WATER AND SANITATION
FOR HEALTH PROJECT

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for International Development

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The WASH Project is managed by Camp Dresser & McKee International Inc. Principal cooperating institutions and subcontractors are Associates in Rural Development, Inc.; International Science and Technology Institute, Inc.; Research Triangle Institute; Training Resources Group; University of North Carolina At Chapel Hill

PRIVATIZATION STUDY OF THE VILLAGE WATER SUPPLY AND SANITATION (VWSS) PROJECT LESOTHO

WASH FIELD REPORT NO. 215

SEPTEMBER 1987

Prepared for
the USAID Mission to the Government of Lesotho
WASH Activity No. 344

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by

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September 1987

Water and Sanitation for Health Project
Contract No. 5942-C-00-4085-00, Project No. 936-5942
is sponsored by the Office of Health, Bureau for Science and Technology
U.S. Agency for International Development
Washington, DC 20523

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ACKNOWLEDGMENTS

The WASH team wishes to express its appreciation to the various offices of the Government of Lesotho, the Village Water Supply and Sanitation Project (VWSS), and the U.S. Agency for International Development for their interest and valuable assistance. The team extends special thanks to David Wadsworth, William Lesaoana, and Ben Rafoneke of VWSS for their efforts in providing information. Adrian deGraffenreid and Mulegeta Yohannes of USAID/Lesotho provided much support in arranging logistics and in providing direction to our study, as did Fred Guymont of USAID/REDSO.

The team also thanks P.K. Moonyane, M.H. Mhlanga, and Joseph Thamae of the Ministry of Interior for their particular insights and assistance in the study.

The team was assisted by many other individuals, particularly from the Lesotho private sector and from project villages that benefited from improved water supplies. We wish them much future success.

Finally, special mention goes to Betsy Andrews and Carol Tilton of the WASH staff for their untiring work in preparing this report and to Diane Bendahmane for editorial assistance.

EXECUTIVE SUMMARY

USAID's involvement in Lesotho's Rural Water and Sanitation Project is drawing to a close. The project has more than exceeded expectations concerning the installation of new systems and the Government of Lesotho (GOL) will be left with hundreds of additional systems to maintain at the conclusion of U.S. funding in September 1988. Concern has been expressed over the GOL's ability to continue to fund maintenance of these and pre-existing systems at the level required to assure sustained and reliable water services to rural communities. This concern has led USAID to explore options concerning how best to assure continued serviceability of the rural systems.

The approach explored in this study involves the transfer of maintenance responsibilities from the public sector to private entities. The study addresses the various factors that would have a bearing on the feasibility of this approach: broad GOL policies which may support or inhibit privatization; the socio-cultural environment; technical issues, such as the appropriateness of the technologies being employed in the program; cost factors; and private sector capabilities for meeting the requirements of rural water systems maintenance.

After establishing the context within which privatization activities would be undertaken, several scenarios are designed and evaluated and a specific program is recommended.

The key findings of the study are as follows:

1. Privatization has not been dealt with to any significant degree at the policy-making level by GOL agencies. However, there are no apparent barriers to privatization efforts, and proposals for privatization would likely be considered on their own merits without pre-existing bias.

2. Earlier water projects in the rural communities encountered difficulties in sustainability due to a lack of emphasis on community responsibilities for maintenance. There are indications that communities may still be reluctant to assume maintenance responsibilities and that local capabilities for implementing cost recovery would need to be significantly upgraded to overcome these attitudes. The problem stems not so much from a lack of financial resources as from the perception that maintenance is a government responsibility. In order to change these perceptions, village water committees would need to be strengthened and given improved levels of support from district rural development officers and their staff of rural development assistants.

3. The technical features of the rural water supply program appear sound and appropriate to the conditions. Gravity systems are constructed whenever possible and there is a large and growing component of handpumps among rural systems. Handpumps constitute the principal maintenance problem to be addressed during the initial stages of privatization, as there are approximately 2,000 in existence at present and several hundred additional handpumps expected to be installed each year.

4. Existing costs incurred by the Village Water Supply and Sanitation (VWSS) Project in construction and maintenance were estimated and future costs for maintenance were projected. Average cost in FY 85/86 for new systems of all types was US $38.81 per capita served, which is at the lower end of the range of costs observed by WASH in other African countries. Maintenance costs averaged about US $1.00 per capita served. However, the latter does not represent an adequate level of maintenance, especially for handpumps. Only about 9 percent of the VWSS budget is allocated for maintenance at present. Future repair costs were projected based on a number of assumptions including the rate of expansion of rural systems, repair frequencies, inflation, and the composition of future maintenance costs by type of system. However, overall maintenance funding requirements will increase significantly because of inflationary impacts and the projected increase in resource allocation required to assure sustainability of rural systems. By 1991, maintenance funding requirements are projected to reach 1.6 million maloti ($1 US = 2M) or an average of 15 maloti per household (M 3.00 per capita). Opportunities for private sector involvement seem strongest for handpump maintenance, with the VWSS retaining responsibilities for supervision, procurement, and revenue collection.

5. An assessment of private-sector capabilities indicates that there is an existing cadre of firms willing and able to participate in the maintenance of rural water-supply systems. Currently, private activities in this area involve well drilling, handpump installations, plumbing and mechanical services, and irrigation systems installation. There is an apparent wide range of experience and technical expertise; all firms would have difficulty assuming all of the VWSS maintenance workload, indicating the desirability of dividing the work to be privatized into smaller components.

6. Six water systems maintenance scenarios were evaluated, ranging from continuation of the VWSS program as it currently exists to full divestment of maintenance responsibilities to the communities. It is recommended that the VWSS adopt a blend of two scenarios involving contracting with the private sector for handpump maintenance in the four lowland districts which have the greatest density of handpumps and through the employment of local technicians to serve small groups of villages in the other six districts. Cost evaluations indicated a potential savings from the implementation of these plans, with the strongest potential from the contracting approach.

7. The recommendations include near-term initiation of privatization of handpump maintenance in the four lowlands districts if competitive bids confirm the prospective benefits in terms of long-term cost savings and service improvements. Similar steps would be taken to implement the village level technician approach in the six highlands districts, on a phased basis so that refinements in approach could be made to assure economic and service advantages. Cost recovery is recommended to begin at a relatively low level, increasing gradually over, say, a five-year period to about 75 percent of full cost recovery. Privatization must be supported by strengthened systems of rural development at the district level and improved performance of water committees at the village level.

Chapter 1

INTRODUCTION

1.1 Background of the Project

In 1979, the U.S. Agency for International Development (USAID) obligated $12 million under the Village Water Supply and Sanitation (VWSS) Project for the purpose of developing and strengthening the institutional capacity of the Village Water Supply Section of the Ministry of Rural Development in Lesotho in designing, constructing, and maintaining new and existing rural water supply systems which reflect health and sanitary education considerations. Under a recent governmental reorganization, the Department of Rural Development in the Ministry of the Interior is the new implementing agency for the VWSS Project; this department supervises the Village Water Supply Section which has continuing implementation responsibilities for the project. (See Appendix A for the organizational chart of the VWSS.)

The project has completed eight of its nine years and has successfully met the original project purposes of constructing rural water systems and building an institutional capacity within the Government of Lesotho (GOL). Expected project outputs have been exceeded: 507 water systems, serving 274,000 rural people, have been constructed so far (April 1987); 800 existing water systems that serve a rural population of 400,000 have been maintained; and 2,900 government and village workers have been trained. Other donors such as the Swiss Helvetas, the Canadian International Development Agency (CIDA), the European Economic Community (EEC), the International Bank for Reconstruction and Development (IBRD), and various non-governmental organizations have joined the USAID project in assisting the VWSS with substantial technical assistance and financial contributions. The $12 million project funds made available by USAID have been almost matched by the other donors combined. The GOL has met its financial and administrative commitments to the VWSS and the other donors since the inception of the project.

As conceived at present, the project will terminate in September 1988. No adequate plan for incorporating existing donor-supported operations into GOL operations has been adopted. Although Canada has expressed some interest, donor assistance is essentially ending and the financial resources of the host country government available to continue the project are limited.

Considering that a yearly outlay of $2.5 million is required to run the VWSS at its current pace of construction and maintenance, the USAID Mission in Lesotho is exploring ways in which VWSS activities can be sustained after the project's completion date and into the future. The GOL goal is the minimum required to meet the U.N. International Drinking Water Supply and Sanitation Decade goals of serving one million rural people with adequate and clean water by the year 2000. The USAID Mission is therefore undertaking a study to explore the possibility that the private sector might assume some or all of the responsibilities currently being borne by the VWSS. The GOL has concurred with this study.

1.2 Scope of Work

USAID/Lesotho requested the Water and Sanitation for Health (WASH) Project to provide a four-person team to study the possibilities and benefits of privatizing activities of the VWSS. The complete scope of work for the WASH team is provided below.

The team was to evaluate the capabilities of the communities to pay for water system construction, operation, and maintenance and to assess the roles and capability of the public and private sectors to support privatization of rural water supply and use. To this end, the team was asked to complete the following tasks.

- Identify factors, including local socio-economic conditions, policies, laws, and regulations, that constrain the development of private approaches to supporting village water supply systems.
- Examine the local markets that could provide a framework for private water-supply support initiatives.
- Identify modes or approaches of fostering private sector initiatives for support of village water systems.
- Identify programs that foster rural private enterprise initiatives in water supply.

In carrying out these tasks, the team was also expected to conduct the following background research.

- Review any host government policies or donor programs that affect or influence the private sector and market forces.
- Identify the policy, procedural, and regulatory reforms needed to promote the private sector in Lesotho and the constraints and opportunities that exist with respect to the private sector, such as access to raw material resources, foreign-exchange resources, managerial and entrepreneurial capacity, labor supply and quality control, financial systems, the availability of capital, the need for and availability of credit, the need for infrastructure, local business experience and skill, access to and application of technology, and cultural and social traditions and practices.

- Determine the size of the general market, the extent to which it is specialized, and its potential for growth and development, especially regarding the availability of capital, trained manpower, and supporting infrastructure.

- Assess the composition, strengths, and limitations of the market sector and recommend remedial actions to overcome the limitations.

- Recommend modes of fostering or enhancing private enterprise initiatives in the provision and use of rural water; analyze the applicable policies and point out needed policy reforms; assess whether any additional feasibility study or pre-investment assistance is needed; and assess whether USAID involvement is needed in establishing potential enterprises and determine the degree of such involvement.

The team also was asked to undertake a cost study comparing the current provision of rural water by the GOL with the provision of rural water through the private sector. The team was asked to review all current methods and costs of operating the VWSS and recommend ways and means by which these methods could be improved and the costs reduced.

1.3 Activities of WASH Consultants

The WASH team consisted of four people:

Philip Roark	Team Leader/Engineer
James Baker	Financial Specialist
Shirley Buzzard	Anthropologist
Henry Cauley	Economist

The period of study in Lesotho was four weeks (July 13 to August 7, 1987). During that time, the team conducted a series of interviews with individuals representing organizations concerned with the VWSS. These individuals included, apart from the staff of the VWSS itself, the staffs of USAID, donor organizations, GOL government agencies, and private firms and businessmen. Field visits were made to three VWSS district offices, and site visits were made to six villages with operating water systems representing various types of systems. Meetings were held with village water committees and local-level rural development staff. Because of time constraints, the team depended heavily on the reports previously prepared for the VWSS project. Of necessity, many assumptions were made where data were missing or unavailable, particularly in projecting costs and revenues, but the WASH team is confident that the conclusions drawn are justifiable. Complete lists of people contacted and documents reviewed are included in Appendix B and the list of references.

Chapter 2

PRIVATIZATION DEFINED

Privatization is a broad term for the process of converting an essentially public service or function to one involving private-sector participation. This chapter provides a general overview of privatization followed by a discussion of the privatization options for the VWSS Project in Lesotho.

2.1 General Overview of Privatization

The extent to which activities currently undertaken by the government can be transferred to the private sector ranges from total divestiture to the selective use of private resources through contractual arrangements. There are numerous combinations and shadings of public-private arrangements; the following list gives examples of privatization techniques that have been implemented elsewhere.

- Divestiture. In this instance the government transfers all investment and operating responsibilities to private-sector entities. Residual government involvement, if any, is limited to regulatory measures as may be required to protect the health, welfare, or safety of the public.

- Private Equity. The government might seek to provide an expansion of services, for example electric power production, without committing public funds. However, in this circumstance the government has no intention of reducing its control or ultimate responsibility for the service. Private-sector entities are invited to submit proposals for the design, construction, operation, and financing of the desired facilities. Bidders are more or less guaranteed a return on investment through sales agreements. After an agreed-upon period of time, the facilities and operations are turned over to the government, whereupon the function becomes solely governmental in nature. This technique is sometimes referred to as the "build, operate, and transfer (BOT)" approach.

- Contracting Out. When the availability of public investment capital is not an issue, the government may introduce privatization of service functions by contract. This is done for a number of reasons: private firms may perform more effectively, they may be able to attract experts for whom government salaries are noncompetitive, the public sector may

lack experience with new technologies, there may be arbitrary ceilings on government staffing, or some combination of these factors may provide the reason. In contracting out, government retains overall control and responsibility. Private involvement may extend from full performance of a service or function to something as minor as typewriter maintenance.

Experience elsewhere suggests that decisions concerning the structuring of privatization arrangements hinge on specific local conditions in four key areas:

- Availability of Financial Resources. When public capital, either investment or working capital, is in short supply, privatization becomes a potential option.

- Performance Criteria. Privatization may be attractive when private entities can provide services at a lower cost or skills not available in the public sector.

- Cost Recovery Potential. The ability to recover costs from service beneficiaries is of particular importance when private investment capital is involved, but is also pertinent in the privatization of activities involving little or no capital investment.

- Nature of the Function. The government usually tends to limit privatization to those functions and services not considered essential to basic human needs.

Figure 1 portrays the interrelationships of these factors in the structuring of privatization packages. Higher levels of private investment and operating responsibilities tend to be associated with services considered nonessential or discretionary, when public investment capital is limited, where private sector performance is at least comparable to public sector performance, and where there is a strong potential for cost recovery. At the other extreme, full public sector investment and operating responsibilities tend to occur in conjunction with a weak potential for cost recovery, when the service involves significant social issues of fundamental human needs, and where the performance capabilities of the private sector offer no incentives for privatization. The mid-range of potential privatizations are likely to be applicable to most situations, wherein a blend of private and public resources will produce an optimum level of service at least cost.

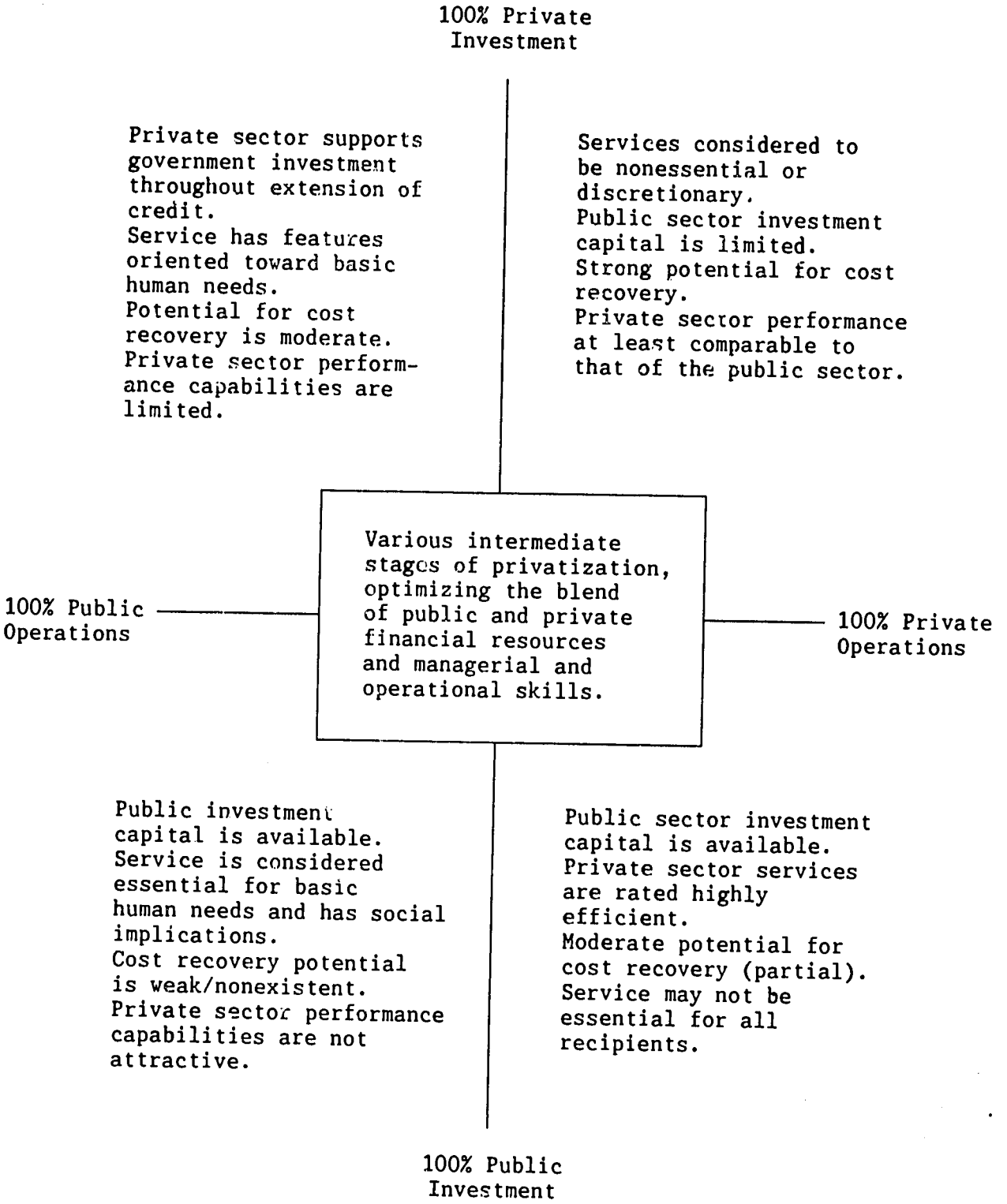


Figure 1

Key Factors Affecting the Extent of Privatization of Public Services

2.2 Privatization of Rural Water Supply Functions

The rural water supply program in Lesotho currently involves a partnership between the public sector, basically the VWSS (including USAID and other donors) and the communities, generally represented by the village water committees. Private-sector participation is significant in the drilling of new boreholes, but limited in the overall scheme of development and maintenance functions. A matrix showing a breakdown of the rural water supply functions and responsibilities of the three entities (the VWSS, the communities, and private enterprises) is presented in Figure 2.

Much of the discussion that follows in this report will be related to determining whether or not the viability of the rural water supply program can be enhanced by shifting the emphasis for various functions from the VWSS column of Figure 2 into the private sector column and, to some extent, the community column. As noted above, the fundamental considerations will be as follows:

- The availability of financial resources following the shift of USAID financial support from rural water supply to other sectors. Can privatization be used to offset the financial shortfall?

- The performance capabilities of the private sector in Lesotho. Is the private sector more efficient, and/or does it possess skills not available to the VWSS? To what extent could its resources meet both the functional and geographic needs of rural water supply?

- The potential for cost recovery. Are villagers willing and able to pay for all or a part of the costs of rural water supply facilities and services? Would cost recovery be affected by private sector participation? Would a private investor be able to recover his investment?

- The nature of the service provided. Does the rural water-supply function in Lesotho provide an essential public service which is designed to meet basic water needs? What limitations should be placed on private-sector participation notwithstanding all other considerations?

FUNCTION	Participant		
	VWSS	Private Sector	Community
Standards setting, monitoring and control	X		
Systems planning and prioritizing	X		
Design	X		
Construction	X	X	X
Operations			X
Routine Servicing			X
Maintenance and Repair	X		
Rehabilitation	X		
Share of Financing for Cash Requirements	100%		

Figure 2

Current Allocation of Responsibilities
Village Water Supply and Sanitation Program, Lesotho

Chapter 3

POLICY SETTING

To describe the context within which privatization arrangements could be undertaken in Lesotho, one must first look at the overall framework of government policies. Such policies concern fiscal affairs, economic and social development, and public-private relationships. Together, they comprise the basic setting for privatization. These policies are reviewed in the sections that follow.

3.1 GOL Fiscal Status and Policies

One of the principal concerns of USAID with respect to the future of rural water supply in Lesotho is the ability of the GOL to provide the level of budgetary support required to keep rural water systems functioning. It is contended by some in the government that the rapid growth in rural systems will result in an unacceptable maintenance burden on the recurrent budget. Recurrent expenditures have increased significantly in recent years and revenues have not kept pace. Borrowing has also increased significantly, intensifying to fiscal concerns.

The chart below shows what share of the total GOL budget in FY 1986/87 was allocated to the water sector in general and the rural water supply functions in particular.

WATER SECTOR BUDGET ALLOCATIONS FY 1986/87
(in millions of maloti)

Item	Expenditures		Outstanding Debt (Dec. 1986)	Subsidized Costs	
	Recurrent	Capital		Total	Per Capita
Total Government	248.9	131.3	416.0	-	-
Total Water	5.7	22.3	53.3	3.2	-
Urban Water	4.5	20.0	53.3	2.1	12.4*
Rural Water	1.2	2.3	0	1.1	2.1

* Estimated to increase to M 20.0 per capita by FY 88/89

Sources: Central Bank of Lesotho 1986 Annual Report, Morrison-Maierle (1987), and Price Waterhouse (1986).

In the framework of total recurrent expenses, the water sector is slightly more than 2 percent of total costs with the rural component making up less than 0.5 percent. The water sector comprises a large proportion of the capital budget at nearly 17 percent of the total, with the rural element comprising about 1.8 percent. The urban water program debt is just under 13 percent of the total outstanding debt; the rural water program has thus far been financed without the use of long-term debt.

With respect to fiscal policies and their impact on the private sector, Lesotho's situation is heavily influenced by the Republic of South Africa. By agreement with South Africa, Lesotho is in a Common Monetary Area, which involves, among other things, the free movement of funds between the two countries and common access to money and capital markets. Inflation and interest rates in the two countries therefore tend to be approximately parallel.

Inflation measured by the retail price index rose from an annual rate of nearly 10 percent in January 1984 to about 20 percent in January 1986 but was declining to about 16 percent per year by the end of 1986. With inflation running at much lower levels in the United States, the rural water program has benefited to the extent that elements of the program provided from U.S. sources have remained relatively more stable in price than those provided from South Africa or locally.

Interest rates have shown a steady decline since the end of 1984, with the prime rate decreasing from 20 percent in December 1984 to 11 percent in January 1987. Trends in the prime lending rate and interest on savings deposits are shown in the following chart.

INTEREST RATE TRENDS, 1984-1987
(in percent)

	1984	1985		1986		1987
	Dec.	June	Dec.	June	Dec.	Jan.
Lesotho Prime Lending	20	20	15	13	13	11
Savings Deposits	10	12	8	7	7	6
Time Deposits (1 yr.)	13	12.5	12	9.25	7	7

Source: Central Bank of Lesotho 1986 Annual Report.

Credit terms to public sector agencies tend to be "soft." As an example, the Water and Sewerage Branch of the Ministry of Water, Energy and Mining has obtained loans and loan commitments totaling over US $25 million from the African Development Fund and International Development Association (IDA) with total maturities of 50 years including 10 years grace, 10 years with principal repayments at 1 percent per year, and 30 years at 3 percent per year; interest is 0.75 percent per year, which probably fails to cover even loan administration costs.

Most domestic credits are issued at two points above prime rate with generally short- to medium-term repayment periods. Trends in domestic credit by major sector are shown in the following chart.

DOMESTIC CREDIT TRENDS, 1983-1986
(in millions of maloti)

	1983	1984	1985	1986
		(end of period)		
Private Sector				
Business Enterprises	29.5	40.1	45.0	45.2
Households	13.2	19.1	34.6	35.3
Total Private	42.7	59.2	79.6	80.5
Public Sector				
Statutory Bodies	10.8	13.4	11.3	11.1
Government	68.0	52.9	76.0	132.2
Total Public	78.8	76.3	87.3	143.3
Total Domestic Credit	121.5	125.5	166.9	223.8

Source: Central Bank of Lesotho 1986 Annual Report.

Credit to the private sector has stagnated in the past two years as government borrowing has increased markedly. Although the liquidity of commercial banks is sufficient to permit expansion of credits to business, an aversion to risk and conservative practices are seen as inhibiting such expansion. A review of bank lending practices to small businesses would be beneficial.

Donors play an important role in Lesotho's fiscal affairs but, with the exception of USAID, donor assistance is almost exclusively applied to capital development. USAID support for maintenance of rural water supplies is difficult to quantify precisely but may be as high as 25 to 30 percent of recurrent costs, as estimated by the WASH team. The bulk of the rural water supply capital program is funded by donors, with more than half being provided by USAID. During the period from 1978 through 1988, total support is estimated to be well over US $20 million.

The USAID project budget contained an unallocated contingency item of approximately $495,000 as of the date of preparation of the Sixth Annual Report of the VWSS Project in April 1987. The feasibility of using this amount, and possibly additional unexpended funds that may remain before the project is completed, to support rural water-supply maintenance in the project should be investigated in accordance with recommendations provided later in this report.

3.2 Water Sector Development Policies and Plans

The economic and social development plans for Lesotho are set forth in its five-year development plans. The Third Five-Year Plan covered the period from 1980 to 1985, and the Fourth Plan, which is still in draft form, covers the period 1986 to 1990. Economic growth during the period of the Third Plan and the beginning of the Fourth in terms of gross domestic and gross national product (GDP and GNP) is shown in the following chart.

PER CAPITA ECONOMIC GROWTH BASED ON MARKET PRICES, 1981-1986
(in maloti)

	Calendar Year					
	1981	1982	1983	1984	1985	1986
GDP	240	264	277	329	381	433
GNP	426	532	584	677	747	822
% Change in GDP at constant prices	-1.4	+1.0	-4.9	9.4	3.5	-0.1

Note: National disposable income is higher due to net transfers from abroad; in 1986, this was about 10% of GNP.

Source: Central Bank of Lesotho 1986 Annual Report.

In real terms, per capita GDP was stagnant or declined in four of the six years shown. Lesotho's economy is affected to a major extent by remittances from migrant workers employed in the mines in South Africa. This is the principal reason that GNP is so much larger than GDP, which over the period shown has accounted for only about one-half of GNP. Data concerning the proportion of GDP accounted for by the water sector is not available, but water and electricity together were only about 0.7 percent of GDP.

With respect to rural development policy in general, emphasis in the Third Plan was placed on helping the poorest 25 percent of rural inhabitants who have few resources of any kind. Rural water-supply development was to be based on self-help through the contribution of labor and a demonstrated willingness to help cover system maintenance costs. Complementary health education measures were to be made part of the program with communal supplies provided for each 100 persons located within 150 meters of each dwelling served. Proper maintenance was to be assured for all newly developed and

pre-existing systems by 1985. New systems were to be constructed for 195 new communities, and 83 existing systems were to be rehabilitated. New systems were to be designed to provide 30 to 40 liters per capita per day including an estimated 18 liters for drinking. Effective maintenance capabilities to back up communities were to be developed in three regions and all ten districts. "Waterminders" were to be trained to conduct simple repairs and report conditions requiring the assistance of the VWSS.

The Fourth Five-Year Plan has not yet been adopted. A draft prepared by the Ministry of the Interior covering its areas of responsibility indicates a general approach for the rural water-supply program that is consistent with that employed during the period of the Third Plan. Added emphasis would be given to maintenance by articulating and implementing a maintenance policy including the proposed plan for cost recovery that had been submitted for consideration by the Village Water Supply Coordinating Committee in 1985. Added emphasis would also be given to the training of village water committees and evaluation of health impacts. The target established for expansion of the rural systems would be to cover 60 percent of the rural population. This would involve expansion of the systems at a rate roughly equivalent to that accomplished in the period of the Third Plan.

3.3 Compatibility of Privatization Concepts with Existing Legislation and GOL Policies

Privatization is not an issue which has been given extensive consideration at the policy-making levels of the GOL. There are no major policy statements or guidelines governing individual privatization decisions nor are there any apparent legal or regulatory obstacles. The question appears to be open for consideration on a case-by-case basis. Proposals for privatization will be considered on their merits with no pre-existing bias.

As noted in Chapter 2, privatization decisions must consider the extent of potential cost recovery for the function or service under consideration. Where costs are to be recovered from beneficiaries, basic questions arise concerning who will collect payments, account for them and oversee their proper handling. By definition such funds should be used to finance the services that are provided. However, in Lesotho, as in many countries, service charges collected from beneficiaries are deposited in the general funds of the government. Previously, some special accounts (deposit or trading accounts) were established. These allowed a degree of flexibility for the government agencies concerned, but the Ministry of Finance is resisting the creation of any additional special accounts and in fact is seeking to eliminate those that now exist. If both government and private resources are employed in the provision of rural water-supply maintenance or other services, careful consideration must be given to the issue of funds management.

Chapter 4

SOCIO-CULTURAL ISSUES

For purposes of this report four socio-cultural issues bear on the feasibility of transferring some VWSS activities to the private sector. These issues, which are particularly relevant if some cost recovery from the community is envisioned, concern lessons learned from past water projects in Lesotho, the ability and willingness of the people to pay for services, and the capability of the village water committees. The issues are discussed one by one in the following sections.

It should be noted that under the terms of the current VWSS mandate, communities were not expected to maintain their water systems. After the system was installed, each village water committee's only responsibility was to notify the VWSS of breakdowns. The seabo, or maintenance fund collected at the time of construction, was intended to be used by the community for any minor repairs it wanted to undertake on its own. Since the VWSS makes repairs free, there has been no occasion for most of the communities to dip into those funds. Also, no staff or funds were allocated by the VWSS for training village water committees.

4.1 Lessons from Lesotho's Earlier Water Projects

The VWSS Project is the third major water project to be undertaken in Lesotho since 1960. Gay (1984b) provides an overview of the two earlier projects. Feachem carried out an in-depth study of the second project, which was very similar to the current one. In that project, 200 village water supply systems were built (Feachem 1978:28). Both previous projects suffered from a weak community-level mechanism for maintaining the water systems. As with the VWSS, earlier systems were installed by the government but relied on community labor. Under the earlier systems, it had been assumed that, because people were willing to supply construction labor and contribute to a maintenance fund at the time of construction, they would take the initiative in raising funds and arranging for repairs in the future.

In discussing the 1968-1978 project, which was funded by the British Ministry of Overseas Development and OXFAM, Feachem found that "real frustration may be felt by individuals when the supply breaks down and there is no agreed way of making sure that the burden of sorting it out is equally shared" (1978:53). In addition, he found that water supplies seldom received sustained maintenance. In discussing the apparent contradiction between people's willingness to help construct systems and their unwillingness to help maintain them, he "found, in fact, that the expectation that villagers will maintain the supply because they have contributed to it and feel that they own it is over-optimistic" (Feachem 1978:59).

Feachem's study found that the collection of funds for maintenance was problematic and that there were serious difficulties raising funds for diesel fuel in those communities with diesel pumps (1978:60). Feachem warned then that "governments and donors must place greater priority on maintenance than on construction of water supplies" (1978:242).

As the VWSS approaches the end of USAID funding these problems resurface. Village water committees have not been trained in community development. Their involvement during construction includes some instruction in routine maintenance. The VWSS has allocated only about 9 percent of its total budget to maintenance (see Table 3 in Chapter 6). All maintenance funds have come from USAID and the GOL, with no maintenance funds from the other six bilateral and multilateral donors.

This brief history of water projects is included here to call attention to the fact that one cannot assume that communities will maintain their systems just because they have contributed labor to construction. They have not done so in the past, and there is no evidence that they will do so in the future under the present circumstances. For this reason, the VWSS has necessarily maintained the systems it has installed at no cost to the communities. VWSS has recently obtained approval for a cost recovery policy proposed two years ago. If implemented as proposed, this might provide up to 50 percent cost recovery. However, no projections have been done as to the cost of implementing a fee collection system, carrying out the needed information program, or enforcing the system.

4.2 Ability to Pay

It is likely that most communities could collectively make a contribution to the maintenance of their water system. There is, however, considerable variation in the ability of individual households to pay.

Although 90 percent of Lesotho's population lives in rural areas, the population is very heavily dependent on wage income. In the lowlands, fully 20 percent of the rural population owns neither land nor animals (Bureau of Statistics 1987:23).

By far, the main source of income for Basotho families is the money remitted by men working in South African mines. About half the households have one member in the mines (53 percent according to Gay 1984b:18; 49.9 percent according to Clarke 1984:8; 36.8 percent according to Rural Sanitation Project 1986:47). Families with miners are the most affluent households in the rural areas. In another 20-25 percent of the households a family member works as a teacher, or in town as a domestic worker or government employee, or in a service position.

Approximately one-fourth of the households have no visible means of support; that is, there is no wage earner and no agricultural income. Residents of these households may be widows, older couples whose children live elsewhere, or families with no eligible wage earners. They make ends meet by relying on contributions from relatives or odd jobs. Women sometimes brew beer or work as traditional healers.

Data on income are always difficult to obtain. Gay (1984b:95-97) found that rural households have an average monthly income of about M 155 ($75.50), but she cautions that this figure masked a skewed distribution. From this amount, households purchase fuel, spend about a fourth on food, and pay school fees and medical expenses. Central Bank of Lesotho (1986:48) data show that a typical miner remits about M 533 per quarter or M 177 ($88.50) per month.

It is important to be aware of the financial life cycle of a typical Basotho family. Since income is proportional to the number of wage earners, particularly miners, and since only younger men usually go to the mines, a typical family has periods of substantial income and periods with very low income (Murray 1981). Gay points out that "development planning must take into account the amounts of expendable income available to certain households at certain times in their life cycles" (Gay 1984b:98-99).

Typically the wages from a young man's first mine contract go to his parents. Contracts are usually for 18 months or two years. Income from the second contract is used to buy animals for a bride-price so that he can marry. His new wife usually lives with his parents while he completes his third tour in the mines. The money from the third and subsequent contracts goes to build a new home and buy furniture (Murray 1981:60).

That some families do have some discretionary income is evidenced in the number of new houses seen in rural communities and the willingness of most families to contribute M 10 to the water system maintenance fund at the time of construction. Some families are able to pay up to M 182 for a VIP latrine or, in some cases, M 297 for a double latrine (Rural Sanitation Project 1986). Baker (1986:iii) estimated that fifty percent of the rural households would be able to pay the full cost of a VIP latrine.

At any one time about one-fourth of the community might have difficulty making contributions to a water maintenance fund. The other three-fourths could likely make the estimated M 10 per household per year necessary to maintain a system. Any system of revenue generation or cost recovery must make allowances for those families who genuinely cannot pay.

4.3 Willingness to Pay

There is evidence that communities are unwilling, under the present system, to pay for maintenance. However, under the VWSS Project, communities have not been asked to pay for maintenance, so the evidence is circumstantial. The evidence suggesting a lack of willingness is as follows:

- A failure to maintain old systems set up much like the current VWSS system.
- Current unwillingness to pay waterminders in those communities with gravity water systems.
- Difficulties in recovering fuel costs in those communities with electric or diesel systems.

- Current high rates of unreported breakdowns, even though the VWSS does not charge for repairs.

- Interviews with village water committee members in six communities (out of over 1,000 recorded water supplies in Lesotho) as well as VWSS staff and district rural development officers in three districts.

- Previous research by social scientists.

The results presented in this section were reviewed by VWSS field staff, VWSS health staff, representatives of the District Rural Development Office in two districts, and field staff of the village sanitation project, all of whom have extensive experience with communities in all parts of the country. The findings presented herein were unanimously supported in review meetings by the indicated parties.

When interviewed, village water committee members, district rural development officers in three districts, various VWSS and UNDP/World Bank Rural Sanitation Project staff, and senior rural development assistants all said that if communities were left to their own devices (without the VWSS), under the current system, the community water systems would not be maintained.

Because they have been unable to collect as little as M 1 per family per year, communities with diesel or electric systems have had to cut back severely on levels of service. Difficulty in recovering operating costs or generating funds for paying waterminders has occurred even in those communities where long hours of hard work have gone into the construction of the system.

The VWSS staff also report that some breakdowns go unreported, even when repairs are free. A recent study of water supply conditions in the southern area indicated that of 162 handpumps, 79 (48 percent) had unreported problems (Tudor 1986). Breakdowns apparently go unreported largely because of confusion over who is responsible for submitting a request for repair to the VWSS and sometimes out of apathy when there are alternative sources of water. Or, people may not bother to report breakdowns because the VWSS has been slow to repair handpumps. There seem to be several factors that account for the apparent contradiction between people's willingness to construct but not to maintain or even to report breakdowns in water systems. The overriding factor appears to be problems with the village water committees, which are discussed separately in Section 4.4.

However, inertia on the part of the community can also be attributed to other issues. If problems with the village water committees were the only bottleneck, then communities would demand that their water committees take responsibility and insist that they sort out their problems.

A number of other factors apparently contribute to the lack of support for the water systems. Some of these are listed below.

- Most people think that the seabo (maintenance fund contribution) they paid at the time of construction would cover all future maintenance of the system. They did not understand that occasional additional collections would be necessary as the system aged and maintenance costs exceeded the funds already collected.

- While most water-system users are women, money is usually earned and controlled by men, many of whom may be absent from the community.

- Twelve to 13 percent of the households never joined the systems in the beginning. In some cases, this was because they could not afford the seabo payments. In other cases, it was disillusionment with development projects in general or a lack of confidence in the village water committee.

- The water system has not made a major impact on people's lives for a number of reasons:

  - There is relatively little waterborne disease in Lesotho.

    Esrey has shown that it is not possible, as yet, to demonstrate that improved water systems per se have an effect on health in Lesotho (Esrey, 1987:263). Health impact typically can be demonstrated only where improved water is used exclusively, where there is a latrine, and where personal hygiene is practiced. These conditions do not yet apply in most communities with VWSS systems.

  - Under VWSS guidelines, improved systems cannot generally be used for other than household purposes. The systems are designed for 30 liters per capita per day (lcd), which limits water usage to domestic requirements. There has been no stimulation of economic activities such as poultry raising, brick-making, or gardening. This is partly because many systems do not have enough water for auxiliary uses. The Rural Sanitation Project baseline study found that "a significant number of households in the sample appear to draw water from unimproved sources despite the fact that all the villages had access to improved water supply of one sort or another...74 percent said they get water from unprotected springs" (Evans et al. 1985:57).

Relatively little water is used. Engler, using meters on taps and pumps, found use rates varied from 7.3 to 18 lcd (1984:23-25). Gay (1984b:102) found the average usage rate to be 10.3 lcd. Esrey (1987:169) found the usage rate to vary from 8.7 lcd in the dry season to 7.1 lcd in the wet season. Water usage rates are slightly higher with gravity systems and in dry seasons. Water use goes up dramatically where people (or institutions such as schools or missions) have private taps.

VWSS standards are to provide 30 lcd, the World Health Organization recommended amount; each tap is designed to serve 30 to 150 people. People clearly do not use as much water from the improved supply as they could. Water for laundry, bathing, and gardens is still probably obtained from traditional sources such as rivers. Engler (1984:24) found that 30 percent of the existing taps served fewer than 30 people. The systems apparently can provide more water, but people are not using it.

The chart below uses data reported in Clarke (1984:35) to estimate the amount of time women spend collecting water.

TIME SPENT PER TRIP COLLECTING WATER
(Percent of women reporting)

Time	Old System	New System
15 minutes or less	9.5	55.0
16-30 minutes	32.2	23.1
30 minutes or more	58.1	21.8

Under the old system, women spent an average of 53 minutes per trip collecting water. Even assuming that that amount could be cut in half, the time saving is not that dramatic, especially since time is apparently not a precious commodity for rural women. Women do not spend much time collecting wood or in gardening. When Clarke asked women how they spent the time saved, 50 percent responded "housekeeping." Only one-fourth indicated that they used the time for potential income-producing activities such as gardening, farming, or sewing.

In Gay's 1982 study of women, she found they spent 37.8 percent of their time relaxing, visiting, bathing, and eating. Twenty-two percent of their time was reported to be spent on wage jobs, agriculture, or sewing. The point is that rural women are not particularly pressed for time. Their husbands are often away, and their children help with household tasks and carry much of the water. Some women enjoy a trip to collect water as it gives them an opportunity to socialize with other women along the way.

- While people appear to be willing to pay for private services, such as children's school fees, individual latrines, and private taps, they are less willing to contribute to public services such as water.

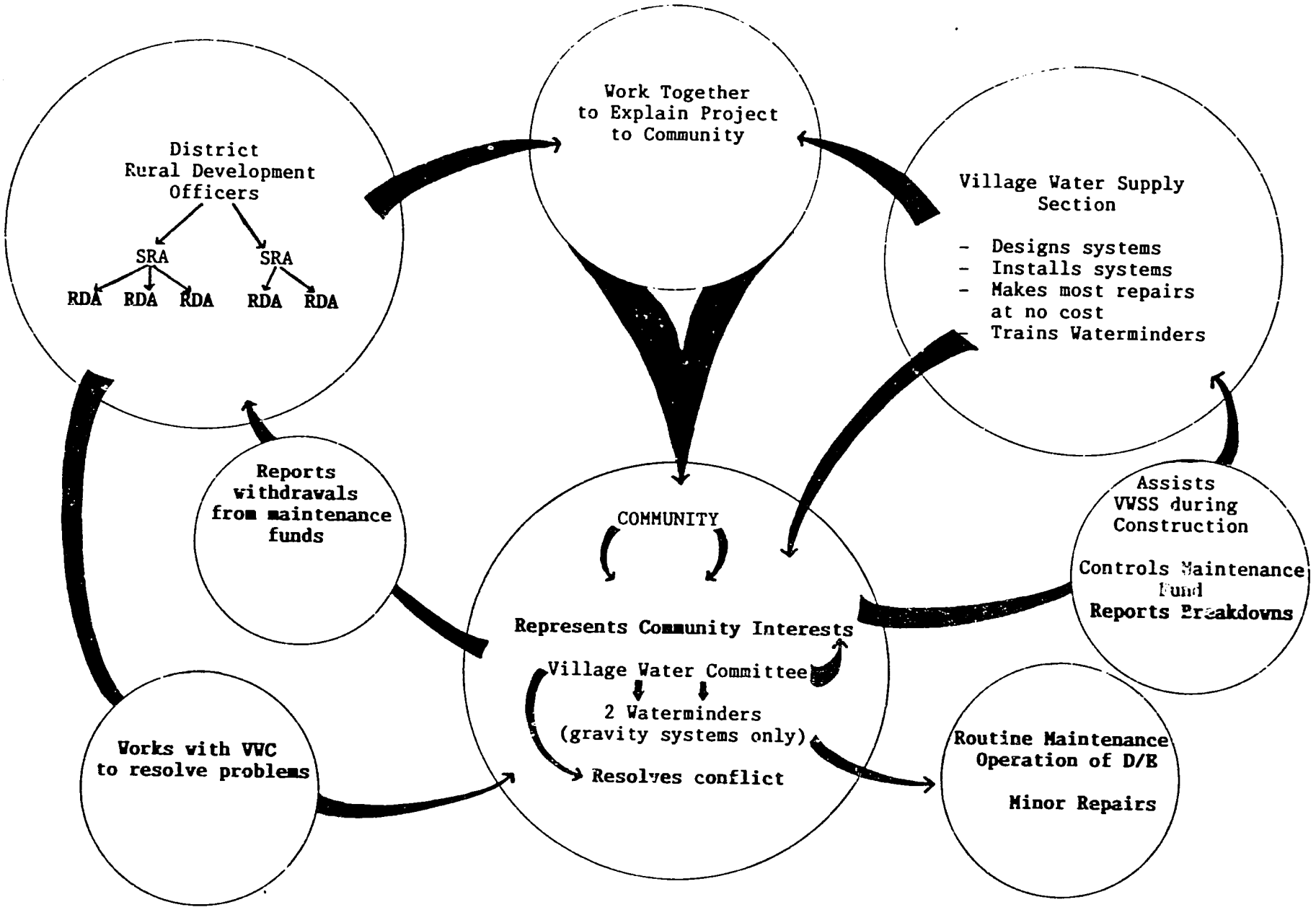
- People feel overburdened with requests for small contributions. In rural areas people are very frequently asked to contribute to this or that worthy cause--schools, churches, funerals, and other development projects. In the scheme of things, a contribution to the water maintenance fund is not a high priority, especially if the water system is working all right. People joke that when any government official comes to their community, no matter what he says, eventually he will ask for money.

- People have been victims of any number of unsuccessful development projects. They are cynical and feel they are often taken advantage of.

For the above reasons it would appear that people are not highly motivated to take the initiative in caring for their water systems, even now when repairs are free. Nevertheless, people knowledgeable about the situation in the communities agree that the most critical problem is that the village water committees are not working as planned. This situation will be discussed in the following section.

4.4 Village Water Committees

To best understand the problems of the village water committees, it is important to look first at their role and theoretical responsibilities. It is also important to look at the district rural development officers and their field staff of rural development assistants. It is the rural development staff who are charged with the responsibility for working with the village water committees during construction and following up after construction is complete. The relationship between the VWSS, District Rural Development Offices and the village water committees is shown in Figure 3.



Responsibilities in bold are currently not well carried out

Figure 3. Relationship between Community, DRDO & VWSS

4.4.1 Village Water Committee Responsibilities

The VWSS will not install a water system in a community until a water committee has been chosen and, if the system is to be a gravity system, until two waterminders have been selected. Village water committees are usually formed by the community after representatives of the VWSS and the District Rural Development Office visit the community and hold public meetings to explain what is expected of the community in order for a water system to be installed. In addition to choosing a water committee and waterminders, each household in the community is expected to contribute about M 10 to a maintenance fund. Previously the amount each household was expected to contribute differed from community to community. During the early years of the VWSS, the contribution was often as little as M 2 per family.

These funds, called a seabo, are placed in a bank account in the name of the village water committee. It has been clearly understood that the funds were to be used only for maintenance of the system. In fact, most of these accounts apparently still exist. Since the VWSS makes repairs at no cost, some accounts have been dormant for three or more years. Some communities spent much of their fund on elaborate inauguration ceremonies; some communities with diesel and electric systems have dipped into the funds for fuel bills or have spent small amounts to replace a tap or small section of pipe. All funds withdrawn from the accounts are supposed to be approved by and registered with the District Rural Development Office, but records are not up to date. Most communities seem to have account balances of M 500 or more. For purposes of planning future maintenance work, it would be useful to have more precise information on the actual balances in these accounts.

Prior to installation of the systems, the water committees assist in conducting a community survey to ascertain the number of households which will use the system and the number of eligible construction workers. They help the VWSS staff survey the region and assist engineers who are planning the system. They also develop a set of rules about how the water can be used, the amount of seabo and labor expected, and charges or fines for those who do not contribute or who move into the community at a later date.

At the time of installation, the village water committee plays an important role in organizing community labor. This is especially important for distribution systems. For such systems, people from the community have dug on an average four kilometers of trenches for pipes. In gravity water systems, each adult is expected to help dig the trenches and the water committee is responsible for seeing that people report on time and do their fair share. Fines are levied for those who do not contribute. People may also be expected to gather stones to build holding tanks and provide other locally available material. For gravity systems, the labor contribution is estimated at M 11,550 per system (based on data from Gay 1984b:104).

With handpumps, community labor requirements are much less than with gravity systems. An estimated equivalent of M 650 worth of labor is contributed per handpump as people assist VWSS drillers, carry water for the drills, house the drillers, and protect the equipment. This assistance is not expected when contract drillers are doing the work.

Throughout the period of planning and installation, water committees receive advice and assistance from the VWSS and District Rural Development Office staff. The responsibilities of the water committees during construction have always been relatively clear and are now spelled out in a manual which is being distributed to the committees (Gay and Mafokeng 1987).

4.4.2 Problems with the Village Water Committees

After the water systems are installed, the committees have little to do so long as the systems are working. Some committees become "water users' associations" whose primary aim is to prohibit those who made no contribution to the system from using the water. Other committees allow anyone to use the water but encourage those who did not contribute to do so now that the system is in place.

According to Ministry of Interior staff in Maseru and Laribe and VWSS staff in Laribe, village water committees are not legally registered. Thus they have no official authority and their by-laws are not enforceable in court. Efforts by the District Rural Development Office staff to have the water committees legitimized by the Justice Department have been unsuccessful. At this point the committees can only appeal to people to make contributions or to work because it is a good cause, but the committees cannot compel people or enforce sanctions against them.

In gravity systems, two waterminders, who are trained by VWSS staff during installation to do preventive maintenance and make minor repairs, are either members of the village water committees or answer to the committees. There have been problems with turnover of waterminders and demands for compensation for their work. The VWSS now recommends that waterminders be compensated for their work, but decisions on the amount of compensation and the method of raising funds are left to the committees.

Where there are diesel or electric pumps requiring daily operation and maintenance, a contribution of 30 lisente per month is suggested for fuel and 20 lisente per month for the waterminder (a total of 50 lisente, or $0.25 per household per month). The water committees have had difficulty collecting these fees, and many waterminders no longer do their jobs because they are not paid. In addition, some water committee members are now asking to be paid.

In many communities, the village water committees are heavily politicized, and water service becomes a victim of other political issues in the community. Although the chief is not supposed to be a member of the committee, in many cases he imposes his authority on the committee or refuses to allow them the freedom they need to make decisions. VWSS and District Rural Development Office staff in Mafeteng and Laribe report cases of vandalism to the water system where it has become a pawn in political battles.

The collection of funds has been fraught with problems. Committees have failed to keep accurate accounts of who paid seabo, contributed labor, or paid their fuel bill for the month. Charlatans have collected funds and given receipts for alleged contributions to the water committee. Whether or not

there is actual misuse of funds, water committee members have not been able to demonstrate accountability to people in the community. Account books are poorly kept and bank books are not available for examination. In any case, people will be reluctant to pay when they mistrust the honesty or capability of those collecting funds, and that has often been the case with the water committees.

Theoretically, a committee structure involves basic principles of democracy. Committee members usually represent different constituencies and reach decisions which are most acceptable to all those represented. For committees to function smoothly, they need to be trained in committee behavior, and members of the community at large must believe that some individuals on the committee are representing their interests. In lineal societies like those found in most places in Africa, people are not as inculcated with the basic traditions of committees. In such societies, power is vested in a progressive hierarchy of leaders, not in elected representatives. For this reason, development projects depending on committees are often unsuccessful unless the committee members are trained in certain skills which enable them to function as representatives.

Committee members must be freely chosen and truly representative of all the factions in the community. They should have a clear statement of their rights and obligations, some understanding of the rudiments of parliamentary procedure, some techniques for conflict resolution, and a willingness to open their deliberations and their account books to public scrutiny.

In the VWSS Project, there was money for training waterminders but no money for training village water committee members. Problems with the water committees were identified as early as 1984 by Engler who wrote, "During our research, we came to know that in many villages, the water committee is facing organizational and political problems" (Engler 1984:27).

During the same year, Gay took an in-depth look at the management of the VWSS and noted that "remarkable progress" had been made in overcoming problems with village water committees. However, she recommended further training, a codification of the responsibilities of the committees, better training for waterminders, and, significantly, a strengthening of the District Rural Development Office staff (Gay 1984b:40-41). Although the VWSS is not responsible for the training of water committees, in response to Gay's recommendations, USAID commissioned her to prepare a manual, available in either English or Sesotho, for distribution to all water committee members. If these committees are to take on the task of collecting maintenance fees and performing some of their own maintenance, this manual will need to be accompanied by a substantial amount of training and follow-up.

Those interviewed by the WASH team suggested that it may be difficult to train old water committees that may have a history of factionalism and dysfunction. Health education staff at the Rural Sanitation Project and VWSS believe it may be more productive to reconstitute the water committees under the rubric of a broader village health committee. Such a committee could take over the responsibilities of the water committees, as well as coordinate the health education components of the Rural Sanitation Project, work with village health workers, and be the vehicle for carrying out other health programs in the community.

Efforts to gain support from the Ministry of Health for a village health committee have, so far, proven unsuccessful. Yet, such a committee would provide an ideal mechanism for integrating the education, sanitation, and water components of the health effort. An integrative effort would be well worthwhile, according to Esrey's recent research, which concludes that health impact is likely to follow only where people exclusively use improved water sources, have a latrine, and where personal hygiene is emphasized (Esrey 1987:267).

There is general agreement among those interviewed that some level of community responsibility for maintenance is essential. Communities should take the initiative for reporting breakdowns and pay a nominal maintenance fee so that they are more likely to take care of the system. There is also a consensus that introducing regular fees for maintenance will require a great deal of skill, patience, and explanation. There will be a strong resistance to paying for maintenance once the existing seabo funds are depleted.

Although the new Management Manual (Gay 1987:36) mentions briefly that the village water committees might raise funds through special fund-raising activities, the interviews suggested that few committees have actually tried this. In other countries, lotteries, raffles, dances, and various income-generating projects have been successful in raising annual fees for community services. Perhaps if the water committees were given information about relatively painless and interesting alternative fund-raising schemes, they would be able and willing to raise some money for maintenance funds.

Further research is necessary to explore the controversy over whether the water committees should have the legal authority to impose fees and conscript labor for maintenance. Feachem argues that while such authority is really necessary for the committees to do their work, "such powers would in practice be a potent weapon in the hands of whichever set of village leaders gained control over the water supply, and their opponents would feel hard done by" (Feachem 1978:76).

Gay seems to feel that a codification of the rights and responsibilities of the water committees (as in the recent manual) would clarify conflicts over responsibilities and the relations of the village water committees to the village development committees (1984b:39-50). VWSS staff appear to feel that they should have some authority to pressure poorly functioning water committees to perform better or replace them. This is clearly a complex issue.

The absence of national rural water legislation or other government guidelines has compounded the problem of managing the rural water supply project. VWSS working policies have been the only guiding principles for rural water supply until most recently when the cost recovery policy was enacted.

4.4.3 The District Rural Development Office Staff

The primary community workers charged with explaining the program to the communities and working with the water committees are the district rural development officers and their staff of rural development assistants. Each office is supposed to have nine rural development assistants and three senior rural development assistants. The rural workers are the foot soldiers for a variety of development projects, and they are the main representatives of development projects in rural areas. In addition to their responsibilities in assisting the VWSS with community organization for the water project, they have similar responsibilities for programs of soil conservation, communal gardens, roads projects, food-for-work, sanitation, and other programs carried out by a dozen or more bilateral and multilateral donors.

These critically important staff members are severely undertrained and underpaid. The typical rural development assistant has completed secondary school but has no formal training in rural or community development aside from a few orientation courses and workshops. The take-home pay for these employees is about M 133 per month. Since they must live away from home, part of their salary goes for housing, food, and transportation home on the weekends. Efforts to recruit rural development assistants who would live at home and work in their home areas have been unsuccessful for a variety of reasons.

Because of low pay and bureaucratic inertia, one-half of the 66 rural development assistants and 24 of the senior rural development assistant positions are now vacant. The Laribe Rural Development Office has only three assistants and two senior assistants for the entire district. Those remaining on the job are demoralized, discouraged, and severely overworked. Yet it is these people on whom the VWSS is relying to distribute the VWSS Management Manual and review it with the water committees. The district rural development officers attended a train-the-trainers session in July 1987, and they will be reviewing the manual with the rural development assistants over the next few months. Given their level of motivation and other responsibilities, there is concern over how effective the rural assistants will be in training the water committees to use the manual.

Past efforts by other donors to upgrade the salaries and working conditions of the rural development assistants have been unsuccessful. Salary increases or position upgrades require major changes in the government personnel system. However, it would be to the benefit of all development programs, those supported by USAID and by other donors as well, if the staff skills and support of the District Rural Development Offices could be brought up to an effective level of functioning.

Any privatization scheme that relies on full or partial cost recovery from the community should bear in mind that the District Rural Development Offices could not bear the brunt of the anticipated outcry. These already demoralized, overworked individuals will need support to be able to convince communities to make routine contributions for the maintenance of their water systems.

Chapter 5

TECHNICAL ISSUES

In this chapter the technologies employed in the VWSS systems and the manner in which they are maintained are described and evaluated. Also, the potential for private sector involvement in construction and maintenance is discussed.

5.1 Technologies Employed

Four types of water systems have been placed in operation by the VWSS. The numbers of water systems by type, as of April 1, 1987, are listed below:

Water System	Number	% of Total
Gravity	391	55
Handpumps	246 (1,433 pumps)	35
Windmills	43	6
Diesel powered	25	4
TOTAL	705	

5.1.1 Gravity Systems

Gravity systems range from simple spring protection to a system of spring development which includes a storage tank, pipeline, and a series of standpipes. Many of the gravity systems contain pipelines of several kilometers in length. Spring protection systems are constructed primarily in the mountainous areas of Lesotho, while gravity systems are common in the more densely populated foothills.

A significant proportion of the gravity systems have been constructed with unpaid village labor. Trenches for pipelines have been dug, stones for reservoirs have been collected and shaped, and sand for concrete has been collected, largely by women workers. Galvanized pipe has been set as the design standard; plastic pipe is not used. The systems observed by the WASH team appeared well-constructed and adapted to the village setting.

5.1.2 Handpumps

Drilled wells equipped with handpumps are constructed by the VWSS whenever springs are not available. Drilled wells are therefore found almost entirely in the lowlands of Lesotho. At present, drilling is carried out primarily on contract by local drilling firms using rotary drill rigs. The use of VWSS-owned cable tool rigs was found to be too slow and expensive.

Drilling success, defined as wells with sufficient water to justify installing a handpump, is about 70 percent of all boreholes attempted. Their success rate is considered high within the southern Africa region. The wells are cased with steel only in the upper unconsolidated zone and the six-inch borehole is left uncased in the hard-rock zone. VWSS wells average about 50 meters in depth. Artesian conditions sometimes raise water levels to less than 30 meters from the surface, which is the optimum range for handpumps.

Boreholes are located by VWSS engineers through surface trace analysis, by visual inspection of the terrain, and on aerial photos. Productive wells tend to lie along fault planes or at contacts along dolerite dikes. Aquifers tend to be discontinuous because of geologic unconformities, and transmissivities are low. Geologic conditions tend to change markedly within short distances, which explains the rather low drilling success rate.

In order to possibly improve drilling success it is recommended that logs continue to be kept of all boreholes, and that these logs be transmitted to the Water Rights Office of the Ministry of Minerals, Energy and Water. A central library of borehole data will assist all future drilling operations in selecting the most productive sites. Neither the VWSS nor private drilling companies are fully cooperating in keeping and submitting logs.

5.1.3 Windmills

A few windmills are in operation under the responsibility of the VWSS. The project itself has not installed windmills but has rehabilitated existing windmills for supplying specific villages. While windmills may offer advantages at specific sites, these sites are generally rare and therefore are not recommended as part of a general program of supplying water to rural villages in Lesotho.

5.1.4 Diesel Engine-Powered Pumps

Diesel engine pumps are incorporated by the VWSS into village water supplies only when no other options are available. Usually these pumps are used to pump water into a reservoir for feeding a gravity system. The recurring costs of fuel and high maintenance requirements confirm that the VWSS approach of minimizing the use of motor pumps is sound. They should be utilized only where other means are not appropriate.

5.2 Operations and Maintenance

Under the present procedures of the VWSS, operations of the water systems are the responsibility of the village water committees. Maintenance is undertaken almost entirely by the VWSS. Minor activities such as cleaning silt boxes, unclogging drains, and improving drainage or halting erosion are undertaken by village waterminders. Repairs to the water systems are undertaken by the VWSS in response to reports received at district offices.

Maintenance requirements for the gravity systems are generally low and potentially within the capabilities of local people. Windmills and diesel motors are beyond the capability of local people to repair. The VWSS must assure such repairs in the future. Since there are relatively few windmills and motor systems, these maintenance requirements are not a large part of the total maintenance responsibilities.

5.2.1 Maintenance Requirements for Handpumps

In the case of handpumps, however, the maintenance requirements pose major questions. By the end of 1987 it is expected that over 2,000 handpumps will have been installed under the VWSS. The VWSS and the GOL are to be commended for standardizing the use of only two types of pumps. Too often, developing countries are plagued with the proliferation of many types of pumps, each provided by separate donors. This makes maintenance particularly difficult. The two pumps, MONO and MOYNO, are both progressing cavity rotary pumps, and their major components are interchangeable. At present, the VWSS has about 900 MOYNO and 600 MONO pumps in service, most of them concentrated in four districts. The MONO is manufactured in South Africa and the MOYNO in Canada (although until about two years ago it was manufactured in the United States). The pumps are considered to be robust, with little preventive maintenance required.

The VWSS is rightfully concerned about handpump maintenance. The project has conducted checks in several districts and found a high percentage of handpumps either not working or functioning less than optimally. In a recent test in Berea District, about 6 percent of 379 handpumps were found to be inoperable while an additional 34 percent required servicing (see Appendix D). Of the latter, the majority of the problems were due to "borehole problems." While information available to the WASH team did not allow an identification of the exact nature of these problems it is presumed that either the borehole caved in or, more probably, the water table dropped below the pump intake because of drought conditions existing in Lesotho since 1981. While borehole problems are more properly classified as construction-related rather than as maintenance problems the result to the village dependent on the system is the same--a shortage of water.

Of the problems associated with mechanical failure, foot valves are identified as a major factor. The MOYNO pump manufacturer has reportedly improved the foot valves on new models, but experience is not yet adequate to know if there is a real change. It is noted that the MOYNO pump is being utilized in rural villages in other African countries (for example, over 2,100 are currently in place in Ghana and Burkina Faso), and foot valves are not reported as being a major problem.

5.2.2 Maintenance Problems

The VWSS staff recognizes several problems related to maintenance. One problem is that inadequate resources are being assigned to maintenance activities. In Mafeteng District it is reported that, on average, two breakdowns are reported each day but only one is repaired. It was reported to the WASH team that delays of several months sometimes occurred in repairing pumps in Maseru District. The VWSS failure to fix pumps quickly has resulted in an initiative by the Catholic Mission at Mazenod to assume repair responsibilities for 130 handpumps in that area.

Another problem is delaying or completely failing to report breakdowns. Since this is primarily the responsibility of the village water committee, apparently these committees are either inadequately trained or apathetic because of VWSS failure to respond to their requests.

A valid question is what is an acceptable level of down time for handpumps. In any mechanical system there will necessarily be breakdowns and therefore a certain percentage of down time must be built into the system. Operating conditions, particularly considering the distances and road conditions, must also be considered along with the needs and alternative sources of water for the villagers. Given that the VWSS has installed about one handpump for every 100 persons in the villages served--a figure which is quite good by most standards (one handpump per 200 persons is more common)--there is a greater degree of flexibility in down time. Under these conditions it is recommended that the VWSS aim for at least a 90 percent standard in operating handpumps. That is, on average, a village water system of handpumps should be operating 90 percent of the time. Data on the actual operating status is not available, but it appears to be considerably less than 90 percent.

5.3 Technical Issues and Privatization

The major question to be treated by this section of the report is whether, given the problems indicated, the private sector offers any advantages, assuming that it is capable and/or interested in undertaking village maintenance of handpumps. (The question of private sector capabilities is treated in Chapter 7.)

To solve the problem of inadequate resources being applied by the VWSS to maintenance, the GOL through the appropriate ministries must decide whether it will do the work itself or give it to the private sector. The problem of improperly designed pump parts can only be solved by the manufacturer. Consideration could be given to purchasing pumps with better reputations but, given the investment already made in MONO and MOYNO pumps, this is not recommended.

The problem of untimely reporting of breakdowns can only be solved by improving the quality of the village water committees. This was addressed in Section 4.4 and does not appear to offer a role for the private sector, although training of village water committees could be considered. Borehole problems relate to the quality of borehole construction, and the boreholes are already being drilled by the private sector.

There are several conclusions to be drawn in studying the technical issues as they relate to privatization. First, borehole construction is already privatized and generally appears to be operating satisfactorily. Construction of gravity systems, which relies to a large extent upon free village labor, is difficult to conceive as being more efficiently operated by the private sector.

The maintenance of village water systems is difficult to judge. Certainly adequate monetary and technical resources are not being applied at present to maintenance. This will have to improve, irrespective of who actually undertakes the work. It is possible to consider contracting handpump installation and maintenance to private firms, but there are some inherent problems. The primary problem is relating performance to actual work undertaken. If all the pump problems were purely mechanical, then judging performance would be a straightforward matter. However, since many of the problems are borehole problems, evaluating performance becomes much more problematic. If maintenance work were contracted to the private sector, the VWSS would still have to continue in a monitoring role and would have to be prepared to assume emergency backstopping should the contractor fail to perform as required.

Chapter 6

MARKET FACTORS

The "market" for private-sector involvement in rural water-systems maintenance is evaluated in this chapter. The emphasis is on a comparison of costs with and without privatization. In this chapter, all figures and tables appear after the text, starting on page 45.

6.1 . VWSS Costs for Fiscal Year 1986

Cost and performance data were collected from the VWSS for the period 1982 through July 1987. The VWSS fiscal year of April 1, 1986, through March 31, 1987, was chosen as the most representative period of VWSS activities since it most closely resembles current operations.

Financial information concerning donor inputs was provided by the VWSS and gleaned from the annual reports. Donor inputs were separated by line item and according to their use within the VWSS for health, water-point establishment, or water-point maintenance activities. All donors contributed to installation activities while only the GOL and USAID provided funds for system maintenance. Summary tables for costs related to installation and maintenance are presented in Tables 1 and 2 respectively.

These tables demonstrate that 9 percent of total VWSS expenses for FY 1986 were allocated to maintenance and 91 percent to the installation of new water systems.

6.1.1 Installation

Total water-point installation inputs excluding community contributions were estimated at $4.1 million for the establishment of 198 water systems (see Table 1). (In-kind community contributions were valued at $800,00 for an average per system of $4,035.) These estimates were made in the following manner:

- USAID inputs through the contractor were divided by line item. A summary of estimated USAID inputs according to activity is shown in Table 3. Approximately 86 percent of USAID's inputs went to water-point establishment, with 9 percent to system maintenance, and 5 percent to health.

- A portion of the contributions from the Canadian International Development Agency (CIDA), the U.N. Capital Development Fund (UNCDF), and CARE were used to hire drilling contractors. The contracted amount has been broken down into expense categories based on a sample breakdown provided by a local drilling contractor.

- All vehicles and major equipment were depreciated over periods established by project performance and estimates of VWSS employees. Depreciation expenses for all but those assigned to drilling contractors and paid by CIDA and UNCDF have been allocated to the GOL.

- Separate categories for vehicles and major equipment and depreciation expenses were used. VWSS fixed assets are increasing and depreciation on current fixed assets has been included in the calculations.

The per capita cost of the water points established, based on the above assumptions, is $38.81. The standard deviation for this per capita cost has been estimated at $2.35. WASH experience in other African countries has shown that the average per capita cost ranges from $40 to $50. Hence, the VWSS has been able to establish water points at rates deemed reasonable when compared to other water programs.

The VWSS has recently adopted a policy of contracting private firms for the drilling of all boreholes. Comparing the drilling costs of the private sector and the VWSS is difficult since private firms are employing rotary type drilling rigs and the VWSS only owns cable tool-type drilling rigs. Rotary rigs may cost from 10 to 15 times the price of a cable tool rig. A comparison of costs for estimated VWSS drilling with a cable rig and actual private sector costs is shown in Table 4. Costs are comparable; however, the private sector firm can drill from five to ten more boreholes per month. As long as the VWSS maintains an aggressive handpump installation program, it should continue to contract borehole drilling with private firms.

Because the VWSS has privatized the borehole drilling portion of its operations, no further market analysis of water-point establishment will be included here.

For gravity systems, the installation has a large community in-kind labor contribution. It appears infeasible to expect private firms to be able to arrange such activities. Installation of gravity systems should continue to be a VWSS responsibility.

6.1.2 Maintenance

The costs of system maintenance were analyzed with and without including USAID expatriate costs. Table 2 summarizes the maintenance costs for VWSS operations during FY 1986 with expatriate costs included. These costs do not include in-kind community contributions valued at $29,500. The maintenance cost per capita has been estimated at $1.00 (M 2.00).

Two major assumptions were made in estimating maintenance costs. First, 15 percent of VWSS and expatriate overhead was allocated to maintenance operations. A sensitivity analysis of this allocation assumption demonstrated that, in the range of 10 to 20 percent, cost per capita for maintenance of all system types varies from $0.85 (M 1.69) to $1.15 (M 2.30).

The second assumption concerned repair frequency or the number of times a system needs maintenance over a year-long period. VWSS historical data and staff estimates were used to arrive at repair frequency estimates. For example, the repair frequency for windmill systems was 1.9. The 43 windmill systems in place during FY 1986 needed an estimated 82 maintenance operations. For gravity, windmill, and diesel-engine systems, the repair frequencies were based on completed job cards during 1985 (Fifth Annual Report, p. 25).

Data from Berea District on handpump status was provided by the VWSS. The Berea data, shown in Appendix D, was a "snapshot" of conditions in the district at a given time. More pertinent data would have shown conditions over the time during which the repairs were reported and completed--a "video" of operations, so to speak.

Handpump repair data from Mafeteng District showed a repair frequency of 1.20 to 2.0. However, it was felt that the Mafeteng data were not representative of past or future operations. Using this data would have unfairly assigned higher material, labor, and transport expenses to past operations when the VWSS has admitted that few resources have been diverted to handpump repair.

As a result, it was assumed that the Berea data covered a year-long period. A handpump repair frequency of 0.35 was used to estimate FY 1986 expenses for handpump repair. The low handpump repair frequency chosen is more illustrative of the low commitment by VWSS to handpump repair than it is of the adequacy of the technology.

Figure 4 (page 54) illustrates the sensitivity of the percent of allocated material costs to handpump repair for the FY 1986 data. The handpump repair frequency of 0.35, although not an optimum representation of the technology's performance, fairly assigns a portion of total maintenance costs to handpump repair. Maintenance costs by system type are presented in Figure 5.

6.2 Projections of Costs without USAID Inputs

In order to model the costs likely to confront the VWSS and GOL after the departure of USAID from the project, maintenance costs were analyzed without USAID expatriate costs. This assumes that USAID inputs to maintenance will not be replaced by another donor and that the GOL will pick up all maintenance costs except the expatriate costs. Maintenance costs for all systems and by system type are presented in Tables 5 and 6 respectively. These costs were estimated using a handpump repair frequency of 0.35.

To project what it will cost the GOL to maintain the 705 systems in place, the 150 systems to be built during 1987, and the systems to be built in the future, assumptions must be made about the following:

- inflation rates,
- water-point installation growth rates,
- absolute repair frequencies,
- relative growth of repair frequencies from year to year, and
- effects of economies of scale on individual system repair.

Inflation rates for various inputs to maintenance operations are summarized in Table 7. These estimates were based on data provided by the Lesotho Bureau of Statistics for 1986.

Based upon past costs of installation, a 4 percent growth rate in the number of systems implies that $3.5 million in donor inputs will be required between 1988 and 1991. Four percent is a conservative estimate in terms of the number of systems, but, as pointed out in the VWSS Sixth Annual Report, few donor contributions are in the pipeline beyond 1988.

The absolute repair frequencies for the various types of systems--gravity, windmill, and diesel engine--were based on historical data. For the handpump systems, a repair frequency estimate of 0.5 was used. This infers that, on average, a handpump will need to be repaired once every two years.

The relative repair frequency captures the greater frequency of repair required as systems age. Gravity, windmill, and diesel engine-powered system repair frequencies were estimated to remain the same over time. Handpump repair frequency was estimated to grow at 2 percent per year. These estimates are considered quite optimistic.

In projecting repairs required over the next several years, it was assumed that the real cost per system repair would remain the same. Nominal repair costs have been inflated at the rates shown in Table 7. No scale economies from higher number of required repairs were assumed.

Using the above assumptions, the requirements for total system maintenance for the period 1987 through 1991 were computed and are given in Figure 6. This figure highlights the increasing maintenance cost burden that will fall on the GOL. Nominal maloti requirements for maintenance double between 1987 and 1991.

Tables 8 and 9 give the cost per family required to break even on maintenance costs for the period 1987 to 1991. These figures are based on average family size of five, villages of 550 people, and one system per village. As shown, yearly payments per family rise from M 8.5 to M 15 over the period projected.

Analysis of VWSS costs reveals high transport cost (30 percent) as a percentage of total costs. The high transport cost is due to the number of trips made to the field to repair individual handpumps and the expense related to transporting drilling equipment.

The most effective means of reducing VWSS maintenance costs would be to cut down on the number of system repairs by reducing the frequency that handpumps need repair or eliminating the high transport costs associated with handpump repair by using private firms or individuals for handpump maintenance.

6.3 Potential for Private Sector Involvement

A number of key issues should be considered when involving the private sector in VWSS maintenance activities:

- supervision,
- procurement/inventory control,
- revenue collection (cost recovery),
- reporting of breakdowns,
- system maintenance (types, locations, operations to be undertaken), and
- cost structure of current VWSS activities.

The private sector's interest and technical abilities are discussed in Chapter 7.

Regardless of the extent of private sector involvement, supervisory and revenue collection (cost recovery from village water committees) responsibilities must stay with the VWSS. It would simply not be a proper role for a profit-making firm to be involved in revenue collection from a non-profit collective organization. Cost recovery issues are discussed in Chapter 4.

Since no one firm is presently large enough to handle all VWSS maintenance activities, economies of scale in procurement would remain with the VWSS. The GOL should retain procurement and inventory control to hold down costs and maintain a check on the quality of materials used.

Although data illustrate a significant percentage of breakdowns not being reported, 50 percent are reported by individuals walking into district and regional VWSS offices. This well-established method of reporting should continue. It would be costly to switch over to reporting directly to a private firm, and the VWSS would not be able to exercise quality control through this method of direct communication with users.

The maintenance operations that should be undertaken by private firms or individuals are those that could be carried out at a lower overall cost, those which could reduce the number of VWSS support staff and transport expenses, and those which could enable the VWSS to assure system quality at a minimum expense to itself.

Windmill and diesel engine repair will represent less than 10 percent of all maintenance costs over the next five years. Despite their high individual costs for repair, the number of repairs per year is low and the contracting of these repairs would not result in a significant decrease in VWSS direct or indirect expenses.

Gravity system repairs can usually be undertaken at the village level. In instances when they cannot--for example, a major washout of a system--the community must be relied on to provide a major in-kind contribution in rebuilding the system. Since a private firm would have no experience in motivating and organizing the community, the maintenance of gravity systems should remain with the VWSS.

The greatest potential for private sector involvement is in the maintenance of handpumps in four lowland districts, Berea, Maseru, Mafeteng, and Mohale's Hoek. These districts have a large number of handpumps and require a significant portion of VWSS maintenance funds due to the high transport costs incurred. Scenarios for the form of private sector involvement and the inherent costs of those scenarios are presented in Chapter 8.

6.4 Other Financial Issues

The analysis presented in this chapter is primarily based on historical data for VWSS activities during FY 1986. The following additional financial issues could significantly influence the projected costs through 1991:

- inflation,
- labor rates,
- foreign exchange rates,
- availability of materials,
- private market cost of capital,
- availability of credit,
- allowances for depreciation expenses, and
- economic sanctions on South Africa.

Inflation factors have been built into cost projections through 1991. However, these estimates were based on Bureau of Statistics historical estimates. Inflation rates greater than the anticipated 15 to 16 percent for materials and fuel would significantly alter the cost projections. In the case of runaway inflation, it would be more important than ever for the VWSS to reduce its transport costs by contracting with private firms.

The influence of the Highlands Water Project* , in regard to its attracting most of the government's capable engineers and mechanics, has not yet been felt, but to compete the GOL will eventually need to raise salaries for qualified technicians. The VWSS may want to begin altering its management and supervisory structure in anticipation of this skilled labor drain. Using private firms or training local technicians, discussed further in Chapter 8, are two ways to address this upcoming problem.

The maloti, which is tied to the South Africa rand, has strengthened vis-à-vis the dollar in the last year. All calculations for this report were done on the basis of two maloti/rand per one U.S dollar. Donors have been providing a majority of the foreign exchange required. In the future foreign exchange requirements will diminish as more materials are obtained from South Africa. However, if it becomes evident that MOYNO spare parts must come from the United States or Canada, foreign exchange requirements will be approximately $21,000 per year.

The VWSS plans to obtain fewer materials from the United States and more from South Africa when USAID involvement terminates. However, some materials, specifically pipes and fittings, when purchased from South Africa are 20 to 25 percent more expensive than those purchased from South Korea by USAID.

Private sector involvement could be risky if the local firms need to expand their operations through debt financing to meet the maintenance contracts. Even though the cost of capital has recently come down, the volatile financial markets could result in the cost of capital suddenly increasing. If that should happen, private firms heavily dependent on floating-rate debt might not be able to service their debts.

Meeting their debt-service payments might be especially troublesome for private firms if their payment from the government is linked to village payments. The GOL will require the private firms to post some type of bond as security for maintaining high quality service. In turn, the GOL will have to provide some timely, guaranteed method of payment for services rendered. It should be noted that the firms contacted did not wish to be responsible for collecting fees directly from the villages, and this practice is not recommended.

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* The Highlands Water Project is a $2 billion project to divert water via a series of dams and tunnels from Lesotho to South Africa. The project will provide royalties to the GOL for the water sent to South Africa and in addition will allow irrigation, water supply, and hydroelectric power to be produced. The entire project will take 30 years to complete.

Linked to the above is the availability of credit. The WASH team's research demonstrated that loans to the private sector from commercial banks have stagnated in Lesotho. The conservatism of the commercial banks is most likely the result of the negative real interest rates that the banks are earning on money lent at the prime rate. Until the Central Bank raises the prime rate or inflation falls, difficulty in obtaining commercial credit will most likely continue.

Small firms have access to the development banks, which are still loaning funds. Private firms that need to expand their operations to meet maintenance contracts with the VWSS could borrow from these sources.

Depreciation expenses have been included in all cost estimations. Since depreciation is a non-cash expense, actual cash flow would be greater than that indicated. The VWSS would need to ensure that the funds collected to cover depreciation of assets are made available when it needs to replace the assets.

Assuming that trade between South Africa and Lesotho continues under the present conditions there would appear to be no major effect on the VWSS from an economic boycott of South Africa by Western nations. MONO pumps are purchased from South Africa and vehicles and steel from Japan and South Korea, respectively. These items represent, by far, the major imported items to the project.

Table 1

Installation Costs for FY '86
(in $000)

Donor	Pers/ Exp	Pers/ Local	Materials	SOC	Transport	V&ME	Dep Exp	Total
AID ($)	$395.90	$207.90	$848.27	---	$33.53	$143.33	---	$1,628.92
GOL ($)	---	301.06	80.79	$17.06	108.28	45.52	$242.15	794.86
Communities	---	---	---	---	---	---	---	0.00
Helvetas	240.80	48.00	---	62.03	18.46	---	---	369.29
UK III	---	---	333.20	---	26.60	106.90	---	466.70
CIDA	---	75.19	53.90	---	49.41	---	4.49	183.00
UNCDF	---	32.80	149.60	---	21.60	---	2.00	206.00
CARE	---	---	267.75	---	21.38	85.88	---	375.00
USCC	---	---	90.00	---	---	---	---	90.00
TOTAL	$636.70	$664.95	$1,823.51	$79.09	$279.25	$381.62	$248.64	$4,113.77
Percent	15.5	16.2	44.3	1.9	6.8	9.3	6.0	100.0

Total Expenditures (000)	$4,113.77
Population served	106,000
Per Capita Cost (US $)	$38.81
Per Capita Cost (Maloti) 2 Maloti/$1.00	M77.62
Average Expenditure per System	$20,777

NOTES:
Pers/Exp = Expatriate personnel
Pers/Local = Local personnel
SOC = Supplies and Operating Costs
V&ME = Vehicles and Major Equipment
Dep Exp = Depreciation Expense
Figures do not include in-kind community contributions for FY 86 valued at $800,000.
CIDA and UNCDF inputs have been allocated according to estimates of drilling contractor costs.

Table 2

Maintenance Costs for FY '86
(in $000)

Donor	Pers/ Exp	Pers/ Local	Materials	SOC	Transport	V&ME	Dep Exp	Total
AID ($)	$79.18	$18.60	$36.61	---	$6.71	$28.67	---	$169.76
GOL ($)	---	61.59	3.21	3.41	89.30	9.10	$62.23	228.84
Communities	---	---	---	---	---	---	---	0.00
TOTAL	$79.18	$80.19	$39.82	$3.41	$96.00	$37.77	$62.23	$398.60
Percent	19.9	20.1	10.0	0.9	24.1	9.5	15.6	100.0

Total Expenditures (000)	$398.60
Population served	398,380
Per Capita Cost (US $)	$1.00
Per Capita Cost (Maloti) 2 Maloti/$1.00	M2.00
Average Expenditure per System	$565.40

NOTES: Pers/Exp = Expatriate personnel
Pers/Local = Local personnel
SOC = Supplies and Operating Costs
V&ME = Vehicles and Major Equipment
Dep Exp = Depreciation Expense
These maintenance costs are based on historical data for 1986-1987. They assume a 15% allocation of VWSS overhead and maintenance operations.
Maintenance allocation sensitivity for the 15% (± 5%) resulted in a range per capita of $0.85 to $1.15.

Table 3

Estimated USAID Inputs Allocated to FY '86
(in $000)

Line Item		Maintenance	Installation	Health	Total
1	Technical Assistance				
	T/A Contractor	$71.21	$356.03	$47.47	$474.70
	VWSS Mgmt. Study	0.37	1.86	0.25	2.48
	Health Impacts	---	---	11.90	11.90
	KAP Study	0.09	0.43	0.06	0.57
	Misc. Studies	0.48	2.39	0.32	3.18
2	Training	5.82	29.08	---	34.90
3	Commodities				
	Drilling Equip.	16.80	---	---	16.80
	Handpumps	---	219.82	---	219.82
	Repair Sys. Maint.	18.00	---	---	18.00
	Vehicles	9.08	45.38	6.05	60.50
	Tools/equipment	1.65	8.25	1.10	11.00
	Water Test Equip.	0.16	0.80	---	0.96
	Pipes, Fittings	---	619.40	---	619.40
	Rural Sanitation	---	---	2.09	2.09
4	Construction	19.59	97.95	13.06	130.60
10	Other Costs				
	Veh. Maint.	6.71	33.53	4.47	44.70
	Sys. Maint. Sal.	18.60	---	---	18.60
	Temp. Laborers	---	207.90	---	207.90
6	Misc.	1.22	6.12	0.82	8.16
	TOTAL	$169.76	$1,628.92	$87.57	$1,886.25
	Percentages	9.0	86.4	4.6	100

NOTE: This breakdown was arrived at by analyzing each line item individually. Each line item was broken down into allocations for maintenance, installation, and health-related activities of the VWSS.
KAP Study = Knowledge, Attitudes, and Practices Study

Table 4

Comparison of Drilling Cost: Private v. VWSS
for 60 meter depth well

	Private (actual)	VWSS (estimated)
Personnel	M 180	M 875
Materials	450	75
Supplies	240	220
Transport	30	120
Depreciation	10	10
Fees	210	0
TOTAL	M 1230	M 1300

NOTE: Based on rotary rig use by the private driller and cable tool drilling by the VWSS.

Table 5

Maintenance Costs for FY '86
without USAID Expatriate Costs
(in $000)

Donor	Pers/ Exp	Pers/ Local	Materials	SOC	Transport	V&ME	Dep Exp	Total
AID	---	$18.60	$36.61	---	$6.71	$28.67	---	$90.58
GOL	---	61.59	3.21	$3.41	89.30	9.10	62.23	228.84
Communities	---	---	---	---	---	---	---	---
TOTAL	---	$80.19	$39.82	$3.41	$96.00	$37.77	$62.23	$319.42
Percent	0.00	25.1	12.5	1.1	30.1	11.8	19.5	100.0

Total Expenditures (000)	$319.42
Population served	398,380
Per Capita Cost (US $)	$0.80
Per Capita Cost (Maloti)	M 1.60
2 Maloti/$1.00	
Average Expenditure per System	$453.08

Table 6

Maintenance Costs by System Type
without USAID Expatriate Costs

System type	Total Cost per system type (in $000s)	Population served/system	$ Cost per capita by system	M Cost per capita by system
Gravity	$100.68	220,915	$0.50	M 1.00
Handpump	159.64	138,990	1.15	2.30
Windmill	24.39	24,295	1.00	2.01
Diesel/Electric	24.71	14,125	1.75	3.50
TOTAL	$319.42	398,325	$0.80	M 1.60

NOTE: These adjusted maintenance costs for FY '86 were used as the basis of cost projections for maintenance over the next five years.

Table 7

Assumptions for Inflation Rates, Installation Growth Rates, and Relative Repair Frequencies

Assumptions of Inflation Rates

Labor*	15.0%
Material*	16.0%
SOC*	10.0%
Transport*	16.5%
V&ME*	15.0%
Installation Growth Rate**	4.0%
Repair Frequency Growth Rate***	2.0%

NOTES: SOC = Supplies and Operating Costs

V&ME = Vehicles and Major Equipment

* Source: Lesotho Bureau of Statistics
Reports issued January, October, and December, 1986.

** The installation growth rate is an estimate of the number of systems that will be installed each year. This estimate was used for 1988-1991. For 1987, the VWSS estimate of 100 gravity systems and 50 handpump systems was used.

*** The repair frequency growth rate estimates the additional repairs required each year as systems age. If the initial repair frequency is 0.50 for 1986, the value for 1987 would be 0.52 with the 2 percent assumption.

Table 8

Maintenance Cost Projections
(Nominal Maloti)

NUMBER OF SYSTEMS

System Type	1987	1988	1989	1990	1991
Gravity	491	511	531	552	574
Handpump	296	308	320	333	346
Windmill	41	39	37	35	33
Diesel/Electric	25	27	29	31	33
TOTAL SYSTEMS	853	884	917	951	987

COST TO REPAIR SYSTEMS

System Type	1987	1988	1989	1990	1991
Gravity	$139,507	$166,850	$199,553	$238,666	$285,444
Handpump	223,542	267,356	319,758	382,430	457,386
Windmill	23,342	25,534	27,858	30,305	32,859
Diesel/Electric	24,806	30,809	38,055	46,782	57,270
TOTAL COSTS	$411,197	$490,550	$585,225	$698,182	$832,959
Total Costs (Maloti)	M882,395	M981,099	M1,170,449	M1,396,365	M1,665,919

COST RECOVERY

	1987	1988	1989	1990	1991
TOTAL COSTS (MALOTI)	M882,395	M981,099	M1,170,449	M1,396,365	M1,665,919
Maloti/Family/Year	M 8.5	M 10.0	M 12.0	M 13.5	M 15.0
Percentage Recovered	97	99	103	101	98

NOTE: Assumptions -- Installation growth at 4%, 1987 repair frequency at 0.50, growth in repair frequency at 2% (0.02), inflation rates as noted in Table 7.

Table 9

Cost Recovery by System Type

Maloti Contributions per Family per Year for 100 Percent Cost Recovery

System Type	1987	1988	1989	1990	1991
Gravity	M 5.17	M 5.94	M 6.83	M 7.86	M 9.04
Handpump	13.73	15.79	18.16	20.88	24.02
Windmill	10.35	11.90	13.69	15.74	18.10
Diesel/Electric	18.04	20.75	23.86	27.44	31.55
Weighted Avg. Maloti/Family/Year	M 8.5	M 10.0	M 12.0	M 13.5	M 15.0
TOTAL COSTS (MALOTI)	822,395	981,099	1,170,449	1,396,365	1,665,919
Percentage Recovered	97	99	103	101	98

Above assumes that 100 percent of households in villages pay yearly fee.

FIGURE 4

ESTIMATED HP MAINTENANCE FUNDS FY 86 BASED ON HP REPAIR FREQUENCY

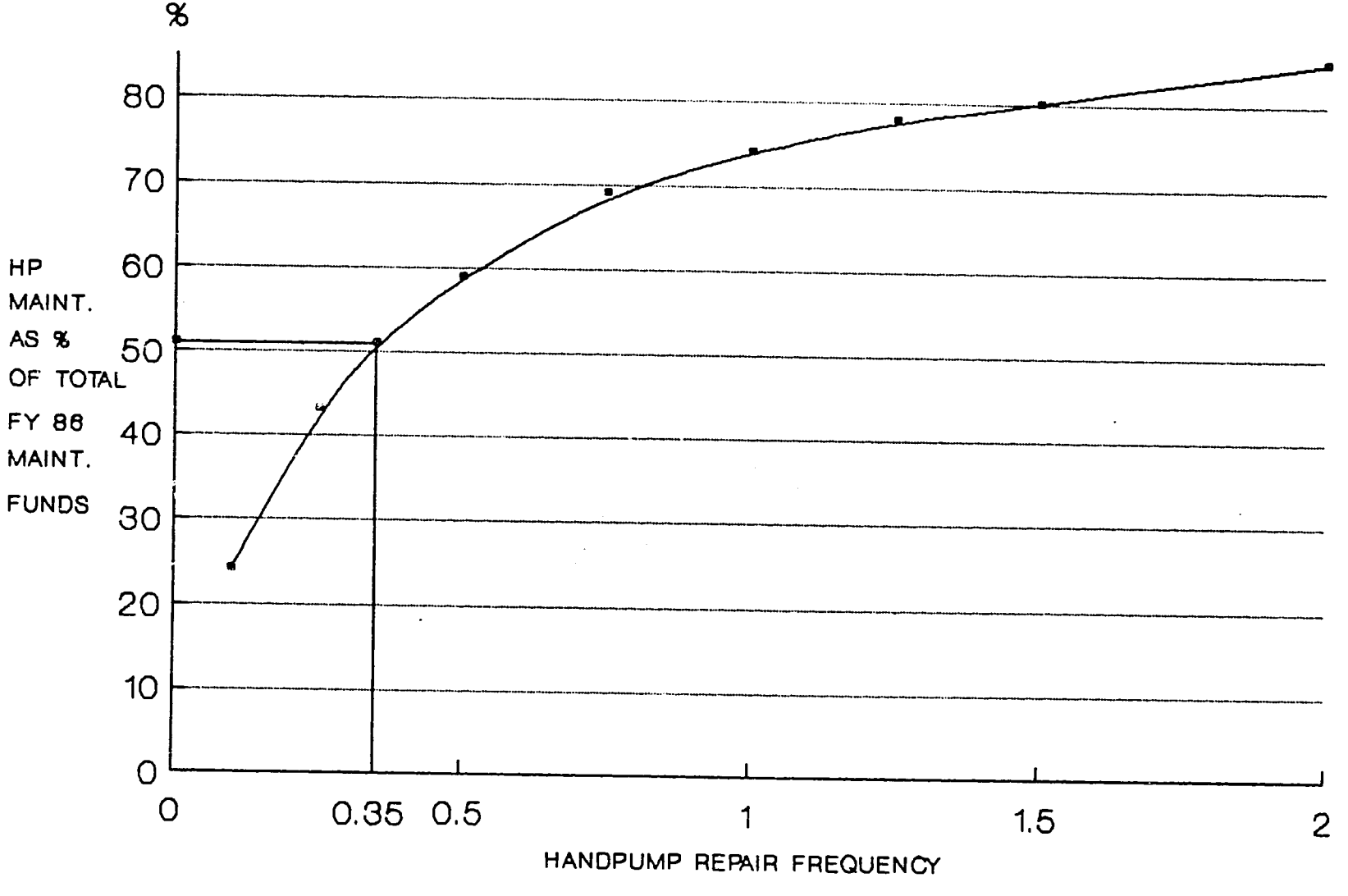
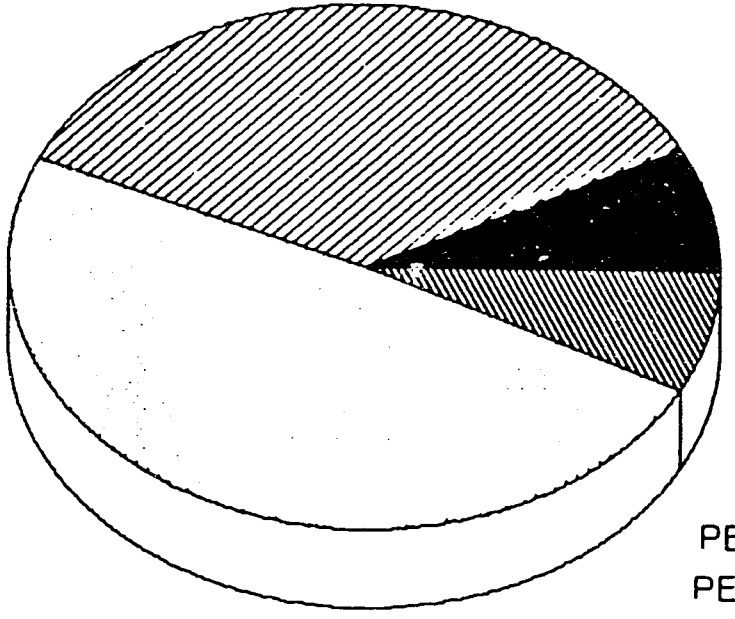


FIGURE 5

MAINTENANCE COSTS BY SYSTEM TYPE FOR FY 86



GRAVITY PER CAP. = $0.64
$142000 PER CAP. = M1.29

DIESEL
$31000
PER CAP. = $2.22
PER CAP. = M4.44

WINDMILL
$30000
PER CAP. = $1.24
PER CAP. = M2.47

HANDPUMP
$195000
PER CAP. = $1.40
PER CAP. = M2.81

NOTES:

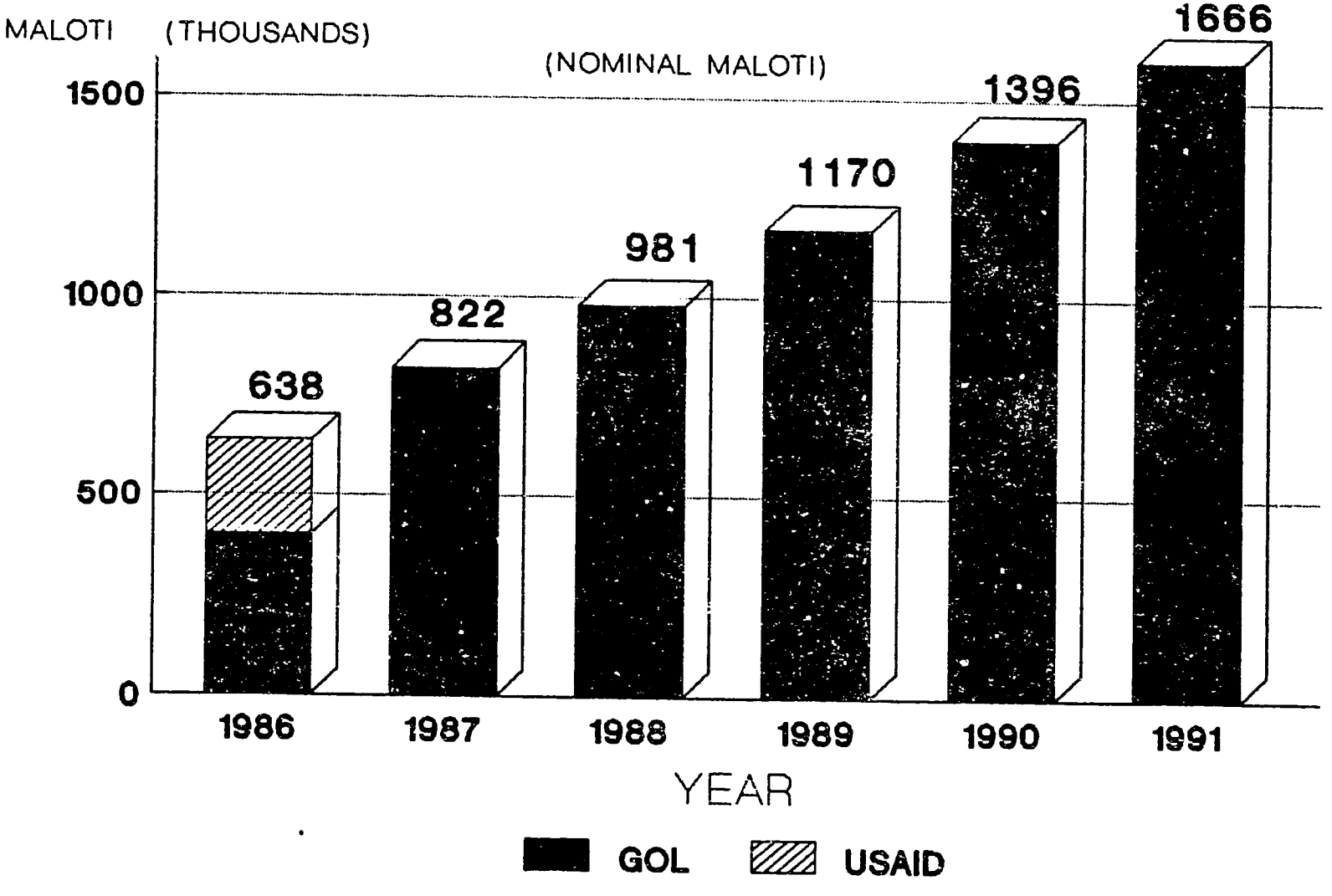
Breakdown of repair costs by system is based on FY '86 data and includes an allocation of AID expatriate costs.

Total for all systems equals $398,600. Weighted average per capita equals $1.00 (M 2.00).

Handpump repair frequency of 0.35. This low repair frequency is more illustrative of a lack of committed resources than of the operation of the handpumps themselves.

FIGURE 6

PROJECTIONS OF MALOTI REQUIRED FOR MAINTENANCE, 1987 - 1991



Chapter 7

SURVEY OF THE PRIVATE SECTOR

7.1 Present Capabilities

A survey was made of local firms with capabilities related to the activities of the VWSS, specifically drilling, pumping, plumbing, and general engineering and management. Representatives of ten firms were interviewed and, while there are probably about ten more firms operating in Lesotho of similar capabilities, it is believed that the following descriptions apply. A list of firms is attached in Appendix C.

There are nine drilling firms registered to operate in Lesotho. It is thought that several more operate without being registered. Several of these firms operate rotary rigs with air, mud, and down-the-hole hammer capabilities. There appears to be sufficient competition to assure low bid prices. Indeed, the VWSS has already successfully contracted with drilling firms and at present undertakes almost all drilling through the private sector.

Pump installation is being offered as a service by some of the drilling firms in addition to firms which generally deal in irrigation equipment or plumbing. Several of these firms act as representatives for various pump manufacturers and stock a limited supply of spare parts. One Lesotho firm (Maseru Pumps and Plastics) is beginning an assembly plant for MONO pumps in Maseru. Again, there appears to be sufficient capability and competition to consider pump installation and maintenance by the private sector. Private firms may be competitive with the VWSS in the four western districts of Lesotho but, because of travel distances and lack of regional representation, they are not as likely to be competitive outside of this region at the present time.

Maluti Irrigation (T&AF Holdings) is an example of a drilling firm which would be capable of undertaking a turnkey operation of drilling, pump installation, and guaranteed maintenance. This firm employs 18 full-time staff and also utilizes student trainees in the industrial curriculum. The firm has five light vehicles (less than three tons), one rotary rig, one compressor, one trench digger, all required pump installation equipment, and a fully-equipped workshop with generators and welders. It maintains stocks worth about 150,000 maloti and reported sales of 1.5 million maloti last year, according to its managing director. Sanitation Water Engineering Consulting (SWEC) is another example of a plumbing firm capable of undertaking pump maintenance contracts. This firm has 14 permanent employees, four light vehicles, and welding, threading, and pipe tools. Last year the firm reported 600,000 maloti in sales, according to its managing director.

Several plumbing firms in Lesotho are potentially capable of constructing and maintaining gravity systems. However, as previously mentioned, the free village labor used in constructing these systems is incompatible with a profit-making firm from the private sector.

In Maseru, several small engineering or management firms consisting of a few individuals enter into small projects or represent larger foreign firms on large projects. Such firms could potentially manage a variety of activities of the type the VWSS undertakes. For example, the VWSS has already contracted with one firm (MB Consultants) to manage the preparation of the manual for the village water committees.

In general, Lesotho-based firms range greatly in their degree of expertise, available equipment, and operating capital. It was not possible to probe into the internal affairs of such firms; however, it may be assumed that many firms operate with the support, direct or indirect, of individuals or larger firms outside Lesotho. To promote the long-term development of Lesotho, Lesotho firms should be involved, whenever possible, in VWSS activities.

7.2 Potential Capabilities

While most firms surveyed displayed a degree of capability and expressed interest in construction and maintenance activities, most also lacked experience carrying out activities on the scale that VWSS is now capable of. Several drilling firms, however, have successfully completed contracts for drilling wells, and the VWSS is already capitalizing on their experience by offering more drilling contracts. Should it be decided that further private sector work, particularly maintenance work, is to be a part of the VWSS, the work should be divided into small contracts, probably on a district level, and companies should be given a year's trial period with close VWSS monitoring. For example, quotations could be requested for the pump installation and maintenance of the 250 wells to be constructed next year in Berea District. The pump maintenance quotes could be based on cost per pump for a year's period. If performance was found acceptable, then the contract could be renewed.

In effect, the VWSS would evaluate its own performance and compare its effectiveness with the private sector. As the private sector increased its capabilities in specific districts, more maintenance contracts could be let in other districts. Under such an arrangement the VWSS would always be required to maintain district representation to monitor the private sector work and possibly to maintain an inventory of spare parts.

7.3 Training and Incentives Required

In order to overcome the risks of small private firms or individuals which might contract with the VWSS, some assistance would probably be required. For example, when bids for handpump maintenance were requested information should be made available to interested firms on the previous VWSS maintenance requirements on the wells. This would include the age of the wells, spare parts requirements, and degree of non-pump-related borehole problems. Either a guaranteed bank loan or an advance mobilization allowance would be desirable from the private firm's perspective.

If village-level technicians were to be made responsible for handpump maintenance, training would be required and a basic set of tools and equipment (including a tripod and pulley system) would have to be provided. Training could be carried out directly by the VWSS or through the private sector pump representatives. Training specialists, such as the Lesotho Opportunities Industrialization Centre, could be utilized for training in plumbing and small business management. For somewhat more sophisticated training in small business management, the Lesotho Chamber of Commerce has submitted a proposal for training within the context of the VWSS.

Chapter 8

SCENARIOS CONSIDERED FOR INCREASED PRIVATE SECTOR INVOLVEMENT

The scenarios developed in this chapter represent a range of feasible and/or potential development alternatives that have been considered by the WASH team for the future of the VWSS Project. The scenarios take into consideration that USAID will no longer be a donor to the project after the end of FY 88. It is further considered that, while the construction of new water systems will continue to be an important goal of the VWSS and other donors will be willing to contribute to VWSS construction activities, it is vital to assure the continued operation and maintenance of the existing water systems. The maintenance activities of the project to date have been considerably less successful than the construction component and therefore emphasis is placed on developing scenarios that will focus on maintenance. The expectation is that construction will continue generally in the same manner as before.

With some exceptions, which are explained here, each of the scenarios describes conditions that can be expected one year from now. The inputs that will be required during the year (FY 88), both financial and personnel, are indicated as general approximations. The outputs depend upon whether or not the maintenance of the water systems is improved. If there is no improvement in maintaining the systems there is no rationale to change from the existing VWSS approach, unless, of course, financial considerations should so dictate. That is, it may be necessary to reduce maintenance simply because of lack of financial support.

Seven separate scenarios have been considered. In the first or status quo scenario the VWSS continues unchanged. The other six scenarios offer varying degrees of change but always take for granted that the VWSS will necessarily exist in some form at least in the capacity of serving as a government agency to monitor whatever work is being done within the private sector. The last scenario considers a turnkey operation of borehole drilling, handpump installation, and handpump maintenance by the private sector through contracts with the VWSS. The seven scenarios are described in the following sections.

8.1 Status Quo Scenario

The status quo scenario assumes that the VWSS Project will continue in its present mode of operations and that its overall budget and level of personnel will remain the same. Since USAID contributions will no longer be available, either the GOL or other donors will have to make up the difference from the loss of USAID funding. It will be necessary to allocate a relatively greater share of the budget to maintain existing water systems at the expense of the construction of new ones. This is necessary because, as the age of the systems increases, general wear will require increased maintenance costs. Thus, construction activities will decrease somewhat and maintenance activities will increase requiring some shifts in personnel, equipment, and vehicles.

It is assumed that the present de facto situation regarding the relationship between the VWSS and the project villages will remain the same. That is, the VWSS will undertake all repairs (it is recognized that there are some exceptions to this) at the request of the villagers. The villagers will oversee operational arrangements and undertake minor repairs but will not contribute any funds to offset VWSS maintenance expenditures. Previously collected funds will remain with the villages and will not be available to the VWSS Project.

Under this scenario it is assumed that the present level of service for handpumps is a barometer for the other types of system. That is, at any given time 6 percent of the systems will be completely unusable and 34 percent of the systems will be providing less than total design efficiency. One month, on average, will be required to repair systems which are broken down.

In a significant number of cases (59 percent) borehole conditions (water table below pump in-take or cave-ins) are the problem and not the pump itself. To rectify such borehole problems major expenditures such as redrilling may be required. In some cases the boreholes may have to be abandoned.

The advantage of maintaining the status quo is that the VWSS is a known entity with the reputation for constructing low-cost water systems. It is an established institution with momentum and with the ability to attract donor assistance.

The disadvantage of the status quo is that maintenance efficiencies are below standard. Donor support for maintenance is not assured, and the village water committees are not functioning as planned. Considerable improvement in these committees will be required if the system is to work correctly.

8.2 Parastatal Scenario

Under this scenario the present VWSS Project would become a parastatal with the same general level of budget but with a reduction in the number of personnel. The ability to hire or fire employees would not be constrained by government practices as it is at present. The technical approach to project implementation would not change. A board of directors of GOL officials would be appointed to oversee the parastatal.

If the VWSS became a parastatal, its employees would benefit through increased remuneration. Salaries could be made competitive with the private sector and bonuses, promotions, and other benefits could be applied. This would likely improve operational efficiency, resulting in increases in the number of systems constructed and existing systems maintained in good repair. Improved maintenance should lead to increased consumer satisfaction.

The parastatal would be empowered to collect a maintenance fee from villagers to offset operational costs as long as the costs involved in the actual collection were considered worthwhile. The willingness to pay issue would be a factor in cost recovery but this would potentially improve with increased consumer satisfaction. The success of this scenario depends upon fine tuning

increased employee benefits with increased employee outputs--a delicate and difficult-to-predict administrative matter. A potential model for this scenario is the transformation of the GOL Water and Sewerage Branch to a parastatal, as described in the Price Waterhouse Report. Consideration could be given to incorporating urban and rural water supply under one parastatal.

The primary advantage of changing the VWSS to a parastatal would be increased efficiency through improved employee performance. The parastatal would have the freedom to reward performance and the responsibility to do away with wasteful operations. Increased cost recovery would be required. The potential for contracting with the private sector would still be possible if needed.

There are many disadvantages to this scenario. The foremost is that a high degree of administrative skill would be required actually to improve efficiencies without increasing the budget. Also legislation would be required to establish a parastatal, and cost recovery would require a major change of attitude on the part of villagers. Another organization, a board of directors, would be required. Certain activities of the VWSS, such as health education, training, and the relationships with the village water committees, might be negatively affected.

8.3 Increased Contracting Scenario

Under the existing VWSS Project a large percentage of drilling contracts have already been let to the private sector. The number of such contracts has increased during the past few years. Under this scenario, all drilling would be carried out on contract by the private sector, and maintenance contracts with private firms would be instituted.

Both the construction of boreholes and possibly the construction of parts of a gravity-fed system, such as the reservoir, would be gradually taken over by the private sector. The VWSS would grant contracts on a bid basis and monitor the contractor's performance.

Maintenance contracts would be granted on the basis of a fixed fee for a set number of systems within a specific district. The contractor would guarantee his work under penalty for failure to comply.

These changes would be implemented gradually over several years. The rate of implementation would be largely dependent upon the increased capability of the private sector, but a sustained effort would be made to turn a majority of the work over to the private sector. Initially maintenance contracts would be let in the four districts with the greatest number of water systems. The VWSS would assure maintenance in the remaining districts.

The VWSS would essentially compete with the private sector in bidding on the contracts. It is expected that in those districts where a relatively dense concentration of water systems exists the private sector would be able to provide the required service at a lower cost than the VWSS. However, for the more isolated districts the VWSS would continue to maintain the systems.

Over time the budget of the VWSS would remain at its present level with a greater proportion of the budget being paid to the private sector for services rendered. The personnel of the VWSS would be reduced proportionally, particularly the drilling and maintenance personnel. Within the VWSS more personnel with monitoring skills would be required.

Since changes would be phased in, a progressive evaluation of the results would be possible. Thus, risks would be minimized since the proper ratio of VWSS and private sector work could be adjusted as required.

The main advantage of increased contracting with the private sector is that a somewhat improved level of service could be expected because the private sector would be more responsive to fulfilling its contractual obligations. In addition the VWSS would remain as a known entity but would change gradually as the private sector took over. Private sector skills could be focused and brought in as needed. Fixed costs would be reduced as these costs would be shifted to the private sector. Total project costs would presumably be decreased. The project could focus donor contributions through specific contracting arrangements to produce specified outputs.

The disadvantages are that the VWSS would have to increase its supervisory skills and establish criteria to monitor contractor performance and VWSS staff would have to be reduced which would probably be difficult. The VWSS would necessarily continue maintenance where the private sector is not established and would need to collect maintenance funds from all village beneficiaries. The construction of gravity systems by a profit-making firm is not compatible with the VWSS approach of relying to a large extent on free village labor.

8.4 Village Responsibility Scenario

Under this scenario responsibility for all water-system maintenance would fall completely on the villages themselves. The village water committees would organize repair efforts and collect user fees to cover the costs of maintenance. In effect this scenario would handle maintenance as the VWSS Project had originally proposed.

For gravity systems this scenario could be implemented now. For motorized pumps and windmills the villages could conceivably hire the maintenance work through local mechanics. For handpumps a training program would be required. The VWSS would train the pump-minders in maintenance of the MONO and MOYNO pumps and supply a tripod and a set of necessary tools for pump maintenance. The village water committees would obtain required spare parts from commercial outlets or the VWSS and would pay a salary to the village repairman.

It is expected that villages with gravity systems would spend less on repairs than those with handpumps. It is further expected that a significant percentage of systems would fall into disrepair whenever large outlays for repair were required. Some villages, rather than pay for the repairs, would choose to return to their old water sources.

Under this scenario the VWSS would continue to construct water systems utilizing the existing methods. Money currently allocated for maintenance would be shifted to construction or the total budget would be reduced proportionally.

The only advantage of this approach would be to reduce significantly VWSS maintenance costs.

There are several disadvantages. Many water systems would probably go out of service. Increased training of village water committees would be needed and considerable improvements in village attitudes would be necessary. Major problems would still have to be repaired by the VWSS.

8.5 Local Technician Scenario

This scenario proposes to rely upon increased local responsibility for maintenance while creating an increased private-sector role in maintenance. This approach proposes that one technician be franchised for about ten villages to be responsible for all system maintenance (both handpumps and gravity systems). This approach is, in effect, a subset of the increased contracting scenario. Local technicians could be hired by the VWSS or by firms who would then be responsible for their work and supply them with spare parts and tools.

The technicians would be summoned as needed by the village water committees whenever a repair was needed, but they would also conduct preventive maintenance. These technicians would be trained and equipped by the VWSS. They would receive a base salary through the VWSS and would be provided spare parts and materials by the VWSS. The VWSS would maintain the capability to undertake major repairs, particularly borehole problems.

Because the technicians would be locally based, significant savings in transportation costs would be realized. The response time in completing repairs would also be significantly improved. It is believed that individuals with suitable mechanical skills may be found in villages among the returned miners, many of whom have worked with machinery much more sophisticated than handpumps.

The advantage of this scenario is that the VWSS would maintain an important role in system management at the local level while reducing its costs. Savings in transportation should be significant. The VWSS and the village water committees would have to monitor the technicians and would replace those whose performance was unsatisfactory. The training and salary base would allow the technicians to become involved in other community construction and repair activities. The scenario is appropriate for all districts in Lesotho. Also, helping returned miners is an important goal of the GOL.

This scenario involves a degree of risk. Nothing like it exists at present in Lesotho, and it relies upon the skills and interest of the local technicians as well as the continued management of the water committees. If only one technician were trained, the system would be vulnerable to his possible departure to another job or location.

8.6 Private Water Association Scenario

This scenario is patterned after the Private Health Association, a local non-governmental organization which provides a variety of primary health services to local hospitals.

The Private Water Association would be a non-profit entity managed locally. It would focus on integrating maintenance activities with training of village committees, improving sanitation, and health education. The association would assume responsibility for each of these activities under one umbrella organization.

The services that the association would undertake include

- negotiating contracts,
- training through subcontracts for village water committees and technicians,
- writing proposals for special projects,
- lobbying for policy change, and
- recommending special projects for potential donors.

The VWSS would retain oversight responsibilities, and the association would work within the policy of the GOL. Individual villages could elect to be members of the association, the purpose of which would be to represent and promote village interests. Membership fees would be paid with the seabo, which has already been collected. Competitive salaries would be paid to the association's staff. Contracting with other entities, both commercial and noncommercial, would be required for specific services.

The advantages are that the VWSS could concentrate on water system construction and become a new organization because the association would take over all other functions at present carried out by the VWSS. The level of maintenance service could be improved, and the integration of health activities should provide improved health among villages, as predicted by Esrey (1987). User interests would be represented in the association, and it would be able to attract smaller and varied donors.

The disadvantage is that the creation of a new organization introduces a risk factor, and it is not clear if the villages would be interested in joining such an organization. Also, the personnel of the VWSS would have to be reduced proportionally. Because of the shift in responsibilities from the VWSS to the association there would probably be no change in overall budget requirements.

8.7 Contracting Installation and Maintenance Scenario

The provision of water to a village with a handpump requires

- site selection with the village water committee,
- borehole drilling,
- pad construction,
- handpump installation, and
- handpump maintenance.

The VWSS is now using local firms to drill the borehole but not involving them in other activities. The previous six scenarios all approached the problem of providing water supplies by disaggregating the tasks to be completed by different groups within the VWSS or the private sector. This scenario suggests that all the activities be linked by a common group, the private contractor.

The maintenance of a handpump is highly dependent on the straight drilling of the borehole, the proper grading for pad construction, and correct installation to prevent early breakdowns. Under the current system, the fate that befalls the party assigned to maintain the handpump is not knowing the quality of the work done by those who drilled the well, constructed the pad, and installed the pump. Inevitably, however, it becomes evident who did high quality work and who did poor work. As it now stands, despite their good intentions, the crews involved before regular pumping begins do not have to face the consequences of their work. Of course, problems discernible by supervisors at the time of their work can lead to improvements; however, non-discernible problems surface for the maintenance crews to contend with. Th drilling crews do not have to live with their errors; the maintenance crew doe

If one agency or firm were responsible for all operations, the maintenance requirements would most likely decrease. This system has been implemented by Sister Giselle at the Reitumetse Church Project in Mazenod. She reports a marked decrease in maintenance requirements when all activities are performed by the same party, as greater care is taken with installation.

The VWSS could consider contracting private firms to perform all operations from drilling through maintenance. Several local firms have indicated that they would be willing to provide year-long guarantees on their work if they were contracted to perform both drilling and maintenance.

Combining drilling and maintenance in one contract would also reduce the maintenance fee that a private firm would charge for maintenance contracts. By removing the risk of uncertain quality drilling and installation, the private contractor could bid at lower levels.

The advantages of this arrangement for the VWSS are that maintenance requirements for handpumps would be reduced and fewer materials would be used. Also, the VWSS would be able to focus its resources in districts where contracting is not feasible. "Package deals," which include both installation and a year-long maintenance agreement, should be less expensive.

The disadvantages are that more supervision of contracts would be required, the VWSS would have less control over quality, and there would be fewer opportunities to correct mistakes.

Chapter 9

COST ANALYSIS OF THE MOST PROMISING SCENARIOS

Based on an assessment of the scenarios presented in Chapter 8 and after discussions with interested parties concerned with the VWSS, it was decided that, of the scenarios described, four are promising and should be explored from a cost standpoint. These four scenarios are discussed in the following sections.

9.1 Increased Contracting Scenario

It was pointed out in Chapter 6 that significant reductions in overall VWSS maintenance expenses would be achieved if transport costs were reduced. The following paragraphs describe one way in which the VWSS could contract with private firms to undertake more expensive handpump maintenance operations while insuring quality water supply at the village level. The VWSS would still be responsible for handpump installation.

The cost analysis for this scenario uses Mafeteng District as an example. Mafeteng District was chosen since it has a high density of handpumps (64 systems as of April 1, 1987) and the most up-to-date handpump repair records. The analysis assumes a .5 handpump repair frequency.

Current costs were analyzed to discern how and to what extent VWSS costs for handpump maintenance could be reduced by hiring a private firm. These costs represent the VWSS expense for performing handpump maintenance in Mafeteng at a given level of service. Private firms that propose to perform the same level of service at a bid price below VWSS costs should be considered as contractors for handpump maintenance. The VWSS will need to establish what additional services it feels a private firm could provide and what it should pay for those services. Therefore, bids above the VWSS expense level should not be categorically dismissed but reviewed to ascertain the type and level of the services offered.

The current situation vis-à-vis the VWSS, the village water committees, and private firms suggests that the responsibilities of the VWSS and contractors should be divided as shown in the following chart.

VWSS	Contractor(s)
Periodic supervision	All handpump maintenance (including borehole repair) in the district
Spare parts procurement	Maintenance record keeping
Revenue collection	

The private firm would be responsible for all handpump maintenance including borehole rehabilitation when required. The VWSS currently has eight of its twelve drill rigs in Mafeteng District. According to the WASH team's analysis, maintenance, operation, and transportation costs related to these rigs are very high.

After contracting with a private firm to perform all handpump maintenance, the VWSS should transfer its current handpump maintenance crew to one of the other districts with a high density of handpumps, such as Mohale's Hoek. In addition, the VWSS should lease six of the eight machines in the district to the firm performing the maintenance or to other firms interested in leasing the cable tool rigs.

Cost savings would be gained by reducing the costs of transporting the repair crews to individual boreholes and by eliminating half of the total operating expenses of the drilling rigs. In addition, the VWSS would receive revenues from the leasing of its drilling machines.

The revenue stream could be increased if the VWSS could lease the equipment on a capital lease basis. Under such an arrangement, the government would essentially be selling a tax benefit to the lessee. The tax benefit is currently of no use to the government but it could increase its lease rate by some percentage of the tax benefit.

Table 10 summarizes the benefits accruing to the VWSS from reduction in costs and income from lease revenues. The table shows that cash flow could be increased by M 108,740 by adopting the above recommendations. This is the amount for which the private firm should be able to provide maintenance services. As long as a firm comes in below this maximum amount, the VWSS should consider its bid.

This privatization study did not provide sufficient time to establish maintenance specifications or to collect private sector bids on maintenance operations. The latter would require private firms to review specifications, do an in-depth analysis of VWSS handpump data for a region (such as Mafeteng), and take a lengthy field visit to assess a representative cross-section of pumps to be maintained.

A bid range of M 89,000 to M 134,000 was suggested by one local private contractor for the maintenance of 373 handpumps. From this estimate one can conclude the following:

- Private firms feel that they can provide maintenance at lower costs than the VWSS.
- The VWSS should solicit actual bids from private firms for undertaking maintenance activities in districts with a high density of handpumps.

Table 10

Private Contracting in Mafeteng*

Reduction in VWSS Costs	M 99,740/yr.
Lease Revenues	9,000/yr.
TOTAL	M 108,740/yr.

Maximum bid price to be entertained for same level of service:

Mafeteng district	M 108,740
If broken down by cost/system/yr.	M 1,700
If broken down by cost/handpump/mo.	M 24.3

* Estimated 373 handpumps.

This study has established a bid price for the current VWSS level of service that should be compared with private firms proposing to provide the same level of service. The private firms may propose to provide additional services, or the VWSS may feel that some additional benefits may accrue by using a private firm (e.g., preventive maintenance). In such a case, the VWSS will need to quantify these benefits to compare them with VWSS expenses and with other private firm bids.

It is important to note that for the Mafeteng District case study presented here, no VWSS assets were assumed sold or transferred to other GOL agencies; and no VWSS employees (technicians or support staff) were presumed to be dismissed or transferred.

In order to contract with private firms for handpump maintenance, several issues must be resolved to assure that the maintenance work is satisfactorily carried out. As indicated earlier in this report, many boreholes are not producing water for reasons other than pump failures (such as lowered water table and cave-ins). In addition, because some boreholes have had equipment improperly installed there have been recurring problems in maintenance. Further, some of the MOYNO pumps have had problems with their foot valves and a great number of these valves had to be replaced. Because of these generally known problems, private firms will probably be unwilling to accept responsibility at a reasonable cost for pumps on a district-wide basis without knowing more about the pumps and the boreholes.

To overcome this problem two alternatives are possible. One is for the VWSS to provide all of its service records to potential bidders. This would allow the bidders to estimate the work required for the set of pumps in question and establish their bids accordingly. However, many pumps do not have a service record, and the unknowns involved may lead the firm to submit a higher bid than is desirable.

A second approach, the recommended alternative, is to contract with a firm to provide maintenance of pumps on a district basis and to assume gradual responsibility for the pumps. That is, the firm would initially be required to repair all of the existing backlog of pumps which are currently broken down. The firm would pull the pumps, inspect all parts, measure water levels, and make all necessary repairs to the pumps (and pads if needed). The firm would charge a flat fee (of about M 200 per pump) for this service and the VWSS would supply the needed spare parts and materials. Thereafter, the firm would accept future responsibility for the maintenance of the repaired pumps for a monthly fee (of about M 20-30 per pump per month). Boreholes which had caved in, which were yielding inadequate quantities of water, or in which the water table had dropped below minimum levels would not be accepted by the firm. These wells would be either redrilled or abandoned. New requests for repairs from villages would be passed on to the firm, and the firm would progressively assume responsibility for all of the wells in the district.

The advantages of this approach are that it would allow the firm to gear up gradually to ultimate responsibility for maintenance of all wells in the district and, at the same time, would allow the VWSS to evaluate the results of the firm's work and gradually to reduce its responsibilities for handpump maintenance. Under the terms of the contract the firm would guarantee an

acceptable water yield from the wells both from a mechanical and hydrological perspective, with exceptions granted in the case of a force majeure (droughts or impassable roads). All needed repairs would be undertaken promptly with a penalty imposed if pumps were left inoperable for more than one month. The VWSS would have to make spot checks to assure contract performance. Contracts should be awarded on a yearly basis with options for renewal. It might be necessary for the VWSS to provide a mobilization advance to the selected firm.

9.2 Local Technician Scenario

Under the local technician scenario, it was envisioned that local men with mechanical capabilities would be trained in handpump maintenance. Each local technician would undergo a VWSS-sponsored two-week training course in Maseru. After the course, the technician would be loaned a complete set of foreman's tools and a tripod. The local technician would be responsible for all handpump maintenance in an area prescribed by the VWSS. Borehole maintenance requiring a drilling rig would still be the responsibility of the VWSS.

The local technician approach assumes that the same number of repairs and materials would be needed as if the VWSS were performing the work itself. The use of local technicians would allow the VWSS to transfer maintenance personnel to other districts. In this scenario the VWSS staff would be reduced from four technicians and one supervisor to one technician and one supervisor. Eight local technicians would be hired. These technicians would each be responsible for eight handpump systems. They would be paid M 250 per month and be given a transportation allowance. The use of the local technicians was assumed to allow a cutback in transportation requirements from three light-duty vehicles and one medium-duty truck to one light-duty vehicle and one medium-duty truck.

To analyze costs for this scenario Mafeteng District was used as an example. Data and reports from Mike Ntja, District Engineer South, placed the handpump repair frequency in Mafeteng in the range of 1.2 to 2. The high repair frequency is primarily due to faulty foot-valve design by MOYNO. For this investigation, a 1.0 repair frequency was used.

Expense profiles for handpump maintenance were computed using just VWSS staff and then using VWSS staff in conjunction with local technicians. The present values of the two options were compared for a five-year period. The results are shown in Table 11. The cost projections assumed that VWSS costs outside of those directly affected by hiring the local technicians would remain the same.

The results demonstrate a 9 percent cost advantage in employing local technicians. It should be noted that this analysis does not capture any cost advantages which might be gained by having local technicians perform routine preventive handpump or gravity system maintenance. On the other hand, the Mafeteng data did not adequately illustrate how much of the VWSS technicians' or supervisors' time would be required in supporting the local technicians. The 9 percent cost advantage could disappear quickly if additional VWSS technicians and vehicles were required to support the local technicians.

Table 11

Comparison of Costs under Local Technician Scenario
(in Maloti)

VWSS Only

	1986	1987	1988	1989	1990	1991
Labor	M 47,520	M 54,648	M 62,845	M 72,272	M 83,113	M 95,580
Materials	32,651	46,178	56,802	69,843	85,849	105,486
SOC	10,200	11,220	12,342	13,576	14,934	16,427
Transport	32,753	38,157	44,453	51,788	60,333	70,288
Dep Exp	24,488	28,161	32,385	37,243	42,830	49,254
TOTAL	M147,612	M178,364	M208,827	M244,722	M287,059	M337,035

Present value if discounted at 15% = M926,445 required over next 5 years for system repair

VWSS and Local Technicians

	1986	1987	1988	1989	1990	1991
Labor - VWSS	M 47,520	M 31,878	M 36,660	M 42,159	M 48,482	M 55,755
Labor - L.T.	0	33,400	31,740	36,501	41,976	48,273
Materials	32,651	46,178	56,802	69,843	85,849	105,486
SOC	10,200	11,220	12,342	13,576	14,934	16,427
Transport	32,753	20,582	23,669	27,219	31,302	35,997
Dep Exp	24,488	19,329	22,229	25,563	29,397	33,807
Trans. Allow.	0	5,568	6,403	7,364	8,468	9,738
TOTAL	M147,612	M168,155	M189,845	M222,225	M260,408	M305,483

Present value if discounted at 15% = M 847,154 required over next 5 years for system repair

9% Savings with VWSS and Local Technicians

NOTE: Discounted cash flows do not include 1986.
L.T. = Local Technicians
SOC = Supplies and Operating Costs
Dep Exp = Depreciation Expense

9.3 Parastatal Scenario

It was difficult to estimate expenditures and cost savings for the parastatal scenario since to do so necessitated quantifying significant changes in attitudes and work practices. If the VWSS were to be changed into a parastatal organization the following changes and results might be anticipated.

CHANGE >>>>>	RESULT
• 20 percent reduction in staff.	• 10 percent reduction in total salaries and allowances. The extra 10 percent from the manpower cutbacks would be used for bonuses and increased incentives.
• Improved working habits in handpump repair.	• 10 percent improvement in handpump repair frequency (a reduction from 0.5 to 0.4).
• More effective use of materials with less waste and more rebuilding of usable parts.	• 10 percent reduction in materials used.
• Reduction in transport costs with better logistical control and more effective placement and use of drilling equipment.	• 20 percent reduction in total transport costs, mostly linked to reduced drilling transport charges.
• Improved vehicle maintenance.	• 10 percent reduction in depreciation expenses.

FY 1986 data were adjusted to illustrate the effects of these changes in operating practice. The results, shown in Table 12, illustrate a 13 percent improvement in cost reduction. A sensitivity analysis on the performance assumption demonstrated a range of 5 to 19 percent improvement.

9.4 Contracting Installation and Maintenance Scenario

The VWSS has rightfully hired local firms to drill boreholes. As mentioned in Chapter 6, even though the VWSS can drill an individual borehole for about the same cost as a private firm, a private firm can drill from 5 to 10 times as many boreholes per month as the VWSS can with its existing cable tool rigs. Section 9.1 discussed the potential cost savings of using a private firm for handpump maintenance. Contracting out both installation and maintenance could lead to further cost savings in the near and long term.

Table 12

FY '86 Maintenance Costs Adjusted to a Parastatal Scenario
(in $000)

Donor	Pers/ Exp	Pers/ Local	Materials	SOC	Transport	V&ME	Dep Exp	Total
AID	---	---	---	---	---	---	---	---
GOL	---	$72.17	$35.84	$3.41	$76.80	$33.99	$56.01	$278.22
Communities	---	---	---	---	---	---	---	---
TOTAL	---	$72.17	$35.84	$3.41	$76.80	$33.99	$56.01	$278.22
Percent	---	25.9	12.9	1.2	27.6	12.2	20.1	100.0

Total Expenditures (000)	$278.22
Population served	398,380
Per Capita Cost (US $)	$0.70
Per Capita Cost (Maloti) 2 Maloti/$1.00	M 1.40
Average Expenditure per System	$394.64

NOTE: FY '86 data for maintenance operations were adjusted according to the assumptions noted in Section 9.3.
Pers/Exp = Expatriate personnel
Pers/Local = Local personnel
SOC = Supplies and Operating Costs
V&ME = Vehicles and Major Equipment
Dep Exp = Depreciation Expense

Under this scenario the VWSS would require drilling firms to bid not only on borehole construction but also on all work required to install a handpump and maintain it for the first year. The VWSS would inspect the contractor's work after drilling, pad construction, and handpump installation. Thereafter the VWSS could conduct spot checks or rely on information on faulty performance being relayed from the village water committees.

It would be in the interest of the contractor to do the best possible work during the early construction phase to preclude extensive handpump maintenance problems later on. WASH experience elsewhere in Africa has demonstrated that major problems from faulty handpump installation will often occur during the first year of operation.

Table 13 demonstrates the sensitivity of the total costs of a handpump over a 10-year period to the frequency with which it needs repair. These calculations are based upon private-sector drilling, installation, and maintenance operations. As shown, the present value cost of a handpump more than doubles as the repair frequency increases from 0.25 (one repair every four years) to 2.0 (one repair every six months). As a percent of the total cost of a handpump, maintenance costs may range from 15 to 59 percent.

Figure 7 compares maintenance costs of the private sector and the VWSS to undertake the same operations. For example, a present value cost of M 4,730 per handpump implies a 0.8 repair frequency for the private sector and a 1.0 repair frequency for the VWSS. The issue is whether one would expect to see at least a 0.2 decrease in repair frequency by having the private sector link all activities from installation through maintenance. Empirical evidence from the Mazenod Mission demonstrates that a much larger drop than 0.2 could be expected. Hence, the linking of all operations by the private sector firm may not only cut costs but ensure a more reliable supply of water.

9.5 Analyses and Conclusions

The above set of analyses shows how significant savings can be realized through private-sector involvement or the formation of a parastatal organization. However, the assumptions that were made in developing the scenarios involve a significant margin for error in the calculated results. This is especially true for the local technician and parastatal scenarios. Since the contracting scenario was analyzed from the standpoint of historical data, its results have a narrower potential margin for error.

At this time, the handpump maintenance contracting alternative provides the most attractive savings and would be easiest to implement. If the VWSS decided to choose this alternative, the next steps would be to establish handpump maintenance specifications and invite bids from the private sector on specific groups of handpumps.

The local technician scenario is attractive but does not provide the level of potential savings offered by the contracting alternative. Hard-to-quantify benefits, such as preventive maintenance, could be evident only after a year-long trial.

Table 13

Influence of Repair Frequency
on Total Costs per Handpump over 10 years
(in Maloti)

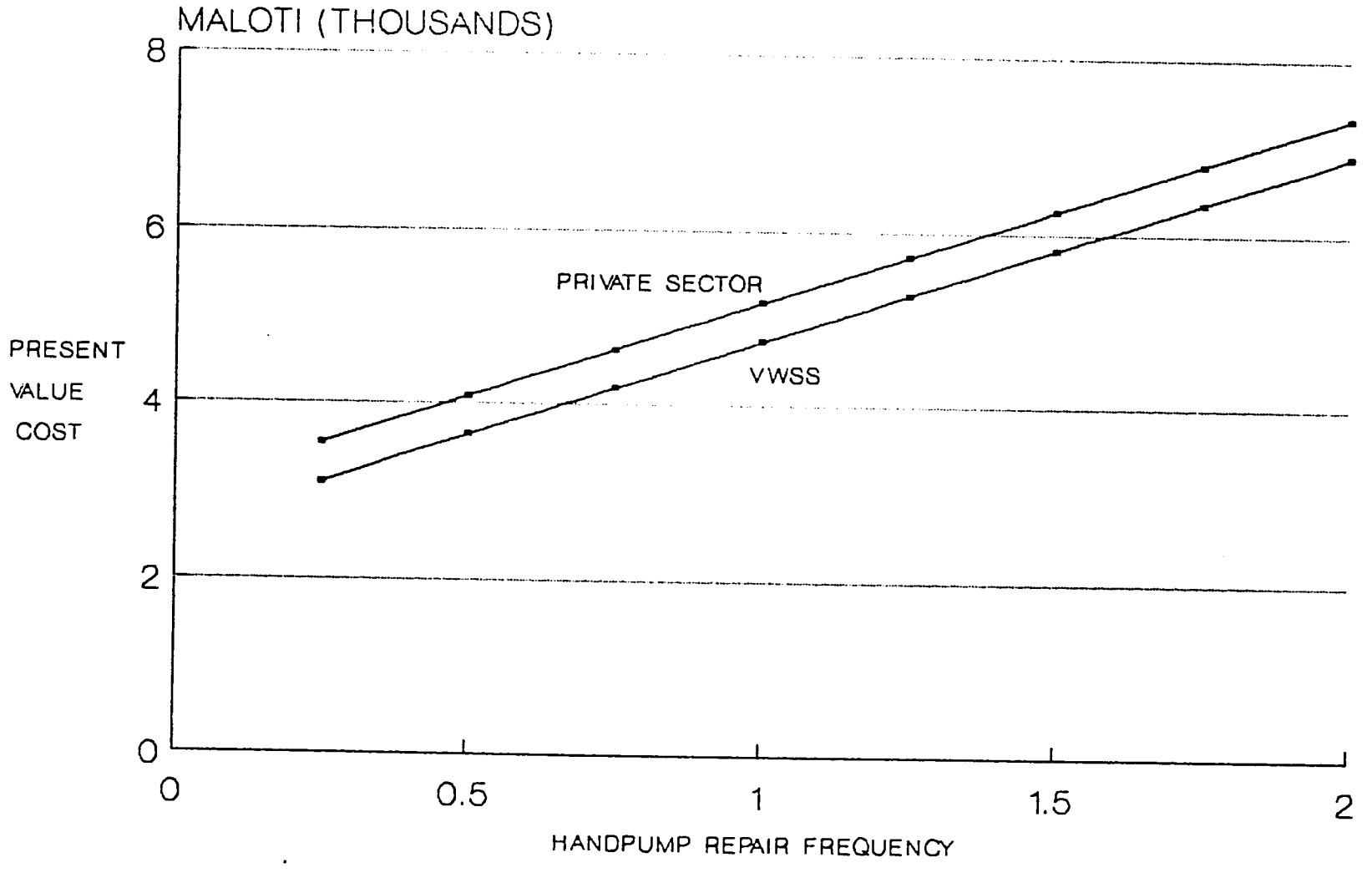
	Year									
	0	1	2	3	4	5	6	7	8	9
Drilling	M 1,230	0	0	0	0	0	0	0	0	0
Installation (incl. pad & handpump)	1,770	0	0	0	0	0	0	0	0	0
Maintenance (repair frequency = 0.25)	54	62	72	83	95	109	126	144	166	191
TOTAL	M 3,054	M 62	M 72	M 83	M 95	M 109	M 126	M 144	M 166	M 191
Present Value (Discounted @ 15%)	M 3,543									

	Present Value Cost		
Repair Frequency	Private Sector	VWSS	Private Sector Maintenance as Percent of Total Costs
0.25	3,543	M 3,100	15%
0.50	4,086	3,643	27%
0.75	4,630	4,187	35%
1.00	5,173	4,730	42%
1.25	5,716	5,273	48%
1.50	6,259	5,816	52%
1.75	6,802	6,359	56%
2.00	7,346	6,903	59%

NOTE: Maintenance costs adjusted to inflation rates in earlier table.

FIGURE 7

COMPARISON OF PRIVATE SECTOR AND VWSS MAINTENANCE COSTS



The parastatal scenario has the widest margin for error since it requires the quantification of changing attitudes and work habits. Furthermore, the formation of a parastatal may require policy changes within the GOL. Cost savings and peripheral benefits could only be assessed after a prolonged period of data collection.

An entirely different approach was suggested in the fourth scenario, which links all activities from borehole drilling through handpump maintenance. This scenario attempts to correct shortcomings in the current approach, which disaggregates the various activities (drilling, pad construction, handpump installation, and maintenance). This scenario does not address the nearly 2,000 handpumps which will be in place by the end of 1987, but it does offer a means of reducing the handpump maintenance load in the future and involving the private sector. Donors are hesitant to invest in maintenance problems. However, this scenario, when applied to new systems, may offer a way in which new donor funds can be used to install systems and maintain them for the critical first year of operation.

In summary, this privatization study addresses three fundamental questions:

- What aspects of the rural water supply program can be privatized?
- What are the constraints to privatization of those activities?
- How can the constraints to privatization be overcome?

The study disclosed a potential for economic and service benefits from the privatization of handpump and borehole maintenance in four lowlands districts through contracting. Privatization of handpump and gravity system maintenance in the other six districts through the use of village-level technicians may offer benefits, but initial indications are that the benefits may not be pronounced. Technicians may be retained through employment or service contracts as private sector participants. Other aspects of VWSS' responsibilities, such as construction, supervision, procurement, and quality control, seem less amenable to privatization. As experience is gained with initial privatization steps, however, other opportunities may be identified.

There are no major obstacles to privatization in terms of GOL policies or legislation. In the near term, private firms could experience difficulties in securing credit to participate in privatization schemes, and some firms might need training in the entrepreneurial aspects of contracting with the VWSS. Until cost recovery can begin producing revenues and reductions in VWSS staffing can be made, corresponding to the assumption of maintenance work by contractors, contracting with private firms is likely to result in net additional costs to VWSS/GOL, and funding may not be forthcoming. Funding would also be needed to implement training for technicians, village water committees, and district rural development staff and to provide tools and

equipment for village technicians. Cost recovery is not an essential complement to privatization in the near term, but would be of increasing importance over time. There are indications that the willingness of households and communities to pay for maintenance services could be a serious constraining factor

USAID could assist in overcoming a number of the identified/potential constraints to privatization by providing technical and financial assistance in areas of training and purchase of tools and equipment for technicians. If credit is needed for Basotho businessmen to participate in privatization activities, USAID could provide funds for a revolving line of credit in association with an appropriate local financial institution. Development of cost recovery capabilities will involve a major community relations effort to change existing perceptions at the village level concerning who is responsible for maintenance and how communities should participate in covering such costs. This can only be achieved through a strengthened system of rural development resources at district and local levels and with substantial improvement in the management capabilities of village water committees. USAID can provide technical and financial assistance in the training programs needed to achieve the required performance improvements.

Chapter 10

CONCLUSIONS AND RECOMMENDATIONS

10.1 Summary of Conclusions

A summary listing of the principal conclusions reached in this study is presented as follows:

1. The VWSS as an institution has been successful in constructing village water supply systems and should be commended for implementing a low-cost construction program.

2. There are no legal barriers or governmental policies which would constrain privatization in Lesotho. However, specific institutional approaches for incorporating privatization may require legislation, such as in the event it is decided to transform the VWSS into a parastatal.

3. The VWSS has already begun privatization of some activities, particularly the drilling of boreholes, and this should be continued.

4. Privatization of the construction of gravity systems is not recommended because of the use of free village labor which is not compatible with a profit-making enterprise.

5. The availability of credit to the private sector could be a constraining factor if large public enterprises are to be created to meet rural water-supply demands or if existing firms require major capital expansions. Credit for smaller enterprises, if needed, should be readily available.

6. Inflation rates have been generally high and must be considered by both private and public entities in planning and managing rural water programs.

7. The maintenance of VWSS water systems, particularly handpumps, is a problem. Privatizing parts of the maintenance requirements appears to offer some increases in efficiency. Increased reliance upon village-level maintenance technicians (especially returned miners) appears to offer advantages.

8. The VWSS should retain supervisory, revenue collection, and procurement responsibilities if private firms are contracted for handpump maintenance.

9. The budgets for water-system maintenance must be increased above present spending levels as the systems, primarily handpumps, are not being adequately maintained. Projecting maintenance costs for all VWSS water systems over the next five years, the following annual expenditures will be required:

1987	M 780,000
1988	942,000
1989	1,112,000
1990	1,342,000
1991	1,600,000

10. If total cost recovery for maintenance of all water systems were to be instituted, based on the costs indicated in item 9, M 8.5 per household per year would be required in 1987 with annual increases to about M 15 by 1991.

11. The willingness of villagers to pay for maintenance is considered a problem under the present operations of the VWSS. If cost recovery is to be achieved, increased training and incentives will be required of village water committees and rural development assistants.

12. Donors that depend on District Rural Development Office staff to implement programs should collaborate with the Ministry of the Interior to substantially upgrade their training, salaries, and support. USAID should investigate ways of strengthening village water committees through training carried out under other health programs.

13. The Draft Fourth Five-Year Development Plan (Ministry of Interior) is endorsed as it pertains to the articulation and implementation of a maintenance policy, including a plan for cost recovery, and in its emphasis on the training of village water committees.

14. There is a need for the GOL to establish a near- to medium-term policy for funding the water sector in general, providing primary emphasis on achieving full financial self-sufficiency for the urban subsector and calling for partial cost recovery from the rural subsector. The GOL should guarantee adequate general budget funding support to cover any gap between recurrent expenditures and revenues in order to assure sustainability of the water systems.

15. At the suggestion of the Principal Secretary of the Ministry of Central Planning it is proposed that consideration be given to utilizing the Village Development Committees in place of the village water committees. The former may provide more authority in collecting and managing maintenance funds.

10.2 Recommendations

10.2.1 General (For the GOL/VWSS)

1. Implement privatization of handpump maintenance by contract with private firms in four districts (Berea, Maseru, Mafeteng, Mohale's Hoek) and by contract with individual technicians in the remaining six districts. This includes the following activities:

   - Conduct a detailed analysis of handpump maintenance requirements in the four districts and prepare specifications for a series of maintenance contracts, clearly delineating the respective responsibilities and the prescribed working relationships of the contractor, the VWSS and the villages, and solicit competitive bids (with the VWSS reserving the right to reject all bids pending confirmation of the economic advantages of contracting). If this plan proves to be economically beneficial, implement it.

   - Identify the optimum scope of work for each technician; establish the working relationships to be maintained between the technicians, the VWSS, and the villages served; identify the specific villages to be served by technicians; determine the types and quantities of equipment to be furnished and request donor assistance in obtaining it; initiate the selection process for technicians; develop and initiate training programs for technicians that have been selected; and implement the program.

2. Develop near-term and long-range policies for funding maintenance requirements for the rural water-supply program within the context of the nation's total water-supply sector. Provide for cost recovery from all subsectors with progressively higher expectations from those elements having the greatest ability to pay.

3. For existing water systems, develop and implement a cost-recovery mechanism for rural water-supply maintenance requirements, beginning at a level of 25 percent of costs and gradually increasing the proportion recovered to the ultimate objective of 75 percent of requirements over a five-year period, beginning in FY 88/89.

4. For water systems to be constructed in the future, inform prospective villages that they will be required to pay for the operation and maintenance of their systems. The villages should be thoroughly versed in the implications of this policy and be given estimates, according to the type of system, of the costs that they will bear.

5. Develop and implement a training program for village water committees designed to enhance their overall performance in management of systems maintenance, financial management, and community relations.

6. Develop and implement training programs to enhance the performance of district rural development officers and rural development assistants. Establish improved mechanisms to support their field operations and initiate formal actions aimed at increasing salaries and benefits for those officials. Work with donors to gain needed funding support for those actions.

10.2.2 For USAID

1. Provide assistance to the GOL/VWSS in the implementation of privatized handpump maintenance contracts with firms and local technicians. Provide funding for additional tools and equipment needed by technicians and evaluate the possibility of providing funding support for the training of technicians. Evaluate the potential need for credit among Basotho businessmen who would be participants in the program and consider providing funding for the establishment of a line of credit for them through BEDCO or some other appropriate financial institution.

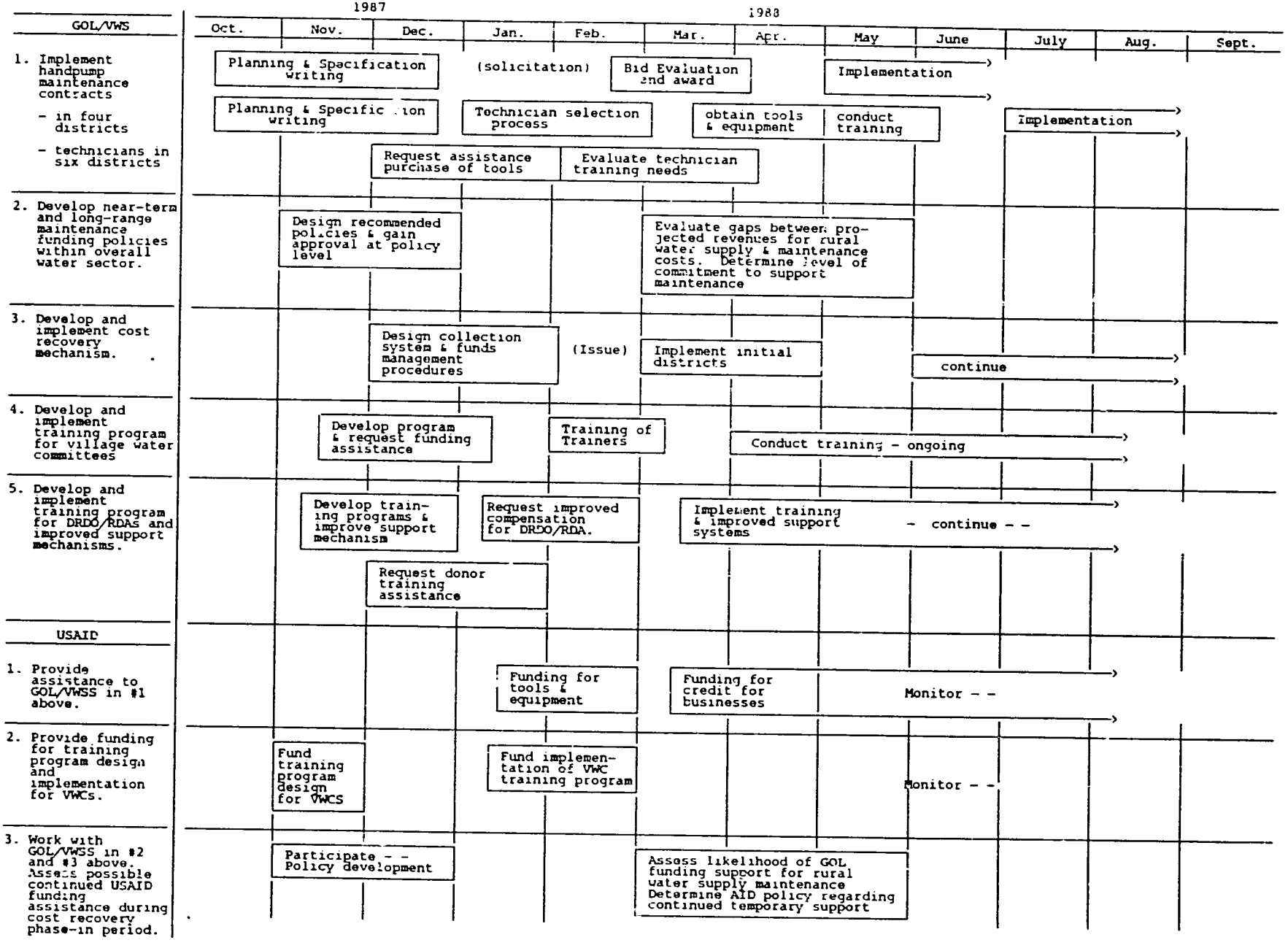
2. Work with the VWSS to identify optimum methods for training village water committees and provide funding assistance if necessary.

3. Work with the GOL/VWSS in projecting maintenance funding requirements for the fiscal years 1988/89 through 1993/94 and in generating revenues to be collected from villages in support of maintenance. Determine the funding requirements needed to fill the gaps. Assess USAID policy with respect to assuring continued system sustainability and the potential benefits of providing further assistance through the use of residual project funds, particularly during the early years of phased implementation of cost recovery from villages.

10.3 Implementation Schedule

A suggested plan for implementation is outlined in Figure 8. All principal recommendations should be implemented, or at least initiated, during the 12 months beginning in October 1987.

Figure 8
Suggested Implementation Schedule



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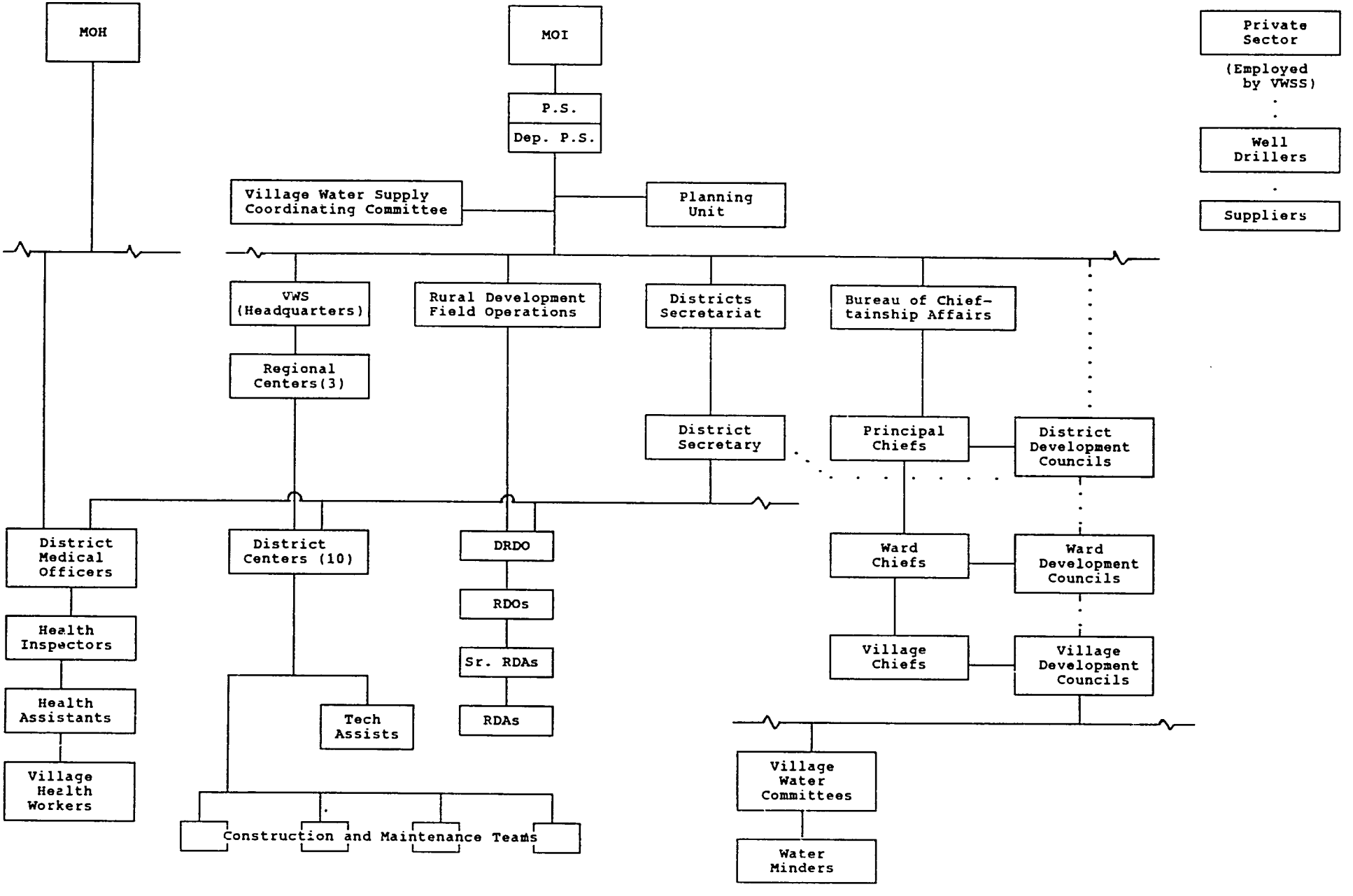
APPENDIX A

Organization Chart - VWSS

Appendix A

ORGANIZATIONAL INVOLVEMENT
VILLAGE WATER SUPPLY AND SANITATION PROJECT, LESOTHO



APPENDIX B

People Contacted

APPENDIX B

People Contacted

USAID

Mr. Jesse L. Snyder, Mission Director
Ms. Carole Tyson, Deputy Mission Director
Ms. Adrian deGraffenreid, Project Development Officer
Mr. Mulegeta Yohannes, Engineer, USAID/Lesotho
Mr. Fred Guymont, Engineering Advisor, REDSO/ESA

Village Water Supply Section

Mr. David Wadsworth, Project Manager
Mr. William Lesaoana, Senior Engineer
Mr. Bernard Khothalo Sefako, Senior Accountant
Mr. Phil Howard, Public Health Coordinator
Mr. Gian Andrea Riedi (Helvetas), Construction Engineer
Mr. Ben Rafoneke, Maintenance Engineer
Mr. Lelieh Leboela, Maintenance Foreman
Mr. Jens Vad (Danida), Berea District Engineer
Ms. Marisa Ernst (Helvetas), VWSS Regional Engineer, North
Mr. M.M. Ntja, VWSS Regional Engineer, South
Mrs. Felile Mntambo - Senior Technical Officer; Mafeteng District
Mr. Mekeletso Maholefele, Site Supervisor, Laribe District

Rural Sanitation Project

Mr. Richard Pollard, National Rural Sanitation Corrdinator
Mr. Willy Sampson, Health Education Advisor
Dr. Phil Evans, Social Anthropologist
Ms. Vanessa Tobin (ODA), Rural Sanitation Coordinator, Northern Districts

Ministry of Interior, Chiefdomship Affairs, and Rural Development

Mr. P.K. Moonyane, Principal Secretary
Mr. M.H. Mhlanga, Senior Planning Officer, Planning Unit
Mr. Joseph Thamae, VWSS Desk Officer, Planning Unit
Mrs. Melineo Mokhatla, DRDO, Laribe District
Mrs. Lebohang Khobotlo, Acting DRDO for Berea District
Mr. T. Thulo, DRDO, Mafeteng District
Mrs. Mapuleng Dlartini, Senior Rural Development Assistant, Laribe
Mrs. Monyau Monyau, Senior Rural Development Assistant, Laribe

Ministry of Central Planning and Economic Affairs

Mr. Kevin M. Manyeli, Principal Secretary

Community Leaders

Mr. Motikoe Motsoene, Chief, Tsifa-Limali, Laribe District
Mrs. Gertrude Motsoene, Chair, VWC, Tsifa-Limali, Laribe District
Mr. Sera Sera, Chief, Litlhoatsaneng, Laribe District
Mrs. Mabel Sera, Chair, VWC, Litlhoatsaneng, Laribe District
Mr. Q. Rabeleng, Chief, Rabeleng, Mafeteng District
Mrs. Masechaba Mahao, Chair, VWC, Rabeleng, Mafeteng District
Mr. Samuel Molise Moyeneke, Chief, Makintane-Molise, Mafeteng District

Members of the Village Water Committees in:

Berea District:	Hammamathae
	Cana
Laribe District:	Tsifa-Limali
	Litlhoatseneng
Mafeteng District:	Rabeleng
	Makintane-Molise

Local Businessmen

Mr. Z.M. Bam, Managing Director, Lesotho Consultants, Ltd.

Dr. Fernando Bermudes, Managing Director, Plumbing Lesotho, Inc.

Mr. Gerhard Dedorath, Chief Executive, MB Consulting

Mr. Terry Fraenke, Managing Director, Maluti Irrigation Company, Ltd.

Mr. Motebang Moahloli, Director, Sanitation Water Engineering Consulting (SWEC), Ltd

Mr. E.L. Mohapi, Director, Maseru Pumps and Plastics, Ltd.

Mr. Morabo Morojele, MB Consulting

Mr. D.T. Phelane, Managing Director, SWK Maluti, Ltd.

Mr. Johannes Selke, Managing Director, Sanitation Water Engineering Consulting (SWEC), Ltd

Mr. B.M. Shale, Development Director, Technical Projects Agency, Ltd.

Dr. Paul Kweku Tabirih, TAB Consulting, Ltd.

Mr. Zola Tsotsi, Managing Director, Afritek Consulting, Ltd.

Other

Mr. Alberto Andreol, Implementation Officer, United Nations Capital Development Fund

Dr. Steven Esrey, Principal Investigator, RWS Health Impact Study

Dr. Judith Gay, Principal Investigator, RWS Management Study

Sr. Giselle, Director, Reitumetse Church Project, Mazenod

Mr. Vincent Hlalele, PHC Program Manager, Private Health Care Association of Lesotho

Mr. J.N. Lepheana, Execitive Director, Lesotho Opportunities Industrialization Center

Ms. Irene Mathias, Development Counsellor, Canadian High Commission, Pretoria

Mr. Majoro, Water Rights Director, Ministry of Minerals, Energy, and Water

Miss Mamocha Moruthane, Legal Advisor, Ministry of Finance

Mr. David Mosebo, Director of Development Administration, Ministry of Planning, Economic Affairs, and Manpower Development

Mr. Mulise, Maintenance Engineer, Reitumetse Church Project, Mazenod

Mr. J.M. Nthongoa, President, Lesotho Chamber of Commerce

Mr. Julian Signorelli, Hydrogeologist, Italian Groundwater Project

Mr. A.L. Tsepane, Deputy Chief Financial Controller, Ministry of Finance

APPENDIX C

Water Works & Related Companies

APPENDIX C

Water Works & Related Companies

The following list includes companies which undertake work related to activities of the VWSS. This includes drilling, pump installation, pump repair, plumbing, and general water management companies. While the list is considered to be fairly complete, some firms may not have been identified by the WASH team. The list is not meant as an endorsement of any particular firm but rather as a resource base which VWSS may consider for future use.

Company	Notes
Afritek Consulting (PTY) LTD Mr. Zola Tsotsi 325950 9th Floor Lesotho Bank Tower	General management and consulting, surveying
Albor Water Drilling c/o Mr. Mahlalisi P.O. Box 1212 Maseru and/or c/o Mr. Tsuene P.O. Box 581 Mafeteng	Registered driller
Beni & Partners Mr. Billson Maseru 313881	Large British parent company, general water works, urban, industrial
Buurman Mr. J.C. Bezuidenhout Excelsior OFS Tel. 05672-1631 c/o Moleko Dlamini Lower Seoli	Registered driller
LESCON Mr. W. Z. Bam Maseru 324680	General Engineering and Management
Lesotho Power Engineering Maseru 312444	

Lesotho Water Drilling (PTY) LTD J.A. Rensberg c/o Village Water Supply Maputsoe	Registered driller
LESTECS Mr. Mochochoko Maseru 323600	
Mr. J. H. Lombard P.O. Box 140 Mohaleschoek c/o Reno Sehalm	Registered driller
M and C Construction (PTY) LTD Mr. Christianson 323630 Industrial Area Maseru	General construction, irrigation plumbing
MB Consulting (PTY) LTD Mr. Gerhard Dedorath Mr. Morabo Morojece P.O. Box 1071	
MCC Mechanical Workshop Maseru 31148	
Maluti Irrigation (PTY) LTD 323915 Industrial Area	See T and AF Holdings
Maseru Diesel Clinic Maseru 322594	Diesel engine specialists
Maseru Drilling Co. Mr. Maetlane Ha Thamae 324187	Registered driller 1 rotary rig, 3 cable tool rigs
Maseru Pumps & Plastics Co. (PTY) LTD Mr. E.L. Mohapi P.O. Box 7439 311454 Maseru	MONO pump assemblers, pump installation, sales and service, water analysis, pump testing, solar, irrigation
Mazenod Project Sister Gisele P.O. Box 34 Mazenod	Catholic Mission, well drilling, pump maintenance
Paulosi Mokeli Mohome Mahlabatheng ha Sekete P.O. Box 82 Roma	Registered driller

Tofi Molete 69 Location Excelsior OFS	Registered driller
Plumbing Lesotho (PTY) LTD Mr. Fernado Burmudes 325448 Maseru	Plumbing, sanitation, rural construction
Tom Rantenbach Bushmanskop P.O. Box 15 Zastron Te. 1821	Registered driller
Rocky Drilling P.F. Cotzee P.O. Box 101 Teyateyaneng - Te. 50324 or Box 586 Maseru	Registered driller
SWEC (PTY) LTD Mr. Johannes Selke P.O. Box 4327 311244 Industrial Area Maseru	Plumbing, pump installation, electrical, irrigation, central heating, solar
SWK Maluti (PTY) LTD Mr. D. T. Phelane 311362 4th Floor Lesotho Bank Tower	General engineering and management
L.B. Saayman P.O. Box 59 Mohaleschoek Tel. 85226	Registered driller
T and AF Holdings (PTY) LTD P.O. Box 694 323915 Industrial Area Maseru	Drilling, pump installation, sales and service

APPENDIX D

Handpump Investigation Statistics - Berea

HANDPUMP INVESTIGATION STATISTICS -= BEREA

STARTING DATE: 11/06/87

CLOSING DATE: 30/06/87

VILLAGE WATER SUPPLY

	MOYNO	MONO	TOTAL
NUMBER OF HANDPUMPS IN BEREA	175	202	377
NUMBER OF HANDPUMPS WORKING WELL	111	139	250
NUMBER OF HANDPUMPS PARTLY WORKING WELL	54	52	106
NUMBER OF HANDPUMPS NOT WORKING COMPLETELY	10	11	21
NUMBER OF HANDPUMPS HAVING PROBLEMS WITH:			
FOOTVALVE	4	2	6
CYLINDER	6	5	11
RODS	2	3	5
HEAD	-	2	2
BH PROBLEMS	41	34	75
BROKEN HANDLES	2	1	13
BAD PADS	13	6	19
LOOSE PUMP BASES	-	3	3
HEAVY DRIVE	3	5	8
NO SPOUTS	1	-	1

HANDPUMPS SURVEYED BY : M. LEOKAOKE