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Workshop on

Improving the Sustainability of Rural Water Supply Projects

October 17-18, 1991

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October 17-18, 1991

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Welcoming Address

By Ato Wondimagegnehu Gizaw
Chairman of CRDA

Ladies and Gentlemen,

Welcome to this workshop. The theme for this workshop is *" Improving the Sustainability of Rural Water Supply Projects".*

An adequate water supply is one of the basic needs of life, but is often lacking in developing countries. In recognition of this pressing problem, considerable efforts have been made by government, non-government and international organizations to improve and expand access to drinking water for rural communities. The International Drinking Water Supply and Sanitation Decade (1981-1990) has witnessed the development and expansion of water supply and sanitation facilities.

In spite of these efforts however, many of the schemes already completed are not in satisfactorily operating condition. Many completed systems have fallen into disrepair or have been abandoned. As a result, a number of countries and NGOs have been obliged to give priority to rehabilitation of existing systems over investment in new facilities.

This situation has caused considerable attention to be given to the question of how to ensure that water supply systems will continue to function and produce intended results after project completion.

While technical and economic factors have a strong influence on sustainability of water supply schemes, there seems to be a growing belief that the highest potential for sustainability is achieved when the beneficiary community is involved in all phases of the project. Therefore, the principal measure of success has now changed from maximum coverage to sustainability of systems constructed.

Community management has been proposed as one possible alternative strategy in view of the increasing evidence that systems are more sustainable when designed, established and operated by the community. Most water supply and sanitation experts seem to agree that a community management approach, as opposed to centrally planned schemes, has several advantages over other approaches.

If a scheme is to continue to operate satisfactorily, people have to recognize the need for the improved service. They must be able and willing to pay for the operation cost. They must also be willing to manage its maintenance.

But the question is how should this be done? What should be the processes necessary to build community management capabilities in rural water supply and sanitation services?

Sustainable water supply programmes involve a combination of technology and institutional / organizational support elements combined in such a way that each community recognizes " the benefits of the improved supply, can afford at least the costs of operating and maintaining it, and has the skills, spare parts, materials and tools available to sustain it". To make it more complete, parallel investments in health education and sanitation programmes should also be incorporated. Regardless of the many variations among water supply systems an integrated approach is likely to make rural water and sanitation schemes more sustainable.

I am sure that many of you have been involved in water development programmes. This forum will no doubt serve as medium for information exchange on both technical, social and institutional aspects of water, health, sanitation and related areas of development. It is our sincere hope that this will enable participants to compare and contrast the different

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methodologies used by government, non-government and other international organizations so as to adopt the most appropriate methods for their own programmes and rural communities with whom they work.

On behalf of CRDA and its member churches and agencies I would like to thank our speakers for offering to share with us their knowledge and experience in this important area of development.

I wish to thank the CRDA Water Interest Group for arranging this workshop with the CRDA Department of Development and Rehabilitation and wish every one an interesting and fruitful discussion.

Thank you,

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WSSA's Experience in Improving the Sustainability of Rural Water Supply Projects

By - Ato Fanta Feyissa
Head, Community Participation
Promoion Service, Water Supply and
Sewerage Authority

Day 1. Presentation I - morning session chaired by Mr. Michael Wood

Introduction

The speaker began by giving a short introduction. He said that the construction and provision of water supply projects should take into account sustainability, effective utility and replicability of the system so as to improve health, productivity and also create a better living environment.

Sustainability implies community and agency capacity to keep systems functioning. This is achieved through building local capacity to anticipate and solve problems. Whereas effective use is optimal, hygienic and consistent use of water and sanitation facilities is essential to maximize benefits and minimize negative consequences. It is achieved only when people accept new practices and make them part of their everyday behaviour. Replicability at the community level means that users achieve such a high degree of self sufficiency that they can expand their efforts to new areas. At the agency level replicability means that elements of successful approaches can be transferred to other projects or new geographical areas.

There is a considerable overlap among the three goals of water supply projects. In particular, capacity building within the community is the main requirement for progress towards sustainability, effective use, and replicability of Rural Water Supply Projects (RWSPs).

Historical Background

Ato Fanta Feyissa said that in Ethiopia rural water supply schemes were started in the early 1950s with borehole drilling for some towns and government authorities and pond construction for semi-nomadic pastoralists. The First and Second Five Year Development Plans (1957-61 and 1963-1967) did not cover rural water supply. During the Third Five Year Plan (1968-1972) 150 wells equipped with the necessary facilities were planned, but by the end of the plan year only 70 deep wells were drilled and only 35 of them were fully equipped.

Following the 1974/75 drought special efforts began to be made by both the government and donor organizations. The Ten Year Perspective Plan (1974- 1984) was drawn in 1974. During this period, 1174 boreholes were drilled, 1260 hand dug wells and 150 springs were constructed by the Ethiopian Water Resources Authority (EWRA).

With population increase and human resource development in the economic and social fields, the demand for water and the need to manage and administer water resources in national integrated and planned manner became urgent and essential. In recognition of this the International Drinking Water Supply and Sanitation Decade (IDWSSD) was launched in 1981.

One of the strategies of the Decade's programme was to involve users in the planning, construction, operation and maintenance of water supply schemes.

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Ato Fanta noted that the concept of community participation was first introduced into Ethiopia in the early 1970's after the Regional African Water Conference was held in Addis Ababa. As a result, WSSA's Community Participation Promotion Service (CPPS) came into being in 1984 under the Ethiopian Water Works Construction Authority (EWWCA) with the following objectives:

1. To gain effective community resource mobilization in the construction, operation and maintenance of RWSPs, and thereby reduce the overall cost of water supply systems.

2. To encourage and organize communities to carryout self-help water supply projects.

3. To ensure that RWSP activity is given due consideration and is appropriate to the needs and requirements of beneficiary communities.

4. To promote community contribution in O&M of their RWSPs so as to enable government funds to be used for increasing water supply facilities in other areas or for any required expansion work in the same community.

5. To develop and increase community's awareness and sense of responsibility for ensuring the sustainability of rural water supply systems.

WSSA's Strategy in Improving Sustainability

The first strategy towards improving the sustainability of rural water supply systems started with the establishment of a new organization structure and manpower allocation both at Head Quarters and the seven Regional Offices. Guidelines were prepared for the establishment of community participation in rural water supply projects, for the formation of community Water and Sanitation Committees and for NGOs engaged in rural water supply activities.

Training programmes were also organized at various levels in areas of community mobilization, water and sanitation education, socio-economic data collection, monitoring and follow-up and training in operating and maintenance of hand pumps.

Activities and Achievements

Ato Fanta Feyissa explained that in the area of community mobilization, Community Participation Promotion Agents (CPPAs) are assigned in different project areas to moblize local community resources for implementation of water development projects.

He added that between 1984-1990, 1251 Water Committees were formed for water projects in various regions. 472 hand pump and motor operators (care takers) were trained, water use and sanitation education was given in 955 areas. For better planning and construction purposes socio-economic data was collected in 355 communities.

Between 1984-1990 a total of 154 communities (240,987 persons) have participated in water systems construction in different regions (106 in hand dug wells, 11 in boreholes and 37 in spring development). This is both in terms of cash contribution and material supply.

Constraints

Ato Fanta Feyissa indicated the following constraints in rural water supply and sanitation projects:

- Lack of basic understanding on the concept of community participation (CP). The major objective of CP is to create and promote sense of ownership and responsibility among local beneficiaries and not merely to reduce construction costs.

- Choice of inappropriate technology in compatible with the needs, interests and practices of the target communities. This often results from lack of socio-economic baseline data.

- Lack of integration and smooth working relationship among and between WSSA, other government and non-government or-

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ganizations and beneficiaries. Acceptable standards and designs are not maintained by all, completed projects are sometimes abandoned without properly transferring them to their legitimate owners, etc.

- Financial, material and manpower constraint - adequate resources are not being allocated.

- Although women are the main users of water and responsible for domestic hygiene, their involvement in water and sanitation projects is limited.

- The number of people being trained and the quality of training is not satisfactory. Training should also be followed by the provision of basic operation and maintenance tools.

- Due to lack of community management (lack of power to make ultimate decisions on matters that directly affect their lives) failures usually outweigh successes in sustainable water supply projects.

Sustainable Development

Ato Fanta then defined sustainability. He said that sustainability aims to maintain efforts and derived benefits both at the community and agency levels without detrimental effects on the environment (even after special financial, and technical assistance has been phased out). Sustainability can be achieved by building problem solving capacities in communities and partnership agencies to resolve problems as they arise.

Obstacles to sustainable water resource development

Ato Fanta said that many systems for supplying communities with water, built with foreign aid are abandoned as they cannot be maintained. Because of this problem a fundamental change of approach was called for which could involve the community in the management of water supply and sanitation systems. Thus, community management of such systems based on proven low cost technologies have become a popular remedy.

Strategies for Sustainable Water Supply

A successful water supply programme must contain institutional/organiza- tional support elements to ensure that each community recognizes the benefits of the improved supply of water, that the community can afford to maintain the equipment and that it has the required skills, spare parts, and other materials to sustain it.

However, achieving full and effective community participation depends on the way members of the community are approached by field staff, extension workers or technical consultants. We must be able to mobilize the will of the beneficiary community. We must build their self-confidence. Confidence and competence increase when people get experience in management and decision making.

Human development for a successful water supply project also involves introducing appropriate technology. The technology selected must be based on the resources available within the community. The community must be involved in the selection of the technology and in the installation and maintenance of the system.

Key Elements in Water Supply Sustainability

Ato Fanta gave the following key elements in water supply sustainability:

- Community institutions must be established with strong administrative mechanisms.

- Development of skills of community members in pump maintenance and related activities; - Enhancement of general attitudes essential for successful achievement of sustainability.

- Community extension services should be provided.

- Community understanding, acceptance and agreement upon levels of service are required.

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- The use of appropriate technology.

- Operational phase inputs - all operational phase inputs (cash or materials) of the water supply system should be accepted and agreed upon by the community.

- Operation and management related supportive systems and services must be provided on a timely basis.

- Allocation of responsibilities must be clearly spelled out. There must be a clear understanding, acceptance and agreement as to who is responsible for what, when, etc.

- Execution of development and operational phase responsibilities on timely basis.

Discussion of Ato Fanta's Presentation

In response to a question from Mr. Lorne Braun, Ato Fanta said that some NGOs have their own CPPA's. Others do not. They also have constraints to use WSSA's CPP staff at field levels as there are not enough WSSA CPPs.

Ato Fanta referred to WSSA's guidelines for CP activity and NGOs are encouraged to have their own CPPA's and to use this guideline.

Mr. Gabe Hurrish, FHI/E commented that in many areas there are extension agents but no CPA's. He enquired if WSSA can organize workshops to train extension workers in CP activities. If NGOs request WSSA to organize training programme does it have such a provision?

Ato Fanta said that it is possible to do so. He referred to the CP course held at Arba Minch in the middle of the year. WSSA has the manpower and expertise to do the training. The financing part may be difficult, he said.

Ato Sahle-Mariam Mogus, CRDA added that if member churches and agencies put a request to CRDA as a group, it may be possible to fund such a programme.

Mr. Wood mentioned that the Southern regional office of WSSA has been giving training courses for pump attendants/operators. Many NGOs have also participated. If NGOs are willing to pay for the services, WSSA is willing to provide such facilities.

Ato Yilma, Action Aid asked if WSSA involves communities in the implementation of water supply systems.

Ato Fanta said that practice has not matched theory.

In response to a question by one of the participants Ato Fanta said that there are no standards of sustainability but there may be broad indicators.

Ms. Halkjaer, FAO, asked if WSSA CPPA's form water committee through the PAs and is it in parallel with PAs or is it in another relationship?

Ato Fanta responded by saying that CPPA's approach communities through local leaders and PAs. The CPPA is assigned from the regional office.

A question was asked about standardization of hand pumps. It was reported that 22 different hand pumps are being used. In January 1991 there were plans to organize a workshop on standardization of hand pumps but it was postponed for December 1991 or January 1992.

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Planning for Sustainable Village Water Supplies

By - Peter Sutcliffe
National Conservation Strategy, ONCCP
(Office of the National Council for Central Planning)

Introduction

Mr. Peter Sutcliffe introduced his presentation by saying that considerable concern has been expressed at the end of the International Drinking Water Supply and Sanitation Decade (1981-90) that the very large level of investment in water projects has not met the expectations of either the rural population or the investors. In particular, there has been lack of sustainability of many water and sanitation developments with very high levels of breakdown or even non-use of facilities which have been provided. Much of the problem can be blamed on inadequate planning. Inadequate that is in terms of participation of communities involved, poor problem diagnosis, inappropriate design or level of technology, lack of attention to institutional issues, and often an overestimation of what improved water supplies by themselves can do in improving the health of rural populations.

Planning is essentially a logical process of deciding between alternative objectives, approaches, technical designs, construction methods, institutional mechanisms and of focus and scale of intervention.

The Planning and Development-Approach

Participatory and Consultative Planning and Development

Participation of and consultation with rural populations in the planning of their development is an accepted principle, which is easier to state than to operationalize. The question is "participation with whom and how?" There are a number of levels and types of organizations who may and must be consulted:

1) Formal administrative:

- National/regional government (often with well defined procedures of consultation).

- Local/community/government (currently these are less well defined in terms of powers and responsibilities).

2) Informal

- Water collectors (women, children) as individuals.

- Water user groups (human and livestock supplies).

The informal sections may or may not be consciously organized. Where no conscious organizations exist (women's groups, user's groups) with recognized institutional procedures it may be necessary to establish these.

Participation and consultation between agency and community is required at all stages: planning, construction, use and management, monitoring and maintenance.

Scope and Scale of Water Supply Planning

It will be necessary to define at the outset the scope and scale of the planning:

- human supplies, or human and livestock water supplies.

- part of a wider rural development programme.

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- part of an evironmental health programme.

The first approach allows the agency to focus on a narrow range of issues and problems, but in doing so may ignore some very relevant environmental health problems, or (in local community terms) more pressing problems (health, agriculture). The third approach is more comprehensive but may leave the agency facing too many problems with all the dangers of over- stretching resources. In terms of planning village water supplies a modified version of the second approach would appear to provide the most effective compromise.

Establishing Objectives

Mr. Sutcliffe made two observations:

1) There is a need to distinguish between the agency's objectives and those of the target community.

2) No community is totally without water.

From these observations he made a number of points:

- the development agency needs to be clear about its own objectives in terms of water supply development, and must be prepared to adjust these to its own resources;

- the agency needs to determine and be clear about the community's objectives and priorities as these may differ from its own;

- there may have to be decisions between potentially conflicting objectives; improving quantity or distance to the consumption point (the house); between one large or a number of smaller supply points;

- a reconcilation will be required between agency and community objectives, and between agreed objectives and available agency and community resources;

- need to reconcile conflicting objectives within the community

: men (priority for livestock) and women (want close/proximity to human supplies).

: infirm or old (close proximity) and others (quantity but farther away).

Problem Diagnosis and Assessment

A. Diagnosis

Focus is on existing water supplies, and is a survey undertaken with the community on the following:

- the water source; the supply (yield) and quality (and seasonal changes).

- time and effort required to reach, wait for, acquire, and transport back to consumption point.

- user groups (and seasonal changes); number and consumption (households, beer maker, dung cake makers).

- user group organization; use, management, and maintenance procedures and resources.

- demand in relation to supply (and seasonal changes).

- type and condition of existing equipment and structures.

B. Assessment

A provisional assessment can be made on whether:

1) To use the existing source and repair, rehabilitate, improve or replace existing supply infrastructure.

2) To use the existing source and install new supply equipment and/or storage structure.

3) Identify new source(s) and develop these in addition or as alternatives to existing supplies.

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Technical Planning

A. Assessing the Supply

1. Improvements to Existing Supplies and Installing New Supply Mechanisms

A number of alternatives are possible:

- repair or replace existing equipment
- enlarge ponds or tanks
- repair or replace existing structures
- deepen and/or clean ponds, tanks, wells, springs
- install protection from contamination
- install water harvesting/collection structures (ponds and tanks)

It is important to consider these in the first instance.

2. Developing New Water Sources

A detailed survey is a pre-requisite. This will generally require a regional survey to identify surface and subsurface water resources if a programme on a large scale is being considered. Agencies should seriously consider obtaining outside expertise, and/or combining resources to commission joint studies in these cases. However, where small surface water developments are being considered agencies may wish to undertake surveys themselves.

a) **Surface Water Sources**

An inventory and assessment of surface water sources for small scale development is best conducted with local people who have lived in the area for many years, on flood levels, seasonal surface drainage ways, stream regimes, spring/seepage area reliability, etc.

Valuable aids include the 1:50000 EMA (Ethiopian Mapping Agency) contour maps, and aerial photographs. Technical information to be acquired before the survey should include the geology, monthly rainfall and evapo-transpiration, and soil types.

- Springs/Seepage zones: (yield and seasonal variations obtain from local informants; direct measurements).

- Drainage lines/small streams: (catchment area; runoff estimation using simple formula).

b) **Shallow Groundwater**

Aerial photographs, ground surveys using augers, old wells, and local knowledge can be used to locate and assess yield of shallow groundwater bodies.

c) **Deep Groundwater**

Expert surveys are required.

B) **Assessing Demand**

1. **Human Demand**

Total human demand on a source (existing or new) will depend on a number of factors:

- population size using the source (may vary according to season and the state of other sources).

- settlement pattern (dispersed, concentrated).

- degree of other uses (beer making, dung caves).

- time and energy used for collection.

  - distance from source to consumption point (note the influence of settlement pattern on distance for different people).
  - waiting/queuing time.
  - collection time and rate of supply *(see box)*

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2. Livestock

Total demand will depend on numbers and types. An ILCA (International Livestock Centre for Africa) publication quotes the following:

Cattle	*25-35*	*Litres/day*
Sheep/goats	*5-15*	*"*
Equines	*20-25*	*"*
Poultry	*15-25*	*1/100/day*

C. Assessing Technology

Assessing which type of supply mechanism (pump, etc.) will depend on many factors and only a simple list is presented here.

- water source: whether surface or subsurface, depth of water, yield, reliability of yield, storage requirements

- water quality: need for treatment

- objectives of development (increase quantity, improve quality)

- cost in relation to funds

- demand: population size, settlement distribution and density

- requirements and ease of maintenance

- community expertise

- agency expertise and resources

- fall back technology (buckets when pump fails)

- fall back sources (stream if borehole fails)

Organization and Institutional Issues

A. Identification of Users and Different Needs

Users are not homogeneous and this must be recognized:

- within family: may be differences in priorities between women and men.

- within community: different groups of people will exist within the community with different needs:

- old or infirm will not be able to walk long distances.

- different priorities between large and small livestock owners.

- increased needs of *'talla'* (local beverage) or dung cake makers.

- differences in demand between large and small families.

B. Existing Organizations

There will be a number of organizations and agencies who will need to be consulted before any water supply planning and development commences.

- National/regional government agencies: to ensure coordination and to avoid duplication.

- Community administrations (PA or PAs): to ensure administrative support.

- Existing water user groups: very important as these will provide major contact point between the agency and the people.

C. Planning the Construction, Use Management, and the Maintenance

1. Planning Levels

Regional/Sub-regional level:
Number of villages to be targeted

Community level:
Number of sites to be developed

Site level:
Supply technology and design

2. Planning Construction

The issues here include:

- degree and type of community assistance and contribution materials, labour, funds

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- whether to use local artisans

- need for specialized assistance (borehole drilling, bulldozer for pond construction)

- urgency of need to complete construction (eg. dams) before rains

3. Planning Use, Management and Regulation

Where an existing source is being improved and an existing User Group exists, there will generally be a set of rules regarding water extraction and use although these may now have to be modified.

For new developments it is important that a User Group be established at the outset, and that the Group work out a set of procedures regarding access, extraction, and regulation of the supply. The Agency should assist only where technical advice is sought.

4. Maintenance Planning

This has often been the most neglected part of water supply planning, and its omission probably accounts for more unsustainable supplies than any other cause. There are a number of issues:

- how many levels of responsibility?: eg. 3 levels might include: site (user group), village/village group (*eg. Peasant Association (PA)/Service Coperative (SC)*); region/awraja

- who takes responsibility at each level

- level of training required at each level

- what stocks of spares and tools at each level

- who monitors and reports

- are there any provisions for regular cost recovery and revolving funds

Cost and Benefit Assessment

The assessment should include not only financial costs and benefits, but also other tangibles which are difficult to monetize such as reduced distances, increased quantity per person, etc. Some examples are provided below:

A. Costs

1. Financial

- Capital costs: can be shown when planned to occur for cash flow analysis; and can be annualized over a set period (working life or equipment) to assist in determining a per unit cost of water delivery.

- Recurrent and maintenance costs: can be handled in the same way as capital costs.

2. Other Costs

-Increased time of collect (due to change in source site, or mode of supply: eg. pump)

-Decrease in quantity (due perhaps to treatment technology)

B. Benefits

1. Financial Benefits

In the past it was not thought possible or even "moral" to place money values on water supply benefits. More recently there have been attempts by economists to place monetary values on benefits:

- time saving is probably the largest direct benefit and there have been many attempts to place monetary value on time (eg. using local farm hired labour rates or same proporation of these)

- it is generally considered doubtful if direct health benefits accrue to improved water supplies but these might be included if considered part of a wider environmental health programme.

2. Other Benefits

- increased consumption (litre/p/day)

- increased in quality (various measures)

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Planning Water Supplies in a Broader Environmental Health Framework
(check-list of potential problems see over)

Too often "village water supplies" have been "add-on" component projects with little or no thought given to the wider environmental health framework existing in the project area. It is suggested here that village water supplies should be planned as an integrated component of a wider environmental health programme. Aspects to be covered in the survey and analysis could therefore include:

- epidemiology of water-borne/related diseases in the village area

- current levels of nutrition

- current levels of personal/household hygiene and community sanitation

- current preventative health programmes and facilities

Around this analysis a wider environmental health programme could thus be planned with the water supply component clearly linked.

Discussion of Mr. Sutcliffe's Presentation

Mr. Paul Gay, BME, asked if there are guidelines which NGOs could use as a resource for technical information.

Mr. Sutcliffe referred to various manuals (eg. VITA manuals and ITDG manuals) that can give useful technical information and guidelines. It was also suggested if CRDA could write/prepare a list of bibliography for use by NGOs as reference.

Ato Sahle-Mariam, CRDA informed the meeting that CRDA has a small library in which some of the manuals and technical materials are available. If additional bibliography and technical reference materials regarding aspects of rural water supply are required the CRDA Water Interest Group can assist in this respect.

In response to a question by Ato Tsegaye Hailu, WSSA, the speaker said that water supplies should always be planned in the context of health and environment.

Mr. Leonnard Moll, Menschen fur Menschen (MFM), asked Mr. Sutcliffe's experience in involving communities in designing water supplies. Mr. Sutcliffe explained his experience in hand dug wells in Liberia. It was also announced that MFM will publish a document on its experience in Illubabor Rural Water Supply. For those interested it can be made available.

Ato Taye Demissew, Bruh Tesfa Children's Village asked regarding obtaining guidelines for NGOs in water supply projects. Mr. Wood said that WSSA is in the process of issuing a series of guidelines for NGOs to follow. Regarding the construction and management of rural water supply systems the first draft of guidelines was presented at a workshop in Arba Minch in May and some feedback has been received. The guidelines have been revised by Mr. Wood, the CIDA consultant and Ato Fanta. This guidelines will be distributed to NGOs for comment. But the initiative has to come from WSSA as for the next step.

Ato Sahle-Mariam, CRDA referred to the role played by the CRDA Water Interest Group when WSSA issued new directives on the drilling, construction and rehabilitation of deep water wells in August 1989. These directives were distributed to members involved in water supply projects. A discussion forum was also arranged to discuss the proposed guidelines with senior officials of WSSA. In this forum NGOs have given their comments on the proposed directives. CRDA can also arrange a similar forum to discuss the proposed NGO guidelines.

The problem involved in the planning for sites and access to water points was also raised. Mr. Sutcliffe mentioned his experience in other countries. He said that in

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Nigeria there is a legal system of compensation for owners of water points. In Liberia there is no problem. The community gives the go ahead. In Ethiopia the system of land tenure is not yet in place. But land registration has been done in Kenya where access to land is more difficult.

Mr. Dutto, LVIA suggested that the government should be approached to provide various technical data to enable NGOs to better plan and implement their water supply projects. Such technical data on water would supplement information and data obtained from local communities.

Mr. Sutcliffe referred to the conference of the National Conservation Strategy held in May 1990. One of the key recommendations for which the Secretariat is working on was that there should be a national natural resource data base and anybody should have access to it. Five government agencies are working to develop computerized nature resource geographic information system.

It was also suggested that there should be a more organized system of consultation in terms of existing facilities and resource data.

Organizing women for maintenance of water supply systems was also discussed.

Mr. Wood said that WSSA has decided to install only Afridev pumps in the southern region. For every pump that is installed one man and one woman will be trained from the community to maintain it. Every Afridev pump comes with a spanner from the manufacturer. The spanner will be handed over to the water committee with a set of spare parts.

Check List of Potential Problems

1. Quantity

- flow (streams, drainage lines) including extremes, seasonality, reliability

- yield (springs, seepage) reliability

- rechange (groundwater)

- depth (groundwater)

2. Quality

- turbidity (suspended solids)

- taste/odour

- chemical

- biological/bacteriological

3. Accessibility and Distance

4. Technical

- extraction (depth of groundwater)

- flood hazards

- existing equipment

5. Social

- old and infirm unable to reach

- women engaged in agriculture/livestock production

- sharing with outside groups eg. in dry season

6. Institutional

- lack of government/agency maintenance

- lack of institutional management and maintenance mechanisms

- lack of local expertise (mechanical, artisan)

7. Environmental Health Concerns

- water-borne or related diseases in sources not used for human drinking but for other purposes (irrigation, livestock watering)

-water related insect disease vectors (malaria)

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Box

INFLUENCE OF TIME AND EFFORT ON WATER CONSUMPTIVE DEMAND

(Source: Rural Water Supply and Sanitation: A Framework for Improving Investments. World Bank 1985)

Per capita water consumed: litres per person per day (Q)

$$Q = 0.065\ T$$

Where
$T = (d/s + q + v/r) / v$
and
d = distance to and from source (kms)
s = walking speed (kms/hour)
q = queuing time (hours)
v = amount collected each trip (litres)
r = rate of delivery (litres/hour)

Example

d = 20 metres, 200 metres, 2000 metres
s = 4 kms per hour
q = 1 minute (1/60)
v = 15 litres
r = 1000 litres per hour

Distance from Source

10 metres	T = 0.0024	Q = 27 litres per person per day
100 metres	T = 0.0054	Q = 12 litres per person per day
250 metres	T = 0.0104	Q = 6 litres per person per day
1000 metres	T = 0.0354	Q = 2 litres per person per day

ILCA Document (Building ponds with annual power in the Ethiopian Highlands)

Communal source:	> 1000 metres	5-10	l/p/d
Communal source:	500-1000 metres	10-15	l/p/d
Communal source:	< 250 metres	15-20	l/p/d
Private connection		30-50	l/p/d

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Sand Filtration with Water Ponds: Sustainability, Practicality and Lessons Learned

By - Gabe Hurrish
Country Representative, FHI/E

Presentation 3 - Afternoon session chaired by *Mr. Lorne Braun*

Mr. Gabe Hurrish explained that FHI/E has been involved in the construction of water ponds around Alaba since 1986. People understand the technology of ponds.

The speaker said that the main reasons for the decision to assist with water ponds were as follows:

First of all, the people were constantly asking for assistance in this area. There is an acute shortage of water sources in the Awraja.

Secondly, there are no springs and hand-dug wells are impossible since the water table is too deep.

Thirdly, FHI does not have the capacity, resources, or expertise to properly facilitate boreholes. And even if boreholes are drilled there is a chance that the water will contain too high flouride for safe human consumption.

Fourthly, the water pond is a technology the people understand and can appreciate. They were the ones who asked FHI/E to assist with the water ponds and FHI wanted to try to provide clean water as much as possible.

The major criteria for choosing water pond sites were:

1. Expressed need of the community (for a clean water source).

2. Community organizes itself (with FHI/E help if needed) into a water committee and makes an official request.

3. The community displays a willingness to assist in the renovation of their pond.

4. The water pond already existed and there was water in it most of the year. This was due to the nature of the programme being new and FHI/E did not want to create new ponds for fear of malaria which is endemic in the area.

Accomplishments:

Three ponds have been renovated and slow sand filtration galleries have been attached. Pumps are installed and working on two of them. In addition:

- ponds have been widened
- walls of the ponds have been lined with mud blocks
- floors of ponds have been compacted using livestock and homemade pounders
- canals have been cleaned and realigned to make them more efficient.
- inlets have been cleaned and rehabilitated
- infiltration galleries have been constructed
- reservoirs have been dug and covered
- hand pumps have been attached
- drainage systems have been constructed

4 additional ponds are currently under renovation in various stages.

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7 local farmers have been trained in pond filtration construction techniques as well as in water pond maintenance and repair aspects.

Mr. Hurrish then gave statistics related to the construction of slow sand filtration galleries attached to water ponds (taken as an average of three water pond sites in the Alaba/Siraro awraja).

The presenter then distributed a photocopy of the full and top views of the water pond filtration system to the participants.

Contribution of Communities

- all labour such as clearing, digging, compacting, making mud blocks, hauling materials, and mixing cement, etc.
- locally available materials such as sand and stones.
- all labour for constructing fences around pond sites.
- supplying guards for the pumps and water pond sites.
- planting of grasses along the slopes of ponds to prevent erosion and trees along the fence to make living fence.

Contribution of FHI:

- materials not locally available such as cement, wood, etc.

- tools for the proper construction and public works activities.

- some food-for-work grain (21 quintals on one pond).

- transport of all locally available materials

- payment for semi-skilled labour since they were away from their fields and required some renumeration.

- pumps and stands as well as tools for repair and maintenance.

Training Component:

7 local farmers were trained on the job in the skills of masonry, construction, and water pond construction. Of these, 4 were skilled enough to continue the work on their own in the proper maintenance of the pumps and water ponds.

One of the four locally trained farmers has been hired by a local company for his masonry skills and he has also been contracted to put in the floor for a health post built by community participation in a neighbouring community.

Every working day before the work began, an informal health education session was held by the water technician to discuss with the people what would be done that day and what the over-all purpose of the work was all about.

Results of the Water Pond Renovation:

There is an 80% reduction in bacteria after filtration as evidenced by a test done with the OXFAM water test kit.

A marked decrease in diarrhea prevalence among children under 5 years of age has been seen as evidenced by a comparison of a survey done before the filtration construction and after.

The communities involved have shown an ability and willingness to maintain and repair the pumps and water ponds as needed.

The locally trained farmers have been able to repair the pumps on their own.

Lessons Learned:

1. The involvement of the community from the start was the most essential element to success in the long term. Once they know their responsibilities and those of the agency, they are willing to do the work quickly.

2. One must make allowances for the schedule of the community since they will

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not work on a schedule which does not suit them.

3. Always have an alternative site planned in case one community refuses to do the work and you can then easily move over to the other community if they are more willing. This can be done by asking them to do all the labour works before FHI spends any money for other materials. We found this strategy to be quite effective for sending a signal to the communities that if they do not participate, FHI will simply go somewhere else.

4. Community participation must take into account the special days of the community, such as holydays, market days, etc. As long as the community sets the schedule they will be responsible for organizing themselves on those days.

5. One should be prepared to work on the ponds in times of the year when the people are not otherwise busy. At cultivation, sowing, and harvesting times one does not get a lot of community participation.

Problems Encountered:

1. Lack of fuel slowed our ability to transport items to the sites. We simply tried to keep the communities busy with other things while we waited for fuel.

2. The recent civil unrest in the country caused a complete stoppage in the work for several months.

3. A local conflict between the Alaba and the Arssi people has caused severe disruptions to work and involvement of the community. Our plans have been compromised and we have asked for extensions from the donors.

Future Steps:

1. Future water pond communities will be required to contribute a greater share of the over-all costs.

2. We are trying to find ways to make the galleries cheaper and are experimenting with new technologies.

3. We want to experiment with plants which cover the water pond in order to prevent excessive evaporation.

4. We are using a new type of pump which is made in Ethiopia by the Akaki Factory and has a good record for repair and maintenance.

5. We want to train more women in the repair and maintenance of the pumps as well as get greater representation of women on the committees.

6. We want the community to begin to pay the salaries of the locally trained farmers to make them more self-sufficient.

Discussion of Mr. Gabe Hurrish's Presentation

As ponds often provide good ground for malaria breeding what precautions has FHI taken?

Mr. Hurrish said that before they started the programme they discussed the matter with the local malaria control office. As they are working on ponds which existed before they are not increasing malaria any more than what existed.

To decrease evaporation FHI is also working on introducing some kind of algae. But malaria breeds in grasses, so it was feared that while trying to decrease evaporation we may actually encourage more malaria to breed.

Mr. Paul Keating, CONCERN said that as the water table in Sike awraja is very deep they are considering to construct ponds.

The length of the gallery is 15 metres. If the gallery is large it means more sand is required. It was reported that the average cost of one pond is about Birr 12,000. FHI was asked to compile data on ponds for use by NGOs. Such data could be on how to prevent leakages, how to measure evaporation, the rate of siltation, etc.

Mr. Wood suggested that NGOs should be in touch with EWWCS/WSSA for techni-

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cal assistance on slow sand filters. NGOs can also contact WSSA for hydrogeological survey data.

In response to a question on the findings of their water quality testing, Mr. Hurrish said that they have seen a reduction of bacteria by 80% after filtration. The full sand filtration system showed a more reduction in bacteria than a graded stone filtration system.

With regard to the question how the people can maintain the filtration system, the presenter said that as sand is locally available the filtration system can be maintained by replacing sand every six or tweleve months.

Regarding the repair and maintenance of the pump, Mr. Hurrish said that at first FHI used EWWCA's direct action pump (Shala pump) but it needed maintenance almost every week. So they had to replace it with the Akaki- made pump to see if it works better. This pump seems good for shallow wells but more time is needed to give our final recommendation.

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Menschen fur Menschen's Experience in Improving the Sustainability of Rural Water Supply Projects

By - Ato Demissew Abate

Ato Demissew Abate gave a brief background on Menschen fur Menschen (MFM). He said that MFM started operation in Ethiopia in 1981 with a relief programme for drought affected people in Errer Valley (Harerge region) and in 1985 for the setters in Illubabor region. Later the Foundation got involved in various development work. In Errer Valley it is implementing agricultural (crop production, horticultural, poultry, health and school programmes). In Illubabor administrative region MFM is involved in water, health, schools (21), bee-keeping, orphanage (60 orphans) and economic programmes.

The Foundation is also involved in appropriate technology (Harer), in relief programmes (Jijiga) and in the production of iodine in Asseb for distribution to iodine deficient people.

MFM is also planning to start agricultural, water and health programmes in Merhabette areas in Northern Shewa.

Water Project in Illubabor

The Illubabor Water Project planned to construct 500 water supply schemes for the settlers in the region. Up to the end of September 1991 the project has constructed 229 schemes, of which 144 are hand dug wells and 85 are springs.

To make the water supply scheme more sustainable MFM works in close collaboration with WSSA. WSSA has assigned one Civil Engineer and two Community Promoters for the water project.

The main types of water supply sources constructed in the project area are hand dug wells and springs.

Two types of hand dug wells are constructed depending on the geological formation of the area: single cylinder wells and double cylinder wells.

Based on the topography and location of the spring sites three types of spring development methods are used.

1. Spot development without a chamber or a box

2. Tapping with a chamber and wing wall

3. Tapping with a chamber and diversion wall

Community Participation

Since the project is intended to supply water for the settlement villages the community promoters visit each village according to the work programme. The community promoters teach and promote the community about water and sanitation. The promoters ensure that the community needs the project and will participate in all possible ways. If the community is found not interested, the village will be left for another time and in the mean time this village is expected to learn from their neighbours and also from a continuous teaching of the promoters till they understand and accept the project that it is for their own benefit.

In the project the community participates in site identification, constructing access road, fencing of the scheme and in the free supply of local construction materials.

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The villagers also form water committee which are responsible for co- ordinating community activities during the construction phase. The water committee selects people to be trained as pump attendants and care takers.

During the operation phase of the scheme the water committee is responsible for co-ordinating community activities to keep the water source clean, properly fenced and to report to the Foundation any problem that may be beyond their capacity to solve.

Feasibility Study

A team of professionals involving the foundation engineer, a foreman and a WSSA engineer visit the villages after all promotion work is done and community acceptance of the project is assured. The recommended source of water supply is selected by the team together with the local people.

Design

All the necessary designs for construction are prepared jointly by the Foundation and the WSSA engineer in the project office. Standards used in the design are:

- Water demand 20 lcd
- Hand dug well for a maximum of 200 people
- Maximum distance of source to the users (one way) 500 mts
- Average pumping hour per day 4 hrs.
- Hand dug well dimensions
- External diametre of How 1.60 mt
- Internal diametre of 1.00 mt
- Thickness of concrete cylinder wall 0.10 m

Construction

There are four construction crews in the project working in different awrajas. Each crew has a Supervisor who has technical education with a Diploma. For hand dug wells, a well trained technician and for spring development works a mason trained on the job in the construction work are assigned. They also have assistants.

Local construction materials are the main problems in the project area. The Foundation has to transport sand, gravel, stone, etc. from very far places.

For some sites sand has to be transported from as far as 400-500 km (round trip). Due to this the construction cost for these sites is very high.

Construction work is done under the close supervision of the WSSA Engineer. After completing the construction work the Engineer does the final inspection and the scheme is accepted for service.

Water Quality Test

To avoid health hazards all water sources are disinfected and the quality of the water is tested before allowing the community to use it. If the quality of water is found potable the scheme is handed over to the water committee of the village for use.

Operation and Maintenance

Pumps installed in the project are VLOM type pumps (Perussag-Indian Mark II modified by a German company). Pump attendants and care takers are trained to perform minor works during the construction phase of the project. The trainees for operation and maintenance are selected by the water committees. For problems which are beyond the capacity of the community the water committee has to report to the project office. The water committee can report to the construction crew working in the area or to the local Ministry of Agriculture or Coffee office so that through them the report can reach the project office in Mettu.

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Because of the low level of income of the community the Foundation is providing free maintenance services.

The project office has planned to organize a maintenance crew for WSSA and provide them with all the necessary tools for operation and maintenance, transport and spare parts.

Problems Encountered

- Trained pump attendants and care takers change their villages.

- Since it is a free service for the community some water committee members lose interest after some time of service.

- In situations where two villages use one water supply source it has been found difficult for the water committees to control the community. When the water supply system breaks one village often blames the other. This often makes it difficult for the water committees to take corrective measures on time.

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Rehabilitation of Hand Dug Wells: A Case Study from Wollayita

By - Ato Nega Bazezew
Water Advisor, OXFAM/UK

Ato Nega Bazezew gave a short historical introduction. He said that during the 1985 food crisis in Damot Gale awraja, North Omo region OXFAM got involved in providing drinking water supplies as part of its emergency support programme in Wollayita. OXFAM later expanded the programme into water development activities in the area with an intention of constructing wells, ponds and the protection of available springs.

Later the programme concentrated mainly on hand dug wells. Ponds were left out and spring protection was de-emphasized because there were no springs in the area which could be protected. From 1985 to the beginning of 1991, OXFAM constructed 92 shallow hand dug wells in 32 Kebeles of the Awraja.

The wells were all lined with 600 mm diametre concrete linings, a standard adopted from EWWCA's Southern Regional Office in Awassa. Some of the wells were fitted with mono hand pumps and some were open wells with ropes and buckets fitted to them. Towards the end of 1990 VLOM hand pumps were introduced to the project and thus few Aquadev hand pumps were installed on some of the wells.

At the moment the water programme has entered into a new phase in which sustainability of already constructed water supply systems in the Awraja is given more emphasis than the construction of new hand dug wells.

Why rehabilitation of wells was necessary?

Ato Nega said that in October 1989 OXFAM conducted an internal review of its water programme which resulted in the addition of social survey work into the programme. By the end of 1990 a total of 92 hand dug wells had been constructed and in February 1991 a rapid social and technical survey of all the wells was carried out.

The results of the survey indicated that:

(a) 60 per cent of the wells get dry for a period of time during each day causing long queuing, and 5 per cent of the wells were completely dry, i.e., some took longer time to re-change and some were dry.

(b) 50 per cent of the drainage aprons were in poor condition.

(c) 40 per cent of the monolift hand pumps were broken down.

Therefore, in order to make the systems more sustainable it was decided to carry out rehabilitation work. Three lessons were learned from the survey results:

a) Well design must be appropriate

b) Appropriate technology must be used (VLOM-pumps).

c) There should be community participation.

The objectives of the rehabilitation programme were as follows:

(a) To ensure a reliable and potable water supply for the communities by deepening the existing wells and renovating the drainage apron.

(b) To let the communities participate in the rehabilitation programme starting from the beginning, and introducing VLOM hand pumps and training of hand pump care takers, thus minimizing the reliance of the community on WSSA for hand pump

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maintenance, and strengthening the already existing water committees.

(c) to maximize the impact on health by targeting specific hygiene education at women and children.

(d) to do monitoring of well water quality and ground water level fluctuations and

(e) to come up with a water supply programme which is sustainable by the community.

Ato Nega indicated that the rehabilitation work has four major components: planning and programming, design, well reconstruction and operation and maintenance.

A. **Planning and programming**

The rehabilitation programme will continue through three and half years, for which a budget of 1,577,610 Birr is already allocated.

The programme has given due consideration to the participation of the community and hence the social work part of the programme has been greatly emphasized. The programme personnel consists of a programme manager, one social co-ordinator, one technical co-ordinator, 7 technical staff, 8 support technical staff, 2 drivers and 3 guards.

The project timetable will consist of different phases in which a three stage work plan is envisaged:

1) July-August and October-December .... Casting of concrete ring beams.

2) January-May ... Widening, deepening, and relining

3) June ... Caissoning*

B. Design

As mentioned above, the main draw back of the well construction was that as the well diametre was so narrow (600 mm) it was very difficult to do deepening or caissoning work inside. Thus it was very imperative to come up with better well design which has been adopted as a standard hand dug well design for OXFAM. This standard well design has evolved through years of experience in Northern Wello and Wollayita.

Ato Nega then gave some of the key features of the standard well design are as follows.

(a) Well lining diametre is 1300 mm (external) and 1200 mm (internal), and this will allow for two additional stages of caissoning. The first caissoning has an internal diametre of 1000 mm during the end of the dry season, and the second caissoning has an internal diametre of 700 mm in times of severe drought.

(b) The cover of the well is made up of precast concrete slab, weighing 560 kg and can be easily removed to allow caissoning.

(c) The drainage apron has radial and circumferential 2% slope, which channels all waste water to a cattle trough and soakaway pit.

(d) On the cover slab a manhole cover is incorporated which weighs 120 kg and this can be removed to give access to the well water in case of hand pump breakdown which is beyond the ability of the hand pump care takers.

(e) A small pipe is cast into the manhole cover to allow easy access for water level monitoring.

(f) A durable masonry wall fence is part of the drainage apron to act like fence for

* Caissoning could be defined as a process of deepening and lining a well in which a concrete tube (caisson lining) is put into the bottom of a well inside the main lining and is made to sink on its own weight by excavating under its lower end.

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animals and to help women and children in placing their water pot in their back.

C. Well Re-construction

The well re-construction consists of both social and technical components.

Social Component

Before any construction is started, the social workers visit the particular community and discuss problems they have concerning water. During this discussion the idea that they have water shortage problem has to come up from the community themselves. Mostly they come up with the idea of deepening the well so as to get more water.

Based on their request the social workers tell them that if they want their well renovated they should be ready to participate in the work by strengthening their water committee, electing hand pump care takers who will be trained in the installation and maintenance of the VLOM hand pumps and also be ready to pay a very small amount of money (about 10 to 25 cents per household per month) for the running costs of the well and/or for the purchase of spare parts (which is not more than 20 Birr per year).

If the community accepts to participate in the renovation work of their water supply system, election of a water committee and hand pump care takers is carried out.

Technical Component

Based on the survey data collected the wells are categorized into three options.

1st option wells are those requiring complete renovation i.e., widening, deepening, and re-construction of the drainage apron.

2nd option wells are wells which require widening only up to three metres from the surface and re-construction of the drainage apron.

3rd option wells are those wells which have been constructed after the new standard well design was introduced into the programme, and thus do not require any renovation work.

For those wells which fall into 1st and 2nd option the technical crew go there after the social team has visited the area, and proceed with their work of widening and deepening while at the same time concrete rings are made on site by community labour using steel ring mould. When the casting of the concrete linings is finished and the rings are well cured, relining is carried out, followed by the construction of the drainage apron.

Community hand pump care takers are trained on hand pump installation and maintenance by the social workers. Thus, when the rehabilitation work of the well is done and the drainage apron is constructed, the hand pump care takers are then asked to install the pump with the guidance of the social workers.

Well deepening is done during the rehabilitation time as far as the dewatering pump capacity allowed. Deepening can be continued during the dry season by caissoning after opening the cover slab, a means which is included in the new standard design.

Hygiene Education and Social Survey Data Collection

Once the well renovation and the installation of the pump has been completed, the social workers will remain in contact with the communities to provide hygiene education in collaboration with the Ministry of Health's Community Health Agent.

Specific hygiene education targeted to women and children water collectors is given at the well site. This is given to a group of five neighbouring households during a 30 minute session and the message will concentrate on:

(a) How to use the hand pump correctly

(b) How to keep the drainage apron clean

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(c) Basic explanation of why the well water is better than the traditional surface water sources.

The social workers will then continue collecting their social data which consists of the distance travelled by each household to the water point and the time taken, the amount of water collected per day by each household, the peak water collection hour and the total household number using the same well as their water source.

The data collected will be baseline data for future use by WSSA for any further work at the well site.

D. Operation and Maintenance

Operation and maintenance of the water supply system at each well is carried out by the hand pump care takers elected by the community. The hand pump care takers often do the maintenance and the installation of the hand pump with the social coordinator and the social workers.

The hand pump care takers do not only do the installation and maintenance of the hand pumps, but also work as pump attendants for which they are paid small fees. Men were assigned as pump attendants until recently and they were paid for their services by the community. However, the hand pump care- takers were not paid anything. Hence, in order to encourage the hand pump care takers we decided to assign them as pump attendants as well so that they get paid, however small the amount may be.

The amount of money collected from the community is 15 to 25 cents per household per month. This amount is enough to pay the monthly 5 Birr each as incentive to the two hand pump care-takers who also serve as pump attendants.

Cost for the spare parts for the hand pump is also contributed by the community. The amount is only 20 Birr per pump per year. Spare parts enough for ten years are provided by OXFAM (as these spare parts are not currently produced in Ethiopia), and are paid for from the monthly contribution made by the community.

E. Monitoring and Evaluation

Monitoring is undertaken by WSSA's construction inspector and water quality technicians. Final project completion reports are submitted to WSSA and entered into their data base to be used by the maintenance crew. Periodic evaluation of the whole programme is undertaken by the WRC (Water Resource Committee) and RRC and internally by the OXFAM water advisor.

F. Conclusion

In any rural water supply programme, the key point that should be properly addressed is its sustainability. For a programme to be sustainable, due attention should be given to the social, technical and institutional aspects of planning, design, construction, operation, and maintenance starting from the very beginning.

In this rehabilitation programme of Wollayita water supply, considerable efforts have been made to consider all of the above aspects, and by doing this it is expected that the programme will be able to maximize benefits for the community and make the water supply programmes more sustainable.

Discussion of Ato Nega's Presentation

In response to a question Ato Nega said that the depth of the wells ranges from 6 to 69 metres.

Mr. Wood asked if they have any plan of testing the yield of the wells.

Ato Nega responded by saying that OXFAM does not have any plan of doing yield measurement except that they do water level fluctuation monitoring.

Ato Tekka, UNICEF asked if they have done any costing on the rehabilitation of the wells.

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OXFAM has the cost data but the cost analysis between the new wells and the rehabilitated ones has not been carried out so far.

It was mentioned that the advantage of open cover slabs is that they can be maintained or rehabilitated any time as they are not sealed.

It was also noted that for each well two people are elected by the community to serve as hand pump care takers. Pump attendants are also hand pump care takers. Each family contributes 10-25 cents per month to be paid for the pump attendants/hand pump care takers. As an incentive they are given 5 Birr per month.

In response to a question it was noted that as spare parts are not locally available and since they are not expensive OXFAM provides spare parts to last them for 10 years. The cost of spare parts (for Afridev pumps) is about 20 Birr/pump/year.

A participant asked how OXFAM selected the well sites. Ato Nega responded that all the 92 wells were constructed during drought emergency periods. Thus no proper planning was done in siting the wells.

Ato Nega also informed the meeting that social survey data such as distance travelled, consumption per household, peak hours of water collection/use, number of people per water well, etc., has also been collected by OXFAM.

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NCA's Experience in Sustainable Water Supply Projects: The Bale Experience

By - Ato Shimelis Derebe
Bale Water Project Coordinator

1. Introduction

1.1. Historical Background of NCA's Intervention

In the aftermath of the Ethio-Somalia war of 1979 more than 300,000 refugees from the Ogaden Region settled in 280 new resettlement site in South Ethiopia. The majority of these resettlement sites were in Bale region. In additional to the war - refugees there were also drought displaced nomadic tribes and people from the over degraded agricultural area of Wello in need of emergency relief assistance.

NCA started giving relief assistance in water supply in 1979.

1.2. NCA's Performance under RRC Programme

The first phase of NCA's intervention in water supply activities started by providing relief services in 1979 and continued until the end of 1986.

During this period 67 wells were drilled in Bale and Sidamo regions out of which 47 were functioning.

1.3. NCA's Development Objectives

In the second phase of intervention (1987-1990) NCA shifted its emphasis from relief to development and entered into partnership agreement with the Water Resources Commission (WRC).

The development initiative consists of two components, known in the project document as scheme one and scheme two.

Scheme One - Development of Ground Water Resources.

Management of drilling operations would be NCA's responsibility. Water Resources Commission (WRC) would provide back-up services to NCA through secondment of technical staff and financial assistance.

Scheme Two - Development of Surface Water Resources.

WRC to manage operations. NCA would provide back up support to WRC in the form of finance; importation of materials and equipment; and provide external consultancy services and training where needed.

The overall development programme target would be the provision of clean water:

- serve 100 communities or an estimated target population of 200,000 people and 100,000 livestock,

- alleviate the problem of water collection for an estimated 50,000 women,

- contribute to the general improvement of health of project beneficiaries,

- assist toward capacity building of WRC,

- promote community ownership and control over community water supply schemes.

1.4. Achievements in the First Cycle of Development

The achievements of the drilling operations (scheme one) at the end of project period include the following:

- a total of 165 bore holes were drilled of which 122 are functional.

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- the water requirement for about 160,000 people and an estimated 60,000 to 70,000 livestock has been met from the drilling operations.

1.5. Surface Water Development

Operations for the development of surface water resources had to be abandoned because of lack of an institutional capacity and due to lack of skilled manpower available in WSSA.

2. Lessons from the Bale Water Project (BWP) Experience on Sustainable Community Water Supply Schemes

Ato Shimelis noted that for sustainable rural community water supply schemes to continue to materialize the following key issues must be taken into account:

2.1. Community Participation (CP)

2.2. Reliable and Safe Water Resource

2.3. Well Design and Construction

2.4. Choice of Pump Technology

2.5. Maintenance and Operation and

2.6. Finance

3. Community Participation

Without active participation of the community, water schemes are bound to fail. Without CP it would mean inappropriate choice of technology and service level, wrong location of water points, high cost, inability to keep water schemes operational and finally total rejection by users.

On the other hand, CP cannot be restricted merely to extracting free labour contribution. All issues of relevance need be addressed systematically using the community's own experience and knowledge. Strong community initiative is important in bringing lasting success for community water supply systems. CP work must start right from the planning stage and proceed through to the completion. NCA has developed a CP work directive known as the ten and fourteen step plans.

4. Reliable and Safe Water Resource

A brief survey and investigation report of NCA's project area indicated that knowledge of local ground water characteristics (hydrogeology) were either sparse or lacking. The need to make the necessary studies and surveys to gather information on the area's geology and ground water (aquifer) potentials became a priority for any meaningful community water supply project.

These surveys have now been conducted involving seconded staff from EWWCA. Staff training was also given for EWWCA and NCA personnel through external consultancy services. On the job training was carried out using up-to-date geophysical instruments. Such efforts by NCA/BWP helped to:-

- raise the institutional capacity of EWWCA through improved professional competence of national staff,

- acquire knowledge of regional geological formation, topograhy, hydrology, geological structures and ground water flow direction of each area of the project.

With knowledge of the local hydrogeology of Bale region, choice of technology as regards drilling equipment and pump types can be made and more intelligible ground water management strategy can be formulated.

The pursuit and finding of safe and reliable water source is a critical issue for attaining sustainability.

5. Construction of Community Water Supply Schemes

Proper well design and construction are essential for the extended life span of the community water supply schemes. Such succeful schemes provide the community with the motivation to assist in the proper maintenance of the system.

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5.1. Key elements to be considered in the construction of a community water well:

5.1.1. **Well Siting**

Before deciding where to start drilling hydrogeologists need to consult with communities and enlist their consent of appropriate well sites. The hydrogeologist should help communities find suitable drilling points.

5.1.2. **Well Depth**

Boreholes should go deep enough into the right water aquifer to guarantee reliable supply even in times of extended drought.

5.1.3. **Casing and Gravel Pack**

Protection of water system components from corrosion and prevention of sand and fine materials from entering into the well is a matter of proper well design and construction. In Bale, bore holes are cased with PVC casings. The slots of the PVC screen are of 3 mm size. After blind and screen casings are installed bore holes are gravel packed.

5.1.4. **Well Development**

Bore holes are pumped continuously for a maximum of six hours after casing and gravel packing. Well development is necessary to facilitate smooth water flow into the well. It helps to avoid clogging by removing suspended particles in the water and to stabilize the gravel pack around the bore hole facility.

5.1.5. **Pump Test**

Pump test must be done to choose proper pump size and determine pump installation depth, to determine safe yield operation, to minimize risks of wells running dry, to optimize wells output and to minimize the risk of premature pump breakdown.

5.1.6. **Grouting and Slab Design**

The top part of the well is grouted by using gravel normally up to 3 metres depth.

The one visible item of a completed water scheme besides the pump head is the concrete slab put on top of the gravel grout.

The purpose of grout and slab are:

- to prevent surface water from entering the well,

- to prevent muddy pools of standing water from forming around the pump and

- to direct overflowing water away from the slab to the drainage section.

It was also noted that NCA has developed and put to use a management information system and reporting format highlighting the major points on construction components.

6. **Choice of Pump Technology**

Several factors need be considered before deciding on the type of pump technology to be used to extract water from the ground. Some of these points are:

- affordability by the community benefitting from the safe water service.

- operation and maintenance at village level.

- capacity for in-country manufacture of parts where no foreign exchange involved.

- state of institutional capacity of the community (organizational skill, technical know how and finance) and

- reliability of pump.

For many rural communities hand pumps are generally the most affordable and hygienic means for lifting ground water to the surface.

7. **Maintenance System**

Transfer of skills for management of maintenance to village communities must receive concerted commitment and positive support by all interested bodies involved in the development of a community

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water supply system. The involvement of government agencies at all levels; (national, regional, and community), NGOs, donor agencies and other interested organization is essential.

The basic necessities for maintenance management by village communities requires financial resources to cover capital costs (purchase of pump) and meet recurrent expenses (purchase of spare parts, for labour etc).

Trained manpower and community institutions are also required.

The public sector, NGOs and donor agencies have instrumental tasks to play in establishing a framework of community management of maintenance through mechanisms such as:

- making spare parts available, encouraging the standardization and spare parts through encouragement of standardization, in-country manufacture of spare parts and providing price subbsidies for spare parts.

- provide extension services for pump maintenance, through pre-training of community leaders in financial management and scheme attendants (pump care takers) in basic technical skills,

- periodic evaluation and monitoring of the water supply and

- conducting refresher courses to maintain standards.

NCA's input as regards maintenance include:

- administration of scheme attendant training.

- support communities with repair of pumps at own cost.

- supply of replacement parts.

- support WSSA in establishing regional maintenance office in Robe, including provision of tools, base camp and vehicles to take over maintenance responsibilities.

8. Finance

The big question is how to cover the huge cost of construction, installation, operation and maintenance costs? Financial sustainability is a central issue in water development projects. There may not be much to draw upon from the Bale experience except with regard to the availability of finance. Cost of construction, equipment particularly drilling rig is high. Bore hole construction, where it is required, will naturally be the single major capital cost item in community water supply programmes.

Under the previous arrangement and circumstances NCA entered into partnership with EWWCA believing that EWWCA will take over drilling operations once NCA withdraws from the drilling field or from Ethiopia. The staff seconded from EWWCA are able to operate and maintain the drilling equipment. The only problem here rests with spare parts which involves foreign exchange.

The second major capital cost item is the pump. NCA has put to the field hand and motorized pumps (for hand pumps India Mark II and Mono Lift are chosen). For motorized pumps diesel and solar energy are used. None of the hand pumps are manufactured in Ethiopia.

The third and last cost item in community water supply scheme deals with operation and maintenance. Two basic maintenance structures should be mentioned: village level maintenance under the management of village communities, and centrally based maintenance under the management of the public sector - WSSA.

Regarding the efforts to reduce recurrent costs down to the minimum (transport, energy, labour and spares) the two structures are not competitive with each other. Village level maintenance is less costly, more attractive and also manageable by the community. With NCA's motorized and hand pump schemes installed to date in

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Bale, VLOM appears remote, and a kind of VLOM and central maintenance partnership arrangement appears visible, because the hand pumps and the motorized schemes are both non-VLOM types.

NCA's experience in this respect is to go both ways; part VLOM and part central - WSSA. A good opportunity exists in BWP to observe the workings of VLOM & WSSA separately and in combination from a close range.

9. Conclusions

In conclusion we re-emphasize that community participation, reliable safe water resource, proper well design and construction, proper choice of pump technology, maintenance and operation and finance are key elements for sustainable community water supply schemes.

Discussion of Ato Shimelis' Presentation

In response to the three questions by Mr. Moll, MFM Ato Shimelis said the following:

- NCA budget for the three year programme is about 7 million Birr.

- The average minimum depth of the boreholes is 25m and the maximum depth is 175 m.

Based on the hydrogeological study conducted rotary drilling machine is being used.

- NGOs are welcome to visit NCA's Bale Water Project.

Mr. Wood asked if the sustainability of the water supply systems has been affected by the recent change of government.

Ato Shimelis said that in some places the members of water and health committees have been replaced by new members. In others the old ones are still functioning but under the overall responsibility of the new Peace and Stability Committee.

Scheme attendants (hand pump care takers) are selected by communities. Training on maintenance and appropriate tools is given free of charge. The specific training course outline can be made available to NGOs.

Did NCA exhaust possibilities of developing surface water before resorting to borehole drilling, Ato Taye, Biruh Tesfa asked.

Ato Shimelis said that surface water development is done by EWWCA and WSSA. NCA has assisted with funds.

NCA is constructing boreholes using seconded WRC staff.

Once a water supply system is handed over to communities NCA does not assist in providing fuel, transport or other materials for the operation and maintenance of village water supplies facilities.

However, at regional level NCA provides logistical support to maintain motorized schemes.

After completion of the construction work the facility is handed over to the community. An agreement is signed between NCA and the beneficiary community.

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10 Step Plan for Hand Pump Schemes

Bale Water Scheme - Norwegian Church Aid

Step 1. Project preparation and coordinating meeting

Step 2. Visit to the scheme village

Step 3. Village information meeting

a. General information meeting
b. Women's meeting

Step 4. Village mass-meeting without outside representation to form W.H.C. *(Water and Health Committees)*

Step 5. Official meeting with village leaders

Step 6. Location of well sites

Step 7. Drilling and construction

Step 8. Health education programme

Step 9. Operation and maintenance period

Step 10. Handing over of scheme to peasants association

14 Steps Plan for Motorized Schemes

Step 1. Project preparation and coordination meeting.

Step 2. Visit to the scheme village

Step 3. Village information meeting

a. General information meeting
b. Women's meeting

Step 4. Village mass-meeting to form water and health committee without outside representation

Step 5. Official meeting with village leaders

Step 6. Technical implementation

Step 7. Health education workshop

Step 8. Upgrading of health educators

Step 9. Location of domestic water points

Step 10. Construction phase

Step 11. Handing over of scheme to WSSA

Step 12. Six months WASH education programme

Step 13. Training of scheme attendants

Step 14. Handing over of scheme to peasants association

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Participant's Forum

Two short presentations were made during the one hour participant's forum. The first one was *by Mr. Michael Wood* on a demonstration project in Sidamo administrative region and the second one *by Mr. Bruce Rowse from CARE/Mozambique*,

1. **Demonstration Project in Sidamo** - *By Mr. Mike Wood*

The Demonstration Project was designed to demonstrate community participation in the planning, construction and maintenance of improved sanitation and water supplies in 16 communities in four adjoining awajras in Sidamo Administrative region. The four awrajas are Wenago, Yirge Chefe, Gelana and Bule Urage.

The **main objectives** of the Demonstration Project are:

- To demonstrate community participation in the planning, construction and maintenance of improved sanitation and water supply systems.

- To involve the community as much as possible in all stages of the project.

- To provide in-depth health education through an awareness programme, and follow-up by field workers.

- To improve the health status and living standards of the beneficiaries.

Secondary Objectives are:

- To train WSSA and Ministry of Health (MOH) extension workers in social surveying techniques and in how to deliver effective health education.

- To train hand pump care takers from the community to maintain their own pumps.

- To form water/health committees in the 16 communities to be responsible for community input in constructing and maintaining sanitation and water facilities.

The implementing agencies for this project will be WSSA and the Ministry of Health.

Funding

The project will be funded by the Canadian International Development Agency (CIDA) with some local costs being covered by WSSA and the MOH. CIDA will be responsible for all offshore procurement of project materials and will pay per diems for extension workers. CIDA will also fund the purchase of local construction materials.

Timing

The project will start on October 1,1990 and will end on 31 March 1992.

Health Education

The Ministry of Health will carry out a three day programme of health education in the 16 communities. Further, on-going health education will be carried out on a regular basis by Community Health Assistants based in the communities. Health education will focus on improving basic hygiene related to the use of the improved sanitation and water facilities.

Sanitation

The Ministry of Health will construct 750 Ventilated Improved Pit Latrines (VIP) according to their existing design. These latrines will be at individual households with the users expected to assist in construction. The MOH will supply the construction materials.

Water

The project will provide 75 shallow wells in the 16 villages. The wells will be constructed by the Ethiopian Water Works

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Construction Authority under contract to WSSA. The wells will be equipped with Village Level Operation and Maintenance (VLOM) hand pumps of the AFRIDEV type. Some of these will be made by the EWWCA Research Workshop in Kaliti.

Evaluation

The project will be monitored and evaluated throughout by WSSA, the MOH and CIDA. The World Bank Regional Water and Sanitation Group - East Africa will also be involved in project evaluation.

Expected Outputs

1. The provision of 750 VIP latrines in 16 communities

2. The provision of 75 hand pumps.

3.An improved level of awareness among the beneficiaries on the health aspects of improved sanitation and water supply.

4. An improvement in the effectiveness and efficiency of field staff of the WSSA and the MOH in carrying out their extension duties in rural communities in the Southern region.

5. An improvement in the health status of the beneficiaries.

6. A Field Manual on procedures to adopt to promote community involvement in planning, constructing and maintaining sanitation and water facilities which will assist in replicating the objectives of this project on a wider scale.

Sequence of Activities

1. Awareness Programme Phase 1:

To inform regional and awraja level officials of concerned Ministries and Departments on the objectives of the Project and the communities in which the project will take place.

2. Baseline Survey:

A detailed socio-economic baseline survey will be carried out in each of the 16 communities to determine a social profile of each community before any activities take place. This survey will then be used to monitor and evaluate the project as it progresses.

3. Health Status Survey:

To be carried out by the MOH Environmental Health Department in two Demonstration Project Communities and in two control communities. This survey will assess the health status of beneficiaries and a control group before and after the project so that any improvement in health can be determined. Certain parametres to measure the health status of the community will be established.

4. Awareness Programme Phase II:

To increase awareness of the benefits of using the improved sanitation and water facilities, and to educate the target groups, particularly women, on improved hygiene practices designed to promote family health. This programme will be carried out the MOH, Health Education Unit and backed up by MOH sanitarians and CHA's in the field on continuing basis.

5. Signing of Agreement:

Between the community and WSSA. The agreement will outline the responsibilities of the community and the responsibilities of WSSA in terms of achieving project objectives. Among other points, the community will be asked to contribute financially towards maintenance costs of hand pumps and part of the replacement costs.

6. Formation of Water/Health Committees:

To be responsible for organizing community input in terms of labour and materials in the construction process. Also, to select hand pump care takers who will be trained to maintain their own hand pumps.

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7. Feasibility and Design Study:

To be done by WSSA Engineering Section, who will design the new water systems and determine, with the community, where they will be located. A similar study will be done by the MOH in relation to pit latrines.

8. Construction of Latrines:

To be carried out by the MOH Environmental Health Department in accordance with existing designs.

9. Construction of Water Systems:

By EWWCA, according o WSSA designs, using either an auger rig or hand- digging crews depending on the location and geological conditions.

10. Handing over completed water and sanitation systems to the community:

This will be done after car takers have been trained and issued with tools and spare parts for hand pumps. The MOH will also inform householders how to maintain pit latrines.

2. CARE International's Exeprience in Mozambique and Zimbabwe
By Mr. Bruce Rowse

Mr. Bruce Rowse said that he had worked with SIM in Yirga Chefe, Sidamo Region. Mr. Rowse gave a short introduction on both Mozambique and Zimbabwe.

In Mozambique the water sector is dominated not so much by NGOs but by the government. Largely NGOs fiance the government. The government mainly deals with the up keep and maintenance of hand dug wells and hand drilled wells. Deep boreholes are done mainly by private companies. The quality of construction is generally high. India Mark II pumps, manufactured by a private company (500/600/yr) is extensively used. But due to poor manufacture these pumps are mostly broken. The government is shifting towards Affidev and direct action pumps.

To make water points more sustainable emphasis is now being put on CP in site selection and construction. Communities often provide food to the technicians as well as free labour. But due to lack of funding there is inadequate training of communities in the construction and management of water points.

The development philosophy in Zimbabwe, the speaker said, is that the community does not own water points. Many private homes own wells.

Mr. Browse gave clarification on some of the tehnical questions. He also donated a book entitled Rural Water Supplies and Sanitation: A Text from Zimbabwe's Blair Research Laboratory to the CRDA library.

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Group Discussions and Reports

The workshop participants joined three working groups. The following themes were given to each discussion group:

Group 1: Planning a Sustainable Rural Water Supply Project

Group 2: Operation and Maintenance of Rural Water Supply Systems

Group 3: Community Management of Rural Water Supply Projects

Discussion Questions and Reports for Group 1

1. What are the essential components you would consider in designing a sustainable water supply programme?

a. Request should first come from the community and has to be confirmed that it is the priority need for the community. This has to be integrated with the existing national plan.

b. Community involvement should be considered from the very beginning to the end, and this should be discussed and agreed upon. Water committee election should also be carried out.

c. Community should participate in site selection.

d. Choice of technology should be appropriate and acceptable by the community.

e. Availability of construction materials should be considered.

f. Training of pump care takers should be considered.

g. Operation and maintenance costs should be covered by the community.

h. Community should be involved in monitoring and evaluation.

2. Planning for sustainable water supply requires a clear definition of objectives, analysis of problems, formulation of activities, etc. In general, it involves major steps. What are these steps?

Clear Statement of Objectives:

- To supply of potable water

- Improve the health of the community

- Reduce wastage of energy/reduction of work load particularly by women.

Problem Analysis

- Health hazards

- Distance travelled in terms of water point selection

Formulation of Activities

Funding agencies - name of donor

Community - provide local materials, labour and cash if possible

MOH - Health Education and Nutrition

MOE - educating the community

WRC - design, supervise, evaluate and identify the real community

3. Who shall plan for sustainable rural water supply systems? Why?

What are the specific ways in which the community can participate in the actual planning process?

Rural water supply systems should be planned by the responsible agency (organization) along with the community. Specific ways in which community can participate are:-

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- source identification (water source) and site selection are the areas where community participation can play a role.

- Providing social data, like population, age, sex group, and health aspects.

4. What specific interventions should be planned to foster the development of a sustainable rural water supply project?

a) Help the community to reflect its own problem and ideas, and make them mobilize their resources for their purpose. - Awareness raising (animation programme).

b) Community/leadership training in some sort of workshop.

c) Monitoring and evaluation of the system in which the communities themselves are involved.

d) Importing of spare parts, and doing major maintenance and rehabilitation.

Discussion Questions and Reports for Group 2

1. What are your actual experiences in maintaining water supply plants in your area?

The maintenance is done by:

- Your organization, WSSA, private operators, random?

Four said community care takers maintain water supply plants in their areas of operation. Eight said water committee care takers.

2. What are you suggestions for the future to handle maintenance? By WSSA, your organization, local operators central body, others.

Please discuss and give priority marks.

- Six said maintenance should be done by WSSA.

- Eight said WSSA should be reponsible at regional level and for boreholes.

-Six said local operators should do the maintenance and eight said against payment.

-Five said community care takers.

3. Operation of water supply

installations should actually run by: local operator, trained technicians.

Please give proposals and ideas for sustainable methods adopted.

One said by government and 7 said by private organizations trained by NGOs.

Give priority marks, if possible to different types of installations (hand pump, catchment, gravity pipeline).

- First choice - gravity pipeline

- Second choice - spring catchment

- Third choice - hand pumps

4. Give details of ordinary operational problems arising in different types of water supply installations:

- hand pump - Not used properly - Care takers not well caring/training, missed communication of failures - workload of pump.

- catchment - Not enough water - cleaning not well done.

- gravity systems - taps broken - safety valves - overflows - cleaning

Please propose solutions according to your experience.

- Monitoring and frequent inspections.

- Adoption of standard faucets (Talbot proposed).

- Spare parts to be made available near sources.

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5. What new proposals are to be made known to improve the effectiveness of operation and maintenance to water supplies?

Please give suggestions.

- WSSA maintain general management but allows community to handle their ways when technicians are available locally.

- Design of works to be made to last longer.

- Community must be motivated.

- Care takers should receive incentives.

- Community must be fully aware of technical problems (education).

- Standardize some equipment.

- Strengthen WSSA at regional level and decentralize availablity of resources.

- There should be full participation of community including financial contribution.

- Frequent monitoring and visits required.

- Training on management of resources required. Refresher courses to care takers must be given.

6. Which type of spare parts, materials and tools are to be left to any water plant for an efficient operation and maintenance of any water supply installation?

- Tools - taps, pipes to be made available.

- Spanners must be given to care takers.

- Spare parts (as many as possible and as near as possible).

- Cement, sand, etc. for a gravity system.

Discussion Questions and Reports for Group 3

1. The popular buzz words now in rural development activities are "community management" especially as applied to rural water supply schemes, as a strategy aimed at increasing sustainability.

But what do we really mean by community management; and what does it entail for the community?

The group defined community management (CM) as follows:

CM is a process of developing the capacity of beneficiaries to manage their own water supply system, to develop their management skills. Communities should have the authority and power to decide on their own water use. The community has to be part and parcel of the decision making process.

Who owns the system? According to the proclamation WSSA owns all water schemes in the country. But in WSSA's community participation guidelines there is repeated reference to community "sense of ownership". This is a contradiction in itself. WSSA represents government but government is for people. We cannot have it both ways.

2. Do you think that rural communities in Ethiopia have the necessary resources to manage water supply schemes?

All resources should be considered - institutional, financial, human, natural and technological resources. Communities may not have all the resources. They could have some financial resources but they lack technical knowhow. Communities need technical advice and material inputs. Communities have the management potential but donors have to develop this potential into real management capabilities. There should be institutional strengthening. However, it should be remembered that this takes time.

3. What role should outside agencies (donors) play in assisting communities to be better equipped to manage their water systems to ensure long term sustainability?

To ensure sustainability we need to create the necessary attitudes in people's mind. We must change their attitudes. Since attitudes have remained largely unchanged,

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the country is littered with failed systems. Therefore, education is fundamental and should be ongoing.

Technical things have been beyond the capacity of people to maintain. Even VLOM pumps may be beyond the capacity of communities to maintain. NGOs and donors come as givers and communities are perceived as receivers.

As government bodies do not often provide support services (parts, perdiems, fuel, ...etc.) to extension workers some NGOs have formed counterpart with local church groups as permanent representatives in an area.

4. Do outside agencies (donors) who are involved in rural water supply in Ethiopia have an obligation to train members of water health committees in management skills?

If so, what form should this training take?

Yes, donors have to train beneficiaries in health and management aspects. NGOs are doing a lot in the area of training. But they should strengthen institutions to do the training. We should not do training by numbers just to keep donors happy. NGOs must have closer links with institutions.

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To increase awareness of the benefits of using the improved sanitation and water facilities, and to educate the target groups, particularly women, on improved hygiene practices designed to promote family health. This programme will be carried out at the MOH Health Education Unit and backed up by MOH sanitarians and CHA's in the field on continuing basis.

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Also, to select hand pump care takers who will be trained to maintain their own hand pumps.

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The development philosophy in Zimbabwe, the speaker said, is that the community does not own water points. Many private homes own wells.

As the government believes that communities cannot maintain wells, it subsidizes families to improve wells by giving cement, et., 3,000 family wells were built like this: The quality of these wells is significantly higher than the traditional wells.

Mr. Browse gave clarification on some of the technical questions. He also donated a book entitled Rural Water Supplies and Sanitation: A Text from Zimbabwe's Blair Research Laboratory to the CRDA library.

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Appendix - Workshop Programme

CHRISTIAN RELIEF AND DEVELOPMENT ASSOCIATION

Programme for the Workshop on Improving the Sustainability of Rural Water Supply Projects October 17-18, 1991

DAY I

08:45 - 09:00 a.m.	Registration
09:00 - 09:15 a.m.	Opening Address
09:15 - 09:45 a.m.	Presentation 1 ***WSSA's Experience in Improving the Sustainability of Rural Water Supply Projects*** BY Fanta Feyissa, Head, Community Participation Promotion Service, WSSA.
09:45 - 10:30 a.m.	Discussion on Presentation 1
10:30 - 11:00 a.m.	COFFEE/TEA BREAK
11:00 - 11:30 a.m.	Presentation 2 ***Planning for Sustainable Village Water Supply*** BY Peter Sutcliffe, National Conservation Strategy, ONCCP
11:30 - 12:15 p.m.	Discussion on Presentation 2
12:15 - 01:15 p.m.	LUNCH (Provided by CRDA)
01:15 - 01:45 p.m.	Presentation 3 ***Sand Filtration with Water Ponds: Sustainability, Practicality and Lessons Learned*** BY Gabe Hurrish, Country Representative, FHI/Ethiopia
01:45 - 02:30 p.m.	Discussion on Presentation 3
02:30 - 03:00 p.m.	Presentation 4 ***Menschen fur Menschen's Experience in Improving the Sustainability of Rural Water Supply Projects*** BY Demissew Abate
03:00 - 03:30 p.m.	COFFEE/TEA BREAK
03:30 - 04:15 p.m.	Discussion on Presentation 4

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DAY II

08:45 - 09:15 a.m.	Presentation 5 ***Rehabilitation of Hand Dug Wells: A Case Study from Wolayita*** **BY** Nega Bazezew, Water Advisor, OXFAM/UK
09:15 - 10:00 a.m.	Discussion on Presentation 5
10:00 - 10:30 a.m.	Presentation 6 ***NCA's Experience in Sustainable Water Supply Projects : the Bale Experience*** BY Shimelis Derebe, Water Development Co-ordinator, NCA
10:30 - 11:00 a.m.	C O F F E E/T E A B R E A K
11:00 - 11:45 a.m.	Discussion on Presentation 6
11:45 - 12:45 p.m.	***Member's Forum***
12:45 - 01:45 p.m.	L U N C H (Provided by CRDA)
01:45 - 03:00 p.m.	Discussion Groups
03:00 - 03:30 p.m.	C O F F E E/T E A B R E A K
03:30 - 04:15 p.m.	***Reports from Group Discussion and summing up***
04:15 - 04:30 p.m.	***Closing***

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