LAKE BASIN DEVELOPMENT AUTHORITY

Proceedings of a Shallow Wells Workshop

HELD IN KISUMU

ON

10Th — 12Th OCTOBER 1983

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CONTENTS

1. INTRODUCTION

These proceedings are the outcome of a three-day workshop on Shallow Wells organized by the Lake Basin Development Authority (LBDA) and sponsored by the Government of the Netherlands.

The objectives of the Workshop are two-fold, namely,

1. to establish the preferred basis and methods for continuation of an LBDA Shallow Wells Programme, taking due account of technical, social, cultural, organizational and financial aspects.

2. to create the opportunity for presentation and exchange of information between various groups and organizations who are, or may be, involved in Shallow Well provisioning especially in the LBDA area.

The Workshop sought to achieve these objectives by commissioning papers in all areas related to Shallow Wells provisioning and by inviting a broad spectrum of participants.

Papers presented and to be found in these proceedings covered:

a. The organization of the LBDA and its activities in Shallow Wells provisioning.
b. Rural domestic water supply situation in the LBDA region.
c. Netherlands Ministry of Development Co-operation's views on a Shallow Wells programme.
d. Technical features of Shallow Wells in Nyanza and Western Provinces.
e. Socio-cultural aspects of Shallow Well implementation and useage.
f. Technical, Maintenance and production aspects.
g. Water, Health and Education.

In these proceedings, each paper is followed by the plenary discussions which took place.

Over seventy participants and observers from Ministries and organizations took part in the Workshop (Appendix I). In group sessions they defined the key issues emerging from the papers and plenary discussions and formulated recommendations for preferred practices and future activities. These are to be found at the end of the proceedings.

In the course of the Workshop, it became clear that some of the issues addressed by the Workshop are valid for programmes anywhere in Kenya. It is thus the hope of the LBDA that this Workshop and the activities which stem from it will contribute to the improved, reliable provisioning of domestic water to the Majority of rural people in the LBDA region and elsewhere.

The LBDA will be happy to provide information to and share our experiences with all persons involved in rural domestic water provisioning as part of our on-going commitment of service to the community and the country.

S B OBURA
MANAGING DIRECTOR
LAKE BASIN DEVELOPMENT AUTHORITY
WORKSHOP DIRECTOR

2. SPEECH BY THE DIRECTOR OF LAKE BASIN SHALLOW WELLS WORKSHOP MR. S. B. OBURA HELD AT THE TOM MBOYA LABOUR COLLEGE - KISUMU 10TH - 12TH OCTOBER 1983

The Guest of Honour, Mr. Francis Cherogony, Provincial Commissioner, Nyanza Province, Distinguished Delegates, Ladies and Gentlemen,

On behalf of the Authority, and the Workshop Secretariat, I would like to extend a warm welcome to all the delegates who have arrived and those who will be arriving within the course of the proceedings. For those delegates who are not clear as to what areas are covered by the LBDA, I would consider it opportune to show you the Geographic boundaries using this map and to briefly highlight some of the salient characteristics of the Authority.

The Lake Basin Development Authority organizational set-up is sectoral and lays emphasis on the resource bases that development activities in this area will have to rely upon. As such, we have, a planning department whose chief task is to integrate and coordinate the planning in the basin region.

Next, we have an operational department which coordinates the implementation activities of the Technical Personnel concerned with the various resources and sectors of the economy in the Region namely: Water, Industry, Mining, Energy, Agriculture, Livestock, Fisheries Health, Forestry, Environment, Tourism and Wildlife, Investment and communications. These two departments form together the core of the organization. There are also the Finance, Administrative and Personnel Departments.

Of more relevance to the occasion, I would like to briefly outline the history of the Lake Basin Development Authority Shallow Wells Programme.

As a result of urgent demand for safe water supply closer to the rural homes in Nyanza and Western Provinces, consideration was made by the Kenya Government for underground water harvesting sometime in 1980. Consequently, in Western Province, the Finnish Government made a long-term committment for rural water supply and the project, "Well Water Exploitation" executed by KEFINCO started in 1981. I am happy to see that representatives of KEFINCO are here to share with all of us their experiences in rural water supply development in the Western Province of the Lake Basin Area.

In Nyanza Province discussions about Shallow Wells were started early in 1981 and by October 1981, an Agreement was reached between Kenya and the Netherlands Government of the launching of the Shallow Wells Pilot Project to be executed in the Lake Basin Development area by DHV Consulting Engineers under the auspices of and in collaboration with the Lake Basin Development Authority as the Government executing agents. However, the actual execution of the project commenced in February of 1982 and ended a few months ago. The objectives of the project were to investigate the feasibility of Shallow Wells construction in the Lake Basin area and the materials and equipment to be used. Other various applications of Shallow Wells, their maintenance and ownership options were to be looked into.

The Dutch Minister for Development Co-operation Mrs Schoo's most welcome visit to the Lake Basin Development Authority in May 1983 culminated in an informal committment by her to LBDA for the funding of a large scale Shallow Wells Project, under the Agreement of Bilateral Cooperation, I have already alluded to.

Towards the end of April, 1983, the Lake Basin Development Authority undertook a socio-cultural investigation in order to gain more knowledge of how the already established wells are functioning in the villages and in an effort to tap the opinions of the well users and key informants, on a viable organizational set-up for the wells

project.

The experience we have gained from the Nyanza Pilot Project has been enormous and the Shallow Wells as a means of domestic water supply have become so popular that my office is filled with requests from people in groups and individuals for the provision of a well.

Considering the abundant health problems arising from the unavailability of safe water and the great hardships to our women who have to fetch water from far distances, I am left with no alternative but to sympathise with the people.

It is my considered opinion that tapping of undergound water which is abundant in the Lake Basin area should offer a quicker answer to this region's plea and need for safe water supply near the people's homes. This should not be considered to mean that I have no faith in piped and treated water. What I mean is that as we carry on with the piped water programme, which will inevitably be more expensive and take longer to realise, we should offer a quicker alternative now.

OBJECTIVES OF THE WORKSHOP

As far as we are concerned, there are two main objectives:

1. To establish the preferred basis and methods for continuation of a Lake Basin Development Authority Shallow Wells Programme taking due account of technical, social, cultural, organizational and financial aspects.

2. To create the opportunity for presentation and exchange of information between various groups and organisations who are or may be involved in Shallow Wells provisioning, especially in the Lake Basin Development area.

3 THE SPEECH BY THE PROVINCIAL COMMISSIONER NYANZA MR FRANCIS CHEROGONY AT THE OFFICIAL OPENING OF THE LAKE BASIN DEVELOPMENT AUTHORITY SHALLOW WELLS WORKSHOP HELD AT TOM MBOYA LABOUR COLLEGE-KISUMU ON THE 10TH OCTOBER 1983

Distinguished delegates, Ladies and Gentlemen,

I feel greatly honoured to have been invited to join this august gathering of experts from far and wide on this first day of the Workshop on Shallow Wells.

I would like to take this opportunity to welcome all foreign guests and experts to Kenya and to Kisumu and hope you will enjoy the kind weather and warmth of Kisumu and Kenyan people. To those from the neighboring provinces, you are equally welcome to Nyanza.

It is fitting that you have chosen Kisumu town as your meeting place since it is the home of the headquarters of the Authority and one could say "the Capital City of the Region". Besides a daily spectacular sunset, it offers all facilities which one would desire. Popularly, Kisumu is sometimes referred to as the U.K. (United Kisumu). It is therefore, expected that you will be united in your deliberations and determination to pursue the objectives of this Workshop with diligence.

Workshop Director, Sir, I must congratulate you and your team and all those who considered it in order to organize this Workshop in the Lake Basin area.

It is always my pleasure to be associated with activities of the Lake Basin Development Authority. The Lake Basin Development Authority is a comparatively young regional development organization with the very important task to plan, coordinate, and speed up the development

in the Lake Basin region. It is then all the more encouraging to see that the organisation is "alive and kicking", coming into the open with other longer existing governmental institutions in the area.

1. Turning to the theme of this Workshop, I would like to make a few observations. The aim of the Workshop is to find the best and cheapest way of providing clean and safe water supply to the rural areas in this region, employing the appropriate technology of the hand-pump.

   It is a noble aim! and I hope sincerely that this objective will be upper-most in your minds during these deliberations. The delivery of clean, and safe drinking water to our people is an absolute condition for the betterment of the quality of life in the rural areas, where more than 90% of our population reside. Discussions of organisationa, financial demographical aspects and logistics of the implementation of the project should under no condition, blur the over-riding goal of providing the needy with clean water for domestic consumption.

2. There is an abundance of water in Nyanza Province. Look at the Lake, a sheet of water five times the size of the whole of the Netherlands. There are rivers, ponds and spring. Yet up to date, far less than 20% of our people have access to treated water supply.

   And as you and I know very well, water is a sumbol of life but it can also be a destructive element to human life. Surface water especially in a hot tropical region like the Lake Basin, harbours numerous water-borne and water related diseases.

   We know that shallow ground-water is comparatively safe. That is why we welcome whole-heartedly, the hand-pump technology to

extract the uncontaminated water resources which abound only a few metres below us. We welcome it because it is a low cost, appropriate and managable device, within reach of the available technological know-how in the village communities.

3. Workshop Director, Sir, when the Lake Basin Development Authority through the kind assistance of the Royal Netherlands Government started the Pilot Project of Shallow Wells in 1982, we saw in the project, the best hope for quicker provision of clean and relatively safe water near to the people in the rural villages.

I can assure you that Nyanza people support you in this and the people are desirous of having this facility to reduce the hardship women face presently and health hazards the whole population are constantly threatened with.

The District is now the focus of development in Kenya. In this respect, I am sure one of the pressing development needs of all the districts in Nyanza is water and you can rest assured that this Shallow Wells Project will get very strong support in the District Development Committees.

4. As in the case of so many development projects, it is quite a simple matter to construct; but to maintain the construction is quite a different affair. In the case of the hand-pump and well, one has to contend with quite regular maintenance operations such as overhauling, servicing, lubrication, replacement, regeneration of the well, breakdowns and so forth.

It will be up to you, distinguished delegates, to give this matter of maintenance, more emphasis during your deliberations. Do not leave this Workshop until you have clearly spelled out in which way the "shallow wells" are going to be cared for, managed

and maintained.

It occurs to me that the answer to this vital dimension of the project has to be found in the target communities themselves. It will require training, community development efforts on the local level, as well as clear policies and cooperation of all implementing agencies concerned.

5. Another important aspect of the project is the pragmatic and structural cooperation required for the construction, maintenance, and management of a large number of pumps, scattered over a cast area like that under the jurisdiction of the Authority.

The Lake Basin Development Authority, charged with the responsibility to coordinate the management of natural resources in the region, cannot implement and accelerate development of the are singlehandedly. It needs the cooperation and inputs of all existing structures in the area, be they governmental or non-governmental. In this particular instance of the Shallow Wells Programme, a concerted cooperative effort will be required from the various provincial and district water departments in the region. Other extension services will be expected from the departments of health and social services and from the various non-governmental organisations like churches and other voluntary change agents operating in the region.

Workshop Director, Sir, I am reliably informed that the Royal Netherlands Government has sponsored this Workshop. May I take this opportunity to convey my sincere thanks and gratitude of the Kenya Government to the Royal Netherlands Government assistnce in Kenya for which this is only one and we are appreciative of the good relationship between the two countries, and the willingness on the part of the Dutch Government to join hands with us in the gigantic task of building this region. As our people are seriously and urgently in

need of safe domestic water supply within easy reach. The Kenya Government would be pleased to see an urgent consideration of starting the major Shallow Wells Project materialise as soon as possible.

In conclusion, Workshop Director, Sir, I wish to suggest to our foreign guests that Kisumu and its environs offer a lot of contrasts which I encourage them to enjoy after the seminar. You should have no hurry to leave but to stay, enjoy anything and everything. I wish the seminar a successful time.

And with these few remarks, it is now my great pleasure to declare the Shallow Wells Seminar Workshop officially open.

4 PAPER NO. 1

LAKE BASIN DEVELOPMENT AUTHORITY

LAKE BASIN DEVELOPMENT AUTHORITY AS AN ORGANIZATION AND ITS ACTIVITIES TOWARDS SHALLOW WELLS AS A LOW COST RURAL WATER SUPPLY

ABSTRACT

This paper endeavours to outline a framework on the part of the Lake Basin Development Authority for the preconditions of a viable Shallow Wells Programme in the Lake Basin area.

The paper sets out to delineate the regional planning and development task of the Authority which forms the context within which a Shallow Wells Project under the auspices of the LBDA might be understood.

Next, the paper touches briefly on some of the potential social, economic and health benefits accruing from a well-organised Shallow Wells Project. The crucial issue however, remains a viable operation and maintenance system, which is intimately related to the question of well ownership.

In the remaining sections, technical aspects, such as ground-water potential, survey methods and construction techniques, arrangement for the production line of pumps and the distribution network of spare parts, as well as institutional aspects and training are discussed.

CONTENTS

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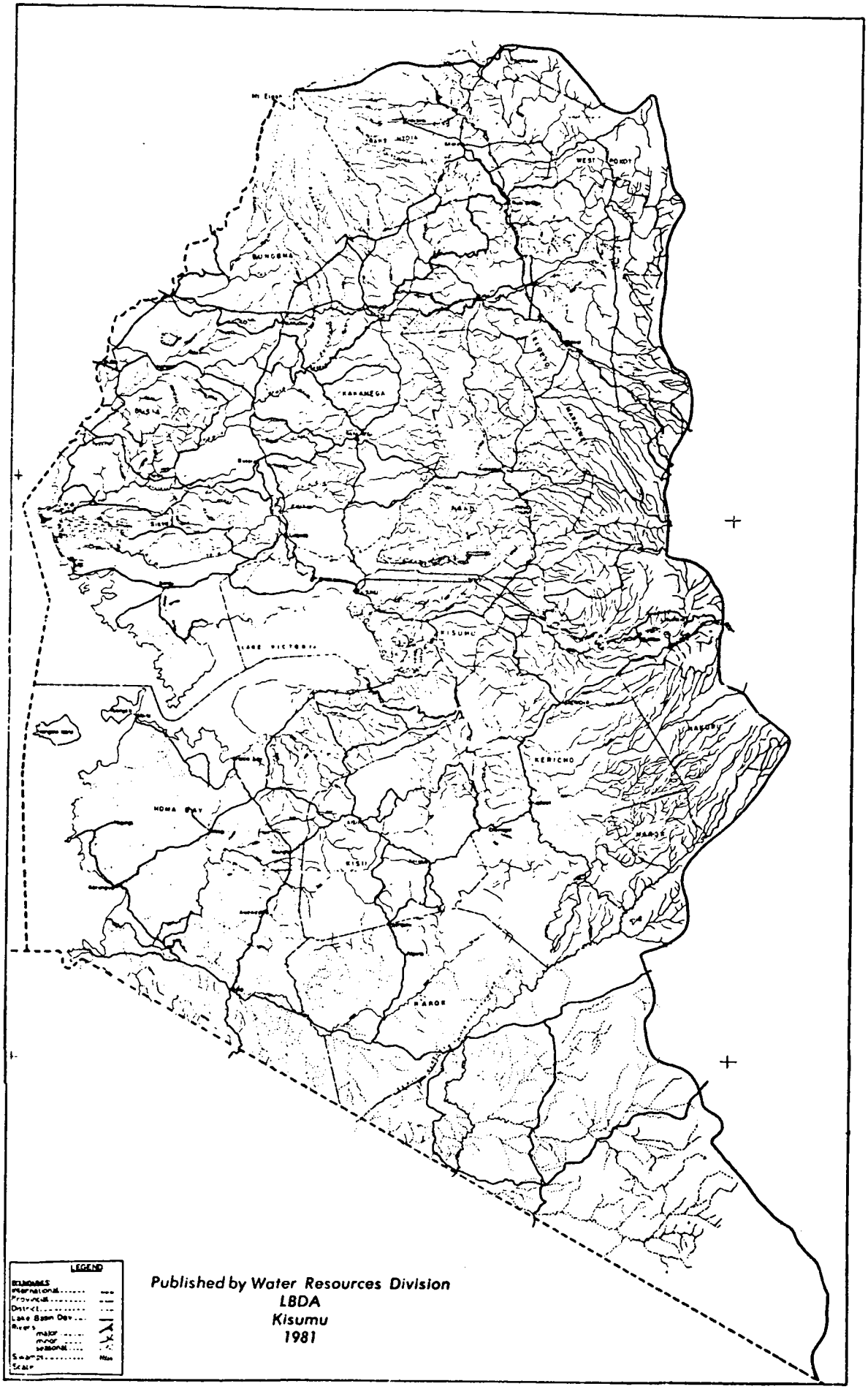

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PART I

THE AUTHORITY'S INVOLVEMENT IN THE PROVISION OF WATER SUPPLY

I.1 The Organization/Area of Jurisdiction

Lake Basin Development Authority (LBDA) is an organisation established by an Act of Parliament to plan and co-ordinate the implementation of development projects in the Kenyan part of the Lake Victoria Catchment areas. It has a Board of Directors and a Managing Director as its Chief Executive.

As a development organisation, it is charged with the cardinal responsibility for planning and co-ordination of the socio-economic development of the Lake Basin region. The area under its jurisdiction occupies 8.0% of Kenyan territory and has 7 million inhabitants which is about 42% of the Kenyan total population. An Act of Parliament of August 1979 by which the Authority was created defines the "Development Area" as the two administrative units of Western and Nyanza Provinces of Kenya and the "Catchment Area" as extending to parts of seven districts within the Rift Valley Province i.e. Narok, Elgeyo Marakwet, Uasin Gishy, Nakuru, Nandi and Kericho.

The Authority's activities within the catchment area involve catchment conservation, rehabilitation, afforestation and re-afforestation. Within the development area i.e. Nyanza and Western Provinces, however, the Authority is to undertake various development activities such as Flood Control, Agriculture, Livestock, Irrigation and Drainage, Effluent Monitoring, Aquaculture, Public Health and Water Resources Development, in short, the management of all natural resources within the region.

Over 90% of the people in the region are rural-based and depend for their livelihood on agriculture. Population density is high everywhere and averages over 200 per Km^2. A majority of people in this area depend on unimproved sources for their domestic water supply. It is therefore, not surprising that the first project undertaken in the Lake Basin area, under the Bilateral Co-operation Programme between the Netherlands and Kenyan Governments was geared, through the initiative of the LBDA towards investigating a particular solution to meet in part, the need for improved domestic water supplies in the rural area.

However, in pursuing a water supply policy further for this region, a wide range of options exist, the choice of which will depend on results and effects to be achieved. Together, those elements which, policy wise, will deserve to be included will determine the shape of Lake Basin Wells Programme. Indicative objectives are given for such a programme.

I.2 Functions of the Authority

Of the thirteen functions delineated in the Act of Parliament establishing the Authority, seven specifically refer to development of the water resources. This underlines the importance the Authority attaches to development of the water resources in the region, and further underscores the high priority the Authority gives to this most valuable of resources. As you will note from the Act, the Authority is charged among others with the responsibility to:

(a) Plan for the development of the area and initiate project activities identified from such planning in the development area through the Government generally.

(b) Develop an up-to-date long range development plan for the area.

(c) Co-ordinate the various studies of schemes within the area such that human, water, animal, land and other resources are utilised to the best advantage, also to monitor the design and execution of planned projects within the area.

(d) Co-ordinate the present abstraction and use of natural resources, especially water, within the area and to set up an effective monitoring of such abstraction and usage.

(e) To cause and effect the construction of any work deemed necessary for the protection and utilization of the water and soil of the area.

It is the last stated function, that of necessity, has resulted in the involvement of the Authority in the implementation of low cost rural water supply in the form of shallow wells, which is the subject of the Workshop. The above mentioned functions clearly entrust the Authority with the planning and co-ordination of the water resources development in the region.

To be sure, improvements in the public health with the accompanying effect on general well-being and increased productivity are intended to be probably the most significant results of improved water supplies.

In the LBDA area, the role of safe water supplies especially in controlling diseases and prevention of the spread of the cholera menace, which is a prevalent ailment in the region is most conspicuous.

It is considered that the installation of protected water supplies in strategic places would be the most effective measure that could limit the spread of cholera epidemics in the area and elsewhere in Kenya.

Malnutrition, for example, caused by lack of protein in food and anaemia due to the frequent attacks of malaria, are some of the true health hazards mostly to the young children in the LBDA area. The occurence is especially noticeable in the low-lying region of the Lake shores where non-availability of safe water is an acute problem This, coupled with water-borne diseases such as Gastro-intestinal problems, bilharzia and malaria which are the most common diseases in the area, contributes to the high infant mortality rate in the region averaging 175 per 1000 live births.

1.3 Relationship with Other existing Institutions in the Region

The general principles governing LBDA's relationship with existing structures inside the development area are:-

(a) Demarcation of Domain: In its immediate task, environment, the LBDA is not on its own. Many of its functions cut across the activities of existing organisations in the area. Systematic demarcation of functional domain and relationship of each participating institution seems to be essential. Domain concensus will reduce conflict and enhance complementarity.

The LBDA is involved in areas of development and functions which the existing organisations have not covered adequately, e.g. irrigated agriculture, and those functions which have not been tackled at all. Examples of the latter are to be found in large scale (long term) programmes such as hydro power generation, low cost rural water supply,

reclamation work, marketing infrastructure, etc.

(b) Co-ordination and Integration:

The guiding principle, however, in establishing smooth working relationships flows from the Authority's overall responsibility for the region.

As we are aware, Ministries and their development activities in the country are mostly sector-based. It is the very task of the Authority to integrate the separate sectorally organized development activities on a regional level.

I.4 Relationship with Ministries

With the understanding that the functions of the Authority in the fields of planning, implementation, co-ordination, review and evaluation cut across the activities of many departments, it is of paramount importance to spell out meticulously a formula for co-operative relationships based on the previously discussed broad principle.

PART II

ORGANIZATIONAL ASPECTS OF A VIABLE SHALLOW WELLS PROJECT

II.1 Socio-Economic and Health Aspects

Any domestic water supply project or programme in the Lake Basin area should ideally be derived from a water supply policy for the area. The purpose of a water policy may be defined as the achievement of maximum benefit from the development and conservation of water resources. Potential benefits may include social, economic and health aspects.

The provision of an improved water supply means that the quality of water is up-graded the reliability is assured, the quantity of water available is increased and its distance from the consumer reduced.

The reduced walking distance to the well saves time and energy and thus releases well-users for other alternative productive purposes leading to economic benefit.

Present knowledge of tropical epidemiology indicates that low income groups in particular have high morbidity due to water borne feacaloral or water-washed infections, as a result of insufficient clean water for personal hygiene or inadequate hygienic practices. It follows, therefore, that water quality accessibility and reliability of supplies should be improved. No efforts should be spared to control the bacteriological quality of the water.

Although wells may also provide drinking water of good quality experience shows that improved village water supplies will only have measureable effects on health, if at the same time

programmes on health education geared towards improved personal and domestic hygiene are implemented.

II.2 Humanitarian or Economic Priority

Any economic scheme should assume high priority if it is going to support an agricultural package programme which preferably should include rural centres serving as a focal point for development.

The magnitude of the effort to fulfill the need for water throughout the area needs a priority choice between a "worst first" and a "growth point" strategy.

The main criterion for water schemes provided for humanitarian reasons should relate to distances. The worse this characteristic is, the higher the priority.

The policy of concentrating water supply investments in "growth points" which possess complementary facilities will increase the probable economic and health impact, but is in direct conflict with a policy of priority to the poorest areas. This leaves no alternative to the policy-makers, but not to ignore the poorest areas on humanitarian and ideological grounds.

An acceptable policy mix for the Lake Basin area would be to concentrate the water supply effort at focal points throughout the region like, DDC sponsored organisations, schools, markets, local co-operatives, church organizations, hospitals, etc. Besides, its proper functions as a water supply, the well may also serve as a point of demonstration which may awaken interest and create demand for the same.

II.3 Ownership

Perhaps the single most important factor which determines the effectiveness of the water supply investment is to secure the proper operation and maintenance of the improved water supply. Problems with operation and maintenance are one of the major drawbacks of any rural scheme. If owned by central and local government, such schemes are often out of order soon after the initial implementation as a result of lack of proper management and qualified manpower, insufficient institutional facilities or lack of funds. Where villages are supposed to carry out essential operation and maintenance tasks, the same occurs because of lack of organisation and knowledge, motivation or means.

Motivation founded on proven interest by participating in the investment and ability to provide the means for maintenance should be the basis for established ownership of a well. A number of the following organisations such as DDCs, Schools, institutes, church organisations, co-operatives, hospitals, markets, etc. seem willing - as became apparent from interviews - to fulfill those requirements for well-ownership. In addition communities, private enterprises and even private persons should be considered for ownership provided that similar requirements are met.

In some instances, the owner may profit from the well. Besides being a source of clean drinking water, the well may also be used for irrigating a vegetable plot, for watering cattle, poultry keeping, etc.

Compared to a piped water supply scheme, a shallow well represents a modest investment with corresponding reduced recurrent costs, catering for an appreciable number of people.

Because of these properties, shallow wells lend themselves to ownerships by the local organisations mentioned before which are necessarily limited in scope but each already providing services in the public interest on a local scale.

It is the provision of wells through the LBDA as an improved low cost water supply, owned by the multitude of existing local organizations already alluded to, which will provide the required network of management entities for improved supplies in the area without burdening the government with maintenance costs. This is because such local organisations are organised entities already created to perform certain public services with sure revenue sources, and are willing to meet recurrent costs in this regard.

PART III

TECHNICAL ASPECTS RELATED TO THE CONSTRUCTION OF SHALLOW WELLS

III.1 Ground-Water Potential

Nyanza and Western Provinces together cover an area of about 24,0000 Km^2, 95% of which has been geologically mapped. The geology of these two provinces is the most complicated, both lithologically as well as structurally of the whole of Kenya.

No systematical ground-water surveys have been executed. Thus actual knowledge about the presence and properties of shallow aquifers is derived from existing shallow wells varying from 3 to 30 m depth and from the results of over 450 survey drilling tests by hand. In the final report of the pilot project, an attempt was made to delineate of shallow ground water appeared to be feasible. Tentative conclusions from data collected so far provide the following hydrogeological picture and possible abstraction methods:

- alluvial deposits, suitable for construction of hand-drilled shallow wells are very scarce in the area. They mainly occur in parts of the Kano Plains, around the Lake Victoria and in some major river valleys.

- the Pre-Cambrian rocks of the Nyanzian and Bukoban systems constitute more than 50% of the rocks in the area. Because the larger part is capped by up to a few meters thick laterite, hand drilling would not be possible. Below, the laterite, either weathered or practically unweathered rock may be found. Shallow Well construction will be possible in areas underlain by these rocks either by hand drilling or possibly by machine drilling.

- the Tertiary and Pleistocene Volcanic rocks together constitute 15% of the rocks at the surface of the area, with only a very thin soil cover below which unweathered hard rock is present. These rocks are fairly young compared to Nyanzian and Kavirondian. The ground-water is reported to occur at depths exceeding 30m. Hence the only possible way of constructing wells would be machine drilling.

- the granite rocks which make up about 15% of the area are usually deeply weathered. Especially in such areas, only hand-drilled and partly hand-dug wells will be possible in the lower slopes of the Valley bottoms.

III.3 Survey Methods and Construction Techniques

From a physical point of view, shallow well construction, as one of the means to create improved domestic water supplies in a large scale appears possible. Site selection and implementation require the application of various survey methods and construction techniques. Depending on lithological properties and depth of aquifers hand drilling and hand digging as well as machine drilling should all be considered.

Out of every 15 test drillings done during the survey, only one site proved successful. This is considered quite low, but may partly be explained by the limited suitability of the applied survey methods, i.e. "Hand-drilling". It is estimated that for survey and construction, hand-drilling may be successfully applied in 10 - 20% of the cases. The majority of the wells will either have to be hand-dug or machine drilled.

Due to the continuing global economic depression, financial inhibiting factors should be considered along with the above mentioned constraints. Experience shows that the survey

component of a water supply programme should be a major activity geared to the selection of suitable well sites, to enhance general hydrogeological field knowledge, to obtain specific data on ground-water properties in relation to geology and lithology, and to assess the suitability of various survey methods in different situations within the area. Similarly, alternative methods and techniques for constructions should be tested in order to determine their usefulness for each particular situation.

III.3 Local Procurement of Well Pumps and Spares

At least, of equal importance is the procurement system to be adopted which is closely related to the choice of execution by public or private sector. The presence and effectiveness of the local distribution network and purchasing system, the degree of dependency on imported goods and the presence or opportunity to create local manufacturing capacity are all elements to be taken into account. Which system is to be adopted within the local context should be learned through practical experience. This certainly tempers any intention to strive for achievement of high production targets in terms of number of constructed wells at least on the initial phases of water supply programme.

This subject has been dealt with in detail in the LBDA's second paper (socio-cultural investigation into the use and functioning of the completed shallow wells in Nyanza Province). The recommendation advanced therein, we hope, shall be adequately discussed in the course of the Workshop.

III.4 Institutional Aspects and Training

Included in the definition of major aims of water supply policy

for the Lake Basin area should be indications of the institutional framework for the various aspects of planning, study, implementation, operation and maintenance.

The role of the Lake Basin Wells Programme in the institutional sense will thus be:

(i) to establish procedures and arrangements for the ownership of the well, a task which could eventually be entrusted to the Planning and monitoring section.

(ii) to assist in the creation of a survey and design section which ultimately would take over the survey and design personnel trained by the programme.

(iii) to establish procedures and arrangements fo maintenance. This would require recruitment of additional staff by the LBDA which together with the presently available staff should participate in the programme as counterpart staff to receive training.

With regard to the private sector, the programme may attempt to influence the local contractors in well construction. This means at first selective and if successful, gradually more involvement of contractors in the construction works, and procurement arrangements.

At the same time, the programme should establish the interest in and capability of local manufacturers to produce shallow wells equipment according to standards provided by the programme. In this respect, emphasis should be given to the manufacturing of spare parts for maintenance. Involvement of the Kenya Industrial Estates might also be considered.

CONCLUSION

Based on the preceding considerations, the objectives of a Lake Basin Wells Programme are:

- the exploitation of shallow ground-water in order to create a first network of improved domestic water supplies by means of wells provided with handpumps with the possible additional benefits of productive use.

- the establishment of ownership of the wells geared to the multitude of existing local organisations with a view to secure the management, operation and maintenance of the wells.

- to provide training with a view to strengthen LBDA's ability and capacity in planning, survey and design and to promote active involvement of the local private sector with regard to construction, procurement and supply.

- to investigate on a plot scale the feasibility of storage wells for crop irrigation.

- to elicit the co-operation of the various relevant organisations in the region for extension input such as health, social services, and community development.

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PLENARY DISCUSSION

PAPER NO. 1

Concern was raised about the possible reduction of the water table due to a large scale implementation of shallow wells. Although a systematic hydrogeological survey has not been carried out, some 95% of the LBDA region has been geologically mapped. Preliminary estimates are that approximately 1.48 Km^2 of water is recharged as an underground supply in the region each year. Recharge is linked to land use in a complex relationship but it is certainly not to be feared that shallow wells will have any marked effect on groundwater level in the region for the foreseeable future.

Water quality is a normal consideration in declaring a site suitable for a well and water engineers take into account the presence of pit latrines, fertilizers, etc. At present, water quality testing is done in Nairobi but it is hoped that the LBDA will have its own laboratory as part of one of its planned projects.

It was observed that the LBDA paper does not articulate any view of the special role of women in domestic water supply provisioning and the needed community participation. In addition, it was noted that women seem to be placed at the end of the technological process of pump design, well construction rather than at the beginning. Men are more transient in rural areas, searching for employment, moving to another wife etc. It was felt that the whole question of the primary target group - women - was not highlighted.

The speaker pointed out that specific concern for the role of women should not be a question of sex - discrimination but rather of men and women pulling together. The requirement that 6000/= be paid by a community demands a collective effort by men and women. Additionally the intended education programmes via Maendeleo Ya Wanawake, Ministry

MEMORANDUM OF THE NETHERLANDS GOVERNMENT

A SHALLOW WELLS PROGRAMME FOR THE LAKE VICTORIA BASIN AREA

1. Introduction

The purpose of this memorandum is to outline a framework within which a Shallow Wells Programme for the Lake Victoria Basin will have to be worked out in the near future rather than to provide an exact blueprint for such a programme. However, a number of aspects which we consider to be of major importance for the correct planning of the programme will be considered. Certain factors will be crucial to the success of the programme: sufficient knowledge of the aims, a conscious choice of the means to be employed and a clear definition of the role of the various participants.

At the outset of the pilot project, a number of choices were made; in particular, it was decided from the very beginning to exploit groundwater using a shallow well and a hand pump. Many other decisions relating to the implementation of the programme, however, were not taken at this stage. It should be clear from the beginning of the programme what method will be used to construct the wells, how ownership and maintenance will be organised and which organisations will be provided with training by the consultant and in what way. The main emphasis of the consultant's work should be placed on creating an institutional structure rather than on construction.

2. The Current Situation

The need for clean water is largely determined by people's

knowledge of the dangers of using polluted water. So far, the project material has not paid much attention to the relationship between polluted drinking water and health in the Lake Victoria Basin. What data, for example, are available on water-related diseases? Until now, the development of a Shallow Wells Programme has been justified on the grounds that cholera epidemics regularly occur in this region. This in itself could be sufficient to justify attempts to improve the water supply, but the decisive question is whether the population connects the cholera epidemics (and other illnesses) with the polluted drinking water. It is not yet known to what extent or how the health education aspect can, or should, be incorporated into the programme.

In planning a drinking water programme these days, the existence and use made of sanitary facilities is always taken into account. To date, this aspect has not been considered in the discussions about the Shallow Wells Programme. If the Shallow Wells Programme is implemented, it must be made clear from the outset how far the improvement of sanitary facilities is an absolute precondition for effective improvement of the drinking water supply.

Aims

The aims of the programme may be classified under four headings:
- technical factors;
- economic factors;
- social factors;
- health factors.

The aims in the field of health care particularly concern the need to disseminate knowledge of preventive medicine and the optimal use of the improved facilities in terms of health care.

In the pilot project, no attention whatsoever was paid to the health care aspect, but in any larger programme this aspect will have to be dealt with far more thoroughly. Sociological research currently being carried out by the Lake Basin Development Authority should indicate what concrete aims can be formulated in this area.

4. Resources and Instruments

The following resources may be distinguished:

- materials;
- manpower;
- finance.

As far as possible, the resources for implementing the programme should be drawn from the local market. This applies to the pump and cylinder as well as the materials for exploration and construction of the wells. Where locally produced materials do not yet satisfy all the quality requirements, an attempt will be made to improve the quality of output in collaboration with the consultant.

As well as input of materials, the programme will involve the input of manpower in areas such as research into drinking water requirements, advice on efficient and effective use of water supervision of the construction of wells and local manufacture of pumps.

The financial resources needed may be divided into investment costs and maintenance costs. Part of the investment costs can be met by the donor, on the understanding that part will also be met by the community of users themselves. The users should normally meet maintenance costs, but where they are unable to do so, assistance must come from the budget of the Ministry of

Water Development.

5. Parties Concerned

The following bodies will be involved in the implementation of the programme:

- Lake Basin Development Authority, Ministry of Water Development, Ministry of Health, Ministry of Culture and Social Services;
- the consultant;
- the water users;
- non-governmental organisations;
- the Dutch government as donor.

The character of the pilot project was determined by the resources made available by the donor. Any new Shallow Wells Programme, however, should follow a different course, determined first and foremost by the needs and capabilities of the water users.

Of course, the water users do not constitute a homogeneous group, and the whole problem of improving the water supply is so extensive that it is necessary to establish priorities.

From the beginning of the programme, there must be a clear statement of the criteria used to select the groups eligible for the construction of a well.

The foremost criterion should be the need for clean drinking water. In principle, the programme should be directed at those groups which have least access to clean drinking water. However, it may be almost impossible for them to make a financial contribution towards investment costs. In this situation, self-help methods may provide an answer.

The maintenance and depreciation costs of a well and pump are estimated at KShs 150 per family per year. It is questionable whether this sort of sum can be afforded in Nyanza Province where some 38% of the households earn less than Kshs 2,000 per year. Poverty in Nyanza Province can largely be explained by the absence of adequate opportunities for earning non-farm income.

Alternative means of covering these costs will have to be investigated. The recent scheme for decentralisation to district level may offer new possibilities.

A very clear line must be drawn between those groups which have to pay the maintenance costs themselves and those whose maintenance costs have to be subsidised.

The role of the LBDA has so far been too unclear. The LBDA should have more of a stimulating and coordinating function than an executive one. As far as possible it should farm out work on long-term contracts. The pilot project demonstrated that local expertise does exist for the construction and maintenance of wells and that local production of the pump is possible, provided there is supervision in the early stages.

The great advantage of subcontracting is that the LBDA is not burdened with the direct management of the materials, workforce, etc. In addition, subcontracting contributes to the development of local industry. The LBDA can best fulfil its central coordinating and initiating function if it is burdened as little as possible with less central business.

The LBDA, the Ministry of Water Development, the Ministry of Health and the Ministry of Culture and Social Services will each name a representative to take part in project management.

These must be civil servants already employed with the different ministries and the LBDA. The project management tasks will be:

- responsibility for the application of selection criteria for construction;
- carrying out an information programme to illustrate the link between preventive health care and improved water supply;
- supervision of both construction and maintenance work which has been contracted out;
- overseeing the development of a local structure geared to production of the hand pump.

The consultant's tasks will mainly focus on supporting the Kenya project management, including training activities. Unlike the pilot project, activities will not concentrate on implementation but on creating an institutional framework. In the final analysis, the contribution of the consultant will not be evaluated by the number of wells constructed in a year. If it is to be deemed a success the crucial element will be whether an organisational structure has been built up in the Lake Basin area which will permit the local production of wells and pumps.

Put more concretely, the most important tasks of the consultant will be:

- assisting project managment in supervising the work of construction and maintenance of wells and pumps which has been contracted out. The consultant will also assist in the contracting procedure;
- organising a local institutional structure for the production of the hand pump;
- assisting in the implementation of an information programme

to illustrate the link between preventive health care and the improved water supply.

The consultant's tasks are complex and the quality of the person appointed will therefore be of critical importance.

In implementing the programme, project management will aim for structural cooperation with the various non-governmental organisations in the area.

The Dutch government will commit itself for a longer period - in principle for five years - to making a financial contribution towards the implementation of the programme.

The most important conditions attached to this financial support are that the programme be directed at those in most urgent need of clean drinking water, and that the implementation of the programme be contracted out to local firms and workshops. The criteria for selecting the communities whose water supply is to be improved, must be made clear from the start of the programme. The LBDA and the ministries mentioned must be prepared to provide qualified personnel for project management.

DGIS/MF

OCTOBER 1983

PLENARY DISCUSSION

PAPER NO. 2

CHAIRMAN: MR. J. N. BONUKE

Presentation

During the presentation, the speaker highlighted the results of an extensive survey of water supply projects (Worldwide) financed by the Netherlands which amount to some billion shillings in the period 1975 - 1980. In brief, the findings are that:

1. Too many projects are undertaken without clear targets (often due to external pressures).
2. The implementing and financing agencies are often too involved in the procurement of materials and other administrative matters.
3. The capacity of the counterpart organisation is often too limited.
4. Finance for recurrest costs is often lacking.
5. The technologies used, though not advanced, were often too energy intensive.
6. The needed concommitment to sanitary component was often lacking.
7. The financial system to subsidize costs was poor.
8. The Netherlands Government did not appear to have any real strategy or policy towards drinking water programmes.

The report contained various recommendations amongst which were:

1. Do not start drinking water projects without clear criteria of quantity, quality and access (walking distance) financial limits, groups to be served, etc.
2. Determine what the major diseases are and the couplings to sanitation needed for an effective programme.
3. Know whose needs are highest.
4. Be aware of the exact position of the various actors in th

programme - the funding agency, the recipient, the executing agency, the implementing agency, consultant, the people, etc.

5. Stress the need for popular participation secured in the earliest stage.

The speaker stressed that the memorandum is not a blueprint but seeks to highlight specific factors such as the need for the creation of the institutional structures to carry and maintain a Shallow Wells Programme. In addition, it is necessary to emphasise the Netherlands view that such a programme must not enhance the already significantly increasing socio-economic differentiation in the area and the trend towards greater inequality.

Finally, the Netherlands wished to express their positive regard for the LBDA Socio-cultural study; not only its quality but the valuable contribution it can make to the improvement in the development of the Shallow Wells Programme.

Discussion

The plenary discussion was centred around five major issues. These were; criteria and prioritization, the status of the memorandum, local fabrication, the role of the LBDA and the role and functioning of consultants.

Firstly, it became clear that prioritititization is needed and thus criteria need to be formulated. Such criteria must be nuanced because peoples "access" can be defined in many ways, physically, financially, technically, socially and so on. For the DANIDA well rehabilitation project, the most important criteria has proven to be a concrete demonstration of interest by the community followed by the ability and capability of the District Water Officer to implement. Access to water does not given an a priori redistribution of income but differential access should not lead to a re-enforcement of

inequality processes. Criteria must recognize this. Provision of basic needs is not neutral and one should prioritize to weaker groups because of overall trends. Because technology can itself restrict access, it is necessary to consider a diversification of the means of rural domestic water provisioning. KEFINCO have chosen the area poorest in terms of present and future planned supply for its programme.

Secondly, it was made clear that the Netherlands memorandum is a position and discussion document whose ideas can be modified by the Workshop. The LBDA saw the memorandum and the Workshop to be ways of strengthening the existing project proposal rather than the basis for a new proposal.

Thirdly, when considering local fabrication many difficulties had been experienced (by WECO) and were highlighted. An important problem is the relative costs of raw materials which make local materials costs alone as much as the finished-product price of some pumps available on the market. Either import duties on materials must be relaxed or be increased on pumps. There is a limit to the production capacity of educational institutions but spare parts etc. are less of a problem if local production is attained. For the programmes underway in the region, most items are imported, however some well heads are being manufactured locally.

The fourth point concerned the prefered role of the LBDA in such a programme. The Netherlands view was that the LBDA should aim to be a co-ordinator and facilitator rather than always an executor of programmes, i.e., it can have the responsibility for project implementation but not necessarily always carry-out the associated physical works - this could be done by the relevant sector ministries and other agencies. This did not seem to be at variance with the LBDA's own ideas or that of the workshop in general.

The fifth and final topic discussed was the role and functioning of consultants. Concern was expressed that involvement of external consultants means a substantial repatriation of development assistance funds (figure of 50 - 70% were cited). In addition, some participants felt that the work of external consultants is not comprehensive enough - they should be complemented by local people. Netherlands aid policy is to utilize consultants rather than own personnel whenever possible. Their Technical Assistance is untied allowing any consultant to be employed. Financial Assistance is partially tied restricting it to a Netherlands consultant or another from a Third World country. There is a large diversity of work being asked of consultants and the general view of the meeting was that local groups should be coupled and utilized as much as possible with local consultants being prefered when consultants are needed.

6 PAPER No. 3

MINISTRY OF WATER DEVELOPMENT

OVERVIEW OF THE RURAL DOMESTIC WATER SUPPLY SITUATION IN THE LAKE BASIN AREA

ABSTRACT

Access of the rural population to improved water supplies varies enormously - being 13 - 15% as a national average and as low as 3 - 4% in some districts. The MOWD has initiated four national Rural Water Supply Programmes over the years involving some 280 schemes half of which are operational, the other under design or construction.

The MOWD schemes currently planned for LBDA region will serve approximately 1 million people, thus some 7 million remain. The MOWD has recognized that piped schemes are prohibitively expensive and have taken a major step in their involvement with the KEFINCO hand-pump programme. Given the slow rate of economic growth and th ground water potential of the area the MOWD's policy and strategy in the coming years will be to encourage the utilization of hand-pumps and the rehabilitation of existing schemes in the region.

REPUBLIC OF KENYA

MINISTRY OF WATER DEVELOPMENT

OVERVIEW OF THE RURAL DOMESTIC WATER SUPPLY SITUATION IN THE LAKE BASIN AREA

1. Introduction

The rural population of Kenya represents about 85% of the total population according to the 1979 census. The present level of access to improved water supply vary widely between regions from as low as 3 - 4% in North Eastern Province to 18 - 20% in Central Province with a national average of 13-15% coverage for the rural population. Within the Lake Basin area - which in this context is defined as Western and Nyanza Provinces - the coverage is around the national average.

As a guideline it can be said that one-half to two-thirds of the rural population with access to an improved water supply is supplied directly through MOWD schemes. The development of rural water supplies over the past decade has been administered within the MOWD under various programmes of which the most important are:

- Rural Water Supply Programme (RWSI, RWSII, RWSIII and RWSIV)
- Self Help Schemes Programme
- Rehabilitation Programme

The RWS Programmes started in the early 1970s and have been by far the most substantial component in the development of rural water supplies in Kenya. Various international agencies and bilateral donors have over the years assisted the RWS programmes financially, noteworthy are the contributions from the Government of Sweden (through SIDA) and the World Bank (IBRD)

Nationwide the RWS programmes have included approx. 280 schemes of which one-half are in operation and the other half at present are either in the design phase or under construction.

2. Water Supply Schemes in Operation

In the following table estimates are given of the total present population living in the Lake Basin regions (Nyanza and Western Provinces) and of the number of people being served by MOWD schemes. In the table, the supply area is divided into rural water supplies and urban water supplies, the latter category includes schemes which serve urban centres and towns and is included here for comparison reason only.

PRESENT POPULATION AND PEOPLE SERVED

		Nyanza Province	Western Province
Rural	Total	3,360,000	2,150,000
	Served	230,000	170,000
Urban	Total	250,000	110,000
	Served	125,000	55,000

In the following presentation, only water supply schemes which serve rural population are included. From the above table, it is seen that a population of approx. 400,000 have access to MOWD rural water supply schemes out of a total rural population of 5,510,000 (i.e. a 7% coverage).

Presently there are 53 MOWD rural water supply schemes in operation of which 34 are located in Nyanza Province and 19 in

Western Province. Thus the average number of consumers being served by a scheme in the Lake Basin area is approx. 7,500. The distribution of the schemes within the two provinces and the districts is as follows:

NYANZA PROVINCE

Kisii District	Kisumu District	Siaya District	S. Nyanza District
Gakero	Awasi	Aluor	Homalime
Gesusu	Kibos	Uyoma	Kandiege
Kerocka	Kibigori	Maina Dam	Kamam
Manga	Nyabondo		Kiabuya
Marani	Nyabera		Kochia
Nyamira	Kanyakwar		Luanda
Sameta	Koru Minare		Macalder
Tabaka			Magunge
Tombe			Mawego
			Ndhiwa
			Ngegu
			Nyangweso
			Obware
			Oyugis
			Pala
			Rongo
			W. Karachuonyo

WESTERN PROVINCE

Bungoma District	Busia District	Kakamega District
Chesakaki	Amagoro	Hamisi
Kibichori	Buyamba	Lumakanda
Kibichori Bokali	Busia Hills	Malawa
Little Nzoia	Busia Mundika I	Shitoli I
Ndivisi Makusekwa	Funyula Nangiria	Mbale
	Mumana	
	Port Victoria	
	Sio Port	
	Wakhungu	

For clarification it should be mentioned that the above list of existing water supplies includes only the schemes that are commissioned and gazetted as being under MOWD's responsibility for operation and maintenance.

3. Water Supply Schemes Under Design or Construction

In the following two tables, the rural water supply schemes currently undersdesign or construction are listed for the Nyanza and Western Provinces, respectively. The tables give information on the programme in which the work is carried out (RWS= Rural Water Supply Programme, S.H.=Self Help Programme), and in addition the project stage (preliminary design phase, final design phase, tendering or under construction) is indicated.

The various projects' design population is also given though the list (particularly for the Self Help Schemes) is not complete. The figure for the design population is in this context not too relevant anyway, because experience shows that when a scheme is in operation, only a certain part (in average 30%) of the design

population actually ends up enjoying the service, i.e., receives water from the scheme.

WESTERN PROVINCE

District	Scheme	Programme	Stage	Design Population
Bungoma	Bukangala	S.H.	Construction	13,600
"	Bungoma Rural	RWS 4	Prel. design	130,000
"	L. Nzoia West	S. H.	Final design	
"	Malaba-Kocholia	RWS	Construction	
Busia	Busia Mundika II	RWS 3	"	25,000
"	Funyula Bemela	RWS 4	"	
"	Funyula II	RWS 3	final design	62,000
Kakamega	Malawa II	RWS 3	Construction	5,000
"	Mbale III	RWS 4	final design	5,000
"	Shitoli-kwisherc I & II	RWS 4	final design	35,000
"	Vihiga Hamisi	RWS 4	final design	

NYANZA PROVINCE

Kisii	Birongo	S.H.	Construction	27,000
"	Kiereni	S.H	Final design	
"	Manga II	RWS 4	Tender	78,000
"	N. Mugirango	RWS 3	Prel. design	346,000
"	Riokindo	S.H.	Construction	5,000
"	Sengera	S.H.	Construction	2,000
Kisumu	Korwenje	S.H.	"	8,000
"	Maseno-Kombewa	RWS3+4	"	243,000
"	Nyakach	S.H.	"	
"	Pap Onditi	S.H.	"	
"	West Seme	S.H.	"	35,000
"	Withur	S.H.	"	

NYANZA PROVINCE

District	Scheme	Program	Stage	Design Population
Siaya	Sakwa	RWS 3	Prel. Design	210,000
"	Sidindi-Malanga	RWS 3+4	Construction	310,000
"	South Sakwa	S.H.	"	27,000
"	Yenga Siranga	S.H.	"	
	Uranga-sisinaga	S.H.	"	1,000
South Nyanza	Sinanga Gembe Hills II	RWS 4	Prel. Design	75,000
"	Mbita	S.H.	Tender	130,000
"	Migori Kihancha	RWS 4	Prel. Design	
"	Migori Ndhiwa	RWS 4	Prel. Design	100,000
"	Oyugis II	RWS 4	Tender	30,000
"	Rapenda-Ndhiwa	S.H.	Construction	
"	W. Karachuonyo III - IV	RWS 4	Final Design	104,000
"	Kochia II	S.H.	Prel. Design	
Proposed Schemes S.N.	Oyani	-	-	-
"	Kanyaluo	-	-	-
"	Wang' Chieng'	-	-	-
"	Okago	-	-	-
"	Kihancha	-	-	-

The summation of the design population figures listed in the tables amounts to nearly 2 million people and adding an estimated figure of 200,000 to allow for the schemes where the design population was not readily available indicate a total design population of 2.2 million. That means the schemes currently under planning, design and construction should eventually when put into operation, be able to serve a total of 600,000 - 700,000 people. This figure together with the 400,000 already served from existing schemes shows that within the foreseeable

future a rural population of more than 1,000,000 will have access to water through a MOWD water supply schemes in the Lake Basin area.

It should be noted that all the above schemes - whether in operation or under design/construction- are piped water supplies, i.e., the population resident in the area of supply is provided with water through individual house connections or through water kiosks/public standpipes. Generally speaking, the schemes are designed also to provide water for livestock and institutional demands.

In 1981, a bilateral (FINNIDA) financed project entitled "Rural Water Supply Development Project in Western Province" commenced for MOWD. The project area extends partially over four districts: Kakamega, Busia, Bungoma, and Siaya. The total project area is 3,600 Km^2 having a present population of 800,000 people. After a period of detailed field investigations the study has come to the conclusion that a proper approach will be utilization of handpump wells and protected springs through out the area. Piped groundwater schemes with a limited extent should be constructed only in designated urban areas. The construction programme for 1983 - 85 comprises 920 handpump wells and 120 protected springs. The design population for the first implementation phase is 200,000, and ultimately this shallow well programme should have a coverage of more than 1.5 million people.

4. Strategy for Provision of Domestic Water Supply

The Government subscribes to the goals of the International Drinking Water Supply and Sanitation Decade (1981-1990). The declared targets to be achieved by 1990 are water supply coverage of 100% in urban areas and 75% in rural areas. This

is in line with the Government statement, as early as 1970, of its intention of providing a safe potable water supply to all by the year 2000.

These goals when compared with present coverage and service levels are far reaching and present a more than challenging task to the MOWD and other agencies.

Development activities in the water sector can be classified according to whether they are primarily concerned with the water needs of rural dwellers or aimed at expanding water supplies in urban places. With more than 90% of the population in the Lake Basin area living in rural areas it is inevitable that the MOWD advocates a policy in favour of financing more rural water supply programmes with the aim of drastically expanding the coverage of improved water supplies in these areas. Following the coverage targets quoted above for rural areas, it implies that by 1990 in the Lake Basin area alone, a rural population of nearly 5 million should be served, and by the year 2000 nearly 9 million. The slower economic growth realized during the recent past years coupled with the high petroleum prices and continuing world inflation will make imports increasingly expensive, while export prospects are not encouraging. The outlook is certainly for slower growth and hence reduced funds available for development expenditures.

In aiming at the development targets, it is therefore crucial that the MOWD will favour least cost solutions (both in capital investments and operation and maintenance costs) to achieve as high a water supply coverage as possible for the limited financial resources available. In this context, it is important to realise that an improved water supply does not necessarily mean a piped water supply system. For this reason, the massive (Kenya's largest) shallow well implementation programme as

how much people should pay. The MoWD has, in the past, discouraged the use of communal water points precisely because of the questions of ownership, responsibility, revenue collection and so on. Individual connections do solve these problems but the advent of communal wells now means that the problems will have to be addressed.

7 PAPER NO. 4a

DHV CONSULTING ENGINEERS

OBSERVATIONS BY THE CONSULTANTS ON SHALLOW WELLS IN NYANZA PROVINCE

ABSTRACT

The paper considers the technical aspects of shallow wells provisioning in Nyanza based on the findings of a pilot programme. It would appear that shallow wells can only be constructed in about 30% of the province. It required 10 - 20 best drillings to locate one well site, a test hole required 1 to 2 days to drill. The paper reviews the various types of hand pumps utilized - the SWN 80, 81, the SWN 80 duplex pump, the kangaroo pump and the irrigation pump. The experience of different methods of well production, namely hand-drilling and hand digging with concrete lining or back filling, are noted. Hand-drilling is indicated to be the cheapest solution so far.

When considering maintenance, the paper addresses the issue of financing and proposes that attention be paid to the productive use of water. In addition, the issues of training and organization development are addressed and it concluded that there are adequate skills available for local production. However, it is questioned as to whether there will be reliable availability of qualitatively acceptable materials for production and maintenance.

PAPER No. 4a

D H V

LAKE BASIN SHALLOW WELLS PROGRAMME

OBSERVATIONS BY THE CONSULTANTS

1. Introduction

Based on the targets of the United Nations International Drinking Water Supply and Sanitation Decade (1981 - 1990) and the targets of the Government of Kenya to provide safe potable water supply to all by the year 2000, the Governments of the Netherlands and Kenya agreed to start the LBDA Lake Basin Shallow Wells Pilot Project.

The objectives of the pilot project were to investigate the possibilities and feasibilities of shallow wells construction on a larger scale as a low cost solution for the water supply in the rural areas, both in capital investment and operation and maintenance terms as a contribution to the said water supply targets.

The pilot project and its limited extension have revealed that it seems likely that only in approdimately 30% of the Nyanza Province can shallow wells be constructed.

Considering the most recent population figures, population density and growth, this would imply that (say) between 4000 and 6000 shallow wells would have to /constructed before /be the end of this century if 250 people would be served per well with 20L/cap/day.

For further details reference is made to the various reports on the pilot project, of which a number have been included in the workshop documentation map.

Hereafter, the experience of the various activities under the pilot project will be briefly discussed.

2. Ground Water Survey

Based on the various hydro-geological studies of the Nyanza Province the ground water survey drilling has been executed in the most promising areas.

Because of the basic objectives, all survey work was executed by hand operated equipment, i.e., low cost, easy to transport, minimal maintenance, with possibilities for local manufacturing and repairs.

Experience showed that the drilling of one test hole takes 1 or 2 days. Finding sufficient water (1000 1/hr) of good quality in Nyanza Province proved to be the biggest technical problem. It took an average of 10 - 20 test drillings to find a site with adequate yield and quality.

So far approximately 600 testholes were made for 40 wells (now in operation) during the period March 1982 - July 1983.

Substantial improvement on the ratio between testholes and effective wells can only be made by introducing mechanical testdrilling. Manual testdrilling (10-20 in number) for one approved site is costing between KShs 5,000 - 10,000.

Whilst the involvement of the population in the province with regard to the siting has been for obvious reasons, been

considered a prerequisite, it will be clear from the above experience, that such involvement has been rather limited.

3. Hand-pump Supply System

a) SWN 80 and SWN 81:

By introducing these handpumps the pilot project focussed on:

- the use of deep well cylinders (no priming required)
- overdimensioning (to keep maintenance minimal)
- as much as possible corrosion free materials (lifetime)

b) SWN 80 Duplex Pump:

On existing deeper boreholes with the groundwater leveal at 30m' maximum, the SWN 80 duplex pump can be installed to double the output. The standard SWN 80 and 81 pumpstands can be coverted into:

- suction pumps for very shallow wells (water level at 5 m' maximum)
- pressure pumps to increase the head for filling overhead tanks for schools and hospitals.

c) The Kangaroo pump

The Kangaroo or spring pump has a 2,5 times bigger yield than a single handpump. This pump also requires little maintenance but can only be applied for lifting water from a depth of 10M' maximum.

d) The Irrigation pump

This pump, specially designed for the "productive use" of water can be introduced for irrigation purposes.

Further information on all above pumps can be found in the brochure "Low Cost Water Supply" part 2 - pumping equipment of which a copy can be found in the Workshop documentation

map.

4. Construction of Shallow Wells.

Based on the project objectives of:

- Low Cost Solutions;
- Input of local labour and expertise to the maximum extent possible;

All construction activities have been carried out manually.

The Shallow Wells can be constructed in the following manners:-

a) Hand-drilling
   - suitable for depths to 20m' maximum.
   - special tools required for hard subsoil layers.
   - construction time approximately one well per week.
   - the complete drilling set can be transported on a 3 ton land rover trailer.
   - construction costs approximately KShs 15,000 per well.

b) Hand-digging + concrete lining
   - lowering of the concrete rings to depths beyong 10m' is rather difficult.
   - special dewatering equipment is usually required below 7 meter.
   - Transport of the concrete rings require trucks.
   - construction time 0,5-1m' per day.
   - construction costs approx. KShs 40,000 per well.

c) Hand-digging - Backfilled
   - suitable in stable soil only.
   - temporary lining might be necessary
   - backfilling material should be available, preferably adjacent to the construction site.
   - construction costs approx. KShs 30,000 per well.

d) Completion

   All wells are completed/finished with:

   - a concrete (reinforced) slab around the pump (4m'

diameter).
- a concrete gutter for outflow of spilled water (minimum 3m').preferably to a soak away pit.
- fencing around the well e.g. euforbia.

It is further recommended to use any spilled water for, e.g. a small vegetable garden for the pump attendant. (small scale productive use).

From the so far indicated data on construction it is clear that the hand-drilled well is the cheapest solution.

5. Maintenance

So far attention has been paid to the aspects of survey and construction of the shallow wells, the cost of which are to be considered as investments. The maintenance aspects are, however, even more important. The objectives can be formulated as follows:

a) Maintenance requirements on the handpumps and wells should be minimal.
b) Day to day up-keep of the handpump and well surrounding by the pump attendant.
c) Periodic maintenance by the pump attendant and/or a pump-mechanic.
d) Availability of spare parts secured.
e) Local assembly (initially) and production/manufacturing (at a later stage) of the handpumps and related equipment.

It is quite obvious that the organisational and financial consequences of the above objectives are of great importance. Whilst certain owners of a well like schools, hospitals etc. are likely having the means to pay for the maintenance costs, other beneficiaries may not have such means. It is therefore, recommended to investigate the productive use of the water through which funds can be generated to cover the cost of

maintenance (spares and salary costs), although initially financial support from LBDA or the government may be required.

For the details of the maintenance aspects reference is made to the LBDA shallow wells maintenance report.

6. Training

Along with the shallow wells activities - survey - construction maintenance - productive use - etc, an intensive training programme will be required.

Apart from technical on-the-job training, the beneficiaries of the water should be informed on:

- the health and sanitation aspects,
- possibilities for productive use of the water,
- Necessity for the pump attendant,
- maintenance of the wells,
- the need for an organisational structure,
- ownership of the well.

It is therefore recommended that a training programme be developed in which all parties concerned should participate i.e. LBDA, the Ministry of Water Development, the Ministry of Health, the Ministry of agriculture, the Ministry of Culture and Social Services, non-governmental or parastatal organisations, the consultants and the beneficiaries, the water users and of course, the donor organisations.

It must be realised, however, that training programmes, the forming of organisational structures, etc. will only be effective if such activities are simulataneously carried out with the further construction of shallow wells, as "seeing is believing" usually improves motivation of all concerned.

7. Local Production of Handpumps and Well Related Equipment

During the pilot project the possibilities for the local production of the handpumps and related equipment have been investigated. It seems quite possible that after the initial assembly of handpumps, the complete manufacturing of these pumps can be arranged locally provided that the quality of the materials found locally are meeting the requirements. The available technical skill, combined with a training programme would certainly be adequate.

The feasibility for this local production should be further investigated to determine whether such a production unit should be a parastatal organisation or private enterprise or other.

Last but not leaast, we would like to mention that the criteria and targets for the Lake Basin Shallow Wells Project should be established with the ultimate aim that on the completion of such programme, all activities of survey, construction, management, maintenance, local production, productive use, etc. are being dealt with by Kenyans with little or no technical and financial support from outside.

That regular evaluation of the project and its achievements are necessary is obvious.

PLENARY DISCUSSION

PAPER No. 4a

CHAIRMAN: DR. C. OKIDI

The plenary discussion focussed on two issues, namely the payment and control of the pump attendant and the recurrent cost levels for pump maintenance.

It was accepted that some form of financial incentive is needed for a person carrying out such a function. This was thought necessary even if the person was nominated by the local community thus enabling them to exercise control on him. The generation of income for such a person was linked to the second issue of funds needed for well maintenance. This was estimated to be KShs 2000 p.a. not including any transport costs or the pump attendant's payment. The productive us of water through irrigation of a small shamba, for example, for the pump attendant, was suggested as a possible income source. Some participants did not think this realistic, as the nature of rural society is changing and monetary payment will now be needed.

It was clarified that the costs cited for the wells do not include the consultant personnel costs as these are part of the donor investment. Whilst trade-offs of different pump types can be made, it was stated that the price was always around 6000/+ (with pumping head of 15 to 20m.

PAPER NO. 4b

KEFINCO CONSULTING ENGINEERS

OBSERVATIONS BY THE CONSULTANT ON SHALLOW WELLS IN WESTERN PROVINCE

ABSTRACT

The paper focuses on alternative domestic water supplies being installed in areas of Western Province jointly with the Ministry of Water Development. The merits of different groundwater supply methods, such as boreholes, shallow wells and protected springs are discussed and related capital investment and recurrent costs for each method are given.

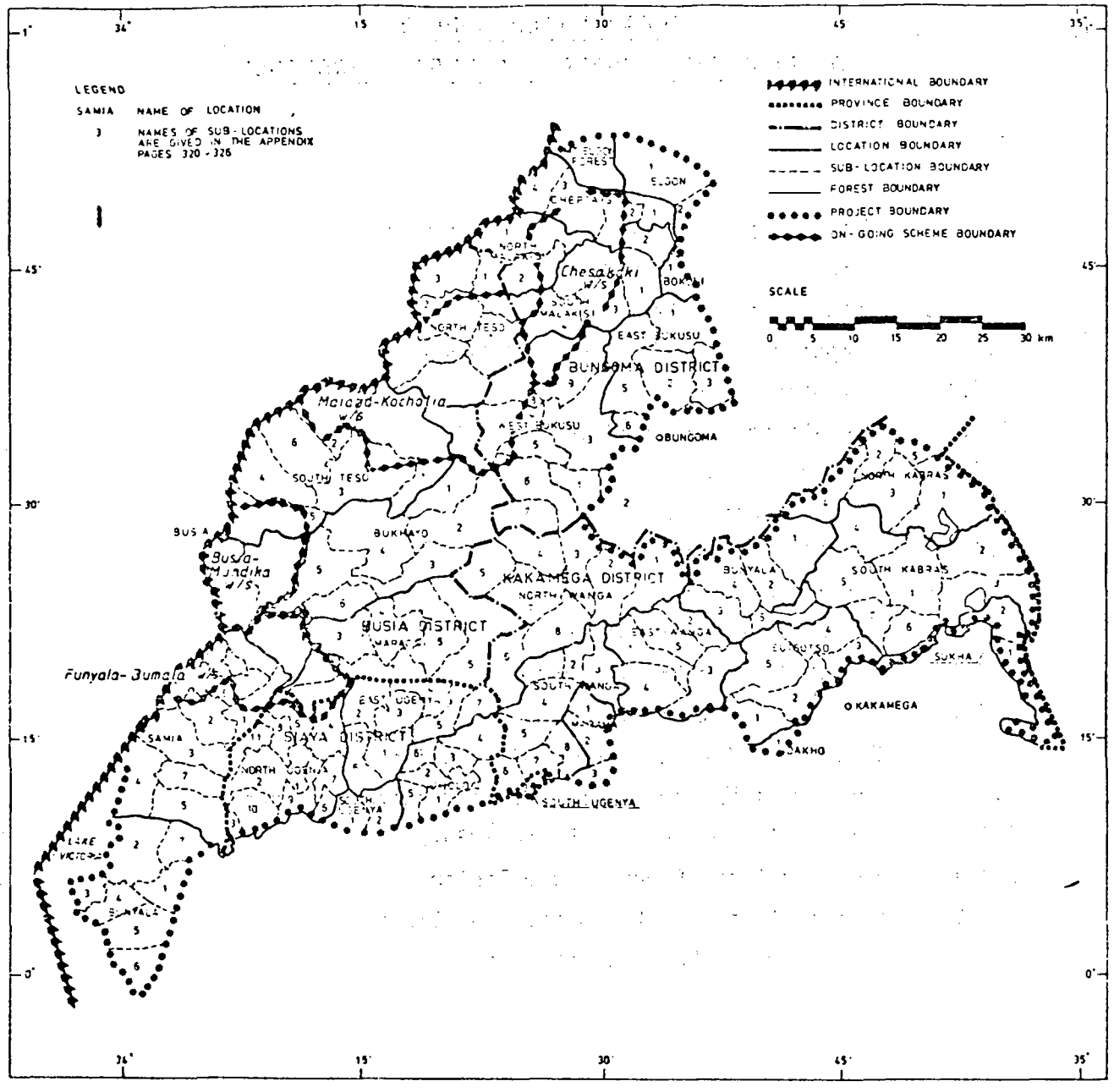
The size of the population to be served against the financial constraints now operating require a choice of low cost solutions. Characteristics of low cost supplies are discussed in terms of their ease of operation, quantity and quality of water, reliability and flexibility of supply and community participation. It is argued that hand pump wells and spring protection offer a viable solution and are a substantial improvement on the present situation.

Finally, the paper outlines the phasing of the KEFINCO project in the period 1982 - 2005 to provide 7,180 hand pump wells and 1400 protected springs. In addition, it gives training needs and cost estimates for different solutions: mechanical drilled hand pump well (hpw) KShs 30,500/=; concrete lined hpw 22,300/=; brick lined hpw 13,600/=; and protected spring 4,025/=.

KEFINCO CONSULTING ENGINEERS

RURAL WATER SUPPLY
DEVELOPMENT PROJECT IN WESTER PROVINCE

CONTENTS



LOCATIONS AND SUB-LOCATIONS IN THE PROJECT AREA

RURAL WATER SUPPLY DEVELOPMENT PROJECT IN WESTERN PROVINCE

1. WATER SUPPLY ALTERNATIVES AND COST ESTIMATES

1.1 General

Kefinco's project area in Western Province can be supplied with water in several different ways because in general, the availability of water is good. The diversities found in the project area create a need for identifying the proper solution for each particular landscape. The water schemes in Western Province which have already been commissioned or are at present going on have each an area of approximately 100 - 400 Km^2. Realization of bigger schemes would cause difficulties because of the great alterations in the topography on account of the slopes of Mt Elgon and the many rivers which split the area. It can also be stated that the on-going schemes in the project area and in all Kenya, have encountered such problems that new approaches to water supply are worth studying.

The target of this project, to supply enough water of safe quality for people in the rural area, means that, e.g., untreated water from rivers or Lake Victoria is not considered an acceptable solution.

1.2 Water Supply Alternatives

The alternative types of water supply systems which have been studied for the project are as follows:

Table 1 Water supply Alternatives

I Surface water, diesel or electric motors, full chemical treatment, rising main, storage tanks, distribution network individual connections and water kiosks. Design can be performed according to the MoWD design Manual.

II Groundwater from deep boreholes (deepter than 40m), diesel or electric motors, a limited treatment, probably only chlorination and pH-adjustment, rising mains, storage tanks distribution network, individual connections and water kiosks. Design can be performed according to the MoWD Design Manual.

III Ground water pumped mainly with handpumps, see Figures 1 - 5.

a. Groundwater from shallow borehole wells (less than 40m) handpumps, no treatment, no pipelines and storage tanks are needed; consumers come and pump water from the well.

b. Groundwater from shallow wells (less than 8m), hand or tractor excavated, lining with concrete rings or bricks, handpumps, the rest as in a.

c. Groundwater from protected springs, the purity of water will be protected, e.g., according to Figure 5. Water flows by gravity through a pipe in the weir, no treatment, consumers fetch water from the protected spring.

The possibility of utilizing surface water from the many rivers of the project area is good. Also the groundwater potential, deep and shallow, including the springs, is clearly sufficient.

The availability of groundwater from boreholes is enough for large schemes if only a big quantity of boreholes is utilized. This would be practical after the distribution

of electricity is arranged throughout the area. However, boreholes would be quite feasible supplying water for the biggest service centres with a limited surrounding rural population included.

According to the experiences gained from KEFINCO's test programme, the possibilities of constructing handpump wells are good almost throughout the project area. In the beginning of the project, most of the shallow test wells have been lined with concrete rings. Lining with fired bricks is now made, where it is technically possible. In most places where the importance of getting water from a certain site, as in the schools, is obvious, the well must be drilled with a drilling-machine.

The utilization of springs for water supply depends decisively on their yield during the dry period of the year. In February, 1983 KEFINCO started a spring protection pilot scheme during which different structures are tested in order to find the most suitable concepts for this area. Based on the spring investigations, it has been preliminarily estimated that a total of 1,400 springs could be utilized for water supply through protection measures. The estimated yields and densities of springs have been taken into consideration in this figure. It must be regarded as a rough estimate; to produce a more accurate result, reliable yield measurements should be at hand at least from a period of ten years. Additionally, it has been estimated that altogether, 110,000 people could be served in this way.

In a limited part of the project area, e.g. on the slopes of Mt. Elgon, it might be possible to build small surface water gravity schemes with very simple treatment. Because this alternative is not of general importance in the project

area, it can be studied later in the more detailed design of water supplies for certain defined areas.

1.3 Comparison of Water Supply Alternatives

Given the favourable circumstances in the project area, the decision as to the supply system must be based on economical and operational comparisons. The investment and operational costs per capita can be considered the best means of economical comparison.

Of course, the service level must be good enough: sufficient quantity and acceptable quality of water and distance to the water point not more than 0.5 - 1 Km.

1.3.1 Investment Costs

Fresh cost data is available of the on-going surface water schemes in Kenya. The information processed by MoWD indicates that the average investment cost in surface water schemes is at present approximately KShs 1,200/= per capita. Using piped groundwater, the savings through limited treatment and a compact distribution area could result in the investment cost of KShs 900/= per capita.

KEFINCO's test programmes have produced cost data on low-cost technology alternatives. Breakdowns of the cost estimates are presented later in this paper.

The number of consumers per well, has, of course, an impact on the average per capita investment, operational and maintenance costs. It can be calculated from the water demand figures, that the average per capita consumption will be approximately 37 1/cap/d for the handpump well alternative. The capacity of one well (7.2 m^3/d.) results

in around 200 consumers per well; this average figure includes also the water demand for livestock, education and health care.

In the following table there are given the investment costs of different water supply alternatives, price level November 1982.

Table 2 Investment costs per Capita

	Alternative	Investment cost KSh/Cap
I	Surface water, full chemical treatment, etc.	1,200 (large schemes)
II	Borehole water, diesel or electric motors etc.	900 (small schemes)
III	Handpump wells	170-230
	Protected springs	100

The total investment costs of a project of 1.681 million people would accordingly be KShs 2,020 million for pipe surface water schemes, KShs 1,510 million for piped groundwater schemes and KShs 390 million for handpump well schemes (Kshs 230 per capita).

In the prevailing very difficult economic situation of the country, the difference of investment costs between the high cost technology and low-cost technology alternatives, KShs 1,120 - 1,630 million, seems quite decisive; only the low-cost technology is feasible.

Although MoWD does not charge the annual capital costs in the price of water, it is worth mentioning that the annuities of the alternatives concerned would be (8% interest rate, 20 year repayment time) for piped surface water KShs 253 per capita per year in 1982. KShs 168 in 1995 and

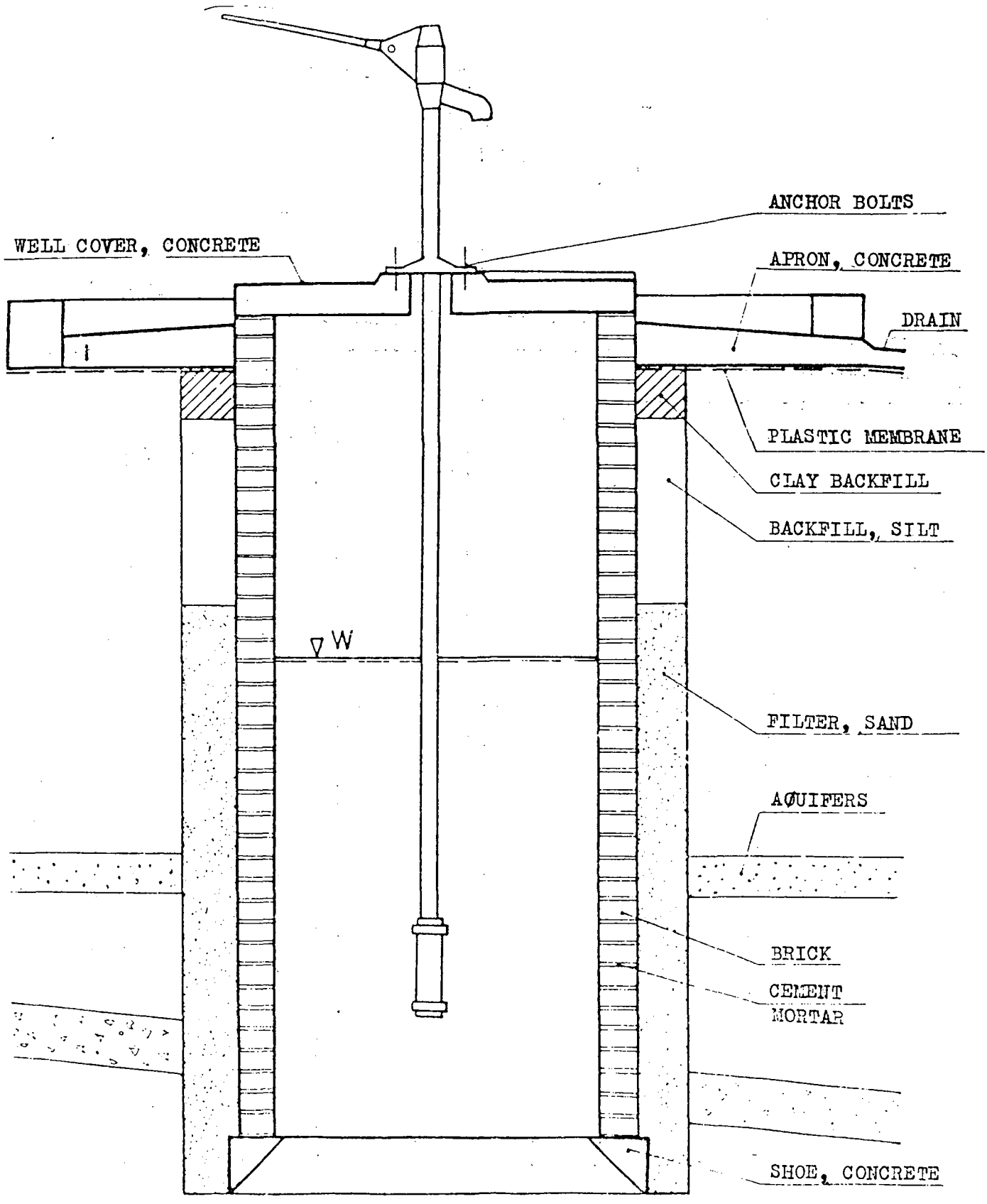


FIGURE 3 SHALLOW WELL LINED WITH BRICKS

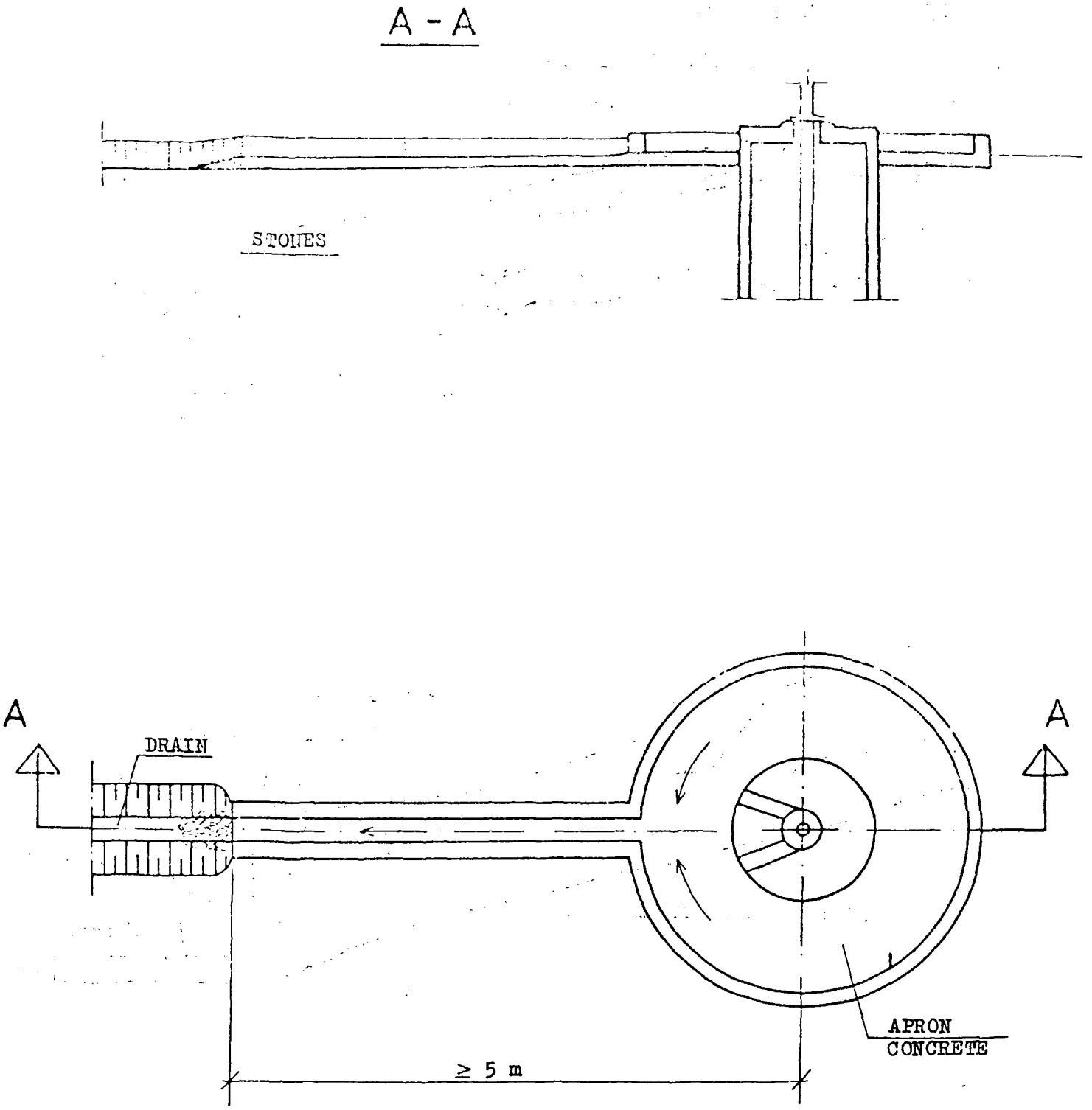
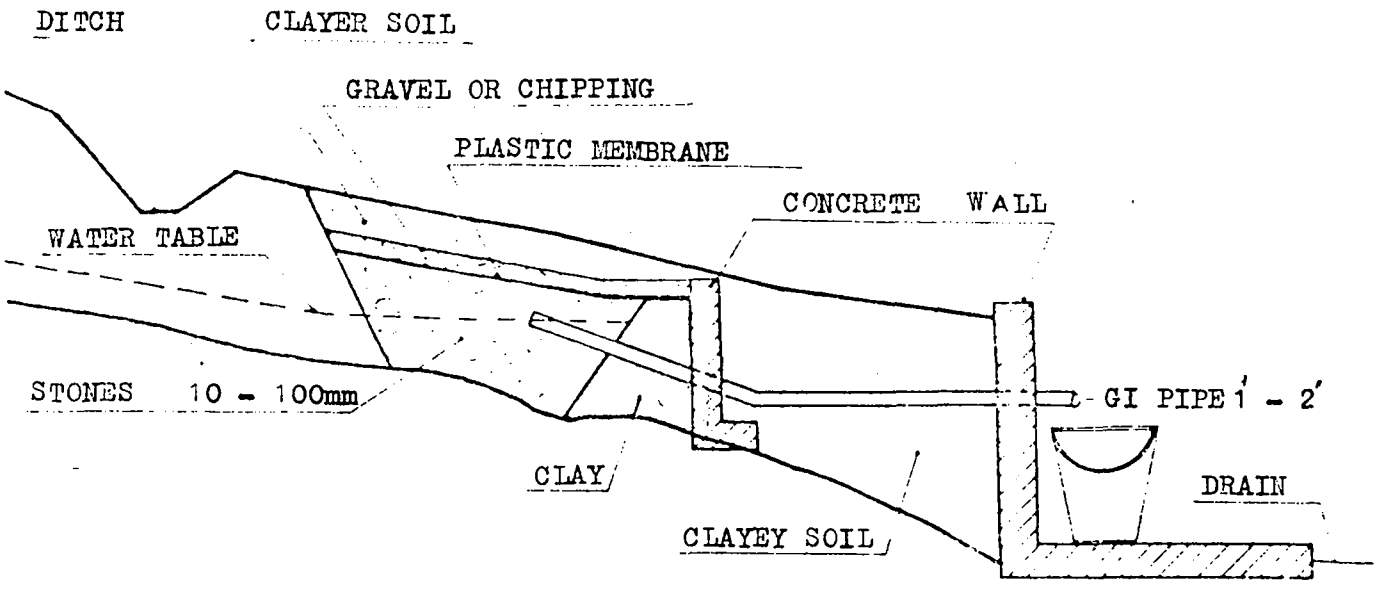


FIGURE 4 APRON FOR SHALLOW WELL



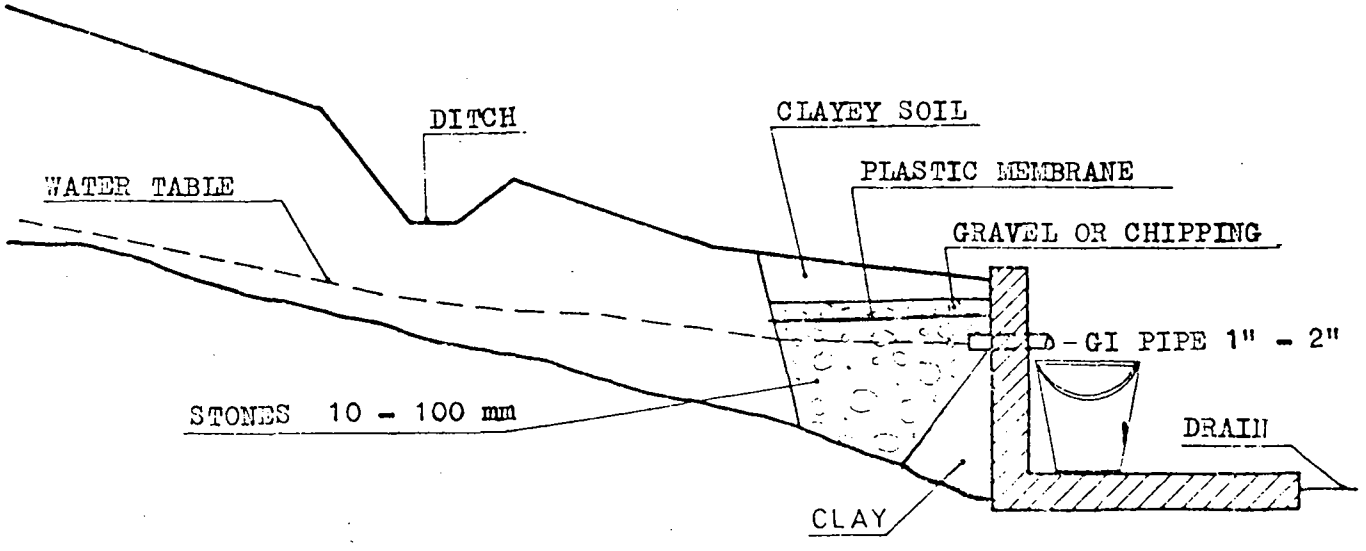


FIGURE 5 SPRING PROTECTION

and Kshs 122 in 2005. For piped groundwater, the corresponding figures are KShs 191, KShs 126, and KShs 92 per capita per year respectively but for handpump wells on KShs 23 per capita per year.

1.3.2 Operational and Maintenance Costs

In order to compare the operational and maintenance costs of the different water supply alternatives, the annual expenditure for maintenance, chemicals, energy and staff have been estimated. The results are as follows:

Table 3 Annual Operational Costs per Capita

	Type of Scheme	Annual Operational Costs KShs per cap		
		1982	1995	2005
I	Surface water	42	31	26
II	Groundwater, diesel or Electricity driven	32	24	19
III	Handpump wells	10	10	10

The handpump well alternative is with a clear margin the cheapest to operate.

1.3.3 Service Level

In the following, there is presented the comparison of the main alternatives by their service level.

1.3.3.1 Walking Distance

In the handpump well alternative a total of 7,180 wells and 1,400 spring protections have to be constructed which on average results in one unit per 0.44 Km^2 (side of the

square 0.66 Km, the ultimate situation in 2005). According to the MoWD Design Manual the maximum walking distance to the kiosk in a piped scheme should be 1 Km in high potential areas. For the people using kiosks, the maximum walking distance will thus be twice that for the handpump wells in the project area.

Piped schemes can in this respect offer a better service level for the share of the population served with individual connections (IC's).

1.3.3.1 Ease of Operation

In the handpump alternative consumers have to use muscle energy to draw water from the well while the kiosks offer pressured water from the taps. However, this factor cannot be considered decisive against handpump wells because it is only a small part of the energy needed for walking to the well and back. No doubt, people with IC's in the piped schemes get a more convenient service, they don't have to pump the water.

1.3.3.3 Quantity of Water

The overall consumption rate is bigger in the piped alternative, approx. 40, 46 and 55 1/capita/day (1982, 1995, 2005) than in the handpump alternative, approx 37 1/capita/day. It should be pondered whether this extra water is worth the substantial increase in investment and operational costs, and even 37 1/capita/day as such represents an impressive improvement, both quantity-wise and quality-wise, in the water supply situation of the people living in the project area. Additionally, the wastage of water through open taps and leaking pipelines increase the consumption of

water without any rise in the service level.

1.3.3.4 Quality of Water

From the point of view of water quality, the high technology systems very often function with half efficiency. In many of the existing small water supplies taking water from rivulets in the project area, chlorination is not performed in spite of the dosing apparatus. This can cause an apparent health risk for the consumers of water.

1.3.3.5 Reliability of Operation

In large schemes certain failures in the treatment plant or in the pumping units, not to mention bursts in major transmission lines, can stop the delivery of water for tens of thousands of people at a time. In diesel powered facilities, the lack of fuel, shortage or even theft, seems to interruptquite frequently the operation several times a year.

With handpump wells mechanical failures are probable with certain frequency but in each case, the repair can be made within one day and not more than approx. 200 people are affected per broken unit. Additionally, the nearest functioning handpump well will not probably be situated out of reach of the consumers because the water is produced quite evenly over the consumption area. It is also a big advantage that no diesel or chemicals are needed in the daily operation of the handpumps.

The handpump alternative can be considered far more reliable than the high technology alternatives.

1.3.3.6 Flexibility of Water Supply

The operation of each handpump well can be started immediately after it has been finished and if the water demand of certain areas turns out to be bigger than forecast, the situation can be solved by simply constructing the additional wells needed. Normally, a piped scheme for tens of thousands of people starts to function not earlier than three years after the construction has been commenced. The situation is more complicated and expensive if a piped scheme becomes underdimensioned on certain service areas.

1.3.4 Community Participation

KEFINCO has already started to study the possibilities of shifting part of the implementation and maintenance of handpump wells and spring protection to the village level. At the same time the utilization of local materials is tested. The aim is to make the consumers accept the water supplies as their "own".

It is much more difficult to integrate the high technology alternatives with active participation of the consumers of water.

1.4 Selection of Water Supply Alternative

The summary of the above comparison is as follows:

- Handpump wells and protected springs are by a great margin the least cost solution, both in investment and in operation and maintenance costs.
- The service level warranted by handpump wells is a substantial and significant improvement compared

with the present water supply situation. The service level can be further improved later if the economical situation in the country justifies extensive new piped schemes in the rural areas.

- The communities can be involved both in implementation and maintenance of the handpump schemes.

On this basis, the following alternative is proposed to be selected.

- The programmes should be started constructing dug and drilled handpump wells throughout the project area. All the springs which are suitable for perennial water supply should be protected.
- The urban and rural centres only should have a piped water supply of sufficient standard. This means in most cases the rehabilitation and/or augmentation of the existing water supply systems.
- If the economical situation in the country improves substantially during the present decade piped water schemes can be constructed to fulfill the demand of a high standard water supply. In that case a valid solution might be constructing piped schemes mainly with individual connections while the handpump could keep the role of water kiosks. This production could be commenced in 10 - 15 years.

2 PHASING OF KEFINCO'S PROJECT IN WESTERN PROVINCE

This water development plan for 1983-2005 is presented in Table 4 and the corresponding population served is presented in Table 5. From the beginning of 1983 till end of 1991, three construction phases are proposed. About 3,350 handpump wells and about 1,400 springs will be constructed for approx. 0.78 million people. Construction or augmentation of the service centre water

Table 4 PHASING OF THE PROJECT

Year	Construction of low cost technology: Handpump wells	Spring protection (no. of springs)	Existing private wells	Construction of high-cost technology: Augmentations or new schemes	Rehabilitations of existing water supplies	Training (number of new pump patrolmen) ***	Maintenance of wells (number of new mobile groups) ***
1982	80				Kakamega, Shikusa		1
1983	120 *	Pilot Scheme	Advisory service		Kakamega, Shikusa	10	0
1984	375	60	for rehabilitation	Butula	Alupe, Malava	19	1
1985	425	60		Chwele	Sega, Moding	21	1
1986	400	130	"	Ukwala, Malava	Kibabii, Apegei, Ugunja, Chakole	20	2
1987	375	180	"	Nambale, Butere	Ingotse, Kisoko, Shirugu	19	1
1988	375	160	"	Navakholo	Maunadam, Bukhalalire, Sigomere	19	1
1989	400	260	"	Mumias	Wakhungu, Munana, Funyala-Nangina	20	1
1990	400	260	"	Port Victoria	Khasoko, Sio Port, Chebuyusi, Namirama	20	1
1991	400	270	"	Ilakati, Shianda	Lugulu, Busia Hills	20	1
1992	300					15	1
1993	300					15	1
1994	300					15	1
1995	300					15	1
1996	300					15	1
1997	300					15	1
1998	300					15	0
1999	300					15	1
2000	300					15	1
2001	220					11	1
2002	220					11	0
2003	220					11	1
2004	230					11	1
2005	240					12	1
Total	7 180	1 400				359	22

* Includes a pilot scheme for hand-dug wells from local materials

** Operation and Maintenance Study, Revenue Collection Study, due October, 1983

*** Based on the first O & M alternative, see pages 181-183

TABLE 5 POPULATION SERVED WITH WATER SUPPLY (MILLIONS)

Year	Popul-ation	Population served with			Population served with piped schemes		Total amount of population served with arranged water supply	Share of Pop-ulation served with arranged water supply
		Handpump wells	Protected springs	Private wells	In urban and rural centres	Elsewhere		
1982	0.810	0.016	-	0.010	0.014	0.025	0.065	8.0
1983	0.836	0.040	-	0.010	0.014	0.025	0.089	10.6
1984	0.863	0.115	0.005	0.010	0.017	0.025	0.172	19.9
1985	0.891	0.200	0.010	0.010	0.020	0.025	0.265	29.7
1986	0.920	0.280	0.020	0.010	0.025	0.025	0.360	39.1
1987	0.949	0.355	0.035	0.010	0.033	0.025	0.458	48.3
1988	0.980	0.430	0.050	0.010	0.036	0.025	0.661	56.2
1989	1.012	0.510	0.070	0.010	0.040	0.025	0.655	64.7
1990	1.044	0.590	0.090	0.010	0.046	0.025	0.761	72.9
1991	1.078	0.670	0.110	0.010	0.051	0.025	0.866	80.3
1992	1.113	0.730	0.110	0.010	0.053	0.025	0.928	83.4
1993	1.149	0.790	0.110	0.010	0.056	0.025	0.991	86.2
1994	1.186	0.850	0.110	0.010	0.059	0.025	1.054	88.9
1995	1.222	0.910	0.110	0.010	0.062	0.025	1.117	91.4
1996	1.263	0.970	0.110	0.010	0.065	0.025	1.180	93.4
1997	1.304	1.030	0.110	0.010	0.068	0.025	1.243	95.3
1998	1.346	1.090	0.110	0.010	0.071	0.025	1.306	97.0
1999	1.389	1.150	0.110	0.010	0.075	0.025	1.370	98.6
2000	1.434	1.210	0.110	0.010	0.079	0.025	1.434	100.0
2001	1.481	1.254	0.110	0.010	0.082	0.025	1.481	100.0
2002	1.528	1.296	0.110	0.010	0.087	0.025	1.528	100.0
2003	1.578	1.342	0.110	0.010	0.091	0.025	1.578	100.0
2004	1.628	1.388	0.110	0.010	0.095	0.025	1.628	100.0
2005	1,681	1.436	0.110	0.010	0.100	0.025	1.681	100.0

supplies will start in 1984 and altogether 11 water supplies will be completed by the end of 1991. People served by these service centres will then number 51,000.

The rehabilitation of the existing water supplies will be completed by the end of 1991. The number of water supplies to be rehabilitated is 22 in the project area and people served 25,000. The people served by the above organized systems will be 80 per cent of total population at the end of 1991.

From the year 1992 onwards, the construction of handpump wells should be continued if the economical situation of the country does not improve substantially. The 100 per cent coverage of water supply services will be reached by the end of 1999. In the ultimate situation by the end of 2005 approx. 1,556 million people would be served with handpump wells or protected springs and 125,000 people with piped systems.

2.1 The first Construction Phase 1983 - 1985

2.1.1 Investigation, Planning and Design

Field investigations and design of water supply facilities will be continued throughout the project period. The follow-up of groundwater discharge and levels will be performed by continuing the gauging of representative springs and measuring of groundwater level fluctuations in the selected wells. Groundwater quality monitoring will be continued analyzing water samples at the water laboratory of the project.

Locating of boreholes will be continued with seismic

measurements. High yielding borehole sites are needed for piped water supplies in urban and rural centres and for most water supplies to be rehabilitated. Seismic measurements are also needed to locate handpump bore hopes in the areas where water can be found mainly only in fault zones, like the vicinity of Mt. Elgon and central and southern Busia District, as well.

A spring protection pilot scheme has already been started and it will be continued. The springs which can be protected for organized water sources have been estimated to number about 1,400. During the years 1984-85, a total of 120 springs will be protected.

During the first construction phase, 1983-85 about 920 handpump wells for about 184,000 people and about 120 protected springs for about 10,000 people will be constructed.

Handpump wells will be constructed evenly so that the locations will have 20 - 40 wells each. The priority inside the location shall be on schools, health care, institutions, and densely populated areas, like most of the designated market and local centres.

Handpump wells will be either boreholes or machine or handdug wells lined with concrete rings or bricks.

3. PHASING OF THE COST ESTIMATES

A Construction Costs of a Handpump Well, the Borehole (in Average 35m Deep) Produced with a Drilling Machine

		KShs
1.	Capital cost of the drilling equipment	4,200
2.	Service and repairs of the drilling equipment	2,900
3.	Drilling bit	300
4.	Survey of a well site	
	- capital costs	700
	- direct costs	1,600
5.	Fuel	2,500
6.	Salaries including watchmen	1,700
7.	Transportation of drillers	1,200
8.	Construction materials	
	- Casing (22m)	4,400
	- Drive shoe	300
	- PVC pipe (35m), including slotting	1,900
	- Filter material	200
	- Handpump including installing	5,000
	- Concrete apron, chipping including transportation	1,500
9.	Transportation of the rig	1,000
10.	Test pumping	1,000
	Total	30,400

B Construction Costs of a Handpump Well Lined With Concrete Rings

1.	Capital Costs of tractor, lorry, land-rover and test pump	5,700
2.	Service and repairs of above mentioned equipment	2,000
3.	Survey of well sites	2,000
4.	Fuel, transportation and excavating	1,300
5.	Salaries	2,000
6.	Construction materials	
	- Sand and ballast	400
	- Cement rings	3,000
	- Flexoband	300
	- Plastic membrane	100
	- Handpump	3,500
	- Concrete slab, chipping including transportation	1,500
7.	Test pumping	500
	Total	22,300

Taking also all the general costs into account like costs of investigations, design and planning, workshop services and other project costs, the total cost per well will be KShs 40,000 - 50,000 which results in KShs 200 - 250 per capita (200 people per well). Thus, in comparison between different water supply alternatives the investment cost of KShs 230 per capita is justified.

C Construction Costs of a Shallow Well Lined With Bricks

		KShs
1.	Capital costs of lorry, land-rover, pump and tools	1,800
2.	Service and repairs of above mentioned equipment	400
3.	Survey of well sites	200
4.	Fuel, transportation and dewatering	500
5.	Salaries	4,300
6.	Construction materials (depth of a well 6m)	
	- Bricks	600
	- Cement	800
	- Handpump	3,500
	- Concrete apron, chipping including transportation	1,500
	Total	13,600

In this alternative, the direct costs are KShs 70 - 50 per capita cheaper than in the former two cases. On average, a figure of KShs 170 per capita will result as comparable investment costs.

D Construction Costs of a Protected Spring

		KShs
1.	Capital costs of lorry, land-rover and tools	1,200
2.	Service and reparis of above mentioned equipment	100
3.	Survey of spring sites	200
4.	Fuel, transportation	300
5.	Salaries	850
6.	Construction materials	
	- Sand and ballast	95
	- Cement	510
	- Stones	100
	- Concrete blocks	270
	- GS pipes 2"	300
	- Plastic membrane	40
	- Wire mesh	45
	- Iron bar	15
	Total	4,025

Depending on the yield one spring can serve up to 200 people. It has been estimated that most of the protected springs will serve 50 - 100 people. Thus, the direct construction cost would be KShs 40 - 80 per capita. Taking also the general expenditure of the project into account, an approximate figure of KShs 100 per capita is achieved.

PLENARY DISCUSSION

PAPER NO. 4b

CHAIRMAN: DR. C. OKIDI

The points raised during the plenary discussion covered a wide range of matters, some of which were raised previously, such as the probability of lowering the water table due to a high density of shallow wells and the use of external and local consultants. In regard to the latter, KEFINCO are working with the MOWD who are providing counterpart personnel; this is not the case with DHV who are, however, involved with local training.

The first new point was on a technical feature of springs. Night storage of water would effectively double the number of users possible and as the discussion showed the inclusion of night storage is purely a financial rather than a technical matter. Placing a tap on the outlet is not really possible although the storage capacity of the spring area itself could make this possible. It depends very much on the specific physical situation and its seepage and recharge rates. It was agreed that the KEFINCO figure of 87 1/capita/day was high, 10 - 15 1/cap/day being the experienced take-off. The higher figure is used to give a safety margin.

The second point related to recurrent costs levels, both consultants estimating some 2,000/= per well per year. It was explained that this was an initial estimated based on a centralized system but the intention was, in the KEFINCO programme, to eventually have 30 - 40 decentralized points of local entrepreneurs.

This led to the discussion on the organisational framework, with concern being expressed about the possibility of two adjacent provinces under one regional authority having two different systems

of maintenance for hand pump wells. It was hoped that the Workshop would help in the harmonization not only of the equipment used but also of the organisational structures and methods chosen. It was emphasised that many of the issues being discussed at the Workshop were applicable nationally.

The final issue discussed was the question of community participation - when do people participate? The impression was that the population is expected to participate once the major programme decisions have been made. It was stressed that one must look actually at the point of entry of the community in the process of decision making - the guiding rule being the earlier the better!

8 PAPER NO. 5

MR. D. GREY - THE WORLD BANK

HAND PUMP PROGRAMMES - NOTES ON SOME KEY ISSUES

ABSTRACT

The paper highlights many of the issues affecting hand pump programmes arguing that such domestic water supplies are wholly appropriate for rural areas. It is however, stressed that the terminology used should be handpump rather than shallow wells because often they are not shallow. For historical reasons, many countries are suffering from a lack of standardization of handpumps supported by various donors. The same is also true for design criteria. The paper discusses well construction methods and the aspects of costs, community participation, pollution protection and the need to make compromise solutions for specific situations.

The ideal features of a handpump are given as: easy maintenance, locally manufactured, sturdy, reliable and relatively low cost. A sound knowledge of community structure and desires is stated to be a prerequisite for a sound pump maintenance system, be it centralized or decentralized. It is suggested that "Agency participation" in community projects is required rather than 'community participation' in agency initiated projects!

The linking of handpump programmes to other activities, such as health education, is discussed and the need for sociological studies emphasised. It is argued that total costs for such programmes should not exceed US$ 30 per capita served. This still means substantial sums are required. Finally, information is given on the Kenya South Coast Hand Pump Project and it is stressed that community involvement must be the foundation of every aspect of a

hand pump programme.

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RURAL WATER SUPPLY HANDPUMPS PROJECT
(LABORATORY TESTING. FIELD TRIALS
AND TECHNOLOGICAL DEVELOPMENT)

(The views expressed in this note are those of the author and should not be attributed to the World Bank)

HANDPUMP PROGRAMMES - NOTES ON SOME KEY ISSUES

1. Introduction

The targets of the International Drinking Water Supply and Sanitation Decade of providing potable water and adequate sanitation facilities to the entire population of the world by 1990 are unlikely to be achieved in full and are being modified by many countries in their Decade Plans. Nevertheless, the Decade is having a major impact by focussing the attention of donors and governments on the special problems of providing for rural communities and there is a growing awareness of the need to adopt cost-effective technologies and to build the necessary institutions to plan, implement and maintain rural water supply programmes. This note attempts to highlight some of the experiences of various countries, particularly but not only in Africa, and draw some comparisons to the problems faced in Kenya generally and the solutions proposed for the Lake Basin area.

2. Low-Cost Rural Water Supplies

Low operating efficiencies or even total stoppage are characteristic features of rural water schemes in many developing countries. There are many reasons for this, not least because the provision of pumped and piped water to replace traditional sources in a remote area is a quantum jump that both the

implementing agency and recipient community are unable to assimilate.

The pressure of attempting to provide at least a basic supply of potable water to rural communities has led to many countries to seek simpler, cheaper, more appropriate and more rapidly implemented water supply options. Rain catchments, spring protection, gravity-fed piped schemes and dug or drilled wells equipped with handpumps are all options that are receiving much attention. Handpumped groundwater supplies are being adopted by many countries as the most suitable option to supply much of their rural population. Such supplies can be cheap to construct can cover large areas of the continent due to their low yield requirements, do not need treatement if properly sited and adequately protected and can be constructed and maintained with considerable involvement of the community. Handpumped groundwater supplies ('shallow wells') are a wholly appropriate supply option and should be regarded as such. Rain catchment and spring protection (with or without gravity-fed reticulation) should be viewed as complimentary (not competing) options.

3. The 'Shallow Well' Confusion

The expression 'shallow well', in common use in Tanzania and becoming accepted in, for example, Kenya and Ethiopia is a term that is confusing and ideally should be avoided. In Tanzania the term was used initially to refer to hand-dug wells similarly equipped; these wells commonly being less than 10m deep and rarely exceeding 15m. There is a common misconception among Tanzania's policy-makers, therefore, than handpumps are only appropriate at these depths and that 'boreholes' with deeper water levels need to be equipped with motor pumps. In Ethiopia, a similar misunderstanding exists, to the extent that 'borehole' has come to mean a drilled well with a motor pump

(regardless of water level) and shallow well means a well-equipped with a handpump. A paragraph in a recent international rural water supply journal 1/ illustrates the extension of this confusion to Kenya:

"Can't use handpumps?
A lot of publicity and money is being devoted to handpumps at the moment, and although this is entirely necessary, there are many areas where they are not an appropriate technology.

For instance, the World Bank/UNDP Handpumps Project will be testing pumps near Mombasa in Kenya, but the major part of the country is not suited to them ....."

Handpumps are appropriate for use to draw water from dug or drilled wells where water levels range from 0 to 60m, and in more exceptional cases, even to 80m. A large rural water supply programme in the Sudan has many handpumps lifting from 50 to 60m and some from even greater depths. A cursory look at groundwater suggest that a large percentage of the country has groundwater levels of less than 60m, and a very much larger percentage of the population live in such areas. It is clear, therefore, that much of the rural population could be supplied with groundwater abstracted by handpumps. To avoid confusion spreading even further, at a time when more appropriate rural water technologies are being considered for much of Kenya, it is proposed that the term handpump wells be used, with the type of construction varying from dug to drilled wells depending on various factors, such as water level and geology.

4. The Standardisation Problem

Handpump well programmes are underway in many countries in Africa: in East Africa including very large programmes in Malawi,

Tanzania, Sudan and Uganda and growing programmes in Lesotho, Zimbabwe, Zambia, Ethiopia and now Kenya as well. Although it would be wrong to attempt to replicate without adaptation the handpump programmes of other countries, there is much to be learnt from them. The Malawi programme is entirely implemented by government with no consultant involvement, and has been since the 1930s. Some pumps have been in operation for over 40 years (although of course, they will have been often repaired, so much of the unit would not be original) and maintenance has been carried out with reasonable effectiveness by mobile maintenance teams for decades. However, although about 1.5 million people in rural areas are already served by over 5000 handpumps, the Government has undertaken a new approach to accelerate the rate of handpump programme implementation in order to serve several million more people. An 'integrated' programme of both hand-dug and machine drilled wells is underway, managed by government professional staff and implemented with considerable involvement of the community. Shallow and deep lift handpumps, designed and mass produced in Malawi, are being installed and first-line maintenance is being undertaken by trained volunteers (mostly women) within the community. Investment costs are very low, between US$6 and $12 per capita, including both direct and overhead but excluding the national cost of self help labour. There are plans to step up construction to approaching 1,000 handpump wells per year. Tanzania has a rather different programme, characterised by several independent projects each involving direct disbursement of donor funds to contractors/consultants who have been constructing handpump wells more or less independantly of Government. Commencing with individual regional water master plans, construction commenced at the beginning of the 1970's and several thousand pumps of different kinds have been installed. Recently the issues of standardisation of design criteria and hardware and the approach to maintenance have been addressed by government

who are concerned by the implications for long term operation and maintenance. Ethiopia also faces problems of non-standardisation with the country divided between donors, many of whom have provided handpumps as a tied aid between donors, many of whom have provided handpumps as a tied aid component of their programme. Examples can be seen of where a donor has ceased funding a programme, and broken down handpumps, dissimilar to any other coming into the country, abound and no spares are available. In recognition of this, the National Water Resources Commission together with the University of Addis Ababa have designed and started manufacturing handpumps, and in a planned programme of tens of thousands of handpump wells, the commission aims to standardise on both hardware and the approach to construction and maintenance. In many other countries the problems of a unified approach to their handpump programme and the local manufacture of appropriate hardware is receiving much attention. The lesson is clear for Kenya. It is possible that a large proportion of the 85% or so of the rural population of Kenya unserved with potable water supplies could be relatively rapidly and cheaply provided with an acceptable service level through the construction of dug and drilled wells equipped with handpumps, often as the first step in the progression through to the eventual target of house connections. However, it is essential that the issues of hand pump programme planning and design, implementation methods, maintenance systems and hardware selection and manufacture be addressed at a national level. Excessive fragmentation and variation will undoubtedly jeopardise the success of the programme. Many if not most of the issues raised at this Workshop are not just Lake Basin isses but national ones.

5. Design criteria

In the design of a handpump programme, a number of criteria need to be established, in much the same way as for any other rural

water supply programme. The Ministry of Water Development 'Design Manual' sets the design criteria for piped schemes and there is much to be said for expanding this to provide general guidelines for handpump programmes. Numerous questions, including planning horizons, population service levels, per-capita water consumption, walking distances, well construction methods, maintenance systems and cost recovery all need answering. Take, for example, the number of people to be served by each well. There is an obvious relationship between the yield of the well, discharge of the pump, per capita water consumption, population nucleation and desired maximum walking distance that have a bearing on the design service level. In Malawi handpump dug wells served 125 people; in the South Kordofan project in the Sudan somehandpumped drilled wells serve well over 1,000 people. In the former case, the wells are dug by hand in poorly permeable formations and equipped with cheap, locally made and though very robust, easily-maintained pumps, so a small design population means a nearby well and a reasonably reliable supply. In the Sudan, water is desperetely short and water levels are deep, so often a decision is made to provide a basic level of service to many people, resulting in long queues at the pump through the day and night and demanding an extremely robust pumping unit. Per capita costs will vary considerably depending on the population service level adopted; 200 - 300 people per handpump are commonly adopted figures, allowing for both minimal queuing and deterioration in pump (or well) performance.

6. Well Construction Methods

There continues to be much debate on the most 'appropriate' techniques for well construction. There are strong advocators for each of many different techniques, including digging under any circumstances (a team in Zimbabwe excavates to 40m+ in

in crystalline, unweathered granite, using blasting and other mining techniques in order to maintain a high level of community participation- such a well may take 3 months to construct in contrast to a drilled well using down the hole hammer (DTH) taking less than 1 day), a hand drilling, cable-tool drilling, DTH drilling (with or without ODEX) etc. Proponents of hand-drilling argue that all machine drilling is expensive. In the MOWD - implemented handpump project on the South Coast small percussion rigs are being used that cost about the same as and can be towed by a landrover, will drill through semi-consolidated formations to 30m in 3 to 4 days using about 6 litres of diesel per day and can be operated with a crew of 3 men. Very few well digging or hand drilling programmes are without vehicles and these machine drills are cheaper to operate and maintain than a vehicle. There is no doubt that in any given circumstance, all options for well construction should be considered and each will have advantages and disadvantages to be weighed on. In general, it is probably best to employ a variety of methods within a single programme in order to combine the advantages of each. Dug wells present a major opportunity for community participation with all the benefits of the sense of ownership that results. Furthermore they are generally cheap to construct and require only simple equipment. However, they are susceptible to pollution and falling water levels during drought and are best restricted to areas of relatively shallow water levels.

Machine drilled wells have little opportunity for community involvement and are probably more expensive but provide good drought and pollution protection and are less restricted by location. A village with both dug and drilled wells will have the benefits of both, and a compromise between cost, service level and technology can be achieved.

7. Handpumps and other Hardware

There is one fundamental point about hardware for a handpump programme: as much of it as possible should be manufactured in-country. Hundreds of thousands of wells are being planned for Africa; the dependence on outside agencies and countries for absolutely essential spares is unthinkable. Here in Kenya there is no doubt whatsoever that the major hardware items such as handpumps and well screens etc. can and should be manufactured by the commercial sector as soon as possible. Broken handpumps litter the rural areas of developing countries. Nevertheless some 450,000 New No. 6 handpumps continue to function in Bangladesh, despite criticism of its crude design and poor manufacture. The reason is clear, the pump is easy to maintain, has been mass produced in Bangladesh for a long time and can be bought (and even sold secondhand) in the market place. Simple rural water supplies are where they ideally belong - in the market. In Kenya, an important step needs to be taken soon - the standardization of handpumps for local manufacture and use in all handpump programmes. Unnecessary proliferation of type will not provide adequate incentive for the private sector to manufacture and will greatly complicate the distribution of spares and development of skills for maintenance. However, well meaning the donor, handpumps on the commodity aid list dooms the programme to eventuual failure. Establishment of manufacture will not necessarily be easy; the tribulations of setting up quality control of the India MK II handpump (of which well over 200,000 are now in villages all over the world) is testimony to that. A handpump should ideally have the following features (in order of importance):

(a) easy to maintain
(b) locally manufactured
(c) sturdyand reliable
(d) relatively low cost.

'Easy to maintain is given priority because all handpumps, whatever the designer or manufactuer may say of them, will break down. Whether this takes place within months or years, if repair is difficult, the programme will fail.

8. Handpump Maintenance

When the construction of wells is completed and the pumps are installed, it is often considered that that is the end of the project. It is not; the end of construction marks the beginning, and the failure of handpump programmes is almost always because inadequate attention is paid to laying the foundations for successful operation and maintenance. The record of centralised maintenance of handpumps by government organisations has not been good (although there are exceptions), due to the problems of access to widely-dispersed wells in remote areas and the provision of spare parts. It is generally accepted now that the problem of handpump maintenance is most likely to be resolved by taking it out of the hands of government and putting it into the hands of the community. In many parts of India, the much publicised government backed multi-tier maintenance system is not working, however, if the pumps prove to be reliable for long enough, villages come to depend on them and when they break down, they see to it that they are repaired - even if it means employing a plumber to come from a nereby town. There are so many new approaches to hand-pump maintenance that is would be impossible to describe them all here. They range from the volunteer systems with extension support being established in Malawi to private-sector contracting in the Ivory Coast to the 'privatisation' of wells that is being proposed in the Lake Basin. There are advantages and disadvantages of all systems, and the growing recognition of the behefits of careful sociocultural analysis of the target community with a view to identifying an acceptable maintenance

structure is to be greatly welcomed. There is little doubt that a more thorough understanding of the structure of the community and sensitivity to people's desires are prerequisites to a successful community-based programme. A young Kenyan sociologist recently wrote of his rejection of 'community participation' in rural water projects as the term implies communities participating in agency projects. Instead he argues for 'agency participation' which implies agencies participating in community projects; a subtle point, perhaps, but a good one.

9. Linkages

Much has been written and said about the correlation (or lack of it) between the provision of clean water and improvements to the health of the community. It would appear that while improved quantities of water are directly beneficial to health, (in reducing water-washed disease), improved quality of water is a necessary but insufficient condition for the reduction of water-borne disease. Broad ranging improvements in rural people's water use hygiene and sanitation habits are essential if the impact of improved water quality is to be real. However whilst most people easily see the benefits of a water supply and are prepared to work or even pay for it , motivating people to improve latrines and adopt new hygiene habits is not so easy. Linking the two - water and sanitation - has the double advantage of ensuring maximum benefits from the improved (and expensive) water supplies as well as raising motivation levels for a sanitation programme. A well planned rural water project will therefore incorporate sociological studies at an early stage and health education and sanitation programmes running in parallel.

10. Institutions and Training

A national handpump programme will require adequately trained

people and suitable institutional frameworks to cover all programme activities from planning through implementation to maintenance. Regardless of whether the programme is in the hands of a Government agency (as is common in East Africa), a parastatal rural water corporation (in some West Africa countries), private contractors (in parts of South Asia), or even the community themselves, the question of training at all levels from the technicians to the village caretakers needs to be addressed. It is commonly stated that the major problems of the IDWSSD are not the availability of funds, or water resources, or suitable technologies but the incapacity of existing institutions and the shortage of adequately-trained staff.

11. Some Financial Considerations

Capital costs of handpump programmes are very variable, ranging from US$5 per capita to approaching US$100 per capita. Costs, including all over-heads and technical assistance should aim at less than US$30 per capita. Nevertheless total programme costs are daunting and, even with this simple supply option, serving Kenya's rural population will cost hundreds of millions of dollars. Although capital costs are substantial and attention paid to minimising them is important, the implications of programme recurrent costs are perhaps very much more serious. Actual per capita maintenance costs for the old mobile maintenance programme in Malawi were approximately US$1 per year, estimates for the multi-tier, community-based maintenance system whose establishment was initiated one year ago are about US$0.2 per capita per year, inclusive of over heads (salaries and transport for government extension back-up). The estimated figures of KShs 8 per person per year (c. US$0.6 per capita) for the Lake Basin Programme are not dissimillar but mostly reflect handpump and well costs and not overheads. A study of the figures would

suggest that the pump costs are high (over four times the cost of an India MK II handpump). Assuming that cost recovery of capital investment is not required (e.g. where bilateral grant aid is utilised), the recurrent costs of maintenance need to be found. There are various ways in which this can be done; Indirect taxation or cross subsidy by government; direct revenue collection by volume (i.e. kiosk); flat rate maintenance levy held in a maintenance account; or ad-hoc collection by the community as the need arises. The selection of an appropriate system will depend on existing community structures and the involvement of successful farmers cooperatives, producer societies, women's groups etc. will increase the potential for community responsibility for maintenance organisation.

12. The South Coast Handpumps Project

MoWD has recently initiated a handpump programme in the Southern part of Coast Province (Diani and Msambweni locations). The programme aims to drill and dig new wells and cover existing open wells, install a variety of handpumps and closely monitor their performance and acceptability. The project provided with very limited funds through UNDP by SIDA, is managed and implemented by MoWD staff, with the exception of one United Nations Volunteer whose task is to install and monitor the handpumps. Two complimentary programmes in the same project area are soon to be initiated. Firstly a demonstration sanitation project is planned by the Ministry of Health (MoH), also funded through UNDP by SIDA, aiming to encourage and evaluate the use of different latrine types. Secondly, a broad-based community liaison and training programme is to be undertaken by an NGO (Kenya Water for Health Organisation KWAHO). This will include day to day liaison between the water project and the community as well as in the development of curricula and training materials for and implementation of a comprehensive programme of health education and handpump caretaker training. Specific

targets for training will be the 37 women groups in the approximately 50 villages of the Project area. Mobilisation of the well construction crews started in June 1983 and during June and July 1983 a sociocultural study directed at defining a maintenance system was undertaken on behalf of the project by the African Medical Research Foundation (AMREF). Although the project continues to have teething problems, these are being slowly overcome and a possible future linkage between MoWD, MoH and KWAHO in implementing a fully integrated handpump and sanitation programme, largely unaided by outside technical assistance, is being defined. Community involvement in all project activities is being encouraged and the close co-operation of district and location level government staff is being received. During the coming year, reports on progress and specific aspects of the programme will be prepared and distributed.

13. Conclusions

No separate section has been devoted to the issue of community involvement in a handpump programme. This is because this must be the foundation of every aspect of the programme, if, in the long term, it is to succeed. The principle, as yet unproven but implied by success in other rural development activities, is that by allowing people to make their own decisions where possible, by letting them pay in cash or at least in kind and by their own physical efforts, their commitment to the programme is as assured as it can be. The greater their contribution, the greater their sense of ownership of the wells and pumps will be and therefore the greater their commitment to long term operation and maintenance. This Workshop, the first of its kind in Kenya, has many important issues to address but perhaps that of the community role in maintenance is the most important. Decisions made for the Lake Basin area are not just local ones, but may have a bearing on the whole of Kenya and the future water supplies of many of her rural population.

PLENARY DISCUSSION

PAPER NO. 5

CHAIRMAN: MR. H. DERKS

The discussion of Mr. Grey's paper revolved mainly around the issues of testing and standardization which are of course, interlinked.

The Kenya pump testing programme at the coast is underway and involves some 200 models half of which will have been manufactured locally. This is in part intended to demonstrate to GoK that locally made pumps can be just as good as those from abroad. It is to be hoped that the MoWD will be provoked into making a firm policy decision on hardware standardization and to formulate design criteria for hand pump wells as they have for piped water supplies. The speaker envisaged a scenario in which a standard series was chosen of 2 to 3 types and design drawing being put out to tender to local manufacturers with needed quality control agreements with the Kenya Bureau of Standards (KBS).

Some participants questioned the practicability of standarizing everything and a more realistic approach is to begin by standardizing parts and let it grow from there. Indeed manufacturers are past the stage of complete standardization and this is unlikely to be viable in a situation where an estimate 10 million pumps are needed world wide (estimate of recent World Bank Conference). Whilst the private sector are free to choose from any pumps on the market for large programmes some standardization is argued to be needed for both quality control and efficiency considerations and also for donors. In India, for example, the government has chosen a particular pump and the quality standards to go with it. It was argued that for Kenya, a policy does have to be made but it takes time to obtain the information to do so.

It was explained that in addition to the pump testing programme, a Women in the Water Decade Programme is starting to try to encourage and focus their involvement. It is hoped to involved NGOs and other organisations in curriculum development, involve community members in basic health issues and maintenance as part of the decades low cost water supply and sanitation programme.

One participant noted a lack of environmental considerations in the discussions whilst another suggested that the primary issue should be water as a resource rather than on hand pump wells only. It was noted that dispersed hand pump wells are being considered as a more environmentally acceptable source of water in semi arid pastoral areas rather than boreholes which give ecological problems associated with livestock amassing at one point.

The speaker made some brief comments on the support of the World Bank to the MoWD noting that Kenya had not requested any Technical Assistance personnel from the World Bank.

9 PAPER NO. 6

LAKE BASIN DEVELOPMENT AUTHORITY

MR. C. BUCKENS

SOCIO-CULTURAL INVESTIGATION INTO THE USE AND FUNCTIONING OF THE COMPLETED SHALLOW WELLS IN NYANZA PROVINCE

ABSTRACT

The paper presents a summary of the main findings and recommendations of a socio-cultural investigation* into the use and functioning of shallow wells installed by the Lake Basin Development Authority in Nyanza Province.

The study focussed on how best to build the wells into the target communities, so as to maximise the envisaged benefits while guaranteeing acceptance and upkeep. The search was for an effective local level organisational set-up, maintenance system, charges, community involvement, distribution of benefits and health education, and patterns of water collection and use.

The study concludes that the handpump, as a form of intermediate technology, can and must become part and parcel of the community in terms of ownership, management and actual up-keep. In the rural communities of Nyanza Province there does exist the basic infrastructure for a viable maintenance system of shallow wells, provided that appropriate training programmes geared towards the particular requirements of hand pump technology is undertaken.

The need for a sustained programme of water and health education is seen as an absolute condition towards creation of awareness and appreciation of safe drinking water in the rural areas.

* The complete work consists of two volumes: A Main Report and a Summary Report, which are available from LBDA Headquarters, P. O. Box 1516 KISUMU, Kenya.

PAPER NO. 6

SUMMARY OF FINDINGS AND RECOMMENDATIONS

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SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

Introduction

In this chapter, a summary of the main findings and recommendations will be presented. No summary, however well done, ever does justice to the theme, unless the reader finds time to struggle through the full text. This is contained in Part One: Organisation and Part Two: Water Collection and Use of the Main Report.

In this summary, each observable will briefly be introduced again, followed by a short discussion of the main findings and the recommendations of the chief investigators.

OWNERSHIP

Different types of ownership will generate different management structures. It forms the foundation of any organisation at the local level around the shallow wells.

Table I : Percentage Distribution by Ownership of Completed Wells

Ownership	F	%
Schools	24	57.5
Markets	6	12.5
Community	6	17.5
Churches	2	5
Health Centre	1	2.5
Private	1	2.5
	N = 40	100

Main Findings

1. There is a consensus of opinion among the respondents of all four subsamples that shallow wells should be subject to public ownership so as to guarantee universal accessibility.

2. Twenty per cent favour private ownership because the water source will be better managed and maintained.

3. Problems arising from ownership structure came especially from (1) privately owned wells (2) wells in church compounds, (3) wells in secondary schools. The most difficult problems arising from these types of ownserhip relate to unfairness like exclusion, restriction and interference in school curricular activities.

4. Preference for public or private well ownership has a negligible statistical relation to education and income

5. The present shallow well beneficiaries would prefer to remain in partnership with the LBDA as far as ownership of the wells is concerned, while the key informants and local leaders are sceptical about such an arrangement.

6. By far, the majority is in favour of communally owned wells, managed by a combination of local water management committees supported by the LBDA.

7. No significant differences in perceptions on ownership were observed between the respondents from the various districts.

Recommendations

1. Well ownership and well management have more than mere organisational implications. The danger exists that oral agreements are made which do not have legal force in present day modern Law. The issue of ownership of the wells should not be confused by atavistic property notions. It should be decided within the context of legal ownership structures defensible in modern courts of law. On completion of the installation of the well, appropriate legal documents ought to be prepared describing in detail the legal ownership of the wells (i.e. land and the pump).

   Furthermore, the type of ownership of the well ought to be seen in the context of the long term policies of the LBDA towards rural water development. The Authority will initially maintain ownership until such a time that shallow wells programme is phased out.

2. At this stage of water supply developments in the Province, the project should install communal wells with maximum accessibility. With less than 20% of the Nyanza population having access to improved water supplies, the project could play a compensatory and complementary role by responding mainly to the communal demand. Figures indicate that they are not only well utilized but communal wells have wide ranging effects through water education, health improvement and the appreciation of clean and safe water.

LOCAL LEVEL ORGANISATION

Main Findings

1. All communities with a well will have to elect along democratic lines, a well management committee, on which the local administration must be represented as an ex-officio member.

2. Respondents were unanimous in favouring femal representation on such well committees.

3. The general satisfaction of the interviewees with the present well management should be understood in the light of the fact that initially no demands for any contributions or charges for maintenance have been made on the local community and that practically all pumps were installed within existing institutions and run by their respective committees.

Recommendations

1. Democractically elected, highly motivated well management committees should be established before any well is installed. The committee should fully participate in the preconstruction phase, by mobilising local involvement, appreciation, and willingness to participate in the maintenance. They should appoint the pump attendant and make arrangements for other relevant extension inputs.

   The presence of such a committee is a reliable social indicator of proper future care, maintenance and sustained motivation.

2. Women as the chief drawers of water should be represented on the well committee. It is recommended that one third of the members of the well management committee be women.

MAINTENANCE

The maintenance requirements for the shallow wells do not differ very substantially from that of the customary water sources as far as hygienic precautions and water collection protocol is concerned. There is however, a clear shift observable from the informal maintenance organisation to the formally institutionalised set-up. New roles appear and certain people are charged with new responsibilities.

The maintenance of the hand pump itself and the well create new expectations and new organisational relationships. The process of training village pump technicians takes time. Consequently, the building into the shallow wells programme of a viable maintenance system, which is firmly rooted in the target communities, has to be given adequate consideration. No detailed blue pring of a comprehensive maintenance system can be introduced straight away at the outset of the project. It is subject to growth and a host of as yet unknown variables. Nevertheless, the form of such a comprehensive maintenance system can be worked out. The filling in of the detailes will be a matter of time. What is required is the mobilization of resources on the level of the district, the location, the village and an impressive degree of motivation to care for the pump. It is a popular maintenance movement that is needed, rather than another ineffective structure.

MAINTENANCE OF THE CUSTOMARY SOURCES

Main Findings

1. There exists an informal maintenance system to care for the customary water source. It is interwoven with family, clan and other social relationships in the community.

2. These relationships and responsibilies are enforced by those at the top of the social stratification system viz, the chief, assistant chief and the village elders.

3. The water users share a communal responsibility for the hygiene and the cleanliness at the source. They are called upon to contribute labour if required to prevent the site from lapsing into a state of disrepair.

4. Within this same structure of local authority, powers exist to deter potential trouble makers from polluting the communal domestic water source.

Recommendations

The custom, habits, norms and values which exist around thw water source should form the basis of a set of similar rules and water by-laws at the wells. Positive socially accepted agreements on water collection protocol should form the basis of the maintenance of shallow well sites, their cleanliness and the prevention of disastrous contamination.

Similarly, the accepted structure of power and leadership in the community should be foundation on which the organisation of well management is to be built.

MAINTENANCE OF SHALLOW WELL SITE

Main Findings

1. The analysis of the data supports the idea of a specially appointed or elected person viz. the pump attendant as the key figure in maintaining the site.

2. This responsibility cannot be fully severed from the communal responsibility, but should be shouldered by everyone involved with the well.

3. The pump attendant is the agent of the local leadership such as elected well committees, and administrative officials.

4. The data reveal that people perceive hygiene and cleanliness at the well as the dominant virtues of proper well utilization. This perception forms a solid foundation for further water education and the increasing appreciation in the community of clean water.

5. The majority of the present well users are satisfied with the present standards of cleanliness at the well site.

Recommendations

The maintenance of the site must be an all-community affair. By means of health education people should be thoroughly aware of the importance of absolute cleanliness of the well. (The pump attendant, as representative of the community and the owner, should see to it that hygienic conditions prevail at the well). This ought to be viewed however, within the context of a programme of general upgrading of the hygienic and sanitary practices prevailing in the community, if the coming of the well is to have any

worthwhile impact on the improvement of health generally.

The day to day supervision of the water collection procedures should rest with the pump attendant. The water by-laws should be formally laid down and given wide publicity in the target communities.

VIABLE, COMPREHENSIVE MAINTENANCE SYSTEM

Main Findings

1. Management and maintenance of the well site and the pump on the local level revolves around the pump attendants, owner and chief.

2. Well beneficiaries expressed the conviction that a good deal of maintenance work can be avoided, if the pump is properly treated.

3. The local administration must be involved in the general management of the well on an ex-officio basis, to ensure that good rules and order are maintained by the community.

4. It is also generally felt that eventually the pump should no longer be seen as an alien intrusion from the big world outside the village but as a normal part of village life. Pump technology is appropriate technology meant for the village level. The ideal situation would be that people at village level buy, own, manage, maintain, repair, overhaul, and replace the pump and the well.

5. For the time being, however, assistance from outside the community is required until proper manufacturing arrangements spare parts distribution systems and locally trained mechanics have been organised.

6. The problem of how this all-round maintenance and supply organisation should develop and grow towards a self-reliant normal operation stage, has no uniform, single solution.

7. One point of view which is increasing in popularity is that the production line (manufacturing, distribution, importation) should from the very beginning, be built outside the implementing body. The LBDA initiates it and plays the leading role in getting it off the ground, but phases itself out of leadership as the shallow well programme gains momentum.

8. Other government machinery should be involved from the outset, as the LBDA generally implements its projects through the existing government structures.

Recommendations

1. In the initial stages of the project, the local level management should focus on preventive maintenance.*[1] It requires a formal organisation around the well, and day to day supervison of the proceedings at the well by an active and trained pump attendant. These duties should consist of enforcement of agreed water by-laws, prevention of mis-use and over-use minor mechanical adjustments like lubrication and nut tightening and lastly, prompt reporting of any major breakdowns.

2. A comprehensive maintenance organisation for the shallow wells must primarily aim at development of a capacity for maintenance of the pump at the village level.*[2] All other infrastructural

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*[1] Maintenance is both preventive and corrective. The former concept refers to all such operations as which are necessary to prevent the installation from breaking down, while the latter concerns itself with the actual repair work.

*[2] Some research is presently being conducted to investigate the possibilities of training women for maintenance work of water supply systems. Although the Chief Investigators would be very sympathetic towards such an approach, the issue was not included in the present work.

pre-requisites should be designed in such a way that the maintenance operation at the village level functions easily.

Which ministerial and other nonOgovernmental departments on provincial and district level should be involved and to which extend, should be viewed from the perspective of the LBDA's general policy regarding its relationship to other existing structures in the region. It cannot be solved in isolation. The Act of Parliament requires in part that the Authority implements its projects through the existing government machinery. The solution of the problem should satisfy this requirement.

The main unresolved issue is where to place the production line of pumps and spare parts. There are a couple of plausible suggestions and they are presented here -

(a) The production line is built into the private sector, It is argued that Western Kenya has a sufficiently well developed engineering instructure. It would welcome this new development. The arrangements for and distribution of spare parts could conveniently be left to the private sector entrepreneurs. There is enough expertise available to manufacture the pump locally. Certain items will have to be imported.

The role of the LBDA in this process would be the role of an initiator, organiser, catalyst and supervisor.

(b) Another possibility is that LBDA initially fosters the production line to maturity within its own camp and later hands it over to private entrepreneural individuals or companies.

Taking everything into account, it is recommended that the production line of the pumps, currently in the private sector outside Kenya, is transferred gradually from the foreign private sector to the local private sector. While the consulting engineers are in Kenya, the transfer can be made gradually. As a governmental institution, the LBDA could possibly be a shareholder, thus keeping abreast with what is happening in the production line and obviously having a say.

Whatever decision is made the LBDA will have to take th initiative and coordinate the activities during the initial stages of the project. It will require a tremendous amount of organisation, training and cadre formation, creation of goodwill and coordination.

CHARGES

The recurrent costs factor of the hand pump is largely determined by the type of maintenance organization. If maintenance is decentralized to the village level with a properly organised system of spare parts distribution and a locally based maintenance crew, the costs will be considerably reduced. Initially (as has been the case) the maintenance system will be centralised on account of the small number of pumps, but gradually as capacity is developed etc., it will be decentralised. The system will determine the charges required.

Main Findings

1. In the case of the pump type (SWN 81) in Nyanza Province, the annual maintenance costs for repairs, spare parts, etc., will be in the region of Shs 2,000/- per annum per pump. (Ref: Maintenance Report, DHV).

2. The large majority of the informants are prepared to pay, as long as the fee is reasonable. Both the poor and the rich are equally willing to pay.

3. Shs 3/50 per family per month would be 0.5% of the average monthly income of the present shallow well users. It is well below the 5% estimate for the domestic water bill worked out by the World Bank.

4. 35% of the present shallow wells users suggested that between Shs 1/= and Shs 10/= per month would be a fair fee. 23% preferred to pay per bucket which would amount to approximately Shs 3.50 per month per family at minimum collection of one bucket per day.

5. All other suffestions of charges would amply cover the maintenance bill of Shs 2000/= per year per pump, taking for granted that 50 families make use of the well.

6. Both the kiosk style of payment and periodic subscription rates are acceptable methods of collection depending on who manages the pump and its socio-organisation environment.

7. To whom the well users would make payment, depends on factors such as the type of management, agreed fee collection procedures, villages organisation and access to banks, etc.

8. Ongeche Church well is an example in a case where users are charged in a kiosk style, the utilization of the well water by the community is minimal viz. for drinking and cooking purposes only. For all other water consumption purposes, the community has reverted to the communal source.

Recommendations

1. It is clear that well users must start paying for the recurrent maintenance costs of the wells. They ought to foot the bill for the actual costs of repairs, and breakdowns. Reckoning that 50 families with an average of 8.3 per cooking unit, make use of the well and that Shs 2,000/= per year per pump for maintenance is realistic, the charge required amounts to Shs 5/= per capita per year. Such charges are realistic, if at the same time the corrective maintenance, is going to be executed by locally based mechanics who are in close proximity to distribution points for spare parts.

2. The well management committee should be trained to run its own affairs. In such situations, it can be left to the committee to decide how and when to collect contributions from the well users. If, however, the committee is not yet very well organised, periodic payment of a set amount of money is to be preferred. The Harambee style of money collection would be a most suitable way especially in the beginning so as to create consensus of opinion and group solidarity.

LOCAL COMMUNITY INVOLVEMENT

Proper maintenance on a sustained basis will only be guaranteed if the entire group of users is very enthusiastic about the arrival of the pump. Usually people who suffer from feelings of relative deprivation are better disposed to involving themselves in activities which lead to their socio-economic betterment. The respondents of the control villages have expressed time and again how much they want an improved water supply like the shallow well. The ultimate basis then for a guaranteed maintenance system is to be found in the degree to which the rural community is dissatisfied with and frustrated by the inadequacy of the present water availability in the area.

Main Findings

1. Popular participation is always cited as a necessary foundation for rural development yet no efforts have been made so far to involve the local community in the planning and organistion that preceeds the construction of a well.

2. Lack of involvement does not indicate unwillingness to participate. Rather it was a consequence of the set up of the pilot project whose main criterium was technical feasibility of underground water utilization. It must be noted however, that the local administration and village elders were involved.

3. Unambiguous ownership of the well, efficient water committees, and an intensive educational programme are the necessary conditions of greater communal involvement.

Recommendations

The preparation of the village for the reception of a well should be done by a deliberate effort to involve the community. LBDA should organize water education programmes that impress on the villagers the value of safe and clean water.

DISTRIBUTION OF BENEFITS

Traditionally, all had access to water sources. Similarly shallow wells as a low cost and viable solution to the rural water problem ought to be universally accessible. Social justice and the equitable distribution of benefits would demand such a strategy. Thus the development of shallow wells could be compensatory in nature. Hence the need should be a realistic social criterion in well allocation.

Main Findings

1. Equity starts with the assignment of wells to those categories of people who can ill afford to bring in a more expensive improved water supply. The shallow well project should have a compensatory bias, especially during the period of the project in which wells are heavily subsidised by the donor.

2. To avoid unfairness at the well, a definite collection protocol should be developed. Such water by-laws should be similar to those in practice at the traditional water sources, with the necessary modifications to suit the new situation.

3. Negative discriminatory developments at the wells can be avoided by democratization of the collection protocol and universal accessibility to the improved water source. Definite agreements are called for with owners of private wells and of those which are located in schools. In secondary schools but also in some primary schools, respective measures have crept it.

   The more vocal beneficiaries should be prevented from exercising undue patronage and influence.

4. It is questionable whether the school compound is in all circumstances the most suitable location of a well.

5. Although the well ought to be located so as to save the time and energy of the majority, it should be remembered that women and the poor deserve special consideration.

6. Population density, the need of the users, land availability, willingness to maintain the well, distance, technical viability, organisational capacity of the community,

motivation of the people and development potential of the pump in the community are the chief criteria which must be taken into account when it is to be decided in which village and in which plot a shallow well will be sunk. Project Management should not be sensitive to pressure exerted upon them with the aim to deflect them from these priorities.

7. The two most wanted immediate benefits accruing from the well, which count most in the perception of the users, are clean quality water and having the well within easy walking distance.

These generate a whole range of other beneficial consequences.

Recommendations:

1. Allocation of wells should be guided by compensatory social planning principles which swing development opportunities automatically in the direction of the needy in the province.

2. Negative discriminatory developments at the wells should be corrected by incorporating in the legal ownership document definite agreements as to accessibility. It should not be left to the arbitrary whims of the individual or institutional owner to decide if and when certain families can collect or not.

3. The siting of the well should be carefully studied so as to maximise benefits. Distance, easy accessibility ownership, security, proper maintenance, population density, proximity to other improved water supplies, risk of interference with other important activities, are some of the leading social variables which should guide the choice of location together with physical, geological, water quality and topographical conditions. It is recommended that the physical survey team

be enlarged to incorporate a social and health component. Their responsibilities ought to be carefully synchronised.

HEALTH

It is commonly believed that improved water supplies spontaneously lead to improvement of public health. The relationship, however, is not casual. Clean and safe water is a necessary but not a sufficient condition of improvement of the health of the people in the community. However, the improvement of the health of the people is one of the chief justifications for investing in clean shallow well water. To bring about the envisaged changes and developments in the rural community, public and environmental health education will have to be introduced on a sustained basis.

Main Findings

1. Hygienic practices in the homesteads, like the treatment of water before consumption, cleaning of water containers, washing of hands before meals and after use of latrines, indicate that the majority practice and are concerned with personal and domestic sanitation even though approximately 35% follow unhygienic habits.

2. People appear to be quite well informed about which diseases are caused by bad water.

3. Malaria is the most common disease in the villages where interviews took place followed by stomach upsets and diarrhoea.

4. The fact that the majority of informants could easily enumerate the various preventive measures against diarrhoea and malaria is in itself an indication they have been

exposed to health education programmes. However, approximately 35% are not familiar with the prevention of these common diseases.

5. The majority of local leaders and key informants thought that health education around the shallow wells is the work of the Ministry of Health, LBDA and the churches. All subsamples emphasized the need for health education if the well is to yield its full spectrum of benefits to the users.

6. According to the local leaders and key informants, the expected and perceived benefits of using shallow well water is mainly a reduction in the incidence of water borne diseases. The key informants warned however, against a premature conclusion about impact on health.

7. The impact of the MoH 'cholera' wells was judged to be marginal, mainly on account of the absence of any form of maintenance.

Recommendations

1. A definite public and environmental health programme should be developed taking as its starting point the experiences at the shallow wells to make people aware of the advantages of clean and safe water and the danger inherent in the consumption of surface water.

2. Secondly, during the recommended stage of preparation of the village which is to receive a shallow well, intensive health and water education programmes could be launched. Therefore, it is advisable that at least one health extension worker joins the shallow wells survey team to prepare the community, so as

to ensure that the expected health benefits will ensure.

3. Last but not least, in the absence of any other productive usage of spilt water at the well site, the gutter and drainage canal a soak-away pit is dug, which is backfilled with gravel and stones. At present most drainage systems at the shallow wells are breeding places for mosquitoes.

WATER COLLECTION AND WATER USE

A disproportionate amount of time is spent by most of the rural households on collection of water. An improved water supply does not mean necessarily a change in water collection habits for those who have to travel long distances to collect water from the existing shallow wells.

In the sample of investigated shallow wells communities, those with schools are heavily represented (46%). This has influenced the results of the study.

It has to be remembered that it is difficult to measure changes in commnities, especially if the wells are not even one year old.

Main Findings

1. The water collection schedule did not change by bringing shallow wells to the villages.

2. 64.4% of the interviewed families use the traditional source as well as the shallow well. This is due to the fact that different waters are used for varying purposes.

3. The people in the area have a wide range of alternative water sources - mostly rivers, streams and ponds. In 18% of the

subsample of control villages roof catchment was used.

4. The people using the shallow wells prefer it for consumption (clean, safe, etc.) 59%, and for collection convenience 39% (distance, etc.).

5. The people interviewed have great difficulties in estimating distance and weight. The variables involving units of measurement ought to be investigated in a more organised way. Future research requires more time to be spent in a village to observe and measure such variables.

6. The average time spent at the well per collection is 5 minutes between 0800 hours and 0900 hours, and 5.5. minutes between 1100 hours and 1200 hours.

7. The bucket is the most common container for water collection in the area.

8. The distance to the source is on the average greater in the shallow well subsample than in the control village subsample. This indicates an appreciation of clean, safe water.

9. In a community with a shallow well more water is drawn for all uses than in a community using traditional sources.

10. The actual use of water at the well differs from that at traditional sources by the exclusion of clothes washing, personal washing and animal watering.

11. The main change, according to the interviewees of the shallow well sample is increased consumption.

12. Expected changes in water use are hard to prove.

13. Most of the completed shallow wells are used below their maximum capacity.

14. The users of shallow wells who still use the traditional source collect about half their supply from the shallow well.

15. No strong relation between distance (homestead to water source) and water use could be found.

16. Strong positive relations were found between level of education and amount of water collected, and between level and amount of water collected.

Recommendations

1. A detailed Rural Water Supply Plan should be prepared for the whole LBDA area. This plan should take into account the population, the existing water-supply situation, the number of people having access at present to improved water supplies, the rainfall frequencies, development potentials, etc. and state clearly the ranking of priorities.

2. Detailed well site selection criteria and procedures should be developed.

3. The amount of clean and safe water available should satisfy the total demands of the users and not just a part of their demand, if a return to unimproved water sources is to be avoided.

PLENARY DISCUSSION

PAPER NO. 6

CHAIRMAN: DR. C. OKIDI

Many questions arose from Mr. Buckens presentation related to the methodology of the study, its general applicabilities, its findings and its implications. The scope of the study restricted itself to the wells installed by the LBDA and thus did not include Ministry of Health wells or sites which were identified as preferable, such as Village Polytechnics. The study also did not include the wells being installed in Western Province as this was considered to be the domain of the MoWD and KEFINCO, although it was felt that many of the general findings were relevant to Western Province. As a point of clarification it was explained that the choice of the cooking unit as the basic household unit was in conformity with the national census criterion.

In relation to the findings on ownership, a problem with the MoH wells was seen to be one of lack of a follow-up and maintenance system. The population regarding them as "government" wells for which they are not responsible. This also manifested itself in the question of payment for the pump attendant. Again, the feeling found in the population was that as the government "brought" the well it should pay the salary of a pump attendant. The study could only consider the dynamics of ownership at the sites chosen. Experience at the Coast has shown that groups such as women's groups can be effective owners and the LBDA study also found that respondents in Nyanza thought this would be true in their Province. This does raise the question of traditional ownership rights which exclude women.

One participant noted that traditional community organisation structures are breaking down and wondered therefore if they could be used as well owners. The Presenter argued that traditional structures

and patterns related to control of traditional sources offer pointers as to rules of useage and by-laws which could be created to deal with this new rural resource. Traditional practices should be drawn upon, even if the traditional forms of social organisations and control are no longer operative, i.e. one can and should learn from tradition in drawing-up protocols and in enforcing them.

Participants agreed that, where possible, use should be made of existing committees and management organisations in rural areas. This discussion led in turn to the question of Land Tenure for the well site. Whilst water rights are clearly vested in government, one participant noted that there are a multiplicity of land statutes. The issue is not just one of ownership of the well site but also access to it.

It was hoped that the workshop would formulate clear recommendation with respect to well ownership and the land issue.

10 PAPER NO. 7

N. GREENACRE - AMREF

SHALLOW WELLS AND HEALTH EDUCATION

ABSTRACT

An important premise of this paper is that shallow wells and a shallow wells programme must be viewed as a means and not an end in itself. Lack of access to potable water has costs to the community which they may or may not perceive. These costs are: the time and energy for collection, actual cash paid (if any), ill health due to lack of water and ill health due to contaminated water.

The start of any programme is the first contact with the community. Popular participation must be consciously incorporated from the outset to avoid mistrust and disillusionment. The degree of awareness of the population will result in differently managed types of projects.

The paper outlines the necessary steps for the creation of a health education programme. These are: firstly, the determination of the incidence of water related diseases and vulnerable groups; the communities level of knowledge and awareness; practices and expectations; the community's social and economic structure. Once these are know, health education objectives can be determined and suitable personnel identified; community members are to be preferred, selected by the whole community.

The paper utilizes the experience of the Kibwezi scheme to illustrate preferred approaches in terms of personnel selection, their training and a timetable for implementation. The paper emphasises that implementation of shallow wells, is and should be part of a larger process and should be seen in this way.

PAPER NO. 7

LAKE BASIN DEVELOPMENT AUTHORITY
SHALLOW WELLS WORKSHOP: OCTOBER 1983

SHALLOW WELLS AND HEALTH EDUCATION

N. GREENACRE, HEAD, ENVIRONMENTAL HEALTH SUPPORT UNIT
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1. Water and Health

Every community has access to water already; if it did not it would not exist. However, the cost of that water to the community will vary considerably from one situation to another.

The cost may be measured in terms of:

- Time and energy spent in collecting water
- In some cases, the actual cash paid for water
- Ill-health through lack of sufficient water
- Ill-health through contaminated water

Whilst insufficient or contaminated water has obvious health effects, e.g. skin diseases, trachoma, diarrhoeas, cholera, etc. the cost of collecting water and cash payments also influence health status in that the time and money could be used for more productive activities which could raise the family's standard of living.

If the aim of a water supply programme is to reduce the cost of water and to bring about improvements in health and the standard of living generally then the physical construction of the well itself is only a means and not an end. The end is the actual change in behaviour which results in improved

health status. The well construction is therefore, a component of the health education process rather than the health education being an ancillary activity to the construction programme.

To obtain changes in human behaviour can be a long and difficult process. Mistakes made in relationships with the community at the beginning of the project can alienate the population to the point that any amount of 'health education follow-up' to the construction programme will have little measurable effect. In one study, a small survey of 12 wells with pumps installed without involvement of the communities gave the following results;

- Drinking water exclusively from the pump - 2 villages
- Drinking water from pump and from existing wels- 2 villages
- Water rejected for drinking because of taste - 4 villages
- Pump out of operation - 3 villages
- Pump not used at all - 1 village

So out of the 12 wells only 2 were likely to have an impact on water-borne diseases.

2. Community Participation

Nowadays the terms 'community participation' is in fashion, replacing perhaps, but used in much the same way as, 'health education' used to be. No project is complete without its 'community participation component.' Whatever the term used, the starting point for achieving change and long term sucess of a water supply project is an awareness in the community of the costs they are paying for their present supply. In an arid or semi-arid area with long distances covered to collect water, the need for a more accessible supply is readily appreciated and may be quoted as the community's first priority

In an area with plentiful, but polluted, surface water, the need for a clean supply may or may not be felt, depending on the prevalence of cholera or even the time elapsed since the last outbreak. The degree of awareness and manner of perception of water as a problem may vary considerably therefore, between communities as well as between the community and the water supply agencies. These differences in awareness have contributed to the rise of four categories of water project:

" a) projects that are initiated, managed and operated by agencies;
b) projects initiated, managed and run by communities;
c) projects initiated, managed and operated by the community. but with substantial inputs from external agencies, and
d) projects initiated by external agencies, but managed and run by communities." (Ayuka Oendo, 1983)[2]

The first category a) relates principally to the urban piped systems and perhaps to some government rural well schemes. Projects in categories b) and c) show communities already very much aware of water as a problem and category d) is the current hope of many water supply agencies. AMREF's main experience has been with categories b) and c) through its rural health project in Kibwezi Division, a semi arid area of Machakos District, although other types of projects have been the subject of consultancy reports by AMREF staff. The LBDA shallow Wells Programme, as I understand it at the time of writing, would fall into category d).

3. Health Education

Although as indicated above, community awareness, involvement and health education are inter-related and overlap in the

achievement of changes in health behaviour, the following is an outline of some of the factors and stages particularly relevant for health education. It is not intended to be dogmatic, but rather as a basis for discussion in the workshop session.

. Pattern of Water Related Diseases in the Community

An assessment of the prevalence/incidence of the different water related diseases occurring in the community may be obtained either from medical facility records or, more accurately, by a medical survey of a representative sample of the population. If possible such information should be gathered over a period of time to show seasonal trends and include a breakdown of prevalence by age, sex and locality. From this knowledge of the morbidity, priorities for the education programme can be identified both as regards high priority diseases, e.g., cholera and high risk groups, e.g. children.

. Community Knowledge, Attitude, Practice and Expectations

Through surveys and discussions with the community determine their customs, beliefs and practices in relation to water and hygiene. This information enables the health educator to take account of those customs and beliefs which may be beneficial, those which are neutral and those which oppose the desired health behaviour. Similarly differences in hygiene practice when at home and when working in the shamba will be important.

. Social and Economic Structure of the Community

Whilst a knowledge of the social and economic structure of the community is of great importance to the mangement and operation of the project, it is also necessary for the

the planning of health education. Whether or not there is an existing Water Committee or Health Committee that can be trained to act as advisers and teachers, or whether reliance will have to be entirely on an agency or government staff will influence the design of the education programme. Similarly the economic situation of householders needs to be assessed in terms of ensuring that the advice given will be within the community's means to follow, e.g. can they afford improved storage containers or even soap?

. Formulation of Objectives

From the above information objectives in terms of specific behaviour changes can be formulated, e.g., the use of sanitary domestic storage containers. The extent to which these objectives are reached will later form criteria for evaluation.

. Personnel

Identify the staff available for providing both direct health education and support of the village water committees, of school teachers or other community members who could promote improved use of the new supply. The existing publichealth technicians, community nurses and public health educators of the Ministry of Health are likely to be the main resources in this respect and collaboration with the Ministry should be sought from the beginning. Assessment of their capabilities will be needed and where necessary short training courses held to orientate them to the particular objectives and methods of the programme and in their approach to the communities.

Organization of Extension Programme

The extension methods to be adopted and the curricula for the various categories of workers will depend to a large extent on the strength of the social organisation of the community and on the community's interest and motivation in water and their water related health problems, i.e., the first 3 headings in this section. For preference, members of the community should be involved as the prime promoters of change with support from Ministry staff, rather than reliance on the latter alone. If the well is to be managed and operated by the community then the responsibility for maximizing the health and other benefits from it must be theirs also. The need for, and role of, a village water committee will no doubt have been covered in the papers on community organisation and ownership.

Community members can also be the key persons to promote improved hygiene and proper use of the well. They live in the village as part of the community, and they know the local customs and beliefs. They represent a major manpower resource; their inclusion in the health education programme creates an enlarged extension staff that are always on the spot - an impossibility for a Ministry or an N.G.O. to achieve without exceptional financing which could not be repeated on a large scale.

Although in a different area and with a broader purpose than that of the LBDA Shallow Wells Programme, AMREF's experience in developing a network of community based health workers in the Kibwezi Rural Health Scheme may indicate some of the problems and pit-falls to be expected in a community based health education programme.

. Sensitization of the Community to the Purpose of the Project

The explanation to the community of the purpose of the project needs to be undertaken through barazas, meetings and discussions before survey work is undertaken. If it is not, then the appearance without warning of people asking questions about customs, belief, health status, etc. could lead to hostility or at best a lot of time being lost by the survey team in explaining their presence. As regards well projects the expected benefits in terms of improved health could be carefully and accurately explained without exaggeration. The author visited a shallow well programme in West Africa which had apparently gained community support and labour by the unrealistic suggestion that all water-related diseases would be eradicated by the construction of a well. Such an approach can lead only to later disappointment and disillusionment.

A positive development in the Kibwezi scheme was the request by community leaders in two sub-locations, not yet covered by the Community Health Worker (CHW) programme, for assistance with implementing community health programmes in their areas. The previous areas covered had been selected by AMREF, not by the communities concerned. In response to the request AMREF staff adopted a more low key approach than had been the case with the earlier communities. In essence the new approach put the onus for determining and solving health problems onto the community rather than on AMREF staff. This has lead to the formation of committees who have carried out their own inquiries and reported back to further meetings. With advice and guidance from AMREF

staff, rather than control, its hoped that the dependency on an outside agency will be reduced and self-reliance and community control enhanced.

. Selection of Community Health Workers

In the first phase of the project, the criteria for selection of a CHW was discussed with the Self-Help Groups in the sub-locations concerned. Criteria varied with the different Self-Help Groups but common criteria included; absence of responsibility, mature, good relationship with the community, willingness to work without payment record of good service to the self-help group. 4,5 Selection was carried out by the Self-Help Group. Later, it was found that these CHWs, being Self-Help Group based, did not always extend their activities to non-members of the SHG. Therefore, in the next phase of project, in sub-locations with village Development Committees encompassing all members of the village, the village was the unit used to select the CHW and not just the Self-Help Group. In relation to a well construction programme the above experience would suggest that the Water Committee or 'Health Educators' should be selected by all the potential beneficiaries of the well and not by only a section of the community!

A further lesson learnt in the first phase of the Kibwezi Scheme was that some of the Community Health Workers had expected payments, or that they would eventually get secure jobs with AMREF. When neither materialized, a considerably number of them dropped out. Care should therefore, be taken to ensure that if the work is to be voluntary and unpaid, the fact is consistently and clearly stated from the beginning. Similarly community promises of help with work on the CHW's shamba have not always materialized and have led to further

disillusionment.

- Training of Community Health Workers

The training of CHWs at Kibwezi begins with introductory sessions over 3 - 5 days, continuously, followed by one day a week sessions for the nect 12 - 20 weeks. The methods used are aimed at realising their latent knowledge and abilities rather than a didactic approach. Role-playing, practical experiences and pictorial hand-outs with a minimum of written text are utilized. In addition group discussion of their experiences in putting into practice the material learnt in previous sessions is used. Total training ranged from 17 days with the first group to 20 days with later groups. Follow-up sessions for all groups continues.

The content of the training was arrived at by the CHWs in collaboration with AMREF trainers to ensure that felt needs would be covered. Whilst for a water supply project, the health topics covered need not be so diverse as for a community health programme, the teaching could include all aspects of the new water supply and not just those directly related to hygiene or the need for clean water; for example, use of the wastewater for a garden or tree nursery or, the well water, in the absence of a lower quality supply, for brick making.

. Training of Health Staff

The support and training of community based health workers requires a different philosophy and different skills than those normally acquired by professional health staff in their own training and subsequent work experience. The ability to work with the members of the community, accepting their

priorities and needs, and helping them to find solutions to their problems rather than to lecture at them, however benevolently, is sometimes lacking, as are the specific skills required for the training and support of community health workers. In the Kibwezi Scheme the Health Centre staff received supplementary training and support from AMREF's Training Department and Community Health Workers Support Unit. In particular key members of the Health Centre staff attended the Support Unit's training course for the trainers of CHWs.

. Time-Table

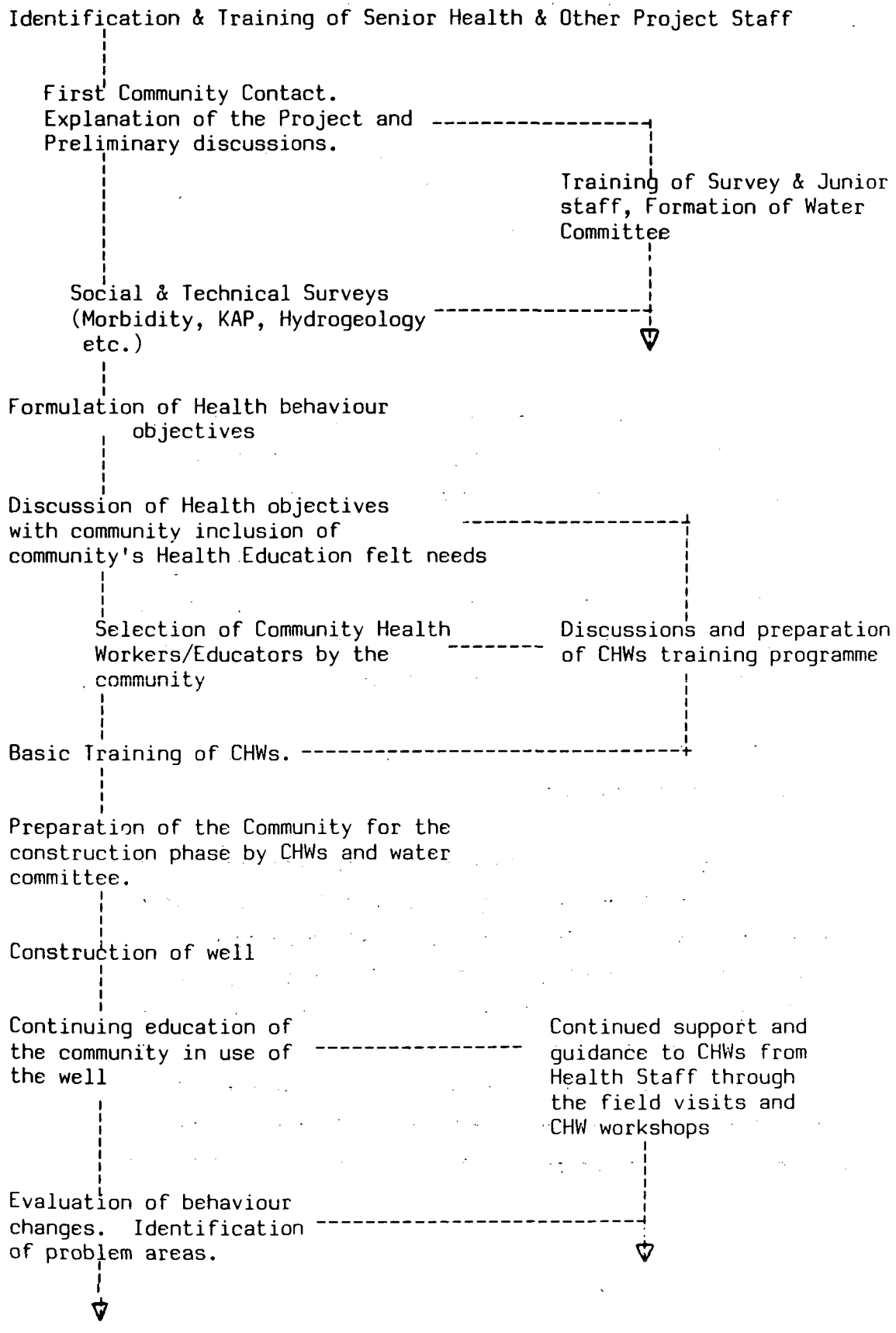
As mentioned in the first section, the physical construction of the well is not the beginning of the process of change, but rather a stage in that process.

The practical implementation of the programme begins with the first contact with the community and this will need to be some months before the construction phase begins if full involvement of the community is to be achieved.

Figure I outlines the possible sequence of steps for the health education programme.

The time scale and organisation of the programme should be long enough and flexible enough to accommodate the village organisation and the inevitable delay before changes in behaviour become established. After 100 years of piped water supply, the hygiene habits of many people in Britain leave much to be desired. We should think, therefore, not in terms of a few weeks for the construction of the well but of long term involvement and the development of the community's own resources in achieving improved health status.

Figure I


Identification & Training of Senior Health & Other Project Staff
First Community Contact.
Explanation of the Project and
Preliminary discussions.
Training of Survey & Junior staff, Formation of Water Committee
Social & Technical Surveys (Morbidity, KAP, Hydrogeology etc.)
Formulation of Health behaviour objectives
Discussion of Health objectives with community inclusion of community's Health Education felt needs
Selection of Community Health Workers/Educators by the community
Discussions and preparation of CHWs training programme
Basic Training of CHWs.
Preparation of the Community for the construction phase by CHWs and water committee.
Construction of well
Continuing education of the community in use of the well
Continued support and guidance to CHWs from Health Staff through the field visits and CHW workshops
Evaluation of behaviour changes. Identification of problem areas.

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3. Ferguson A. 1983, Kibwezi Rural Health Scheme, Review and Assessment AMREF p. 25

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PLENARY DISCUSSION

PAPER No. 7

CHAIRMAN: Dr. C. Okidi

The discussion on this paper was stimulated by a letter from a chief, read out to the participants, in which he explained that the community were not prepared for the would-be charges and were too poor to contribute for the well. The resulting debate centred on the community's perception and expectations in terms of water provisioning and how to deal with them.

There was a consensus of experience that too often communities expect free assistance and that on occasion this is stimulated by local politicians. They need to be educated to be realistic. The mere presence of LBDA vehicles was said to raise expectations. Such expectations would suggest that neither the community nor the chief is is aware of the role, function and activities of the LBDA. It is therefore, necessary for the LBDA to educate and inform of the real situation, what the LBDA's limitations are and what is expected from the communities themselves. AMREF are quite pragmatic and strict in what they say to the community:- "When you have raised money, we will come and assist you, but not before."

It was agreed by the participants that while a lot of self-help work has been done for schools little has been done for water and it is not realistic to expect easier acceptance by communities of their need to contribute. It is human to hope for something for nothing and to some extent people have been "groomed" in this way. An opinion expressed was that, as planners, our role is to put our expertise in the hands of the community and learn together. It was argued that motivation of communities is related to their awareness of the costs

being borne by them of lack of potable water.

A participant pointed out that some communities are aware of the water health linkages and going through the whole procedure with them may demotivate. It must be possible to short-cut the procedures when dealing with such communities. In addition, there are some communities who are indeed poor and this requires a flexibility on the part of donors so that their groups can also be served.

The final point discussed was on the control of community Health workers (CHWs). Although AMREF have a regular schedule of follow-up sessions, they still experience a 50% wastage in CHWs even though the community have selected them.

LAKE BASIN DEVELOPMENT AUTHORITY

SHALLOW WELLS WORKSHOP 10 - 12 OCTOBER 1983

RECOMMENDATIONS

RECOMMENDATIONS

OVERVIEW

During the course of the Workshop, a number of issues were identified as being of significance for any Shallow Wells Programme. These were the issues of:

1. Well ownership;
2. Selection criteria for target groups and sites;
3. Domestic water supply methods and costs levels;
4. Organistional capability of LBDA to implement a Shallow Wells Programme;
5. Community participation;
6. Maintenance/manufacturing/standardizations;
7. Education and Training;
8. Water, Health and Sanitation.

Groups of participants deliberated on and formed recommendations for these issues which were presented, discussed and approved at the final plenary session.

The specific recommendations which follow naturally have implications for the LBDA itself but also have implications for Government groups and organisations which are involved in low cost domestic water provisioning in Kenya. Whilst the issues have been noted separately, they are obviously interlinked, these linkages and overlaps have not been removed and will be seen in the recommendations. This is done

because in our view successful linking of these issues is fundamental to the problems of water provisioning by means of Shallow Wells.

WORKSHOP RECOMMENDATIONS

1. Recommendations on Well Ownership:-

1.1 The Workshop recommends that:

a) As far as possible, Shallow Wells should be sited on trust land or community land such as schools, church compounds, market centres.

b) Where land is communally surrendered for water purposes, it should be registered under the Ministry responsible for Water Development.

c) The LBDA should, where possible acquire or advise the Ministry responsible for Water Development to acquire land where thus appropriate or where there are land problems and enter into partnerships in purchase of equipment or other related items with the community which will benefit.

d) i) Legal ownership of the well must eventually be vested in the existing legally recognized bodies in the community.

ii) Where such committees do not exist they must be legally formed;

iii) Administrative leaders in the community such as chiefs and assistant chiefs should be ex-officio members of such committees;

iv) Committees should be responsible for safety, security, and operation of the well and should ensure universal access.

2. Recommendations on Selection Criteria for Target Groups and Sites

2.1 Criteria:

The criteria for selection should be based on a combination of the following factors;

a) Health status of the community;

b) Existing and planned water resources
   - Quantity
   - Quality
   - Distance for access

c) The population to be served from one supply point
   - minimum number per supply
   - population density, i.e., people vs distance

d) The location of key public institutions
   - schools, clinics, markets, co-operatives

e) The existence of effective functioning community organisations
   - womens' groups, farmers' associations, self-help groups

f) Economic status;

g) The physical potential for allocation of a Shallow Well;

h) Demonstrated potential and commitment of the community to maintain the supply.

The criteria need to identify divisions and locations within the region with highest priority and then identify communities within these areas.

3. Recommendations on Domestic Water Supply Methods and Cost Levels:

The Workshop came to the conclusions that:

a) Reliance on a single method of domestic water provisioning is not realistic.

b) For each given situation, the most suitable method should

be selected based on.

- available sources
- comparative costs
- maintenance needs
- water use potential for income generation

A comparison of options would include:- rain harvesting, spring protection, small dams, hand dug wells, hand drilled wells, machine drilled wells, piped schemes.

The following recommendations were made in relation to an LBDA Shallow Wells Programme;

1. An immediate survey should be carried out to identify areas and target groups according to proposed criteria;
2. The programme should not be merely the development of a Shallow Wells construction capacity but should be a broader-based water supply programme using appropriate low-cost options;
3. There should be a more rational distribution of project funds between institution building and water supply construction;
4. Every effort should be made to establish the lowest possible costs for each method.

Recommendation on the Role of the LBDA in Implementing a Shallow Wells Programme:

It was recommended that the LBDA remain an implementing agency of a Shallow Wells Programme in the Lake Basin area, especially in the light of the statutory powers bestowed upon it and specifically:

a) The LBDA should, as a co-ordinating body, establish an effective machinery to enable it to collaborate with all Ministries and Organisations operating in the Lake Basin area

in the implementation of all aspects of a Shallow Wells programme;

b) That no major organisational changes need be made in the LBDA structure for the purpose of implementation in the light of its function in relation to Ministries and other organisations;

c) That the LBDA should take the initiative to cause and facilitate the local manufacture of hand pumps, hand drilling equipment and necessary spare parts and support the standardization of the equipment used;

d) The LBDA as a regional organisation should ensure that necessary surveys are set up in conjunction with the relevant Ministries. These surveys should include investigations of alternative water sources as well as into areas of greatest need;

e) The LBDA should ensure that necessary training courses are undertaken for personnel to be deployed in the Shallow Wells Programme;

f) The LBDA's major role should be the co-ordination, supervision of a programme and disbursement of the funds available to it for the actual execution of the work involved in domestic water provisioning in the region. In this sense, one can designate the LBDA as the implementing agency whilst those that actually carry-out the programme could be called the executing agency.

g) The LBDA should co-ordinate effectively with the Ministry of Social Services in particular and other relevant Ministries and groups in order to sensitize, mobilize and stimulate proper participation of people in a Shallow Wells Programme.

Recommendations on Community Participation:

1 The Workshop recommended that the population be involved from

the earliest stage possible in the domestic water programme and that:

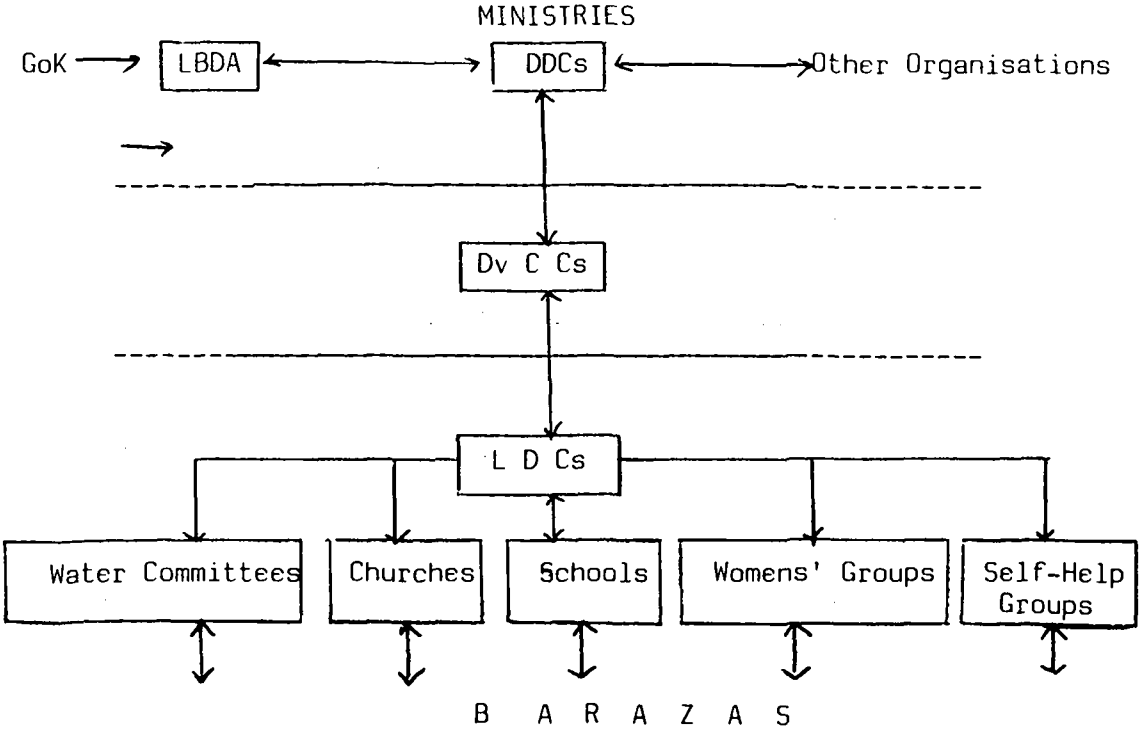
a) The LBDA make known in the broadest possible way the programme and the role of the population in it:

b) That mechanisms are developed to ensure the mobilization and participation of the beneficiaries in all phases of the programme including:

- Surveying
- Siting
- Construction
- Operation
- Maintenance
- Training

c) The population's potential contribution should be recognized as being varied, including; land, labour, finance, materials, organisational structure.

5.2 The Workshop recommended the development of an Organisational relationship betwen the LBDA and the District Development Committees for implementation, community input and involvement and co-ordination.



DDC = District Development Committees
Dv D C = Divisional Development Committees
LDC = Locational Development Committees

6. Recommendation on Maintenance/Manufacturing and Standardization:

6.1 Manufacture

Handpumps and other necessary components should be manufactured locally and preference should be given to publi institutions such as Institutes of Technology, Village Polytechnics, Railway Workshops etc.

6.2 Standardization

Standardization of pumps and parts should be encouraged leading to one preferred design. Such standards should be adopted at National level and accorded a KBS Symbol.

6.3 Maintenance

a) The primary responsibility for maintenance should be entrusted to the Well Committee (with an initial back-up service from the LBDA). The LBDA should ensure that the Well Committee can carry this responsibility and does discharge it.
b) The MoWD must be involved in all aspects of maintenance.
c) Spare parts stores should eventually be decentralized and probably supplied through the private sector.
d) The pump attendant should be paid on an honorarium basis by the community from revenue derived from water tarriffs.

7. Recommendation on Education and Training:

7.1 Personnel

a) The pump attendant should be identified before implementation takes place, he/she should assist in construction and installation, should be responsible for preventive maintenance, cleanliness and the good order of the site and is

employed by the Well Committee. His/her training should be at village level on-the-job.

b) The pump mechanic can be employed either by the MoWD or in the private sector, should be multi-skilled (e.g. a plumber mechanic) and the community has the option of choosing who is requested to carry out corrective maintenance. Pump training should be at Institutes of Technology.

Training

The Workshop recommended the following responsibilities and involvement in training for the various functions associated with Shallow Wells.

Function	Involvement in Training
1. Manufacturing	Institutes of Technology, Village Polytechnics, MOWD, LBDA/Consultant
2. Construction/ Surveying	MOWD, Institutes of Technology, Village Polytechnics, LBDA/Consultant
3. Maintenance	
Pump attendant	On-the-job (village level)
Pump mechanic	Institute of Technology
Supervision & Control	MOWD/LBDA
4. Health	Ministry of Health Voluntary Orgs./NGOs Ministry of Education Ministry of Culture & Social Services Ministry of Information LBDA/Consultant
5. Productive use	Ministry of Agriculture & Livestock Development, Ministry of Environment & Natural Resources

8. Recommendations of Water, Health and Sanitation:

a) It is the responsibility of the LBDA to ensure that appropriate health education is given to the target beneficiaries of any water supply scheme.

b) The LBDA, in collaboration with other government agencies, should ensure that water supplied in domestic water provisioning meets minimum health standards and that delivery is affected under appropriate sanitary conditions.

c) The LBDA should ensure the coupling of necessary sanitation improvements to any domestic water provisioning scheme.

12 CLOSING ADDRESS BY MR. TH. W. SIX, CHARGE d'AFFAIRS, ROYAL NETHERLANDS EMBASSY, NAIROBI

Mr. Chairman, Managing Director, Ladies and Gentlemen,

Now that three days of discussions have come to an end, it is a great pleasure that you have invited me to say a few words.

Let me say that we from the Netherlands were particularly impressed by the Large number of participants, by their very active contribution to the discussions and by the wealth of ideas that came forward.

It is all very well to provide a framework for an exchange of information and opinions but in the end, the actors themselves must turn it into a success and in our view, there is no doubt that these days have been a great success.

The main objective of this workshop - as we saw it - was to get new ideas for a meaningful Shallow Wells Programme in the LBDA region. The Netherlands Government feels committed in principal to contribute to such a programme. As you know, however, we felt that the LBDA proposal of the beginning of this year needed to be strengthened in some aspects of Rural Water Supply by means of shallow wells. In particular, we felt that socio-cultural aspects could be given more attention.

It is therefore, so very gratifying that one of the outstanding contributions to the deliberations came from the LBDA in the form of the Socio-Cultural Study, the thick blue book.

The socio-cultural issues raised together with other ideas will be included in the proceedings and above all will be reflected in the recommendations of this Workshop. They should be taken into account during the process of formulating a further shallow wells proposal.

That will inevitably take time. But we from our side will do our utmost to find the right balance between speed and quality.

Mr. Chairman, Mr. Workshop Director, apart from new elements for a project proposal, this workshop was also meant to provide an opportunity for an exchange of information amongst the participants and here too, we feel that it has served its purpose. We were therefore, very pleased that the awareness was very clearly brought forward in the discussions such that the form of an LBDA shallow wells proposal may have an impact on other similar projects in rural areas outside the region.

Let me conclude, Mr. Chairman, by stating our pride and satisfaction that we may cooperate with your organisation. We feel confident that this cooperation will continue along fruitful lines.

We are very grateful for your hospitality here during these days in the beautiful scenery of Kisumu and the great lake, the friendly atmosphere and the smooth organisation which was all so vital for a free and meaningful exchange of ideas. A word of warm thanks on behalf of all of us also to the Principal of the Tom Mboya Labour College, Mr. Akumu, who gave us all the support we needed to make the meeting a success.

Mr. Habwe, Mr. Obura, in expressing my hope that these three days of intense discussions will lead to a new start for the Shallow Wells in the LBDA area, I declare this Workshop closed!

W. Th. SIX
CHARGE d'AFFAIRS OF THE NETHERLANDS
KISUMU - 12 OCTOBER 1983

Appendix I

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Appendix II

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DGIS	-	Netherlands Directorate-General for Development Co-operation
GoK	-	Government of Kenya
KBS	-	Kenya Bureau of STandards
KEFINCO	-	Kenya Finland Co-operation Project
LBDA	-	Lake Basin Development Authority
MoH	-	Ministry of Health
MoWD	-	Ministry of Water Development
NGOs	-	Non Governmental Organisations
RDF	-	Rural Development Fund
UNICEF	-	United Nations Children's Fund
WECO	-	Western College of Arts and Applied Science