by up to ten years, with the corresponding increase in costs and foregone benefits. On the other hand, it ensures the retention of skills and experience, and would promote a fully national effort. Scenario (ii) has a number of drawbacks, notably in foregone opportunities for multiplier effects, retention of experience, and the high risk involved in using foreign expertise which may not necessarily be equipped to deal with the specific problems and policies of Zimbabwe. Where technical assistance is used, the use of counterparts is endorsed. Scenario (iii) seeks to minimize the risks and costs inherent in (i) and (ii). This is recommended by the Consultants (details are provided below in Section 6 and in Volume 7).

3.15 OPERATION AND MAINTENANCE

Inadequate support for operation and maintenance can result in massive wastage of investments and great frustration on the part of beneficiaries. Zimbabwe's existing capacity in the District Development Fund and the Ministry of Energy and Water Resources and Development has coped adequately with earlier levels of sector development.

However, with increased levels of development there is now an urgent need to give operation and maintenance the highest consideration in planning rural water and sanitation programmes. In particular, successful implementation of Master Plan Programmes will require a considerable shift of the weight of resources from development to operation and maintenance (see Section 6 below).

3.15.1

Maintenance of Piped Supplies

Until such time as local authorities or the District Development Fund are capable of taking over the responsibilities for operation and maintenance of piped water supplies, the Ministry of Energy and Water Resources and Development will retain it. Recommendations to enhance the present capacity include:

(i) A clearer division of responsibilities between maintenance and construction teams at the provincial level
(ii) The establishment of additional branch workshops, and
(iii) Enhanced manpower and support for maintenance with the Ministry of Energy and Water Resources and Development.

3.15.2

Maintenance of Primary Supplies

The District Development Fund is charged with the overall responsibility for maintenance of primary supplies. Implementation of the Master Plan Programmes will necessitate a major expansion of the District Development Fund's maintenance capacity for primary supplies.

To cater for this expansion, a three-tier maintenance strategy is proposed, as follows:

(i) Village Level: Water Committees, as sub-committees of Village Development Committees will be responsible for preventive maintenance. Each committee should have at least one simply equipped voluntary, trained pump caretaker with specific responsibilities for preventive pump maintenance

(ii) Ward Level: Paid pump minders will be appointed through the District Development Fund to undertake routine maintenance and repairs for up to fifty installations, and to supervise the work of the pump caretakers

(iii) District Level: District Development Fund district maintenance units will

oversee and provide third-tier back-up to all district maintenance of primary supplies.

The establishment of these new structures will require: considerable training at all levels; the development of effective reporting systems; systems for the provision of spares; and greater standardization of hand pumps.

3.15.3

Maintenance of Latrines

Operation and maintenance problems of Ventilated Improved Pit Latrines will be greatly lessened by improved standards of construction through skill training, and the development and distribution of construction aids and training materials.

Maintenance of latrines will remain the responsibility of owners, supported by Health Assistants and Village Health Workers or Village Community Workers. The responsibility for replacement of latrines, anticipated to be every ten to fifteen years, will lie with the users.

It is recommended that rural consumers should contribute to the cost of rural water supply and sanitation, thereby reducing the costs incurred by Government and enhancing local responsibility for services. Discussion of key policy issues with regard to payment for water is presented in Sections 3.12 and 3.13. In general the recommended policy target is partial to complete recovery of recurrent costs for water supplies, and no cost recovery of sanitation subsidies. A summary of recommendations is presented in Table 3.2.

3.16.1

Piped Water Supply Consumers

It is recommended that communal standpipes be provided to water user groups as described in Section 3.12. User groups would pay for water on a metered calculation, with a unit cost worked out on a household basis.

Complete cost recovery of the capital costs of piped supplies is felt to be an unrealistic aim.

Table 3.2
Summary of Cost Recovery Policy Recommendations

Facility / Category	Water		Sanitation
	Piped Supplies	Primary Supplies	Latrines
Consumer Unit	Water-User Group containing Consumer Households	Water-User Group containing Consumer Households	Household
Rates (Jan 1986 Prices)	General Rate 50 cents/m³ Concessionary Rate 30 cents/m³ Intermediary Rate 40 cents/m³	Z$1/Household/Annum	Nil
Capital Cost Recovery Target	None (Pilot-test community construction)	Not Quantified (Community participation in construction and provision of local materials)	Not Quantified (Community participation in construction and provision of local materials)
Long-Term Recurrent Cost Recovery Target	Complete (cash payment and labour)	Partial (50% of total cash payment and maintenance)	None (User Labour in maintenance)

Consumer contributions to cost recovery, through community participation in construction requires further pilot-testing and close monitoring to develop model cost-efficient implementation procedures.

3.16.2

Primary Water Supplies Consumers

Recommended consumer contribution to the capital cost of primary water supplies will consist of labour for excavation (in the case of wells) and construction of headwork facilities, and the provision of local materials. An annual payment of Z$1 per household per annum is the initial recommended consumer contribution to recurrent costs, in addition to payment for tools and defined spares, and a community-level contribution to pump and headworks maintenance.

3.16.3

Sanitation

On the basis of willingness-to-pay survey data and Government's overall health objectives, it is recommended that Government continues to subsidize the cost of rural sanitation. Householders will contribute local materials and labour, for excavation and construction, and be responsible for maintenance.

4. Rural Water Supply Programme

4.1 THE RECOMMENDED RURAL WATER SUPPLY PROGRAMME

A detailed description of the Rural Water Supply Programme is presented in Volume 3. The main components of the recommended Long Term Programme (1985 - 2005) are:

(i) Complete coverage of communal and resettlement area populations, and their livestock, with potable water supplies by the year 2005

(ii) Provision of 576 new piped supplies to 476 service centres and 100 resettlement areas

(iii) The remainder of the population to be served with potable water from approximately 36 000 primary supplies

(iv) A total annual investment costZ$333 million (in 1985 prices). The estimated total annual cost including all support cost (in 1985 prices) is Z$699 million, or taking account of inflation, Z$2 992 million. Approximately sixty six per cent of this sum, Z$220 million, will be required for primary supplies, while piped supplies will cost about Z$113 million.

(v) The proposed piped supplies will serve a design population of 330 000 and the primary supplies a population of 8,6 million. Per capita investment costs (1985 prices) are Z$342 for piped supplies, and Z$25,60 for primary supplies, with an overall average of Z$37,30 for all supplies. Per capita annual operation and maintenance costs (1985 prices) will be approximately Z$20 and Z$0,9 for piped and primary supplies, respectively, and

(vi) A major and immediate investment of resources into operation and maintenance and an increasing shift of the weight of resources from development to operation and maintenance through the plan period.

Table 4.1 shows the number of piped and primary supplies proposed and the associated development costs (in 1985 prices), for the short, medium and the long-term Programme periods.

Figure 4.1 presents the annual development and operation maintenance costs for the programme on a national basis in 1985 prices. It can be seen that:

(i) Annual development costs (in 1985 prices) increase from Z$13,7 million in 1985/6 to almost Z$20 million by 2004/5, based on a two per cent real annual increase

(ii) The associated operation and maintenance costs increase from Z$4,5 million in 1985/6 to Z$21,3 million in 2004/5. The 1985/6 figure is approximately forty per cent above that currently being spent on operation and maintenance. This reflects the shortage of finance being provided at present for rural water supply maintenance. The necessary annual increase in operation and maintenance costs averages over eight per cent per annum in real terms from 1985 to 2005, but during the Short Term Programme period an average of thirteen per cent per annum is needed

(iii) The total direct annual costs increase from Z$18,2 million in 1985/6 to about Z$41,3 million in 2004/5 (1985 prices). This represents an annual increase in real terms of just over four per cent, and

(iv) The total annual costs, including a twenty per cent allowance for overhead support costs, increase from Z$21,8 million in 1985/6 to Z$49,5 million in 2004/5.

Table 4.1

Summary Table of Targets for the Rural Water Supply Programme

Programme / Targets	Short Term Programme 1985-1990	Medium Term Programme 1985-1995	Long Term Programme 1985-2005
No. of Primary Water Supplies	6,878	15,462	35,861
No. of Piped Water Supplies	136	224	576
TOTAL INVESTMENT (1985 Prices) (Z$ 1000)	71,362	150,029	333,148

The main feature of the proposed expenditures is the need continually to increase the proportion of the total resources for maintenance. In 1985/6 operation and maintenance requires under twenty five per cent of total rural water supply expenditure, but by 2004/5 the proportion increases to over fifty per cent.

Figure 4.2 presents an estimate of future costs of the Long Term Programme assuming a rate of inflation of fifteen per cent to 1990, and of ten per cent thereafter.

PROGRAMME DESIGN 4.2

This sub-section summarizes explanatory notes to support the recommended programme. The Master Plan targets proposed in the Rural Water Supply Programme signify a substantial increase in construction and maintenance activity, and their achievement will depend upon resource allocation and the implementation of sector recommendations.

Limited attention should be given to the

Figure 4.1
Projected Costs of the Recommended Rural Water Supply Programme (1985 Prices)

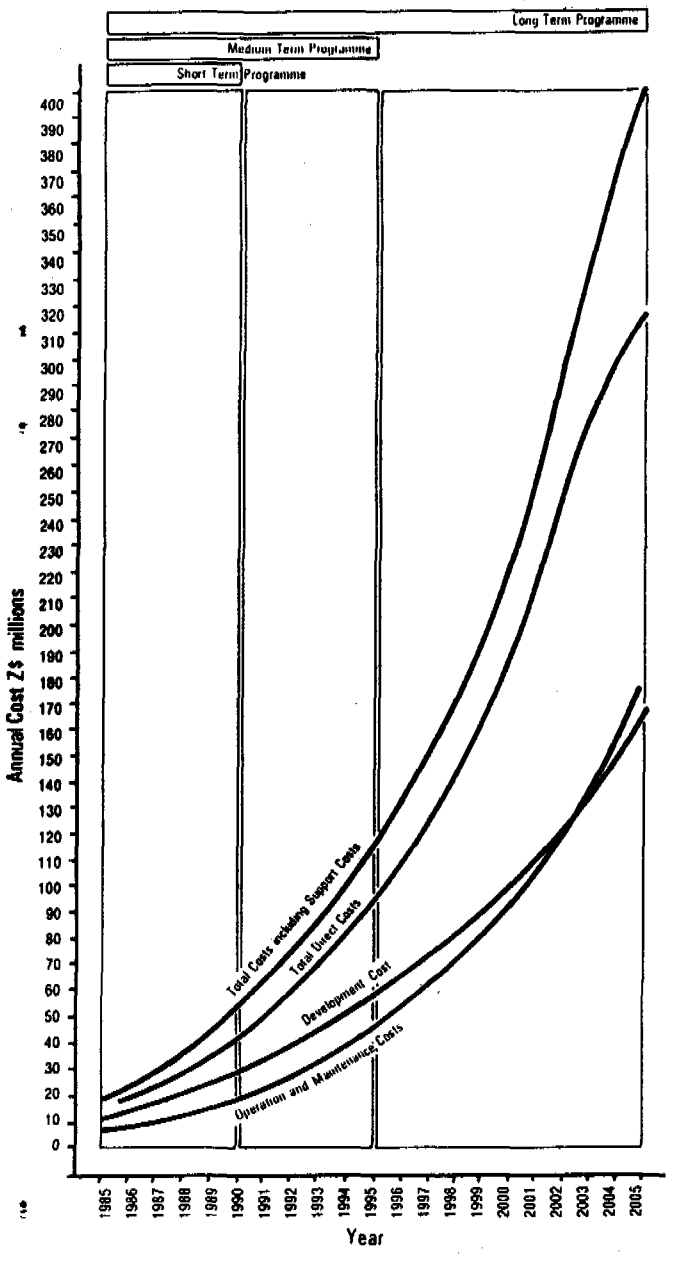
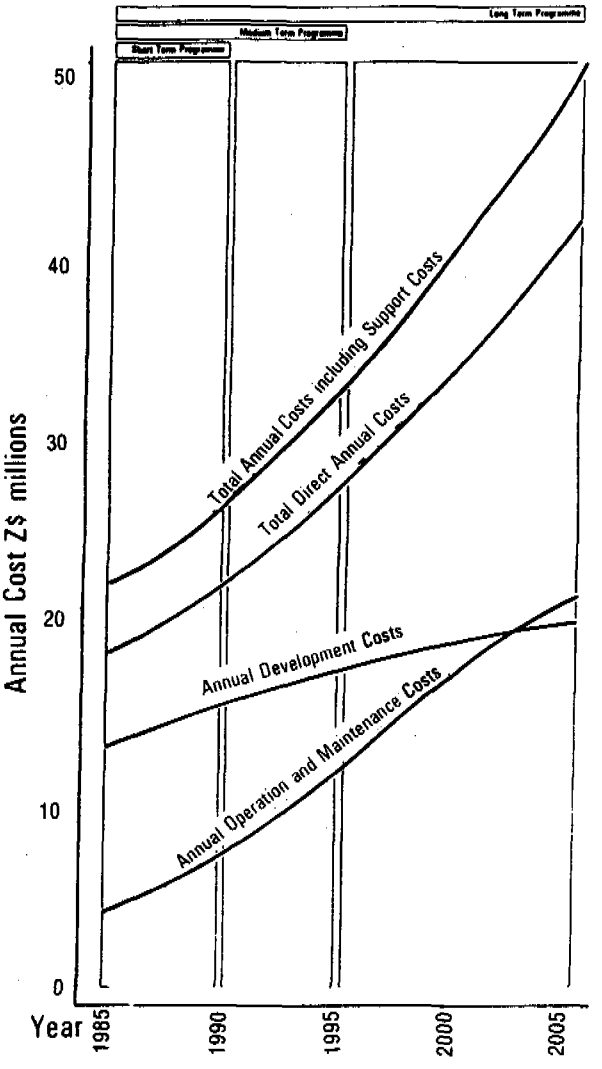


Figure 4.2
Future Costs of the Recommended Rural Water Supply Programme (Actual Costs)



actual numbers of facilities proposed, since these will inevitably require revision in the course of the Master Plan period. Moreover, the projections of the Rural Water Supply Programme are primarily indicators of overall capacity and general direction, and do not presume to present the detail that will be generated through the decentralized process of developing village, ward, district and provincial water plans.

In order to provide flexibility in rural water supply planning the Consultants have developed an extensive computer package during their work. The computer programmes have been used to formulate the recommended Rural Water Supply Programme, but by varying any of the parameters relating to costs, numbers to be served, numbers of different types of water supplies, programme period etc., the Ministry of Energy and Water Resources and Development will be able to revise the programme when required. A detailed presentation of the functions and structure of this computer programme can be found in Volume 3, Appendix 3.

4.2.1
Extent and Level of Service for Piped Supplies

Although the Consultants argue the case against providing communal standpipes (see Section 3.11), it is, nevertheless, recommended that the design capacity of piped supplies should allow for communal consumption. The main reason for this is that the additional development costs are minor, owing to economies of scale, and, if the capacity is provided but not required, the unnecessary investment will be small and the design life slightly extended. Furthermore, this capacity will be required if:

(i) The shared group connection policy is successful, or

(ii) The district councils wish to provide free communal standpipes and are willing to pay the water bills.

4.2.2
Extent of the Reticulation System at Service Centre Supplies

For reasons of cost (see Volume 3 for a detailed discussion), the Consultants recommend that, in general, the reticulation system should not be extended to nearby villages. Two exceptions, where it may be appropriate to extend the system in specific locations, are:

(i) Areas where the development of improved primary sources would be particularly difficult or expensive, or

(ii) Where a real demand for shared group connections has developed.

4.2.3
Phasing of Piped and Primary Supplies

If it is believed that piped supplies in service centres would significantly increase development, emphasis in the early years should be placed on developing as many piped schemes as is possible within the financial constraints. On the other hand if higher priority is given to social criteria and equity, emphasis should be placed on primary supplies so that a greater number of rural people have access to potable water as soon as possible.

The Consultants believe that the latter policy is appropriate for Zimbabwe for the following reasons:

(i) **Widespread Benefits:** The per capita cost of primary supplies is far less than that of piped supplies. Hence the proposed policy will provide a greater number of people with a satisfactory supply in the early years of the programme

(ii) Development Prospects at Service Centres: Although the impetus provided by water supplies to development can be great, most impact studies have produced disappointing results in that the benefits identified have often been far less than those expected. This has usually been due to the lack of complementary inputs. In many of the identified service centres these other inputs are still lacking so the effect of a piped supply would be rather limited for some time. So while the provision of water to high priority locations can be justified today (and these will be provided in the early years of the planned programme period), it may be better to wait more than ten years before putting piped water in the majority of the centres

(iii) Low Effective Demand: The effective demand for water in many of the centres may be extremely limited in the early years because of the limited income base and most residents' ability to pay.

The Consultants recommend that a more limited number of piped supplies should be built in the period 1985-95, and that the remaining schemes should be built during 1995-2005. For example if only Z$30 million of the Z$150 million total planned 1985-95 development expenditure was spent on piped supplies in 1985-95, leaving Z$120 million for primary supplies, fifty six per cent of all primary supplies planned for 1985-2005 could be built in the first ten years.

The recommended approach of limited provision of piped supplies over the short term,

has had to be modified because of the necessity to develop the resettlement areas, through piped supplies, in the early years of the programme and to maintain a realistic expansion of construction capacity. It is concluded that it would be most appropriate to phase piped schemes, as indicated in Figure 4.3, increasing to around thirty five schemes per year in the latter years of the plan period. Figure 4.4 presents the yearly output of primary water supplies.

4.2.4

Scheduling of Total Programme Cost

Figure 4.5 presents alternative projections for annual investments in the Rural Water Supply Programme scheduled over 1985 to 2005. Scenario 1 presents total annual maintenance and operating costs for only 110 highest priority service centres: while scenario 2 includes these costs for 476 highest priority centres. Each scenario is projected assuming both two and five per cent annual increases in development expenditures (representing real annual increases on all water supply expenditure of approximately four and seven per cent respectively).

It is recommended that the scenario wherein piped supplies are uprated or newly constructed in all 476 service centres should be adopted. Firstly this is closest in line with the Government's overall rural development strategy. Secondly the overall cost of the Rural Water Supply Programme from 1985 to 2005 would only be twenty per cent greater than if piped supplies were restricted to two piped supplies in every district, i.e. 110 supplies, and the cost is considered to be affordable.

The two per cent annual increase in

Figure 4.3
Projected Annual Rate of Construction of Piped Water Supplies

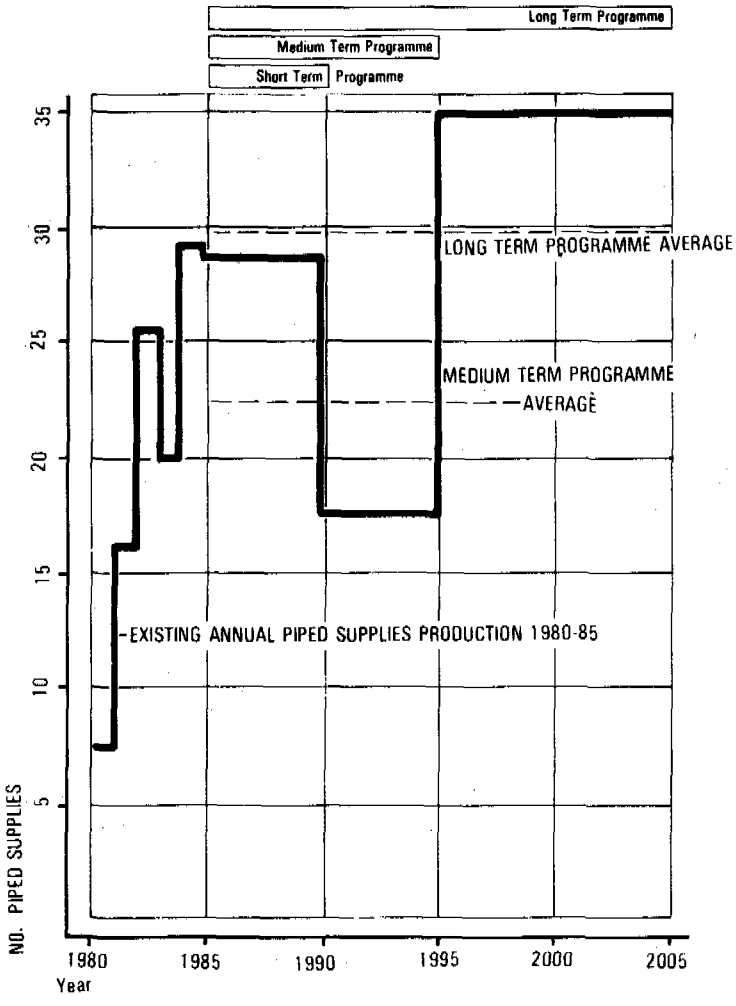
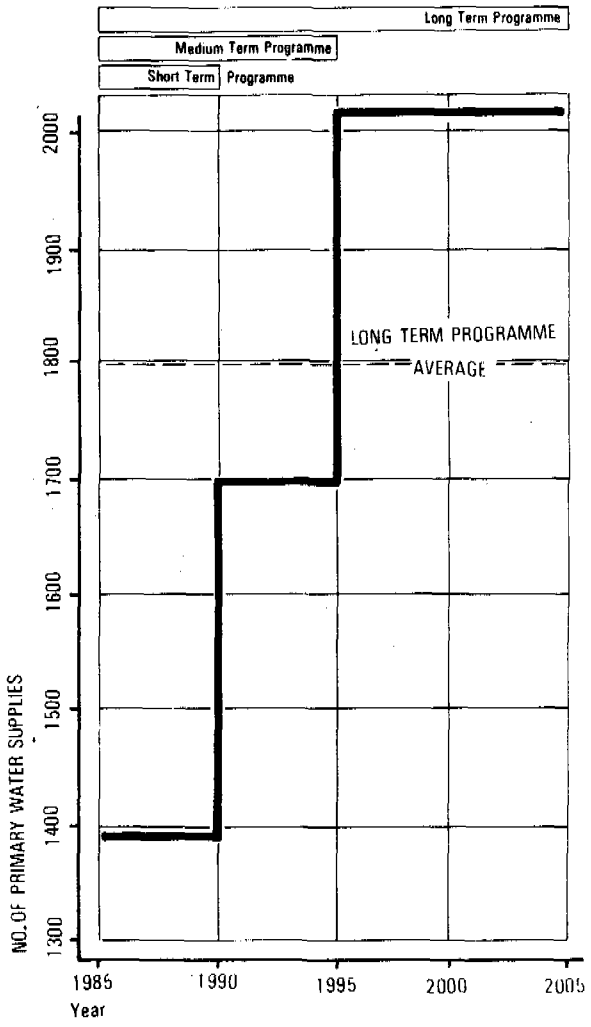


Figure 4.4
Projected Annual Rate of Construction of Primary Water Supplies



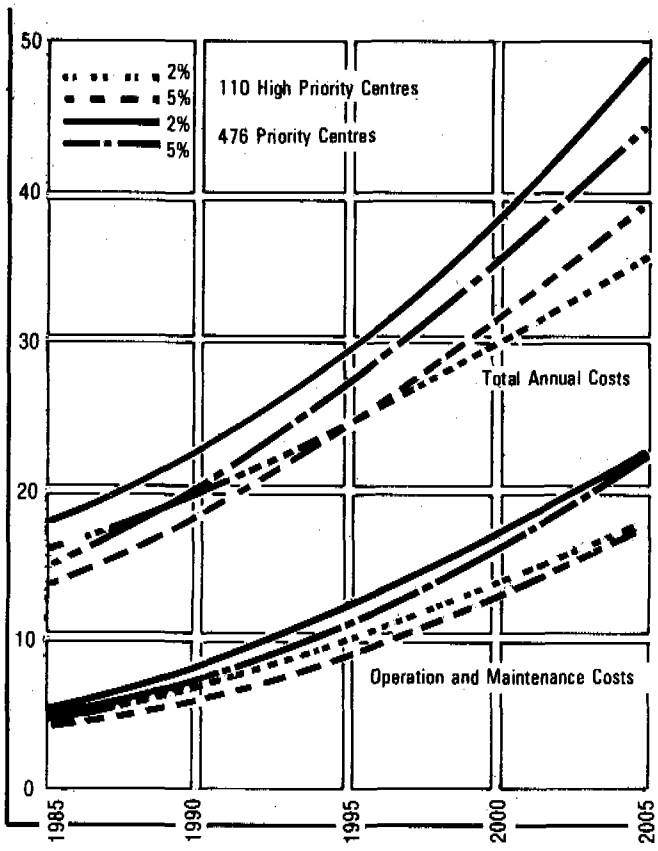
development expenditure is recommended because the annual average expenditure (Z$18 million) is consistent with recent expenditures in the sector (see Volume 3), and hence more realistic.

It could be argued that a real annual increase of around four per cent in total water supply expenditure is overly conservative. However, the implementation of the proposed plan will still achieve targets of coverage of over half of the communal area population by 1995, and complete coverage with potable water by 2005. Moreover the Consultant's proposal has taken into consideration the following points:

(i) Maintenance and Support Needs: Total financial expenditures may not be the most serious constraint to the objectives of supplying the entire plan population with potable water. Upgrading of primary supply maintenance capacity will require a major expansion of maintenance capability combined with a huge community participation training programme. The recommended programme will not only require a major investment over the next three to five years in maintenance infrastructure, but it will mean that the annual operation and maintenance cost of primary rural water supplies in the communal areas will increase from today's expenditure of around Z$3,2 million per annum to Z$8,3 million per annum by 1990, i.e. an average annual increase of twenty one per cent. Thereafter the average annual increase will be nine per cent between 1990 and 1995 and over six per cent between 1995 and 2005.

Figure 4.5

Annual Cost Projections for Service Centre Supplies with Different Assumptions



(ii) Low Effective Demand at Service Centres: Although a faster development of piped supplies than is proposed would be technically feasible, at present the level of 'effective' demand in many of the centres is still low. Construction of lower priority schemes in the early years would also mean that revenue may only cover a minor percentage of the operation and maintenance costs

(iii) Commercial Farming Sector: To date Government's involvement in water supplies outside the communal areas has largely been restricted to towns and centres. It is possible that during the Master Plan period Government may step in to ensure that the poorer section of the population in the commercial farming areas enjoy facilities equal to those being created in the communal and resettlement areas. This could increase Government's total rural water supply expenditure

(iv) Level of Donor Assistance: The proposed plan will still require a high level of donor assistance. While it is expected that donors will continue to support the rural water supply sector strongly in the next few years, it is believed that it would be over-optimistic to expect donors to assume a greater, or even the same share of support of an increasing annual expenditure as at present. The Consultants believe that it is reasonable to assume that donor contributions to the direct cost of water supplies in the communal areas will remain at around sixty per cent until 1990, but will gradually be reduced to thirty per cent by 2005.

5. Rural Sanitation Programme

5.1 THE RECOMMENDED RURAL SANITATION PROGRAMME

The Consultants examined a number of alternative programmes to achieve saturation of sanitation facilities. The optimum programme target, over a twenty-year period, based on the population projections and the assumptions that fifteen per cent of the population will construct their latrines individually, is that 1,4 million latrines need to be constructed by 2005.

To achieve this the recommended programme would have to build up implementation capacity from its present level of around 20 000 latrines per year to achieve a sustained implementation rate of close to 80 000 latrines per year from 1988 to 2000. Thereafter, the rate could taper off to match the post-2005 population growth demand of 43 000 latrines per annum.

These goals are regarded as ambitious, but not unrealistic. The expanded and accelerated training of Ministry of Health extension workers, Village Health Workers and Health Assistants is now well established and should produce sufficient staff to support a long-term latrine building programme. It is assumed here that the transition of Village Health Workers to Village Community Workers will not detract from their contribution to sanitation promotion.

If the Ministry of Health increases its latrine implementation capacity in all provinces to that of the Masvingo province, it could supervise the construction of 48 000 latrines per annum. Assistance from donors should within two years increase the overall total to 60 000. Hence a target within four years of 80 000 is not unrealistic and it is believed that, given support by donors, the Ministry is capable of implementing the proposed large-scale rural programme of latrine construction.

The Medium and Long Term Programme targets should also be attainable: if the present rate of Village Health Worker/Village Community Worker expansion is maintained every health extension worker would have to promote six latrines per annum to achieve the overall targets.

Table A1.2 (Appendix 1) presents details of the proposed Rural Sanitation Programme, and

Table 5.1

Summary Targets for Proposed Rural Sanitation Programme

	Programme		
Target	Short Term Programme (1985 - 90)	Medium Term Programme (1985 - 95)	Long Term Programme (1985 - 2005)
No. of Latrines Proposed	283 000	678 000	1400 000
Population to be Served	1 600 000	3 800 000	7 900 000
Total Investment Z$'s (Future prices)	41 800 000	100 100 000	206 900 000

shows the number of latrines which should be constructed annually, together with the cumulative number of latrines. Table 5.1 summarizes the numbers of latrines proposed and development costs (in 1985 prices) for the Short, Medium and Long Term Programme periods. The projected annual construction targets are presented in Figure 5.1. It can be seen that the proposed twenty-year programme aims to construct 283 000 latrines to serve just under one third of the unserved population by 1990, the end of the Short Term Programme period. By the end of the Medium Term Programme in 1995 some 678 000 latrines should have been constructed, and approximately two thirds of the communal area population should be served with a Ventilated Improved Pit Latrine.

5.2 SUBSIDIES AND UNIT COSTS

Recent experience suggests that the provision of locally unobtainable items needed for latrine construction (i.e. cement, reinforcement, fly screen and ventilation pipes) is an important prerequisite for sanitation programme success. It is proposed that a standard level of provision of these items should be maintained in all rural sanitation programmes. It is estimated that the average cost of these inputs is just under Z$28 per latrine (1985 prices). This level of subsidy to be provided by Government is considered sufficient to encourage the proposed rate of construction. If it were to be reduced or eliminated, the number of latrines built and/or the standard of construction may fall.

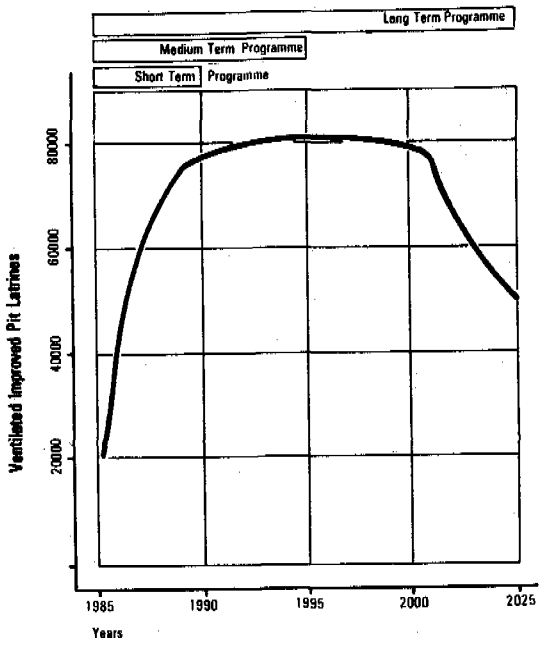
Although the national socio-economic survey showed that there exists a genuine willingness to contribute to latrine construction, the Consultants consider that cost recovery of the recommended subsidy is not feasible. The experience of ongoing successful programmes suggests that given adequate promotion by the Ministry of Health, beneficiaries would be willing to provide labour and locally available materials. The imputed value of these inputs is estimated at Z$100 per latrine (1985 prices). Government support costs for promotion and organization are estimated to average Z$20 per latrine (1985 prices).

5.3 RURAL SANITATION PROGRAMME COSTS

Table A1.2 also shows the materials subsidy, support, and local contribution costs based on the above unit costs. Figures 5.2. and 5.3 present a graphic summary of cost projections.

It can be seen that the total cost of the

Figure 5.1
Projected Annual Construction Targets for the Rural Sanitation Programme



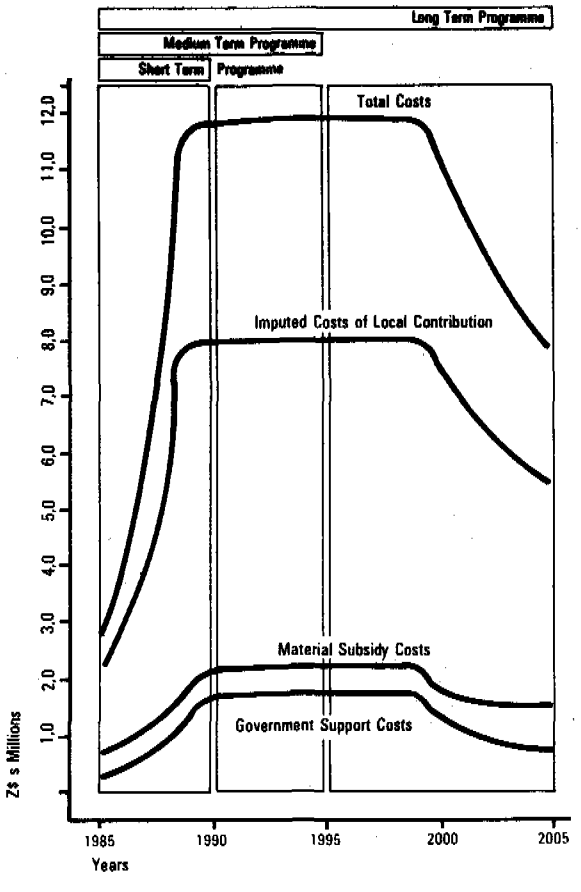


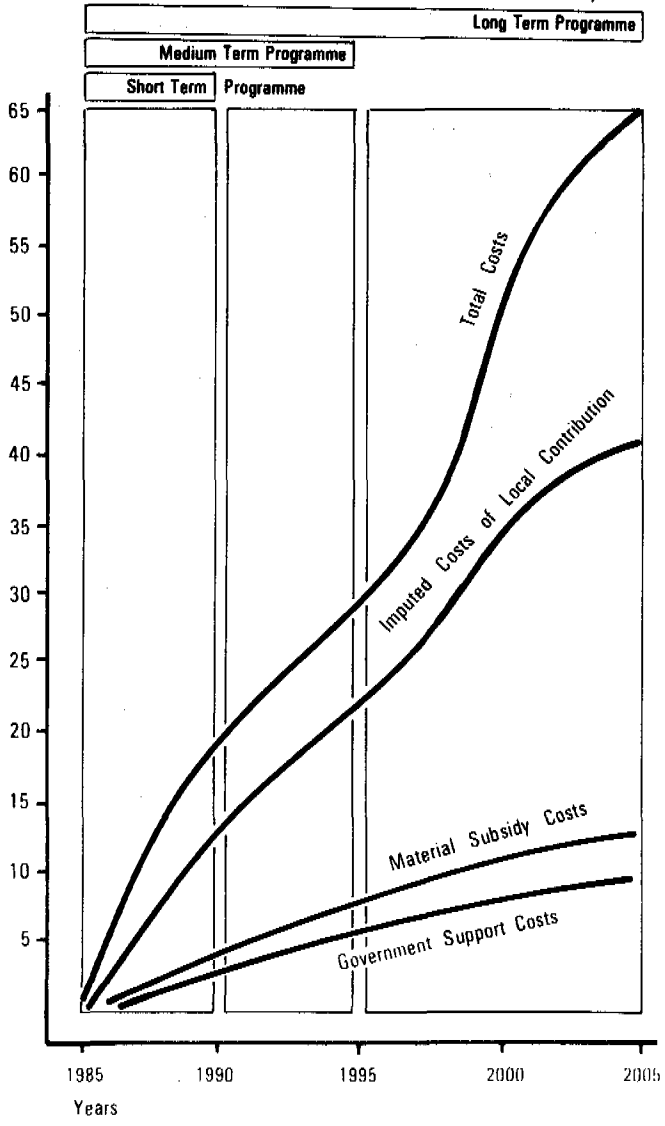
Figure 5.2
Projected Costs of the Recommended Rural Sanitation Programme (1985 Prices)

proposed pit latrine programme including the imputed value of the beneficiaries' contribution is estimated to be Z$207 million in 1985 prices. The local contribution represents almost sixty eight per cent of the total cost, and the cost to Government is estimated to be Z$39 million to cover the materials subsidy, and Z$28 million in support costs (in 1985 prices). While the latter will be provided by Government, it is expected that donors may provide approximately two thirds of material costs.

The anticipated distribution of costs between beneficiaries, Government and donors is summarized in Table 5.2. These apparently high future costs are put in perspective by seeing them in annual terms in 1985 prices. The total cost to Government of Z$146 million in Figure 5.2 represents an annual cost of Z$2 million in 1985 prices.

Figure 5.3

Projected Costs of the Recommended Rural Sanitation Programme (Future Prices)



5.4 POLICIES NECESSARY FOR LONG-TERM SUCCESS

To achieve the proposed implementation rate, given donor assistance and given that Government would be able to provide the necessary funding, a number of policy measures will need to be followed. These include:

(i) A Mix of Implementation Strategies: The programme should include a mix of available implementation strategies, including the use of local builders, individual construction and community construction groups, each of which has particular applications

(ii) Expansion of Pilot Projects: Pilot projects, which have proved valuable in initiating expanded programmes, should be established in each province

(iii) Upgrading Programmes: Wherever possible well-constructed non-vented latrines should be upgraded

(iv) Programme Implementation: Higher priority must be given to the establishment of monitoring and evaluation procedures, co-ordination with non-governmental organizations and educational and communications support, and

(v) Replacement Promotion: Given a latrine life of approximately fifteen years, mobilization procedures to ensure unsubsidized self-help replacement must be developed by the late 1990s.

Table 5.2

Distribution of Total Rural Sanitation Programme Costs (Future Prices)

Contributor	Contribution	
	Form	Cost
Beneficiaries	Labour and Local Materials	Z$500 000 000
Government	Materials and Support Costs	Z$146 000 000
Donors	Material Grants	Z$ 92 000 000

6. Financial and Manpower Requirements

6.1 OVERALL PROGRAMME COSTS

The overall costs of the proposed Rural Water Supply Programme and Sanitation Programme are presented graphically in Figure 6.1 and in detail in Table A1.3 in Appendix 1. These costs indicate an increase in annual expenditure from Z$25 million in 1985/6 to Z$57 million in 2004/5 (in 1985 prices). In future prices with the inflation assumptions described in Section 4.1, this represents an increase to Z$467 million by 2004/5. The estimates include support costs, estimated at twenty per cent of total direct costs of the programme (note that detailed manpower costings suggest a slow increase from twenty to twenty five per cent over the long term).

The total overall cost of the twenty-year Programme is Z$836 million in 1985 prices (Z$3 731 million in future prices). The total cost of the Short Term Programme is Z$164 million while the cost of the Medium Term Programme is Z$377 million (in 1985 prices).

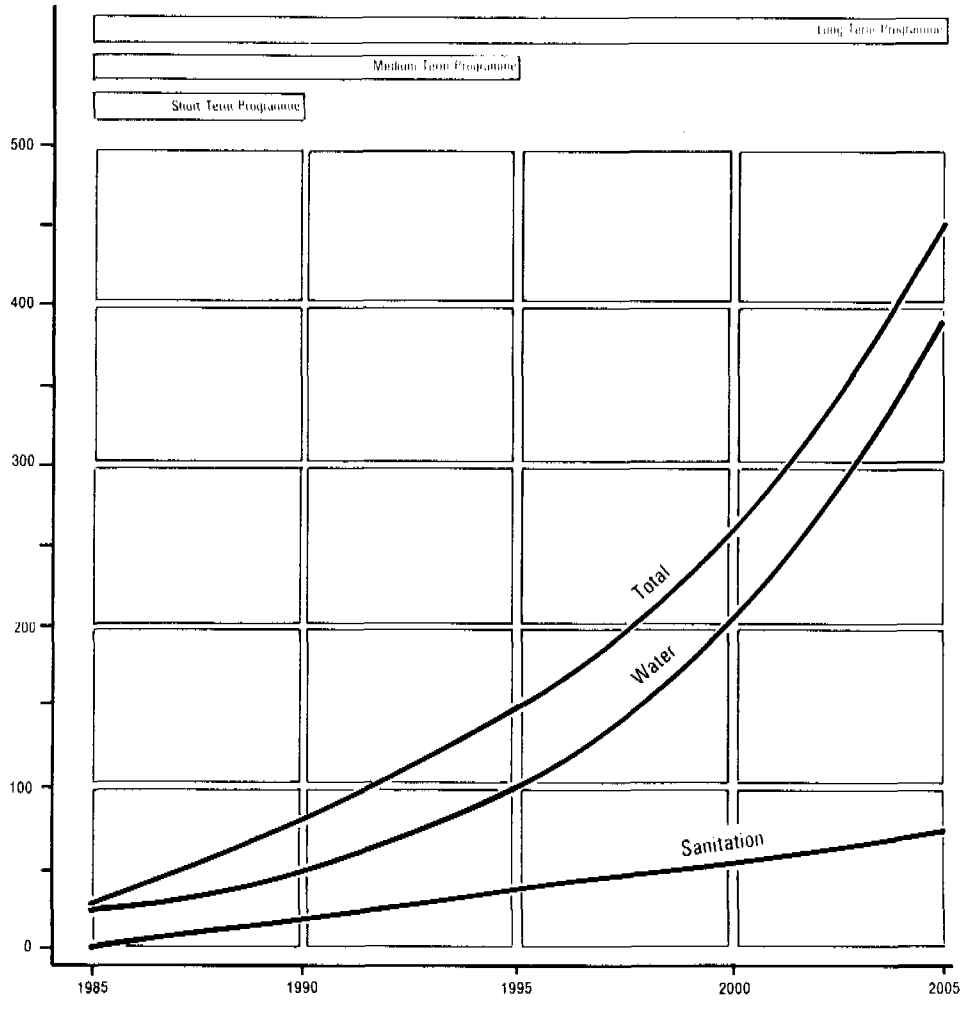
6.2 DISTRIBUTION OF COSTS

These costs will be borne by Government, with assistance from donors and contributions from consumers. It is suggested that projections of donor contributions for the rural water supply programme should be based on aid remaining at its present level of sixty per cent of direct costs until 1990, decreasing to fifty per cent by 1995, forty per cent by 2000 and thirty per cent by 2004/5. These percentages and linear interpolations for the intermediate years have been applied to the total direct water supply and sanitation costs shown in Table A1.3 to estimate the funding required from donors. From these figures it can be seen that the necessary donor contribution is projected to increase from Z$12 million in 1985/6 to over Z$109 million in 2004/5. In real terms the 2004/5 requirement is similar to that for 1985/6.

The balance between the overall cost and donor contributions will be met by Government

Figure 6.1

Overall Costs of Proposed Rural Water Supply and Sanitation Programmes (Future Prices)



and the beneficiaries. The division of the cost is uncertain since the contribution that consumers can be expected to make requires making certain key assumptions.

In the case of the Rural Sanitation Programme, it is anticipated that beneficiaries will contribute the major part of the costs (as described in Section 5) by providing locally available materials and labour. Anticipated consumer contributions to the Rural Water Supply Programme are much more uncertain; and different assumptions result in different cost projections. These are presented as Projections A, B and C in Table A1.3 of Appendix 1, and shown graphically in Figure 6.2.

Both piped and primary water supply programmes can be shown to have optimistic and pessimistic projections with regard to consumer contributions. The optimistic scenario for primary supplies is a cost-saving to maintenance costs which increases from zero in 1989/90 to fifty per cent in 2004/5 (see discussion in Section 3.12). The pessimistic projection assumes that local contributions will achieve only half these savings to Government.

The optimistic projection for tariff collection at piped water supplies is a collection of seventy six per cent of recurrent costs in 1985/6, increasing to complete recurrent cost collection by 1991/2. The pessimistic projection, again, is half of the optimistic rates.

With these assumptions the following projections are made:

(i) Projection A: Combines the optimistic primary supply assumption with the optimistic piped supply assumption. This combination results in the overall contribution of rural consumers increasing from forty per cent of maintenance costs in 1985/6 to seventy six per cent in 2004/5.

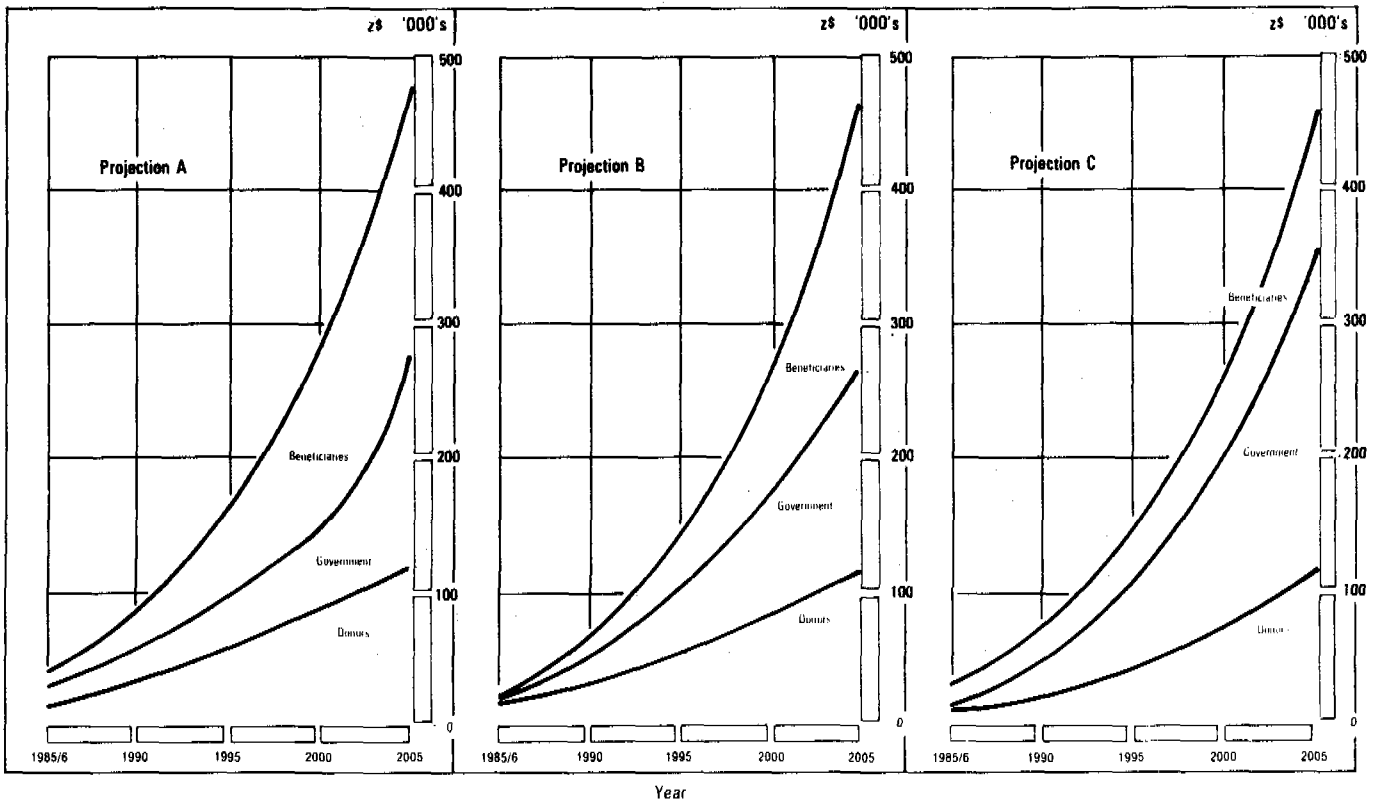
(ii)Projection B: Combines the optimistic primary water supply assumption with the pessimistic piped supply assumption. This combination results in the overall contribution of rural consumers increasing from twenty per cent in 1985/6 to almost fifty per cent in 2004/5.

(iii)Projection C: Combines the pessimistic primary water supply assumption with the pessimistic piped supply assumption. This combination results in the overall contribution of rural consumers increasing from twenty five per cent in 1985/6 to thirty four per cent in 2004/5.

The overall Government contributions represent the balance of the overall costs for the different projections. These overall projections are summed up for the Short, Medium, and Long Term Programmes in Table A1.4 of Appendix 1 in 1985 prices.

Figure 6.2

Allocation of Overall Costs between Government, Donors and Beneficiaries (Future Prices)



6.3 SUMMARY OF FEATURES OF FINANCIAL REQUIREMENTS

The main features of the financial requirements of the proposed programmes include the following:

(i) The cost of the Rural Water Supply Programme during the Short Term and Medium Term Programme periods represents about seventy five per cent of the total cost of the combined programme. The Rural Sanitation Programme accounts for the remaining twenty five per cent.Over the entire period the split is eighty to twenty per cent

(ii) The projected overall contribution from donors is around forty per cent during 1985-90, but it is subsequently reduced so that it represents approximately thirty per cent of the total costs of the overall programme over the entire twenty-year period. The projected donor contribution over this period is considerably higher for the Rural Water Supply Programme, than for the Sanitation Programme (thirty four as against twelve and a half per cent)

(iii) The projected requirements from Government (in 1985 prices) range from Z$55 to Z$62 million in the Short Term Programme; from Z$117 to Z$143 million in the Medium Term Programme, and from Z$299 to Z$394 million in the Long Term Programme, depending on the extent to which beneficiaries contribute (i.e. Projections A, B or C). While the beneficiaries' contributions for water supplies in the optimistic projection (Projection A) are, typically, just over double those in the pessismistic projection (Projection C), the effect on the financial requirement from Government for the overall combined programme is more limited in percentage terms, and

(iv) There is a very significant difference in the source of contributions for the Rural Water Supply and Sanitation Programmes. Whereas in the latter it is expected that the beneficiaries will meet two thirds of the costs, it is projected that they will only provide between thirteen and twenty eight per cent of the costs of water supply provision. Conversely, Government's contributions to water supply provision will be higher than those for sanitation, between thirty eight per cent and fifty three per cent for water supply compared to twenty per cent for sanitation.

6.4 THE PROBLEM OF RECURRENT FINANCE

In 1985/6 it is estimated that operation and maintenance costs are under one third of development costs. These costs will assume a progressively larger proportion of total costs over the whole planning period, and will exceed development costs from 2002/3 onwards. Even now, recurrent finance tends to be an even greater constraint on the rural water sector than development finance, and the rapidly increasing recurrent financial requirements resulting from the Consultant's projections suggest that unless the Government adopts the attitude that, 'while it is important to develop new supplies, the proper maintenance of existing facilities represents a better buy', recurrent finance may become an even more serious problem.

This requires that Government itself should be willing to provide recurrent finance to match the development in the sector. This considerable task for Government would be made more bearable if donors were prepared to contribute towards the real burden of recurrent costs. This would mean that aid could be placed where it is needed most, rather than being restricted to activities arbitrarily considered to represent 'development'. It would also present an opportunity for developing long-term rural maintenance programmes in place of firefighting activities necessitated by the limited recurrent finance that Zimbabwe can provide from its own resources. It may even be desirable for donors to fund that part of Government's overheads required to support aid-funded programmes. For example, the support costs of the proposed sanitation programme are almost as large as the direct costs of Government and donors.

Donor contributions toward the uprating or rehabilitation of water supplies would also greatly reduce the burden of costs borne by Government.

Fortunately, donors are becoming more flexible, and a limited amount of aid for recurrent purposes is being provided. If the remaining resistance is not overcome, insufficient provision for maintenance and uprating will soon lead to a rapid deterioration of newly-developed facilities. It is recommended that donors providing funds for rural water supply development be requested to provide recurrent finance for several years and finance for uprating as part of their contribution to programmes.

6.5 MANPOWER REQUIREMENTS

The Consultant's manpower review suggests that the shortages and inexperience of professional, technical and administrative staff are already critical in some areas and will probably deteriorate before they improve. Manpower represents a major bottleneck in achieving the aims of the Master Plan.

The present manpower situation in the Ministry of Energy and Water Resources and Development is critical, with vacancies in the senior professional posts, consistently running at twenty to twenty five per cent of established posts. This situation is made more serious when one takes into account the fact that of those in senior professional posts, some twenty per cent are expatriate staff employed on local contract or through technical aid. About twenty five per cent of the posts for technicians are vacant; and the ratio of engineers to technicians is unduly high.

The recommended lead co-ordinating Ministry, the Ministry of Local Government, Rural and Urban Development, also requires technical strengthening in order to support local authorities to carry out envisaged roles in planning and implementation. A new cadre of Provincial and District Field Officers (Water) will also be required by the District Development Fund. Thus, a substantial number of additional professional and technical manpower is required.

There is also an expanded need for sub-professionals; the existing and planned local capacity for training and recruiting is, however, considered to be satisfactory.

Local sources of education, training and recruitment for technical and professional cadres should, over the medium and long term, prove adequate for the needs of the Master Plan. However, there is a serious shortfall in the short term; in particular there is a peak of activities in the years 1989-1993 when human resources from local sources are insufficient. This requires a strategic approach consisting of a number of elements.

(i) Systematic Career Planning: Systematic career planning measures need to be instituted to inhibit the drift from public to private sector employment of existing senior professionals, and, it is hoped, to attract more experienced local personnel. Additional measures to encourage young local graduates to seek long-term careers in the public sector are required.

(ii) Accelerated Recruitment: An accelerated recruitment programme for international personnel supported by technical assistance is required. It is essential that this is not seen as a 'stop-gap'. Package deals should be negotiated with selected donors whereby rolling teams of experts are recruited under technical assistance, if necessary with 'topping up' arrangements in base countries to ensure that high-level staff are attracted. These should be required to undergo an induction and orientation programme in Zimbabwe to ensure that their skills are directed in ways which are appropriate to national development strategies. In-service training of junior staff and contributions to field manuals should also be written into their terms of service.

(iii) Linking Manpower with Output: A 'linked' approach to the recommended rate of implementation of the water and sanitation programme should be adopted. This would entail monitoring of the success rate of manpower development, and adjusting the phasing of construction accordingly. In terms of the degree of precision in the projections provided here, it is probable that the proposed schedule of construction be maintained with not more than a twelve to fifteen per cent slippage on manpower build-up.

(iv) Evaluation: An evaluatory review of human resources should be carried out, within the Short Term Programme, to assess progress, new needs and the detailed requirements for manpower which the practical experience of initial implementation will have generated.

7. Implementation of the Master Plan

7.1 GENERAL STEPS TOWARDS IMPLEMENTATION

Successful implementation of the Master Plan, based on the recommended strategies, is to a large extent dependent on the Government's ability and willingness to convert the Master Plan into a long-term action programme.

In order to achieve an integrated approach, the six main Government agencies involved in the sector must co-operate closely during planning and implementation. These comprise:

(i) The Ministry of Finance, Economic Planning and Development
(ii) The Ministry of Energy and Water Resources and Development
(iii) The Ministry of Health
(iv) The Ministry of Local Government, Rural and Urban Development
(v) The District Development Fund, and
(vi) The Ministry of Community Development and Women's Affairs.

The purpose of this section is to itemize the logical steps which are necessary to convert the Master Plan into an acceptable work plan for future development within the sector.

Table 7.1 tabulates the general steps required for implementation.

7.2 ESTABLISHMENT OF THE NATIONAL CO-ORDINATION UNIT

To improve sectoral planning and co-ordination, as described in Section 3.2, and in detail in Volume 6, it is necessary to establish a National Co-ordination Unit within the Ministry of Local Government, Rural and Urban Development, staffed initially by a National Co-ordinator. The functions of the Unit include the following:

(i) To prepare sector plans and budgets, based on district, provincial and national plans and updated Master Plan information, for presentation to the National Action Committee
(ii) To act as the Secretariat to the National Action Committee
(iii) To assist in providing overall co-ordination of programming, planning, design and construction with all Government departments and other organizations involved in the sector and to maintain a rational division of responsibilities
(iv) To assist in securing funding for the sector by preparation of applicants for donor assistance

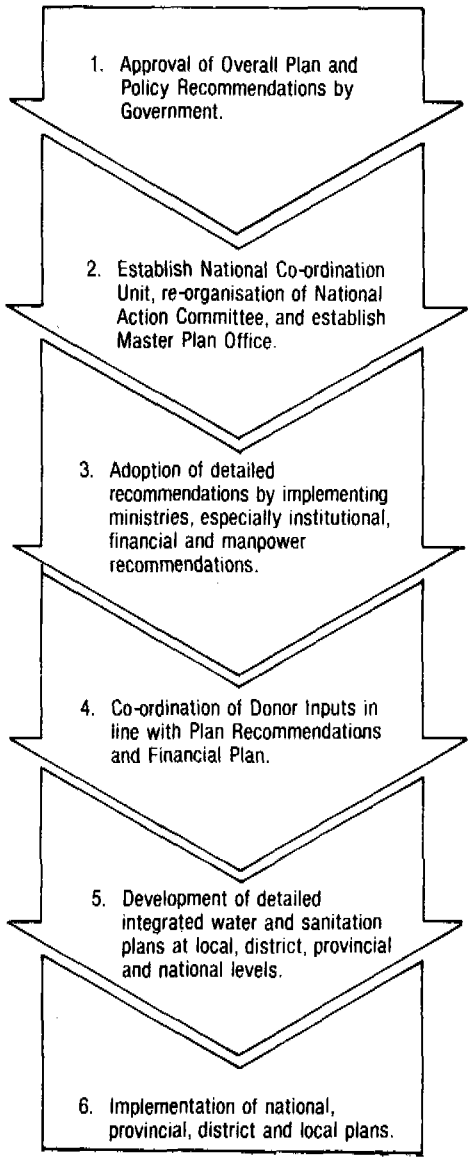
7.3 ESTABLISHMENT OF THE MASTER PLAN OFFICE

The twenty eight volumes and annexes which comprise the Master Plan, submitted by the Consultant, will require extensive work to be fully considered by Government. In view of the importance of the sector and in order for Government to make the best use of the Master Plan, it is recommended that Government establish an office to be responsible for following up the Master Plan Proposals. Since much of the information is technical, and the plan was commissioned by the Ministry of Energy and Water Resources and Development, it is proposed that a Master Plan Office be established in the Ministry of Energy and Water Resources and Development.

In the short term the responsibilities of the

Figure 7.1

General Steps towards Implementation of the Master Plan



Master Plan Office would be to:

(i) Promote the use of the Master Plan
(ii) Disseminate information from the Master Plan to other ministries and for district and provincial plans, and
(iii) Distribute Master Plan volumes to other concerned agencies.

In the longer term the function of the Office would be to:

(i) Regularly update the Master Plan
(ii) Establish and run a computerized data base
(iii) Commission or undertake further studies as necessary
(iv) Liaise closely with the National Co-ordination Unit on monitoring and evaluation of sector projects.

7.4 IMPLEMENTATION STEPS FOR THE MINISTRY OF FINANCE, ECONOMIC PLANNING AND DEVELOPMENT

Key steps which need to be taken by the Ministry of Finance, Economic Planning and Development to enable it to fulfill its envisaged role in the implementation of the Master Plan include:

(i) Approval and adoption of the financial, institutional and manpower recommendations contained in the Master plan
(ii) Active participation in the National Action Committee
(iii) Through the National Action Committee, implementation of financial, institutional and training policies, review of sectoral plans, rationalization of donor programmes, and co-ordination and integration within the sector as a whole.

7.5 IMPLEMENTATION STEPS FOR THE MINISTRY OF LOCAL GOVERNMENT, RURAL AND URBAN DEVELOPMENT

Key steps which need to be taken by the Ministry of Local Government, Rural and Urban Development include

(i) Approval and adoption of relevant recommendations outlined in the Master Plan
(ii) Establishment of the National Co-ordination Unit and full support for its activities
(iii) Active participation in the National Action Committee
(iv) The development of district and provincial plans for water and sanitation through local authorities, and
(v) Assume overall responsibilities for the implementation of long-term sectoral programmes.

7.6 IMPLEMENTATION STEPS FOR THE MINISTRY OF ENERGY AND WATER RESOURCES AND DEVELOPMENT

Key steps which need to be taken by the Ministry of Energy and Water Resources and Development include:

(i) Approval and adoption of recommendations contained in the Master plan
(ii) Establishment of the Master Plan Office
(iii) Active participation in the National Action Committee
(iv) The implementation of institutional, financial and manpower development recommendations
(v) Assume responsibility for technical aspects of water resource development and engineering design
(vi) Implementation of relevant aspects of the Rural Water Supply Programme and adoption of technical recommendations based on Master Plan technical reports.

7.7 IMPLEMENTATION STEPS FOR THE MINISTRY OF HEALTH

Key steps which need to be taken by the Ministry of Health to enable it to fulfil its envisaged role in the implementation of the Master Plan include:

(i) Approval and adoption of recommendations contained in the Master Plan
(ii) Active participation in the National Action Committee
(iii) The implementation of institutional, financial and manpower development recommendations; in particular the institutional proposals for strengthening health education, sanitation delivery and social and health aspects of monitoring and evaluation
(iv) Adoption of recommendations for the development of short and long-term well and sanitation programmes
(v) Strengthening and development of an integrated national health information system
(vi) Implementation of recommendations for increased provision of health education in the sector.

7.8 IMPLEMENTATION STEPS FOR THE DISTRICT DEVELOPMENT FUND

Key steps which need to be taken by the District Development Fund to enable it to fulfil its envisaged role in the implementation of the Master Plan include:

(i) Approval and adoption of recommendations contained in the Master Plan
(ii) Active participation in the National Action Committee
(iii) The implementation of institutional, financial and manpower development recommendations, particularly development of an increased maintenance capacity, including a tiered district-level maintenance system
(iv) Implementation of primary water supply programmes as recommended in the Master Plan.

7.9 IMPLEMENTATION STEPS FOR THE MINISTRY OF COMMUNITY DEVELOPMENT AND WOMEN'S AFFAIRS

Key steps which need to be taken by the Ministry of Community Development and Women's Affairs to enable it to fulfil its envisaged role in the implementation of the Master Plan include:

(i) Approval and adoption of recommendations contained in the Master Plan
(ii) Active participation in the National Action Committee
(iii) Implementation of financial and manpower development recommendations
(iv) Strengthening of support for community participation in the sector as outlined in the Master Plan and implementation of training programmes at national, provincial, district and village levels in support of community participation
(v) Implementation of recommendations regarding strengthening the involvement of women in the sector.

7.10 CO-ORDINATION OF DONOR ACTIVITIES

It is likely that Government will have to rely extensively on donors both for supplementary funding and technical assistance in the implementation of the proposed twenty-year development programme. It is essential that both policy and planning/implementation guidelines for such organizations are provided to achieve consistency and effectiveness. The development of such guidelines would be the responsibility of the National Co-ordination Unit, with the advice of the National Action Committee.

Donor policies and implementation strategies must themselves be consistent with those followed by the Government. Donors should be guided towards specific project areas to which priority is given, but which do not overlap with Government's initiatives or with other organizations. It is also important that donors implementing their own sector programmes be required to follow Government sector policies. These include issues as diverse as the provision of drilling rigs to policies on the integration of water, sanitation and health education within single projects. This is not to restrict or curtail the innovation and initiative of such organizations, but rather to ensure minimum standards and to protect communities from well-meant but inappropriate projects.

MONITORING AND EVALUATION

Monitoring the activities and performance within the sector will become an increasingly important activity during the life of the Master Plan.

Monitoring is the day-to-day recording of project activities (such as, number of primary water supplies and latrines constructed, details of borehole and well projects, construction and maintenance information on primary water supplies, etc.), in order to provide the information and feedback necessary to facilitate corrections and modifications to programmes, should problems occur.

Monitoring is also an input of evaluation. Evaluation is defined as an objective, overall assessment of programmes at specific stages undertaken in order to assess factors such as efficiency, impact, functioning and usage, and to propose improvements.

To strengthen Government's capacity and capability to record sector information and to systemize data monitoring, the Consultants have proposed an expansion of the use of computers. A programme proposal is outlined in Volume 3, and it is recommended that this be adopted as a priority in the implementation programme. The implementation and operation of the monitoring system should be the responsibility of the National Co-ordination Unit working through the National Action Committee. The Master Plan Office would assist in this exercise through the development

development of the Master Plan data base. A common system recording information should be used by all the implementing ministries. Proposals for monitoring social and health aspects are made in Volume 4.2.

Guidelines for an evaluation system for managers of water and sanitation programmes have been developed by the World Health Organization. A short outline of the system is included in Volume 4.4 and the Consultants recommend that this system be adopted as a basis for future evaluation by all ministries involved in the sector.

It is envisaged that the Master Plan will require continuous evaluation and adjustment as the sector planning environment alters . The Master Plan Office in the Ministry of Energy and Water Resources and Development will have the responsibility for updating and building upon data collected and presented in the Master Plan.

Appendix 1: Tables

Table A1.1
Summary of Basic Design Criteria for Rural Water Supplies

1 Population Growth Rate:

1985 - 2005

Zimbabwe	3.3%
Communal Areas	3.0%
Resettlement Areas	3.0%
Growth Points	6.2%
District Service Centres	5.1%
Rural Service Centres	4.1%

2 Human Water Demands

Individual Connections		60 litres per capita per day
Communal Taps		
	(less than 300 metres walking distance)	40 litres per capita per day
	(more than 300 metres walking distance)	25 litres per capita per day
Boreholes	(30 litres per capita per day supplied to 250 persons per borehole)	7,5 cubic metres per day
Wells	(30 litres per capita per day supplied to 150 persons per well)	4,5 cubic metres per day

3 Institutional Demands

Primary School	13,6 cubic metres per day
Secondary School	10,4 cubic metres per day
Clinic	7,5 cubic metres per day

4 Livestock Demand

Per Livestock Unit	20 litres per Livestock Unit per day

5 Peak Factors

Peak Daily Demand	1,75 x Average Daily Demand
Peak Hourly Demand	3,0 x Average Daily Demand

6 Storage

Piped Supplies	2 x Average Daily Demand

Table A1.2

Cost and Number of Latrines in the Proposed Rural Sanitation Programme

	Proposed Programme		Costs in 1985 Prices (Z$'000)				Costs in Future Prices (Z$'000)			
	Annual no. of latrines to be constructed	Cumulative no. of latrines	Materials subsidy cost	Imputed cost of local contribution	Government support costs	Total cost	Materials subsidy cost	Imputed cost of local contribution	Government support cost	Total cost
1985/6	20 000	20 000	552	2 000	400	2 952	552	2 000	400	2 952
1986/7	40 000	60 000	1 104	4 000	800	5 904	1 270	4 600	920	6 790
1987/8	65 000	125 000	1 794	6 500	1 300	9 594	2 373	8 596	1 719	12 688
1988/9	79 000	204 000	2 180	7 900	1 580	11 660	3 316	12 015	2 403	17 734
1989/0	79 000	283 000	2 180	7 900	1 580	11 660	3 814	13 817	2 763	20 394
1990/1	79 000	362 000	2 180	7 900	1 580	11 660	4 386	15 889	3 178	23 453
1991/2	79 000	441 000	2 180	7 900	1 580	11 660	4 824	17 479	3 496	25 799
1992/3	79 000	520 000	2 180	7 900	1 580	11 660	5 307	19 227	3 845	28 379
1993/4	79 000	599 000	2 180	7 900	1 580	11 660	5 837	21 150	4 230	31 217
1994/5	79 000	678 000	2 180	7 900	1 580	11 660	6 421	23 264	4 653	34 338
1995/6	79 000	757 000	2 180	7 900	1 580	11 660	7 063	25 591	5 118	37 772
1996/7	79 000	836 000	2 180	7 900	1 580	11 660	7 769	28 150	5 630	41 549
1997/8	79 000	915 000	2 180	7 900	1 580	11 660	8 546	30 965	6 193	45 704
1998/9	79 000	994 000	2 180	7 900	1 580	11 660	9 401	34 062	6 812	50 275
1999/2000	79 000	1 073 000	2 180	7 900	1 580	11 660	10 341	37 468	7 494	55 303
2000/1	79 000	1 152 000	2 180	7 900	1 580	11 660	11 375	41 215	8 243	60 833
2001/2	70 000	1 222 000	1 932	7 000	1 400	10 332	11 086	40 173	8 035	59 294
2002/3	65 000	1 287 000	1 794	6 500	1 300	9 594	11 325	41 035	8 207	60 567
2003/4	60 000	1 347 000	1 656	6 000	1 200	8 856	11 500	41 664	8 333	61 497
2004/5	55 000	1 402 000	1 518	5 500	1 100	8 118	11 595	42 009	8 402	62 006
Total	1 402 000		38 690	140 200	28 040	206 930	138 101	500 369	100 074	738 544

Table A1.3 Overall Costs of Proposed Rural Water Supply and Sanitation Programmes and Their Allocation between Government, Donors and Beneficiaries (Future Prices)

Projection A: Most Optimistic Assumptions

Projection B: Mix of Optimistic and Pessimistic Assumptions

Projection C: Most Pessimistic Assumptions

Projection A:

	OVERALL COST			DONOR CONTRIBUTION			GOVERNMENT CONTRIBUTION			BENEFICIARIES' CONTRIBUTION		
	Water (Z$/mill)	Sanitation (Z$/mill)	Total (Z$/mill)	Water (Z$/mill)	Sanitation (Z$/mill)	Total (Z$/mill)	Water (Z$/mill)	Sanitation (Z$/mill)	Total (Z$/mill)	Water (Z$/mill)	Sanitation (Z$/mill)	Total (Z$/mill)
1985/6	23,44	2,95	26,39	11,72	0,37	12,09	9,77	0,58	10,35	1,95	2,00	3,95
1986/7	28,50	6,79	35,29	14,25	0,85	15,10	11,49	1,34	12,83	2,76	4,60	7,36
1987/8	34,60	12,69	47,29	17,30	1,58	18,88	13,47	2,51	15,98	3,83	8,60	12,43
1988/9	41,92	17,73	59,65	20,96	2,21	23,17	15,34	3,51	18,85	5,62	12,01	17,63
1989/90	50,71	20,39	71,10	25,36	2,54	27,90	17,32	4,03	21,35	8,03	13,82	21,85
1990/1	60,96	23,45	84,41	29,46	2,92	32,38	20,45	4,64	25,09	11,05	15,89	26,94
1991/2	70,27	25,80	96,07	32,79	3,22	36,01	23,03	5,10	28,13	14,45	17,48	31,93
1992/3	80,93	28,38	109,31	36,42	3,54	39,96	26,42	5,61	32,03	18,09	19,23	37,32
1993/4	93,07	31,22	124,29	40,33	3,89	44,22	30,32	6,18	36,50	22,42	21,15	43,57
1994/5	106,93	34,34	141,27	44,55	4,28	48,83	35,07	6,80	41,87	27,31	23,26	50,57
1995/6	121,99	37,77	159,76	48,80	4,71	53,51	41,15	7,47	48,62	32,04	25,59	57,63
1996/7	139,83	41,55	181,38	53,60	5,18	58,79	48,32	8,22	56,54	37,91	28,15	66,06
1997/8	160,14	45,70	205,84	58,72	5,70	64,42	56,64	9,04	65,68	44,78	30,96	75,74
1998/9	183,26	50,28	233,54	64,14	6,27	70,41	66,45	9,95	76,40	52,67	34,06	86,73
1999/00	209,55	55,30	264,85	69,85	6,89	76,74	77,92	10,94	88,86	61,78	37,47	99,25
2000/1	239,45	60,83	300,28	75,83	7,58	83,41	91,31	12,03	103,34	72,31	41,22	113,53
2001/2	273,42	59,29	332,71	82,03	7,39	89,42	106,94	11,73	118,67	84,45	40,17	124,62
2002/3	312,02	60,57	372,59	88,41	7,55	95,96	125,17	11,98	137,15	98,44	41,04	139,48
2003/4	355,85	61,50	417,35	94,89	7,67	102,56	146,58	12,17	158,75	114,38	41,66	156,04
2004/5	405,60	62,01	467,61	101,40	7,73	109,13	171,33	12,27	183,60	132,87	42,01	174,88
TOTAL	2 992,44	738,54	3 730,98	1 010,81	92,07	1 102,88	1 134,49	146,10	1 280,59	847,14	500,37	1 347,51

Projection B:

GOVERNMENT CONTRIBUTION			BENEFICIARIES' CONTRIBUTION		
Water (Z$/mill)	Sanitation (Z$/mill)	Total (Z$/mill)	Water (Z$/mill)	Sanitation (Z$/mill)	Total (Z$/mill)
10,75	0,58	11,33	0,97	2,00	2,97
12,87	1,34	14,21	1,38	4,60	5,98
15,38	2,51	17,89	1,92	8,60	10,52
17,95	3,51	21,46	3,01	12,01	15,02
20,84	4,03	24,87	4,51	13,82	18,33
25,08	4,64	29,72	6,42	15,89	22,31
28,84	5,10	33,94	8,64	17,48	26,12
33,40	5,61	39,01	11,11	19,23	30,34
38,65	6,18	44,83	14,09	21,15	35,24
44,97	6,80	51,77	17,41	23,26	40,67
52,70	7,47	60,17	20,49	25,59	46,08
61,93	8,22	70,15	24,30	28,15	52,45
76,23	9,04	81,67	28,79	30,96	59,75
85,18	9,95	95,13	33,94	34,06	68,00
99,80	10,94	110,74	39,90	37,47	77,37
116,82	12,03	128,85	46,60	41,22	88,02
136,62	11,73	148,35	54,77	40,17	94,94
159,63	11,98	171,61	63,98	41,04	105,02
186,51	12,17	198,68	74,45	41,66	116,11
217,54	12,27	229,81	86,66	42,01	128,67
1 438,09	146,10	1 584,19	543,54	500.37	1 043,91

Projection C:

GOVERNMENT CONTRIBUTION			BENEFICIARIES' CONTRIBUTION		
Water (Z$/mill)	Sanitation (Z$/mill)	Total (Z$/mill)	Water (Z$/mill)	Sanitation (Z$/mill)	Total (Z$/mill)
10,75	0,58	11,33	0,97	2,00	2,97
12,87	1,34	14,21	1,38	4,60	5,98
15,38	2,51	17,89	1,92	8,60	10,52
18,22	3,51	21,73	2,74	12,01	14,75
21,50	4,03	25,53	3,85	13,82	17,67
26,29	4,64	30,93	5,21	15,89	21,10
30,73	5,10	35,83	6,75	17,48	24,23
36,16	5,61	41,77	8,35	19,23	27,58
42,49	6,18	48,67	10,25	21,15	31,40
49,98	6,80	56,78	12,40	23,26	35,66
58,67	7,47	66,14	14,52	25,59	40,11
69,07	8,22	77,29	17,16	28,15	45,31
81,14	9,04	90,18	20,28	30,96	51,24
95,29	9,95	105,24	23,83	34,06	57,89
111,78	10,94	122,72	27,92	37,47	65,39
130,98	12,03	143,01	32,64	41,22	73,86
153,31	11,73	165,04	38,08	40,17	78,25
179,27	11,98	191,25	44,34	41,04	85,38
209,57	12,17	221,74	51,39	41,66	93,05
244,57	12,27	256,84	59,63	42,01	101,64
1 598,02	146,10	1 744,12	383,61	500,37	883,98

Table A1.4
Overall Costs and Their Allocation for Master Plan Periods (1985 prices)

		Long Term Programme (Z$ mill)			Medium Term Programme (Z$ mill)			Short Term Programme (Z$ mill)		
Overall Cost	Water	699			277			122		
	Sanitation	207			100			42		
	Total	906			377			164		
Donor Contribution	Water	266			131			61		
	Sanitation	26			12			5		
	Total	242			143			66		
Government Contribution	Water	■ 258	■■ 323	■■■ 353	■ 97	■■ 117	■■■ 123	■ 47	■■ 53	■■■ 54
	Sanitation	41	41	41	20	20	20	8	8	8
	Total	299	364	394	117	137	143	55	61	62
Beneficiaries' Contribution	Water	175	110	80	49	29	23	14	8	7
	Sanitation	140	140	140	68	68	68	28	28	28
	Total	315	250	220	117	97	91	42	36	35

■ Projection A i.e. optimistic with respect to both piped supply revenue and primary supply community participation.

■■ Projection B i.e. pessimistic with respect to piped supply revenue but optimistic with respect to primary supply community participation.

■■■ Projection C i.e. pessimistic with respect to both piped supply revenue and primary supply community participation.

Appendix 2: Annotated Bibliography and Guide

Volume 1

EXECUTIVE SUMMARY

Main Author: P Cross

An overall summary of the major findings of all Master Plan studies and a summary of recommended Rural Water Supply and Sanitation Programmes for the period 1985 to 2005. The Volume is intended for a general, rather than a specialist, readership.

Volume 2.1

HYDROLOGY

Main Author: A Svaeren

A compilation of all relevant hydrological and meteorological data and discussion of methods for estimating yields from surface water sources in various areas of Zimbabwe.

The magnitude and distribution of rainfall, evaporation and runoff are described. Recommendations are made regarding the network of rainfall, evaporation and river gauging stations as well as data processing.

Volume 2.2

HYDROGEOLOGY

Main Authors: E Martinelli and G L Hubert

A comprehensive hydrogeological investigation, including geological and photogeological mapping, geophysics, controlled test-pumping and hydraulic evaluation, water quality and ground-water engineering.

The data gathered has been used to classify the various geologies of the country into ten hydrogeological units, each possessing a distinctive ground-water occurrence, hydraulic parameters and development potential. Recommendations are made on ground-water development, including hand-dug well and borehole design and the identification of future hydrogeological projects.

Annex I

Four newly developed 1:500 000 hydrogeological maps of Zimbabwe showing identified hydrogeological units. The maps are accompanied by explanatory memoirs.

Annex II

The complete field census data from tested boreholes, hand-dug wells and springs.

Volume 2.3

WATER QUALITY

Main Author: O Weholt

An analysis of more than 250 water samples collected from surface and groundwater sources throughout Zimbabwe. The analysis forms the basis for a general assessment of water quality. The Volume proposes water quality guidelines.

Volume 3

RURAL WATER SUPPLY PROGRAMME

Computer Programme Development:
Main Author: O K Paulsen
F Kvaerneng

The Volume presents recommendations for a Rural Water Supply Programme to meet the water demand of the rural population of the communal and resettlement areas of the country, and their livestock, over the twenty-year period, 1985 to 2005.

In the course of the development of this Programme an extensive Rural Water Supply Programme Computer Package, which includes an inventory, rural water supply planning variables and cost calculation options, has been developed. The Computer Package is presented in this report.

The proposed Rural Water Supply Programme comprises a number of recommended development strategies for piped and primary water supplies for consideration in the development of district and provincial development plans. Short, Medium and Long Term Programmes are proposed, covering the periods 1985-90, 1985-95 and 1985-2005 respectively.

Annex

The annex consists of five boxfiles of computer-printed data sheets from the Rural Water Supply Programme. The forms contain design details and cost calculations for primary and piped water supply schemes with reference to district, provincial and national planning levels. Each boxfile contains data from one water province (on the basis of the classification in use by the Department of Water Resources and Development).

Volume 3.1

POPULATION DEVELOPMENT

Main Author: A M Browne

This review of population studies provides part of the planning framework within which the rural water supply and sanitation programme has been developed, and provides information on population development to enable target planning.

The Volume includes chapters on past, present and future population development.

Volume 3.2

SOIL AND WATER CONSERVATION

Main Author: G W van den Wall Bake

The Volume contributes to an understanding of

the relationship between water development and conservation, by describing an integrated Siltation and Soil Erosion Survey of thirty dams. The study quantifies the degree and spread of soil erosion, and the relationship between soil erosion and sedimentation rates in Zimbabwe. It recommends that new water development programmes be part of integrated soil and water conservation programmes. Upgrading of conservation monitoring and planning capacities are urgently required to plan, carry out and evaluate integrated conservation programmes.

Annex I

A detailed report on the findings and methodology of basin surveys from the Siltation and Soil Erosion Project.

Annex II

Detailed basin maps of the three large dams studied in the Siltation and Soil Erosion Project.

Annex III

Detailed basin maps of the sixteen small dams studied in the Siltation and Soil Erosion Project.

Annex IV

Catchment Soil Erosion Maps for the twenty two dams studied in the Siltation and Soil Erosion Project.

Volume 3.3
INVENTORY OF EXISTING WATER SUPPLY SITUATION
Main Author: O K Paulsen
Computer Programme Development: F Kvaerneng

The main objective of this Inventory has been to obtain an accurate picture of the existing water supply situation within the area of study, and to focus on the importance of a monitoring system for the rural water supplies throughout Zimbabwe.

The Inventory has been developed into a computer-based programme, called 'The Rural Water Supply Programme Computer Package' which, it is recommended, should become a permanent, nationwide system for recording, filing and monitoring the rural water supply situation in the future.

Annex

The Annex contains five boxfiles of computer-printed inventory forms. The forms are arranged by district and contain details of facilities in communal areas and rural service centres. Each boxfile contains the forms for one of the Department of Water Resources and Development's five provinces.

Volume 3.4
WATER TARIFF STUDY
Main Author: D G Browne

The study examines the existing tariff policy at water supply stations and village water supplies. It recommends an appropriate water tariff structure and price for the near future for all categories of rural water supplies. Issues which have a bearing on pricing policy or whose outcome depends on pricing policy are also examined.

Annex I

Presentation of a study of willingness to pay for rural water supplies and sanitation.

Annex II

Presentation of a study of water usage and payment from a piped village water supply.

Volume 4.1
OUTLINE OF A HEALTH PROFILE
Main Author: A Heywood

The Volume examines the current status of water and excreta-related disease in Zimbabwe from available statistics collected from various levels of the health services. Prominent diseases and optimum control measures are discussed, together with an assessment of the likely role of water and sanitation interventions.

Recommendations made include suggestions of ways to maximize health benefits from water and sanitation, identification of problem areas and comments on strengthening the health information system.

Volume 4.2
SOCIAL STUDIES
Main author: P Cross

The social studies described in this volume examine the social parameters to water and sanitation provision of relevance to the Master Plan. Studies undertaken include social anthropological fieldwork, in-depth attitudinal and observational studies, a review of community organization in selected projects and a national socio-economic study (3 600 interviews) in communal areas.

Conclusions and recommendations from these studies cover social and behavioural aspects of existing water supplies, sanitation, hygiene and community participation.

Volume 4.3
HEALTH EDUCATION
Main Author: S Laver

The Volume reviews the provision of health education in the context of the promotion and

development of water supply and sanitation in Zimbabwe. The existing infrastucture for health education is examined, and the study investigates the information-sharing process at all levels and the role of health education in project development.

Recommendations are made to strengthen the institutional structure of health education and enhance the integration and design of educational support as it pertains to water and sanitation.

Volume 4.4
SANITATION TECHNOLOGY
Main Author: R A Boydell

A comprehensive review of sanitation programmes and technology in Zimbabwe. Based on these reviews an optimum rural Sanitation Programme is recommemded for the provision of Ventilated Improved Pit Latrines (Blair latrines) to the entire communal and resettlement population.

Detailed recommendations are made for the implementation of this twenty-year programme, including training and manpower development, delivery strategies, a subsidy for unobtainable materials, and technology selection.

Volume 5
OPERATION AND MAINTENANCE
Main Author: S Stene-Johansen

A review of the existing requirements with regard to operation and maintenance of rural water supply. Strategies for operation and maintenance, costs, administrative responsibilities as well as technical routines and procedures are discussed. Recommendations are made for future operation and maintenance activities, including manpower requirements, community participation and training.

Volume 6
MANAGEMENT
Main Author: D G Browne

This volume provides a detailed review of existing institutional arrangements and management issues in domestic rural water and sanitation. After consideration of the contributions made by the many agencies in the sector, recommendations are made and justified for a rescheduling of divisions of ministerial responsibilities, particularly with respect to: the Ministry of Local Government and Rural and Urban Development and its technical arm, the District Development Fund; the Ministry of Energy and Water Resources and Development; the Ministry of Health; and the Ministry of Community Development and Women's Affairs.

Certain management aspects of the Ministry of Energy and Water Resources and Development, including budgeting, systems of financial control, planning, revenue collection, vehicles stores and procurement are also examined and recommendations made.

Volume 7
HUMAN RESOURCES DEVELOPMENT
Main Author: S Cross

The Volume investigates the manpower requirements for the five lead Government agencies within the rural water supply and sanitation sector for implementation of the Master Plan.

Recommended manpower development strategies include: optimizing local manpower resources; accelerated recruitment to fill existing senior professional posts; and appropriate use of technical personnel. Future training needs and staff development policies are also examined.

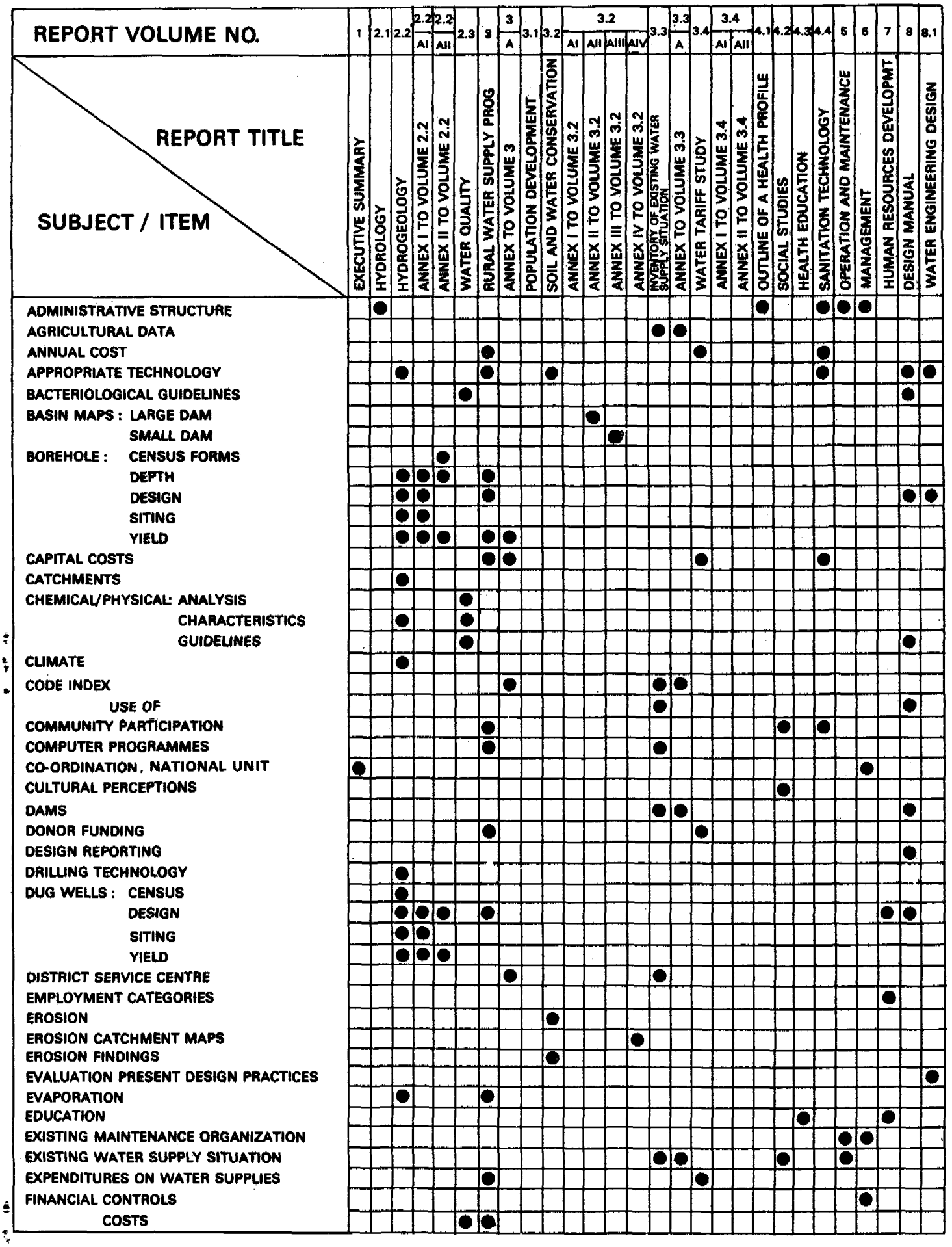
Volume 8
DESIGN MANUAL
Main Author: I Lovdal

The Volume is an updatable manual for the planning and design of rural water supplies. The manual provides standard guidelines and design criteria for use by all those concerned with engineering design of rural water supplies and associated structures in Zimbabwe.

Design aspects discussed include: water demand, water quality, intake structures, pumping and power sources, water treatment, distribution, storage, and cost estimates.

Volume 8.1
WATER ENGINEERING DESIGN
Main Authors: I Lovdal and E Skjelfoss

This study recommends standard designs and solutions for water supply schemes. The report is based on an evaluation of twenty five piped schemes and a large number of boreholes and hand-dug wells. Standards are proposed covering all design aspects.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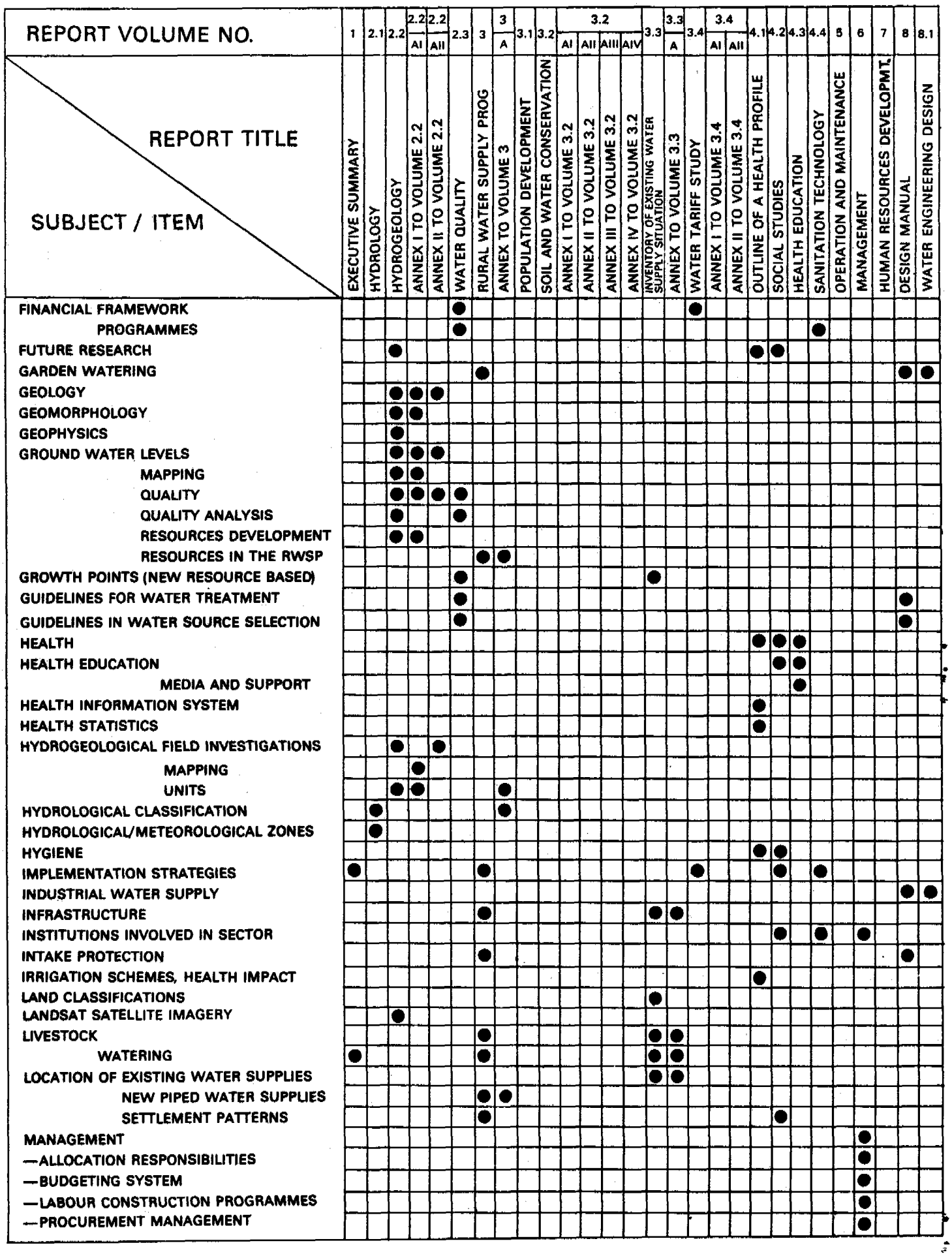
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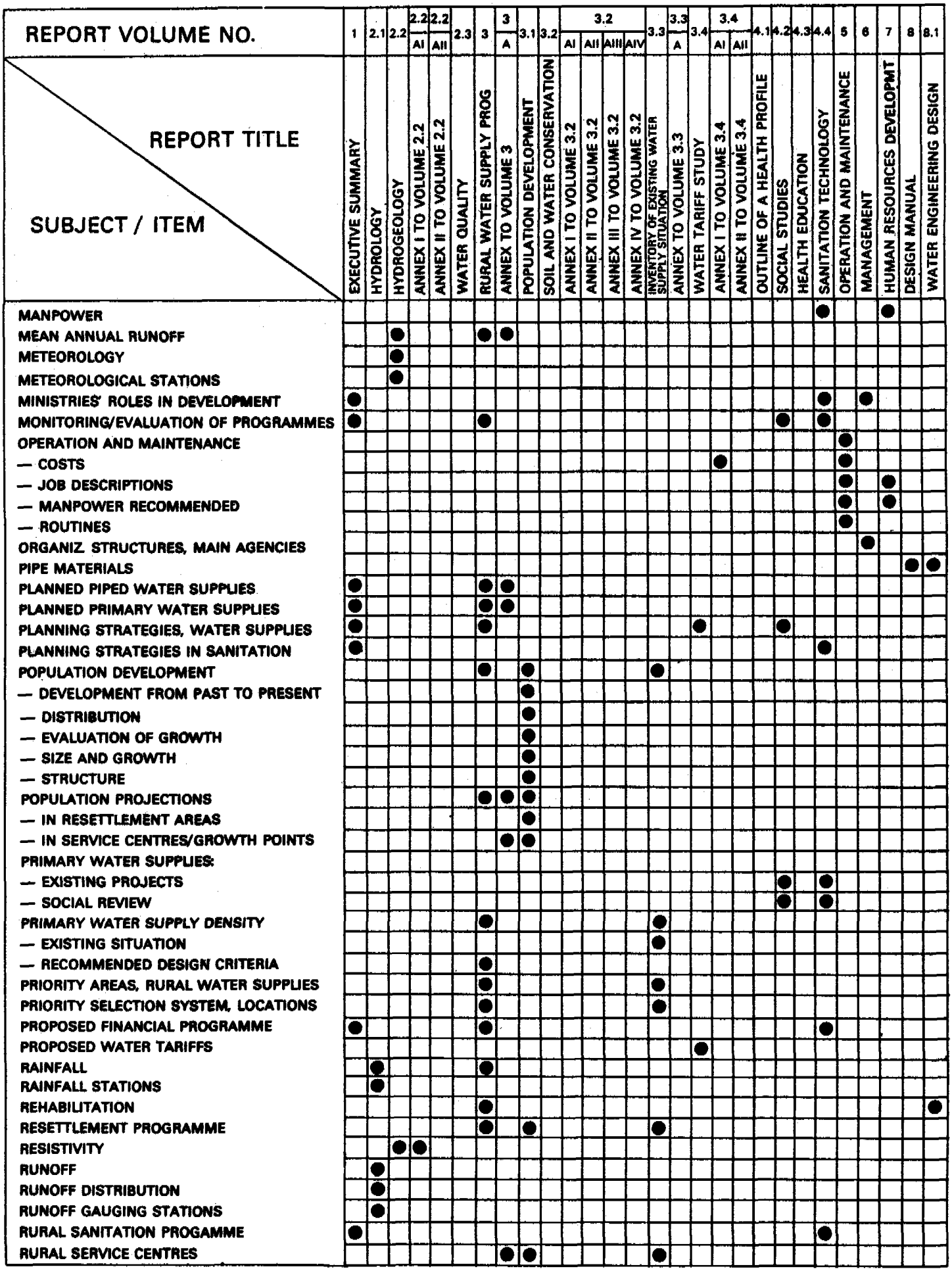
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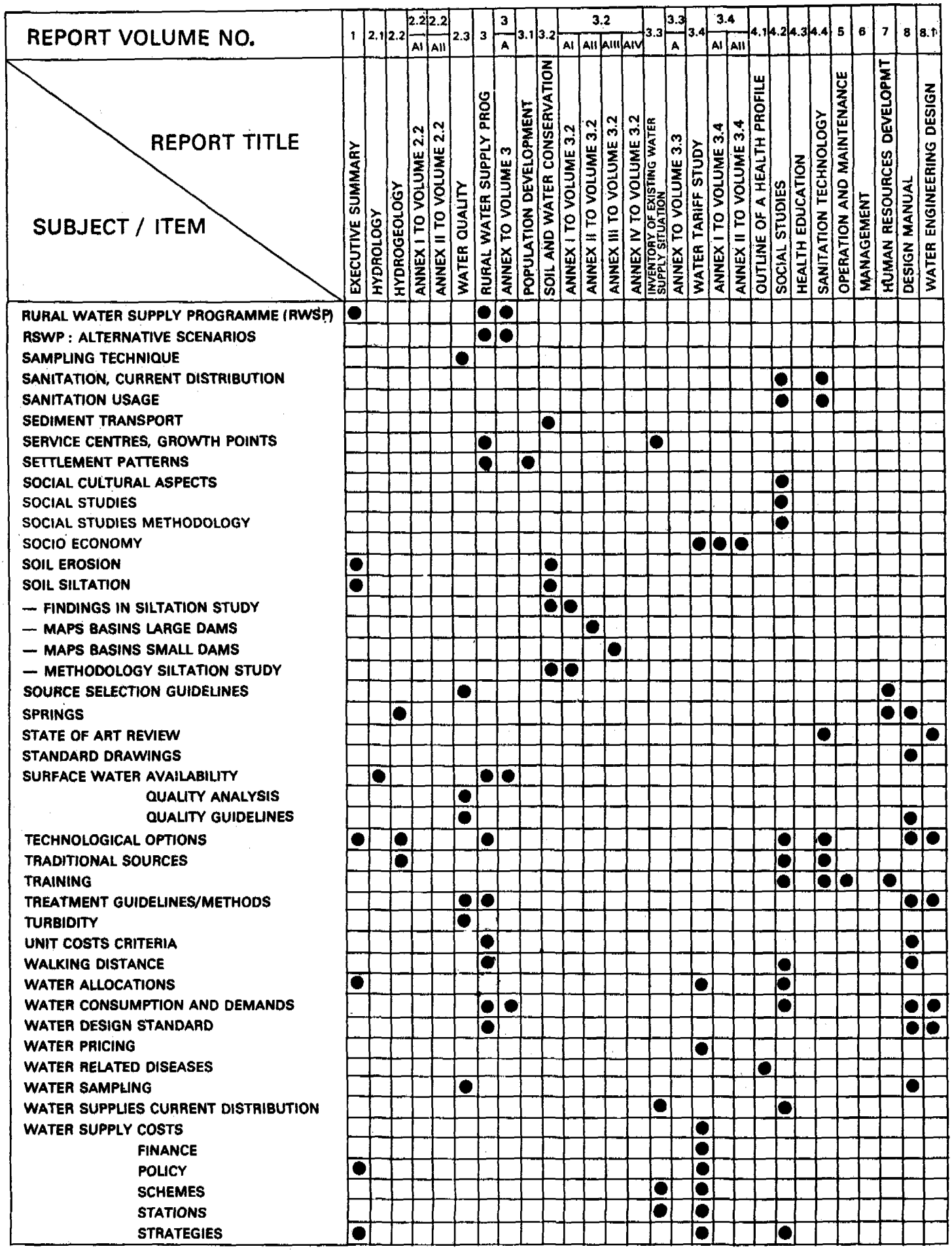
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