THE PRICE OF WATER IN RURAL AFRICA

The Lesotho Case

ASSIGNMENT J.A. MUELLER

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LIST OF ACRONYMS

GOL	Government of Lesotho
HELVETAS	Swiss Assotiation for Technical Assistance
ODA	Overseas Development Administration
SDC	Swiss Development Corporation
UN	United Nations
VWS	Village Water Supply
VWSS	Village Water Supply Section
SKAT	Swiss Center for Appropriate Technology

PREFACE

The first four chapters of this paper are covering the problems in general. The subsequent chapters deal with Lesotho in particular. Lesotho, a former British protectorate, is a country completely surrounded by the Republic of South Africa and is one of the least developed countries.

The Section of Village Water Supply, a Section in the Ministry of Internal Affairs, is charged with rural water development. Major donors are Danemark, Germany, Holland, Ireland, Switzerland and the United States. As from 1978 aid has started and rapidly increased.

The author would like to thank the many people who assisted to produce the part of this paper which deals with the Lesotho case in particular.

I am especially indebted to the Head of Section, Mr K.W. Lesaoana and the members of the HELVETAS team in Maseru. Without their support I would not have collected enough data within a reasonable time, nor gained the necessary insight into the government system.

The views expressed in this paper are entirely the views of the author.

Altendorf, Switzerland.

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J.A. Mueller

CHAPTER 1

INTRODUCTION

In rural Africa, watersupplies are built mainly with donor assistance. Recipient countries do contribute to it in cash and in kind.

> According to a United Nations (UN) survey about two billion people in the world have no access to safe and clean water. Of this, an estimated 1.200 million "victims' of the phenomenon are in Africa and other developing countries. (The Standard, No 23768 Nairobi, Wednesday, October 24,1990

1. Sustainibility

One of the particular problems encountered is that this projects are very often found not to be sustainable. Sustainibility means

> "Keeping an effort going continuously; the ability to last out and keep from falling, esp. for prolonged period" (Oxford Dictionary.)

Thus, a sustainable project should bring a lasting progress, that can continue without external aid. A project is sustainable only when revenue is collected from the beneficiaries to cover recurrent operating costs and costs on capital. (depreciation and interest)

In my opinion, appropriate technology, socio-cultural approach etc. are part of a successful project. One of the elements for a successful water project is an established and sound financial management from the beginning to the time after handing over. If neglected, projects are doomed to fail in the long run. This is rather a problem of financing than an economic one. This target can only be reached when organisational measures are taken that returns are forthcoming. If possibilities to evade payments are left, projects cannot be put on a sound financial footing and are then failing when new construction is due.

It is a common fact that water pricing in Africa is not quiet of a high priority. This paper does not deal with cost-benefit analysis, but with the costing of water in rural areas in Lesotho.

Therefore, countries who once have decided in principle to provide water supplies to the rural areas, be it with or without donor support, the financial costing has a higher priority than economic costing.

2. Economic Costing

Whereas economic costs are of the interest of a Government; the consumer is rather interested in the financial cost for his household. The difficulty in developing financial costs is that they are entirely dependent upon policy variables that can change dramatically.

Economic costing for water supplies is rather difficult and prone to include a lot of estimated values because it is very difficult to assign a meaningful economic value to improved community health, thus improved availability of labour, improved death-rate of under-fives, a trend of population increase in the short run. An other problem is to estimate cost such as community support activity.

2.1 Economic Value of Water Supplies

The economic value of water supplies is considered very low, at least in the specific case of Lesotho. Apart from the study mentioned below there are also other studies supporting the case. (Judith Gay, USAID) It is also obvious that for as long as people work longer hours than normally can be expected for economic reasons, the eased situation will not stimulate production but reduce the exorbitant workload

> ... the provision of piped water alone is insufficient to stimulate water-related production. The only clear material benefit of improved supplies is a small time and energy saving which, although offers some relief to women in a society hard pressed by the exigencies of migrant labour, is of no economic value.
>
> Source: SELF-HELP AND VILLAGE DEVELOPMENT: RURAL DOMESTIC WATER SUPPLIES IN LESOTHO, Edward P Woodrow Cross, Dissertation, Faculty of Arts, University of Witwatersrand, Johannesburg, 1980

3. Public Health Aspects

Improved community health is generally considered the major benefit but it is very difficult to assign a meaningful economic value to it. There may be some non-market values. Although the focus of this assignment is the price of water, the relation to sanitation and health should be kept in mind.

> Financing of new construction and the operation and maintenance of existing water supplies outstrips any local available resources in the developing countries. ... At the moment it can be at least presumed that the population growth is not declining.
> Because water is first developed at the least expensive cost the cost of additional water in the future is often very much underestimated. The decision to install flush toilet systems will increase per capita demand by around 50 to 70%.
> The high population growth is an additional obstacle to achieve the goal of full coverage within a reasonable time. (short run)
> (Appropriate Technology for Water Supply and Sanitation, A Planners Guide, World Bank, December 1980)

4. Population Growth, Timeframe:

A major problem which was obvious shortly after the beginning of the water decade was the given time frame. It is about two thirds of the worlds population in need of improved water supplies, that is about 2 billion people. Such a formidable performance was beyond the possibilities from the very beginning.

Notwithstanding the high number, the population growth in developing countries is an additional obstacle to achieve the goal of full coverage even in the year 2000. The achievements made in construction and population served is very much reduced by population growth. Financing of new construction and the operation and maintenance of existing water supplies outstrips any local available resources in the developing countries. Donor investments therefore will continue to be very crucial to ever achieve the goal as declared by the UN for the Water Decade, and after.

In Lesotho, at the moment it can be at least presumed that the population growth is not declining.

5. Social Costs

A matter that seems to get little attention is the price of the social costs to a Government. As the decision is made that water is of a high priority, the financing put forward for water supplies and sanitation is not available for other purposes. Again, improved health may lead to reduced loss of labour in the working age group as well as in the group of school children and students and improve the death-rate of under-fives, which would theoretically lead to more labour available, improved number of well (formal) educated manpower and also a trend of population increase due to a reduced death-ratio. These above mentioned points have economic advantages and disadvantages, specifically as far as population growth is concerned. Yet, comparison with the developed countries in the past indicates that a decline in population growth took place only after improving the standard of living of which water and sanitation is part of.

6. Affordability

It is said that affordability can be tested by comparing financial cost with the income. It is very difficult to estimate what amount people in Lesotho would be willing to spend. Yet, as some pricing for rural water is made, it should perhaps be a prerequisite before the construction of a water supply that people agree in advance to a certain price for the water service in a written form; if such agreement is not reached, the water supply should not be built. Some indication of what limit can be expected is mentioned below.

> Systems that have a monthly cost exceeding 10% of income are probably out of the range of affordability without further subsidy.
>
> Source: Appropriate Technology for Water Supply and Sanitation, Summary of technical and economic options, World Bank

7. BACKGROUND OF WATER PRICING

In Lesotho, where VWSS is part of GOL, administratively there is necessity to comply with civil service practices. Typical for most developing countries, including Lesotho, is a statement made at the African Water Technology Conference in Nairobi, Kenya (24-26 February 1987) Opening speech of the Director of Water Development for Kenya as regards subsidies on water supplies.

> ...the provision of water ... would be viewed as a provision of service and not as a source of revenue.
> Source: World Water / April 1987, p.50

The problem is obvious, cost recovery using economic prices is not yet widely accepted in Africa.

> In England, water companies must have the charges to customers authorized by government. Profits and consequent dividends on share capital are limited by regulations. These limits are such that the return on capital invested in water companies is no greater than the return on money loaned to local authorities and other public bodies.
>
> A pricing difficulty is that a large proportion of the costs which have to be met by a water undertaking are fixed charges, such as capital repayment charges, administration, and operational costs. These do not change much with increasing demand for water, until new capital works have to be built. The short run marginal cost tends to reduce as the output from existing sources is increased to the maximum possible. If a further demand then takes place, a relatively steep rise in charges is likely to follow ...
>
> To ameliorate this situation the charge for water can be based upon the long run marginal cost.
> Source: Water Supply, Third edition, p.34/35

The price will therefore generate some savings from revenue to meet future capital expenditure. One beneficial financial effect is that price variations to consumers are smoothed, preventing sudden large increases in charges when a new scheme must be built.

8. Discounting and Economic Appraisals of Water Projects

> The total cost of a water project over the whole of its useful life consists of the initial capital outlay, any subsequent phased outlays of capital plus all the annual operating and maintenance cost to the end of its use. ... water supply charges for water usually express the cost of production. ... even the range of discounts that might reasonably be applied is a matter of debate among economists...
> Source: Water Supply, Third edition, p.34/35

8.1 Replacement Value

> There is no replacement inflation accounting standard agreed in the UK. (Theory and Practice of Investment 5th Edition p.182)

This same problem exists also in Lesotho. Because of the absence of such standards, in my opinion common sense would indicate to use the US $ or another suitable hard currency for the necessary calculations allowing for an average inflation of, say 6% p.a. and make annual adjustments for variations in the exchange rate between $ and currency of the country under review.

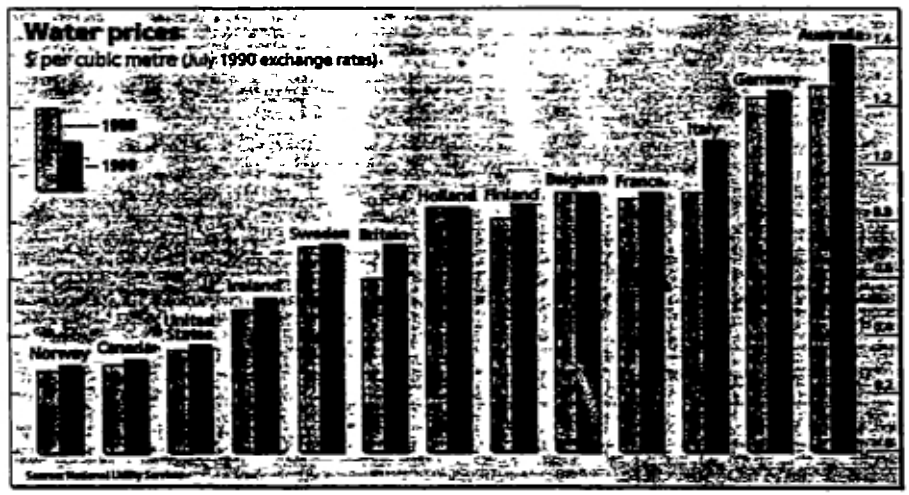
9. Water Prices

Water prices in developed countries vary greatly between $ 1.40 and $ 0.30 per cubic meter, (July 1990 exchange rates). see Fig 1.

It is not clear to what extent this prices include "environmental costs", but it is obvious that in the long run such costs must be covered by the water price.

Fig 1

■ **WATER** Since 1989 the price of water in Australia, Italy and Britain has increased substantially faster than each country's rate of inflation. Australia's water prices, already the highest in the chart, increased by 11% (in local-currency terms), as subsidies continued to be reduced. In Britain the price increase, at 19%, coincided with the privatisation of water utilities, a reduction in subsidies, and pressure from the European Community to improve water quality. Italy's water prices rose by 20%, partly because local municipalities were for the first time allowed to to recover all the costs of supplying water. Germans pay the second most for their water. Huge sums will be required to upgrade East Gemany's water supplies, and soon Germany's water prices may well be higher than arid Australia's.



Source: The Economist, December 1 1990

CHAPTER 2

Management, Administration and Financing

2.1. Introduction

As mentioned earlier, projects are only sustainable with sound management, administration and financing.

Management and administration of rural water projects has improved considerably during the water decade. Due to the type of works, most managing positions are filled with engineers. However, the formal education at university level does usually not include management and administration. This skills have than to be acquired on the job. By its nature, it is more difficult to familiarize with financial and accounting matters at managerial level, being an engineer.

2.2. Management

Management is responsible for running an enterprise. The duties are overall planning of all aspects as regards the running of the undertaking and instructions for executive staff and administration.

In Africa, it is, with a few exceptions of truly private rural water supplies, that government leadership and control of water supplies is the rule. As it is engineers in most cases who manage water works, it is usually a rather technocratic management.

Management is also responsible to decide technical and financial limits for rehabilitation and replacement. This is the most far reaching decision and needs knowledge on border cost of maintenance, investment and financing.

2.3. Administration

As government is administering projects, including parastatal organizations, administration procedures are most often run in lines of civil service regulations. It is a fact, that efficiency in large administrations is not that much effective. The responsibility is not for supplying the consumer with water but abiding to the civil service rules and regulations of the respective ministry or government department.

2.4. Financing

Town water supplies can usually obtain capital either by rising funds from the public or from development banks such as ODA or ADB. Town supplies are known to get revenue for the service and, town population is in general more wealthy than the rural one.

This opportunity does not exist for rural water supplies. Therefore, rural water projects are usually funded from government budget and donor grants.

> Due to the fact that grants are not repayable by their nature capital investments for rural water supplies are not managed with the same care for cost recovery like town water supplies. Unless rural supplies are run on cost effective lines, any future rebuilding, extension; that is sustainibility, is uncertain; no funds will be at hand nor is there credit worthiness.

2.5. Ownership and control

Donors usually expect that the ownership of rural water supplies is conveyed to the rural population, that is, a particular village and that the village will be responsible for operation and maintenance.

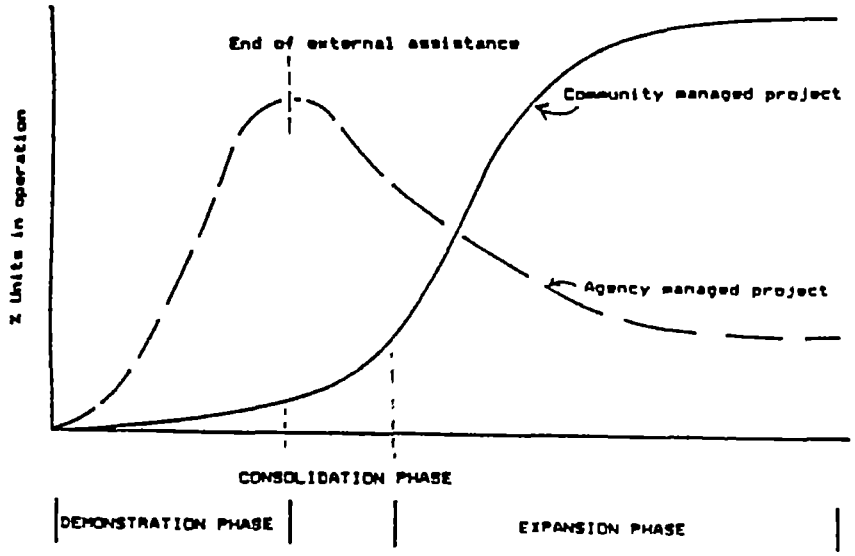
From a legal point of view this is not possible in most cases. Most countries channel donor funds through the treasury. That enables the control of flows of foreign currency into the country. Again, most governments treat granted funds like government funds. Thus, any works established with grants channeled through the government are automatically government property.

2.6. Participative programme of donors

Within management, administration and financing of water projects donors have some influence insofar as some of their own staff is usually integrated into the project(s) and ties are attached to the bilateral agreements. This fact may have positive or negative impact on the project. As far as sound financial management is concerned, participation, with remarkable financial input and eventual withdrawal of future financing and staffing which is not planned on long terms is an additional constraint to plan for the future. Figure 2 indicates such typical participation.

Fig 2

Participative Programme of Donors

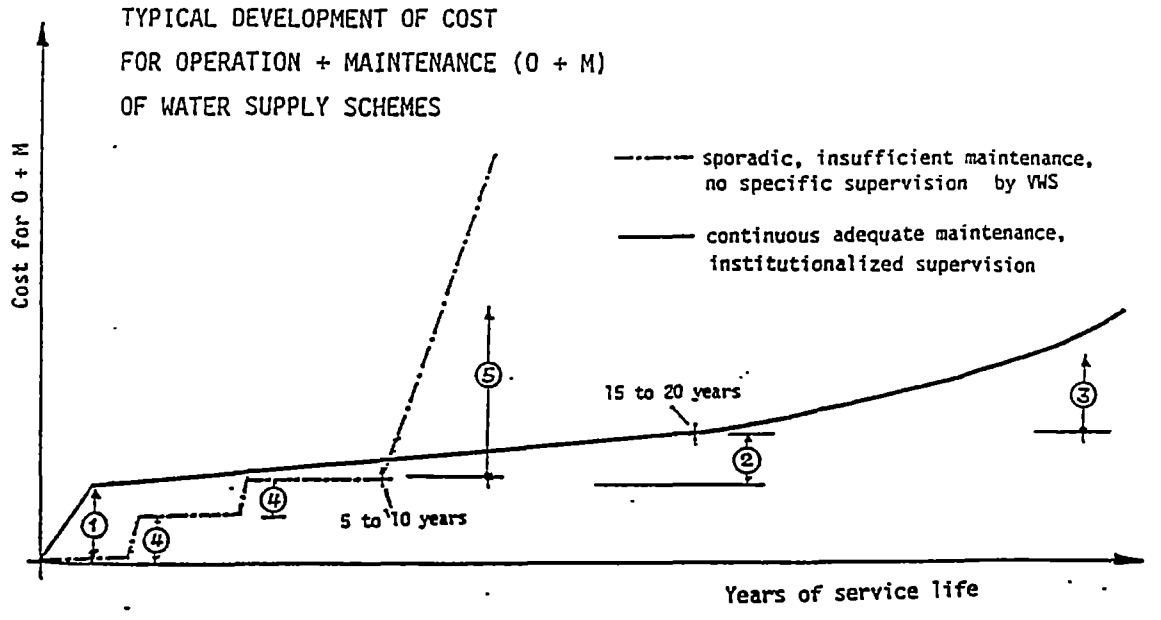


3.7.2 OPERATION AND MAINTENANCE.

The maintenance cost will be raising over time as maintenance becomes more expensive the longer projects do last. If maintenance is not regularly pursued, a complete breakdown may occur much to early, before the end of the assumed time of service, which is also used to calculate depreciation and costs per unit of water.

Fig 6

Typical development of Costs for Operation and Maintenance



① Repairs and modifications after 1st year of operation (to be considered as part of construction cost)
② Full cost recovery by village possible
③ Major repairs may require additional funds by GOL
④ Major repairs required probably beyond capacity of village
→ VWS undertakes repairs or villagers return their original unprotected water sources
⑤ Complete breakdown of water supply scheme
→ rehabilitation or new construction required

Source: SKAT

CHAPTER 3

COSTING

3.1. FINANCIAL COSTING

Comparing with private enterprise, maintenance and depreciation must render itself financially sound. That is that maintenance is feasible for a period of time when writing off as permitted in tax schedules or the physical deterioration on the capital investment item does call for replacement; that is the case when maintenance costs do exceed the gain of the investment,(border cost of maintenance) or when the maintenance cost is higher than the servicing of a bank credit of a comparable capital investment. (interest and servicing of capital)

Within such a period of time, credits have to be paid back if the capital investment was on borrowed capital, or reserves had to be set aside from the profits if the investment was on own capital resources. The price has to cover at least fixed and variable costs and should allow for higher costs in the future (inflation).

While economic costs are based on physical conditions, and are quite objective, financial costs are subject to national policies, such as interest rates, availability of subsidies and other political decisions.

But the consumer is more interested in financial costs - what he will have to pay for water, and how the payment will be spread over time.

Again, the project engineer is interested in <u>part of the financial costs only</u> that is the budget for a particular project, the capital investment for a water supply. The crucial point is, that his design will have a far reaching impact on future fixed and running costs, the two extremes being either low capital investment with high maintenance costs or high capital investment with low maintenance costs.

Financial costing has to follow sound management principles as in any proper business organisation.

These ar as follows:

- proper principles of administration
- accounting principles

Perhaps the most important principle as regards rural water supplies and water pricing is the principle of the going-concern.

3.2. PRINCIPLES OF COSTING

3.2.1 Fixed costs

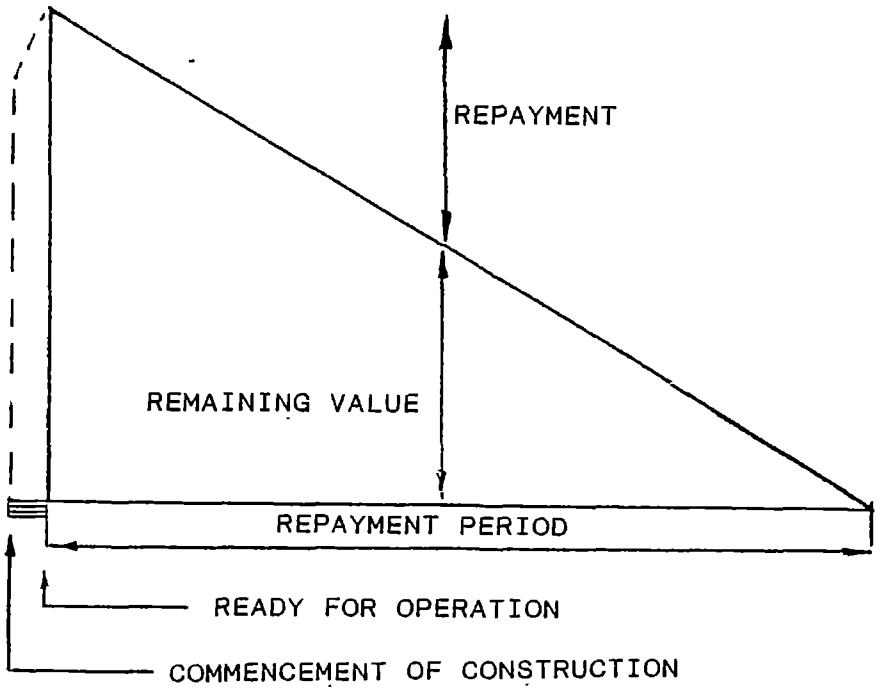
Fixed cost (sometimes also called overhead costs) are those costs that must be met even when the production with the investment is zero, that amount is independent of output. (service on capital, interest rates, rents, security, works maintenance watchmen pay.

3.2.2 Depreciation "straight line depreciation"

There are different forms of depreciation. I am of the opinion, that for the purpose of costing for rural water supplies the so called "straight line depreciation" is appropriate. The graph below shows a typical straight line depreciation.

Fig. 3

Straight line depreciation



3.3. Profit

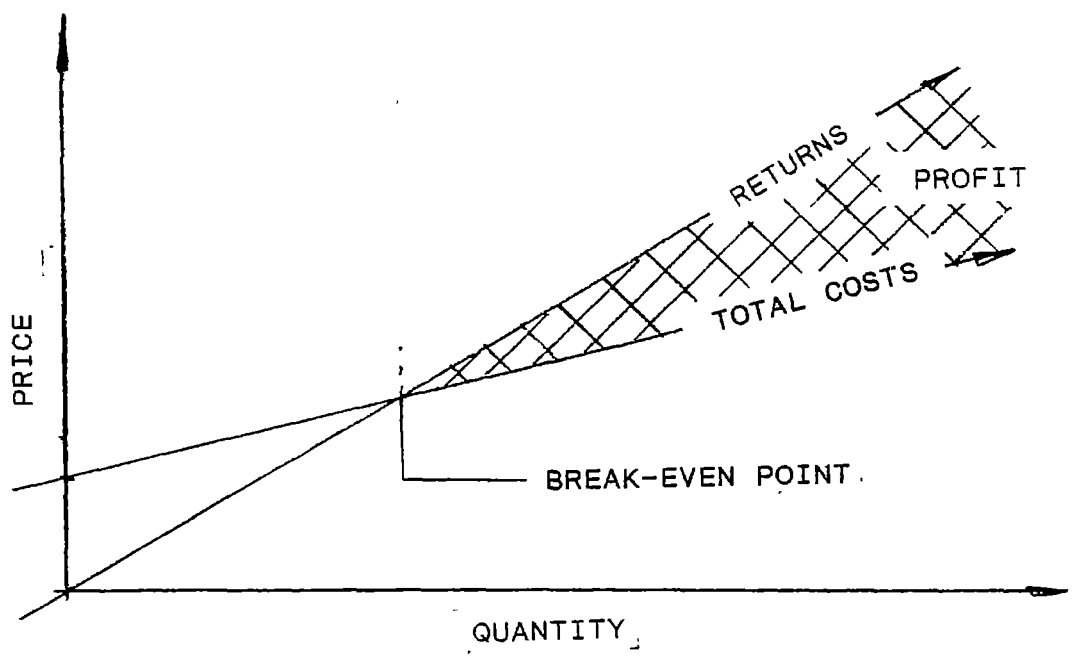
Profit in general is the excess of returns over the outlay in contrast to loss. Any enterprise, in order to survive, cannot operate with losses. Water supplies need to charge at least a revenue at the break-even point in order to remain operational, unless subsidies are provided.

This statement is only correct at project level. At national level, the total of all inputs must be offset by the total of all (local) revenues in cash and in kind.

If this is not the case the total of the projects are not sustainable.

Fig. 5

Fixed costs, variable costs and profit



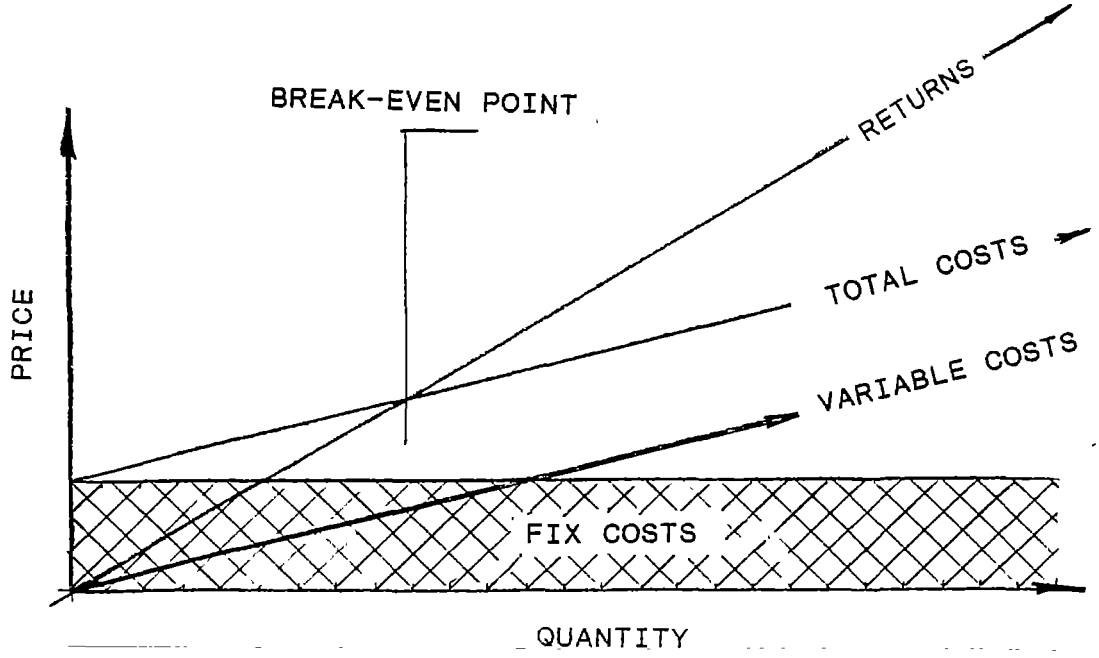
Total profit = Total revenue - Total costs

3.2.3 Variable costs

Variable costs occur according to output. The higher the number of units of production (Liters of water) the higher the variable cost. In the water supply sector it is crucial that a high amount are fixed charges, such as capital repayment, administration and operational costs. These change very little with increasing demand for water, until new capital works must be built. The costs which relate to the amount of water consumed, (costs for pumping and treatment) represent a small proportion of the total price for water. If a rise in demand exceeds the capacity of existing water works and new capital investments are necessary, a relative steep rise in charges is to follow to allow for the increased fixed costs.

Fig 4

Fixed and variable costs



3.4. The Responsibility of Investors or Donors

In the private sector it is considered that such type of undertaking is an on-going concern. That implies that the investor has a certain responsibility towards keeping such undertaking on-going. In the case of Lesotho it is very questionable, whether the Government and the rural population will be able to raise the necessary finances to keep the existing projects well maintained and to accumulate funds for future rebuilding of the existing water projects at the existing standards: let alone to build improved systems.

The question raised then implies the responsibility of the donors as an investor, most grants being bound for particular projects by the donor. If it is agreed that the costs for each individual household are exceeding an amount they could afford, then some other investment philosophy would be necessary. There is a measure of uncertainty in any investment. Sound investment principles as such would ask for securities. In my opinion therefore, the donor would have to tie the grant to a clause demanding that a 100% cost recovery be instituted, if possible. If this is not the case, the donor would be ethically also responsible towards maintenance too, not only for the capital investment for new water supplies.

If the water supplies should remain an viable long run undertaking, than the maintenance, extensions, and replacement must be run on proper business lines at the level of the village as well as at national level.

3.5. Banking to the Poor

Considering above mentioned problems, to run such rural undertakings on proper business lines, 'banking to the poor" should perhaps be considered. If grants were loaned to villages it would also be rather understood that such monies have to be repaid and serviced. That could have an educational effect for the rural population. A question to be solved would be the institutionalization of such banking, it could be government, commercial banks or NGO's entrusted to deal with such loans.

In my opinion, it must be understood by the villagers that grantet money is not for free; that the contribution of labour does not cover the costs of a water supply, and unless capital is accumulated for future rebuilding and extension of a water supply the existing system is sometime in the future to come to an end of its use and no funds will be accumulated for rebuilding, nor is there credit-worthyness to obtain monies otherwise.

3.6. Water Pricing

When cost recovery problems arise, the question raised is very often: " What water rate is justifiable ?" This question is wrong as far as sound financial management is concerned. Secondly, this question implies that the design and management structure was not organized before project implementation to establish the costs of the service to supply water, and to find out whether such a service at such certain costs are acceptable to a rural community.

Cost recovery, from the point of view of donor countries, should enable the recipient countries to accumulate capital as a reserve-fund or sinking fund which will be needed for reconstruction and extensions of water supplies at such a time when the existing structures are at the end of its use.

3.7. Life span of Projects and Investment cost

Life span is varying greatly. Geology and climate over the continent of Africa is changing from desert to virgin forest, from tropical climate to mountains with snow covered peaks; the soil consists of sand, black soils and red, laterite soils with varying underlying strata.

Water tanks are more exposed over ground than in areas with moderate climate in europe. In areas in Africa with high erosion this will cause a much shorter life span of a water project compared with some similar project in a moderate climate.

Again, rural projects are designed to provide a minimum of water to the population. Provided that monies would be available to improve the supply to, say, double the quantity, most projects would need redimensioning the reticulation significantly, or turn to household water tanks to provide the necessary water storage capacity. As development in Africa is rapid and very uncertain, it would not be wise to invest to much into very high durability.

Investment costs per capita vary considerably over the continent. This phenomenon can be explained by different types of supplies that are feasible and the different materials and techniques applied.

CHAPTER 4

Water and Water Authorities

4.1. Water

Water, by customary law, is free for everybody. In states with western style laws, nominal fees or levies are charged to allow management and control on water abstraction. Importance of such control increases in importance as population and demand is increasing in order to safeguard limited resources and pollution of water.

Water quality for the purpose of drinking water needs also to be monitored, to ensure that people may not be harmed by sub-standard water provided in a water supply system. This is primarily a health aspect and may be implemented by water authorities or health authorities.

An additional aspect of water quality as regards the works is the water quality and the materials used for the water systems. Water may be aggressive towards cement or metals. Problems, as mentioned above, may make the price of the service to provide water more expensive.

4.2. Water Authorities

Undertakings to supply water in rural areas are found in many different forms such as Water supply departments in Ministries, Parastatals, Private Enterprise, Non Governmental Organisation or Co-operatives. Due to their different statutes they have also different forms of organisation and different objectives.

- Ministry:

Most african countries have a ministry or a department assigned with the task to build and maintain rural water supplies. Major donor assistance is channeled through the government accounting system, allowing also the control of foreign exchange. The contribution by the Government is very often small.
There is a trend that the ministry should be a technical one, so as to have the national water management under one umbrella.
The provision of services in the rural areas have a high political propaganda and publicity aspect. It occurs therefore that forming a pure technical ministry is opposed on mere political grounds.

- Parastatal:

Parastatal organisation have usually Government instruction to render a service that otherwise could be a monopoly by its nature; the problems lie largely in matters of efficiency, and profitability, although a balanced budget is required in theory.

- Private Enterprise:

Private undertakings have to manage as an going-concern and to abide to accounting principles, and make profit to ensure future operationality.

- Co-operatives:

Cooperatives operate with various success. The key element in cooperatives is in general similar to private enterprise with the purpose to provide services at the most competitive price which is only rendered to members. Profits are re-distributed to members. Taxes on cooperatives are usually lower than in private enterprise.

- NGO's (Non Governmental Organizations)

NGO's, other than established churches, are pending legal status in many countries. They may be involved in any stage of a project. They are usually not profit making. NGO's are found as operators (e.g. Churches) or as consultants, engineers and contractors to build water supplies. The income is largely granted money, profits in excess to sustain the organizations are not expected. In fact if the grants were not available, the organizations would not be viable businesses.

CHAPTER 5

Specifications of Rural Water Supplies

5.1 Introduction:

Specifications are based on experience and assumptions for the future. This applies for future consumption of water as well as for the durability of the works. These presumptions are very important when pricing for the service of water. In many countries there is no experience yet as to how long the works will last with the different prevailing climatic conditions. In most developing countries it is also very difficult to predict the population growth. Experience in Cameroon covers not more than 20 years. In Lesotho, within VWSS it is even less. Basically it is missions that have most of the long term experience. Yet, these projects are basically run as private water supplies and ownership is clearly private. Thus, they are not really comparable with systems where ownership is indistinct and have to be maintained by villagers and government staff.

5.2. Specifications:

5.2.1. Water Quantity

The design water quantity is usually 30 liters per capita day (l/c/d). That includes an allowance for future population increase.

> Typical domestic water usage is 30 l/c/d to a communal standpipe with a range of 20 - 50 liters. There is an allowance for future growth and higher use of water per person at the end of the design period according to population growth.
> Small Community Water Supplies, Technology of small Water Supply Systems in Developing countries. IRC, August 1983, Technical Paper Series, No 18

Experience in different places indicate that people use piped water very carefully in times of drougnt, a result of experience in the past, when there were no water supplies. This phenomenon was found in Lesotho.[1]) Thus it can be presumed that the design water quantity may suffice. A obvious point is that reticulation systems may need to be extended before the end of the design life time of projects because of rapidly expanding villages in certain growth areas.

[1]) Study of Markus Engler in Lesotho: SAMBIZANGA PILOT PROJECT· RESULTS OF SANITATION AND WATER SURVEY, GARM, LUANDA, ANGOLA, APRIL 1989

5.2.2 Durability of Works and Equipment

There is not much data available about the service life of rural water supplies. One reason is perhaps that there is not much long term experience available. A large number of rural projects may reach its end of use only towards the end of this century. At that time there will be more practical experience and data available. Undermentioned publication has some indication for the service life of water supplies, but the durability of water supplies may differ considerably in the different climatic areas of Africa.

Service Life of different Elements of a Rural Water Supply:

Spring and Stream catchments	30 - 50 years
Storage tanks, buildings in concrete or masonry	over 50 years
Installations	10 - 20 years
Under ground pipes	over 50 years
Pumps, Engines	10 - 20 years

Source: Manual for Rural Water Supply, SKAT, St Gall, 1980, Publication No. 8

Considering the extremely high erosion conditions in Lesotho the figures, in my opinion, should be downgraded. Experience from mission hospitals indicate that even under ground pipes have to be re-buried or replaced after 20 years, due to erosion. If experience in the future would provide better results, pricing could be adjusted accordingly.

For the purpose of pricing, we may assume that engines and pumps may last 6 - 10 years only. The agricultural pumps and engines used in the project are durable but allowance should be given for the more difficult maintenance in the rural areas.

5.3. Depreciation:

Depreciation depends entirely on above discussed design specifications. For water supplies most capital expenditure is used for the works. In countries, where capital is scarce, repayment may be planned according to the designed service time of the works. Assumptions should be rather conservative, unless there is enough practical experience, in order to achieve a complete repayment before or at the replacement time.

CHAPTER 6

THE LESOTHO CASE

6.1. Introduction

It is not possible to compute a water rate without making some suppositions. In this case, they are referring to the standard manual, figures from my final report and the draft Water and Sewerage Order.

The costing allows for long-run break-even costs, that is all paid labour, materials, equipment and other expenses. As there is no competition for building rural water supplies (in financial terms), there is no critical break-even condition. That implies also that the price is not necessarily the long-run Minimum Average Cost due to lack of competition.

The draft "WATER AND SEWERAGE ORDER 19.." gives some indications as to how GOL intends to run rural water supplies in the future. There is a proviso for "annual recurrent charges for defraying any expenditure for maintenance and repairs" para 120.(2) by VWSS, than to be Department of Rural Water Supply. If there is "an excess of M 1,000.00 in a village's recurrent account it should be transferred to a capital fund held in the trading account against future extensions ... or in the event of natural disaster necessitate major works to repair or replace parts of the systems." Para 121 (2) (b).

The indications are very clear that there is no proviso for a sinking fund to provide for <u>future reconstruction</u>. Donors may not be in agreement to that. It could be expected that at least the revenue affordable to the rural population should be collected and accumulated for reconstruction. Indications are also there that accumulating funds at a commercial bank are not considered.

6.2. Raising revenue:

One important point has to be made; To raise such water rates in the rural areas can only be achieved if there is a mechanism to avoid evasion of paying the water rates.

If a government is not willing to collect any revenue for a service rendered, local refinancing will be impossible, and foreign assistance will be needed again. With such attitude, the long term outlook is despairing for the future of rural water supplies at a time when replacement is due.

6.3. Suppositions

- Capital Inputs:
All capital including grants are considered investments which must generate a revenue but not a profit in order to accumulate reserve funds for future replacement of works.

For the provision of free labour during construction and maintenance at village level no allowance is provided in financial terms. It is rather presumed that in the future people will again provide free labour for replacement construction work when they are due. (People to-date don't pay for their water supplies with exception of providing free labour during construction and maintenance; they provide also for fuel or electricity (running costs) at places where there is a power driven system.)

The per capita cost is taken from the HELVETAS final report of J. Mueller; June 1990. It covers the years 1983 - 1989 with a population of 544,000 served. The amount is excluding free labour and rounded from $ US 43.67 to $ 44.00 and from M 101.55 to M 102.00.

- Inflation and Interest Rates:

In Lesotho, the experience over the past years indicate that the interest rate remained above the inflation rate. Therefore a sinking fund calculated at constant prices will allow for inflation as long as monies are banked with interest, that is, with a commercial bank. If funds would be accumulated within the treasury of GOL, no interest would be accrued and allowance would be necessary for inflation. Inflation during the end of the eighties used to be in the range of 15%, interest rates of commercial banks used to pay some 18 - 19%.

- Durability of Works and Equipment

As mentioned earlier, for the time being, it is prudent to assume a life span of 20 years only, for water supply related works in Lesotho, due to the high degree of erosion, unless field results would allow for longer periods. Here, a time of 20 years is used to compute depreciation.

- Water Consumption per capita

Considering 30 l/c/d including the population growth, we can assume an actual consumption of 20 l/c/d; that results in a annual consumption of 7,300 liters per capita.

6.4. Costing:

Above mentioned per capita cost of $ US 44.00 / M 102.00 includes all overheads by GOL as far as they are charged to the VWSS section. Rent for land for offices, workshops etc is not included. Rent for the land used for the water supplies is also not included.

Considering the draft for a new Water and Sewerage Order also in the future there will be "land allocated to it or for which a wayleave application for a public servitude will be made;" 123.(a)

In my opinion it is reasonable to make a mixed price covering all the different projects country-wide on a per capita basis. Projects with power driven installations would still have to pay for the fuel or electricity used. The remaining water rate would than be spread more evenly over the rural population which, I think, would be fair from a social point of view.

Calculation of Interest on Capital:

The calculation of the annual interest on capital is: 50 % of the total capital investment at annual interest rate. In this particular case (per capita):

$$\frac{M\ 102.00}{2} : 100 \times 19 = \text{Maloti } 9.69$$

Table 1 on page 25 is computed without capitalization of the free labour supplied. The result is about Maloti 2.19 or $ US 1.00 per cubic meter.

Table 2 on page 26 is computed with capitalization of the free labour. The result is about Maloti 2.62 or $ US 1.20.

- FIXED COSTS:

Table 1 (excluding free labour)

All Prices in Maloti at 1990 constant Price

	Per Capita [5]	Per Household [1]	Per Average Village [2]	In %
Construction Cost	102.00	459.00	45,900.00	

Annual Costs of depreciation over 20 years

Construction Cost	5.10	22.95	2,295.00	31.85
Interest on Capital	9.69	43.61	4,360.50	60.50
Free labour	not included	-.-	-.-	-.-

- VARIABLE COSTS:

Water minder [3]	0.80	3.80	360.00	05.00
Materials and Sundries	0.30	1.35	135.00	01.90
Free labour	not included	-.-	-.-	-.-
Fuel & Power (where applicable)[4]	0.12	0.54	54.00	00.75
	16.01 [6]	72.05 [6]	7,204.50[6]	
Annual Water consumption M^3	7.3	32,85	3,285	
Price per M^3 (Maloti)	2.19 ($ US) approx 1.00			

[1]) Household of 4.5 persons
[2]) Average village size of 450 people
[3]) Report on water minder seminar in Leribe, M.Ernst 1990
[4]) Summaries of Ch. Meuli, District Engineer, Butha Buthe
[5]) see page 24
[6]) Free labour not included

- FIXED COSTS:

Table 2 (Including free labour at agricultural rates)

All Prices in Maloti at 1990 constant Price

	Per Capita [5]	Per Household [1]	Per Average Village [2]	In %
Construction Cost incl. free labour	123.00	553.50	55,350.00	

Annual Costs of depreciation over 20 years

Construction Cost	6.15	27.68	2,767.50	33.10
Interest on Investment (Capital & labour)	11.69	52.58	5,258.25	61.00

- VARIABLE COSTS:

Water minder [3]	0.80	3.60	360.00	04.18
Materials and Sundries	0.30	1.35	135.00	01.55
Free labour	0.10 E)	0.45	45.00	0.52
Fuel & Power (where applicable) [4]	0.12	0.54	54.00	00.65
Free labour included	19.16	86.20	8,619.75	100 %
Annual Water consumption M^3	7.3	32,85	3,285	
Price per M^3 (Maloti)	2.62 ($ US) approx. 1.20			

[1]) Household of 4.5 persons
[2]) Average village size of 450 people
[3]) Report on water minder seminar in Leribe, M.Ernst 1990
[4]) Summaries of Ch. Meuli, District Engineer, Butha Buthe
[5]) see page 24
E) Estimate

6.5 Discussion

6.5.1 Results

The results from Table 1 and Table 2 indicate that water in the rural areas have a higher price than water from a town supply; even by standards of developed countries (see page 7).It must be considered that the repayment period used is 20 years; a longer repayment period would lower the water rate, but would call for improved maintenance. Maintenance cost would be rising over time as maintenance would become more expensive the longer a project would last.

Town water supplies in Lesotho have a graded rate. In general the average price is about Maloti 1.50 per cubic meter. Thus water from rural water supplies is comparatively more expensive. People in rural areas cannot be expected to pay higher water rates than people in town.

It is obvious that the interest rate is very high, higher than the repayment of capital over 20 years! This is due to prevailing high interest rates in a country of high inflation.

6.5.2. Affordability:

Can people then afford a service to supply water in rural areas ? The answer is most probably no, not at cost efficient rates. A pending question is how to provide for the required capital accumulation necessary to reconstruct water supplies in the future. The necessity to plan and provide for the future is certain.

In addition, as the water rate is already too expensive, proper maintenance becomes as well unaffordable at national level.

It can be considered that unless some donor commitment is turned towards maintenance of existing systems, where donors have been the major financiers, developing countries may not be in a situation to even sustain the existing projects.

The question is whether there is no responsibility of the donors, as far as the investment is concerned, at least to agreeing for a certain financial input for maintenance in response to a government budget indicating readiness by funds allocated to maintain the constructed projects and to perhaps set aside funds for new construction. (relationship between maintenance costs and new construction input). The allocation of funds in the government budget could be used as an indicator.

An other point is of course the frequency and magnitude of collecting revenue from the rural public. If a lump sum would be raised once during the year rural people may not have that much cash in hand.

6.6. Priority setting:

Priority setting is of course a political decision at government level: maintenance versus new construction, what has the higher priority considering population growth? Donors used to presume that maintenance is clearly a duty of the recipient country and foreign assistance would be for new construction, institution building and training including technical assistance. There should be a an optimum relation between them. If resources are scarce, a first step could be the protection of water only, to improve the quality, but not reducing the walking distance: in general, to build works nearer to a zero solution.

6.7. Suggestions:

- Rural population should pay a price for piped water.
- The rural population may be charged with town water rates unless the national rural water supply rates would be cheaper.
- The agreement to pay should be in written form, legally binding.
- The water shall not be metered, but an assumed consumption of 20 l/c/d could be charged.
- Revenue should be banked at commercial rates to minimize losses caused by inflation.
- The quality of maintenance may be improved to allow for longer repayment periods.
- Water extraction permits should be charged only once, at the time of construction of water supply, to allow control for national water management.
- Water supplies should only be built in villages where paying for the service of supplying water is agreed.
- New water supplies may be built as simple as possible, near zero options should be considered, or different supplies with better economies of scale. Preliminary to construction, costing including repayment of capital investment, interest and maintenance cost should be made; that should then be considered in planning of new supplies.
- A system of subsidy should be arranged to make up for the difference between revenue from water rates and actual costs.

Altendorf 05.02.1991

J.A. Mueller

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