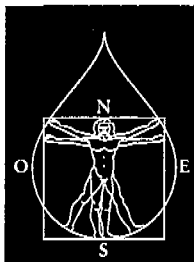


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Report of the International Seminar on Drinking Water and
Sanitation for Grassroots Organizations.

Tilonia, India, November 21-25 1993

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Organized by :

The Social Work and Research Centre, Tilonia
The International Secretariat for Water, Montreal
Approtech Asia, Manila

In collaboration with :

UNDP's Special Unit for TCDC
UNDP - World Bank Water and Sanitation Program



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TABLE OF CONTENTS

Acknowledgments..... p. 1

Introduction and Methodology of Work..... p. 2

Introductory Presentation, by Sanjit Bunker Roy..... p. 3

Proceedings..... p. 5

Annexes :

- I : Program
- II : List of Participants

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Acknowledgments .

The organizers of the International Seminar on Drinking Water and Sanitation for Grassroots Organization wish to thank all the staff of the Social Work and Research Centre in Tilonia for having welcomed and assisted participants with such a dedication.

The Seminar could not have been held without the financial assistance of the Technical Cooperation for Developing Countries Unit of the UNDP, the UNDP-World Bank Water and Sanitation Program and Approtech Asia.

We wish to express our gratitude to the participants whose presence contributed directly to the successful outcome of this meeting, to the traditional folk musicians of Rajasthan, and to the women and children of the Tilonia area.

Introduction and methodology of work.

The Social Work and Research Centre (SWRC) supported by the International Secretariat for Water (ISW) and Approtech Asia organized an International Seminar of Grassroots Organizations on Drinking Water and Sanitation in Tilonia, India, November 21-25 1993. This Seminar took place at the Campus of the SWRC.

The purpose of the Seminar was to foster a learning and sharing process between community-based organizations on community involvement into decision-making on drinking water and sanitation, and approaches to manage internal delivery of drinking water and sanitation, which can be replicated and scaled up on a regional basis. Eighteen participants were selected on a regional basis to represent a variety of experience, knowledge, approach. Two resource people from the International Resource Centre (The Hague) and the Foundation for International Training (Toronto) provided additional contributions. The working languages of the Seminar were English, Spanish and French.

It was suggested that participants prepared a written contribution, along with visual material, answering to the following questions about the area they are working in :

- i) What is the main source of drinking water in the area ? open wells ? hand pumps ? rivers ? piped water supply system ?
- ii) If it is open wells, how deep is the water and what is the diameter of the well ? If it is hand pumps, indicate type installed and send a photograph.
- iii) Is the project based in an alluvial area or a rocky area ?
- iv) To what extent has the community been involved in the planning and implementation process (brief note) ?
- v) What new ideas have been introduced to bring down the cost of providing drinking water ?

The Seminar was structured with a combination of presentation and discussion of case studies, field work related to hand pump repair and maintenance, field visit regarding various low cost community-based endeavours, training and presentation of a puppet show related to drinking water and sanitation, plenary session on future action plan.

The plenary session on future action plan focussed on the following themes :

- major lessons coming out from the case studies presented;
- future collaboration between the SWRC and each participating group;
- needs for information sharing and people exchange;
- actions related to networking between these community-based organizations;
- assessment of the workshop.

Introductory Presentation : The Experience of the Social Work Research Centre (SWRC).

By Sanjit Bunker Roy.

The SWRC is located in a small village of about 2000 people on the fringes of the desert of Rajasthan. The village of Tilonia is about 400 km south west of Delhi and 100 km from the State Capital of Jaipur on the Ajmer highway.

Tilonia receives on an average 8-10 inches of rainfall annually (if we are lucky) but since the SWRC started, the area has seen two severe droughts when not one drop of rain fell for 6 years at one stretch.

Water for drinking and irrigation comes from open wells over 150 feet deep.

The SWRC is a small voluntary agency registered in 1972. The initial objectives were to provide basic needs like drinking water, health and education services, employment and energy (fuel and fodder : lighting) to a population of over 100,000 spread over 500 sq. miles living in 110 villages. But over the years the objectives have undergone many changes. The use of traditional knowledge and skills have become very important. Creating an environment to give more power to rural women and using traditional media for disseminating information and knowledge to the poorest of the poor has become crucial.

The SWRC strives to replicate the Tilonia concept on other States of India by attracting young boys and girls from other parts of the country to live and work in Tilonia, with a view to developing enough confidence and skills to allow them to start their own projects elsewhere.

How to reach these aims ?

The basic requirement is trust. There should be an inherent belief put into practice at every level on every occasion that rural communities have a vast bank of knowledge, skills and practical wisdom that must be used for their own development. This is the only approach that will eventually make communities sustainable.

It has always been the practice to grossly under-estimate the capabilities and capacities of ordinary poorly paper-qualified people to provide a sophisticated technical and scientific service. As a result government has depended on professional services from outside. All over the world, compared to the colossal funds invested this approach has proved an expensive failure.

Trust will slowly develop self confidence. This intangible process of human development is evident on the field by the number of community thought-out solutions easily put into practice.

One sure sign of success of an alternative low cost approach is the hostility it generates among vested interests. It is only through a conflict of interests, approaches and methods that a change of attitude is possible.

Trust, self confidence to solve their own problems and the process of letting people acquire some dignity to stand fast against people who do not want them to develop is how Tilonia intends reaching some of the aims.

Providing services, trying new ideas and demystifying technology and making it accessible to the poor are some of the means to achieving these aims.

What is Tilonia trying to prove that is so important ?

a) That there is a great difference between literacy and education. Paper qualifications are a very poor and incompetent way of judging the worth and capabilities of persons. That is why it is considered a major disqualification if you have too many paper degrees.

b) The use of village knowledge, skills and wisdom can make communities sustainable and independent - if given the opportunity, time and space to do so.

c) Communities (however illiterate but still educated) can take collective decisions without official interference and influence. These decisions are more enduring, sustainable and more acceptable to the community.

d) The most sophisticated and complicated of technological appliances can be demystified and made accessible for improving the quality of life of the poorest of the poor. The poor can install, operate, repair and maintain at quarter the cost with no government or professional help.

e) That the village does not consider environment and development issues as separate and isolated. By adopting and practicing a simple life style they have shown how to integrate issues that "experts" are unable to resolve even today.

PROCEEDINGS

1- Major lessons drawn from the 18 case studies presented at the Seminar

1.1 Approaches and techniques to drinking water and sanitation.

- Requirement for an integrated approach linking water, sanitation, waste treatment and health/hygiene, and not isolated projects poorly rooted in the community.
- Sanitation should be given more emphasis because it reduces the use of water, improves health and water quality conditions.
- Emphasize the sustainability of systems and technologies with direct involvement of local community being in a position to assess costs, lifetime of systems, facility to maintain and repair, and with a target to enhance local self-reliance.
- Cost assessment must involve a comparison of technologies (implementation, maintenance, repair), capacity to pay of local people, cost-efficiency of selected technology and potential direct/indirect fallouts on irrigation, gardening, health, livelihood.
- Local communities should pay for the services: the amount and modalities of payment should be determined by them, depending on their financial capacity, the level of services provided, and payback.
- Latrines in general seem to raise a lot of resistance: it would be useful to assess and to test the cultural appropriateness of latrines in different situations. However, community latrines have worked well in some countries.

1.2 Community involvement

- It's a key aspect to get the support of local community. Furthermore, voluntary organizations and NGO's have a particular asset to get the involvement of communities.
- Minimize social conflicts by taking into account social, cultural and religious factors, such as respect for local customs and traditions, revitalizing traditional technologies and practices, benefits to households.
- Use water as an entry point for the sustainable development of local communities.

- Facilitate self-diagnosis of gaps and needs by local communities : importance to use highly participatory approaches.

- Community awareness and education are prerequisites to projects and activities related to drinking water and sanitation; this means :

- i) people involved in such activities must be knowledgeable on training and education;
- ii) local community must be made aware and trained in the interrelated aspects of water, sanitation and health, before implementation;
- iii) the selection of local people in charge of the water-related projects/activities must be made with care, responsibility and a transparent process;
- iv) local education and training will empower people to develop a sense of ownership and responsibility over infrastructures and services, to develop their own expertise and different technical options on the sound use of water, saving water devices.

- Water-related projects and activities must prioritize the development of human resources, before techniques, by strengthening local resources and organizations and fostering community leadership starting at childhood.

- Water-related projects and activities should also be considered as a process of community strengthening generating new forms of initiatives and organizations through a trial and error process, and motivating people for change.

- Water-related projects and activities must foster equal participation of men and women : special attention must be given to men's involvement in health education.

- Health considerations should be included to prevent service people/local workers to be exposed to disease and other dangers.

- The role of voluntary organizations and NGO's needs to be redefined in the overall framework of privatization of water services, and call for their involvement as service providers.

Experience shows that these organizations should facilitate the work of local communities, ensure replicability from an identification of needs made at the local level. The conditions of replicability must include strengthening of local autonomy in the implementation process, community initiative, and control of costs.

- Support agencies must not create conditionalities.

1.3 Information and communications.

- Community involvement requires culturally and socially sensitive communication approaches, along with appropriate tools and methods.

- Importance to use kits of information, visual materials, modes of communication which are highly participatory, motivate people to find solutions, and generate community's self-esteem and self-reliance.

- Communications at the community level must emphasize teachings targetted to local learning and transfer knowledge useful for local action and problem solving.

- Information and education packages should foster interactive exchanges; rather than showing negative/positive situations, they should start from the current situation, facilitate discussion of problems and let local people devise the solution.

- For people used to oral communications, social animation, videos and audiovisual support, popular theatre, puppets, songs and other modes of artistic expressions are more relevant than written material. Furthermore, they should be used to raise awareness of problems, facilitate problem-solving and interaction between extension staff, local communities and local decision-makers.

- Exchange programs between community-based initiatives on water and sanitation is considered as a valuable means to improving knowledge, fostering skills and sharing experiences.

2 - Action plan

2.1 Information sharing

- a) Priority on sharing of information and approaches directly between partners of this network
 - operation experience
 - information used for practical knowledge
 - importance to emphasize knowledge at the community level
- b) Information useful to common interest of the network sent to ISW
 - successful approaches
 - documentation of cases and dissemination to all partners

2.2 Exchange for materials/people

See Report on Future Areas of Collaboration and Follow-up Action (SWRC).

2.3 Future of the network

- ISW submits a proposal to participants before December 24th (outline) and persuade the UNDP on a series of training sessions held in each region as well as an annual meeting of the network. Morocco, followed by Ecuador volunteers to organize this meeting in November 1994.

- Participants agree upon the *raison d'être* of this network which is to emphasize practical learning at the community level and to give right directions to countries with emerging voluntary organizations (former communist countries, North Africa and Middle East).

- The Latin American participants designate Quito as the focal point for the region with the proposal to hold a regional meeting. Morocco and India will play a similar role for Africa and Asia.

2.4 Working group on the role of NGOs and CBOs

Participants agree to form regional working groups to redefine partnerships between NGOs and CBOs adapted to community level as well as the role of NGO's being more and more solicited by States either in service delivering or in privatization of services. Participants will bring their regional position to the next meeting.

3. Assessment of the Seminar

- Problem of communication, language to dialogue with local staff : facilitate better exchanges.

- Too much rush : we need more time for field work/visits, more time to reflect upon and go deeper in some questions.

- Meeting too short : need a longer seminar next time.

- More time for individual exchanges, and for a better knowledge of country and surroundings of Tilonia to appreciate local way of living.

- Open the network to other participants (Central and Eastern Europe) and women.

- Food needs to be adapted to the different diets.

- Foster intercountry collaboration.

- Maintain field activities during next workshop; take Tilonia as the standard to maintain a setting for humility.

- Better treatment of water issues in a worldwide perspective.

- Simultaneous translation.

- More time for preparation.

ANNEXES

Annex I : Program

Sunday November 21, 1993

9:30 a.m. Welcome by SWRC
Presentation of the SWRC
Workshop survival strategies
Methodology

12:00 p.m. Lunch break

2:30 p.m. Case studies

7:00 p.m. Dinner break

8:30 p.m. Presentation of India's caste system and
women's role

Monday November 22, 1993

9:30 a.m. Field work : hand pump repair and maintenance

12:00 p.m. Lunch break

2:30 p.m. Case studies

7:00 p.m. Dinner break

8:30 p.m. Case studies

Tuesday, November 23, 1993

7:00 a.m. Field work : hand pump repair and maintenance
and field visits

12:00 p.m. Lunch break

2:30 p.m. Case studies

7:00 p.m. Dinner break

8:30 p.m. Case studies

Wednesday, November 24, 1993

8:30 a.m. Ground water survey at village and drilling at
work

11:00 a.m. Case studies

12:00 p.m. Lunch break
2:30 p.m. Case studies
7:00 p.m. Dinner break
8:00 p.m. Traditional Folk music from Rajasthan

Thursday, November 25, 1993

9:00 a.m. Presentation of medicine
10:30 a.m. Training in making puppets
12:00 p.m. Lunch break
2:00 p.m. Puppet show
3:00 p.m. Plenary
7:00 p.m. Dinner break
8:30 p.m. Plenary, Conclusions and follow-up

Friday, November 26, 1993

Pushkar and Ajmer Visit

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**WORKSHOP ON DRINKING WATER AND SANITATION
(20TH - 26TH NOVEMBER '94)
WORKSHOP EVALUATION (PARTICIPANTS)**

1. TANZANIA

Chris A. Lushiku from Tanzania found the field-visits during the workshop very useful in relating to the discussions later in the day and at night when case-studies from respective countries were presented. The field visits gave him the opportunity to observe a bore hole which was quite different from the shallow wells that are normally constructed in Tanzania.

Being a regional planner, he found the case-study presented by the participant from Morocco with its emphasis on an integrated package of improved water supply systems, sanitation facilities and health education as an experience that could be relevant to Tanzania. In particular the process of operation and maintenance of installed facilities would be of significance.

Application of appropriate technologies such as the use of bamboo pipes for handpumps which was discussed at the workshop is another area in which Tanzania wants to experiment.

Having participated in the workshop, Tanzania would like to maintain links and share information with all participant countries of the workshop.

2. NIGERIA

The workshop design had a balanced combination of field-visits and case-studies.

Chris.N.Ugwu from Nigeria is a teacher and found the case-study presented by SWRC, Tilonia as very educative and a learning experience. He would be interested in collaborating with SWRC Tilonia, Mexico and Tanzania.

3. UGANDA

David Mununuzi from Uganda is a forester by profession. He found the case-study from Mexico to some extent of relevance to his work but felt that the workshop did not discuss valley tanks and dams in detail.

David thinks that future workshops should also be based on agro-ecological zones apart from geographical regions.

Field visits during the workshop at Tilonia had quite convinced David that rural women can repair and maintain handpumps. Since this is not the case in his country, David feels motivated to introduce the concept of rural women handpump mechanics in Uganda.

Another specific outcome of the workshop according to David has been the need for replacing steel pipes in the Mark II handpump with PVC pipes. He wants to explore the possibilities of fabricating such pipes in Uganda by conducting a survey.

Use of Bio-gas as renewable source of energy is an area which David is interested to apply in his region where the cattle-owners throw away the dung. Bio-gas energy he feels will meet the fuel-wood demands of the communities.

The potential of solar pumps to provide water to cattle instead of using the semi-rotary pumps is an alternative which he wants to try out.

Spelling out specific areas of collaboration, David is very much interested in having access to information and collaborate with SWRC, Tilonia on solar pumps and bio-gas models apart from the using plastic fluppys for India Mark II handpumps.

David would like to collaborate with Mexico on the construction and maintenance of surface water tanks.

Tilonia, to David had a lot of information which could be used to improve the natural resource management in rural communities living in Uganda.

4. BURKINA FASO

For Lompo Justin from Burkina Faso, the field-visits made him repair handpumps with his own hands. Hitherto, his job entailed him to supervise and plan, programmes. This 'hands on workshop' was a new experience to him which he hopes to share with his colleagues and the community.

Lompo would like his organisation to collaborate with SWRC, Tilonia, Morocco and Niger in exchange of applications in technologies.

5. GHANA

Among the case-studies presented, Mudoc from Ghana was

particularly interested in those presented by Mexico, Nigeria, Bolivia and Niger. The case-studies were relevant to him in the context that Water and Sanitation Programmes need to be looked at from the communities own set of choices and should have respect for their existing knowledge.

What appealed to him most at the workshop was the need for initiating a process of self-reliance amongst communities and emphasis on local knowledge and material.

As a specific outcome of the workshop, Ghana would wish to collaborate with Mexico, SWRC, Tilonia, Bolivia, Nigeria, Uganda and Niger. It would also like to know more about SWRC, as it sees great potential for the NGO from Ghana to learn from Tilonia's experience in designing a programme for handpump maintenance, in his country.

6. NIGER

Richard Carothers presented his case-study on windpumping technology in the Sahel region of Niger.

Case-studies presented by Ghana, Nigeria, Mali, Philippines and Costa Rica were relevant to the Niger experience. He would specifically like to link the experiences of Ghana (well construction and video film), Nigeria (community mobilisation) Philippines and Costa Rica (information on PVC/pumps).

Niger will like to exchange windpump technology with Mali. It is also interested in knowing more about the Asian experiences.

Commenting on the approaches of the workshop, Richard felt the need for a format, guide in preparing the case studies. This would have allowed for comparisons in establishment of organisational philosophies, strategies used successes and failures, the process of leadership building and support, the extent of sustainability achieved etc.

The field-visits were very useful to the Niger experience though the time allotted was very short. More areas like rainwater harvesting, construction of tanks and drilling should have been covered. Richard would like to copy the diagrams of handpumps tools. He is specially interested in low cost drilling rigs, water

testing kits and methods. Low-cost water prospecting technology is another area in which Niger would like access to information.

7. EGYPT

Emad Adly from Egypt a medical doctor, was absolutely thrilled with the field-visits in the morning sessions repairing the handpumps. The case-study presented by SWRC, Tilonia was of particular interest to him as he feels that field conditions and situations are similar to Egypt as in India. He would like to replicate some of the workshop ideas in rural parts of Egypt. These ideas relate to the sitting type latrine, drainage systems for rural sewage and the application of solar energy.

Emad would like to collaborate with SWRC, Tilonia, Costa Rica and Morocco.

Reflecting upon the field-visits Emad Adly provides three specific improvements in the repair of handpumps.

Firstly he suggests a brush to remove the rust from the pipe. Secondly he feels that the first part of the central rod that is clamped to unscrew the rod needs to be strengthened for withstanding constant screwing and unscrewing.

Thirdly Emad suggests an elevator to minimise the physical strength needed to remove the pipes while repairing the handpumps.

8. MOROCCO

Driss Moumane is a Water Projects Manager in the rural areas of Morocco. He thinks SWRC Tilonia is much bigger than what he expected and would have liked to spend more time in it than just five days.

The case-studies on Bangladesh (rural latrines) and Bolivia which was focussed on teaching material for Basic Rural Sanitation was of relevance to his work.

For Driss, the workshop at Tilonia was able to clarify his perceptions about the role of an NGO. The Bolivian and Bangladesh experiences with special emphasis on Hygiene Education and Construction of Latrines, are two areas which will be applied in Moroccan villages.

Morocco would therefore like to collaborate with these two

countries in terms of mutual exchange of information and ideas.

9. COSTA RICA

Commenting upon the content of the workshop, Marianne from Costa Rica expected it to have a technical bias where all participants would analyse the advantages of different pumps in different field conditions. The workshop as it progressed turned out to be something different and much better.

She found the case-studies from Nigeria, and Ecuador relevant to her work. Both Ecuador and Costa Rica have similar approaches in their present involvement with urban areas.

Costa Rica would like to collaborate therefore with Mexico, Ecuador and SWRC, Tilonia. With Mexico, it would like to exchange its experiences regarding Costa Rican Natives Association with the Mexican experience on working with natives.

The approach of working with communities co-ordinated by federations of community level organisations in Ecuador can be exchanged mutually with Costa Rica through teachers.

With Tilonia it would like to collaborate on determining the work perspective, analysing its hows and why's. Marianne also feels the need for more information on solar electrification from SWRC, Tilonia.

To sum up her feelings about the workshop, Marianne felt that it was one of the best experiences she ever had - as a human being.

10. POLAND

Zbigniew Ryzak from Poland is a psychologist by profession and a trained electronic technician. He found the case-studies from Bolivia, Mexico, Costa Rica and Ghana. The Health Education component and its methods in the Bolivia interesting case study was of mutual interest.

The process of people's involvement in the Mexican case study had relevance to Polish conditions, just as in the Costa Rican case study.

Health Education and use of fresh water will be two areas on which the Polish NGO will lay stress on.

Ryzak would like to collaborate with Mexico on their experiences regarding community involvement. He however felt that apart from Poland there were no other East or Central European countries represented at the workshop.

11. LAOS

Vannalard from Laos is a civil engineer working on rural water supply systems in his country. At the workshop, he was particularly interested in the Nepal case-study, as it dealt with gravity fed water supply system. This was similar to the experiences in Laos.

The workshop discussions and the field-visits according to him had focussed on the importance of community involvement in rural water supply systems. The need to initiate an educational process amongst communities and use of local material in constructing such systems has been the workshop outcome which Vannalard will make efforts to apply in his country.

Laos would be very much interested in collaborating with Ghana and Bolivia on issues of mutual interest.

12. PHILIPPINES

Nolindo A Cantos is also a civil engineer from Philippines working on rural water supply. He found many of the case-studies presented to be similiar to his project in approach while many other presentations provided better alternatives

To him the field-visits revealed the immense potential of rural women being involved in the repair of handpumps.

Taking a cue from this Nolindo expects to involve women in repair and maintenance of the rural water supply project in his country.

He is quite interested to apply appropriate technologies that can provide developmental alternatives to the villagers in Philippines.

The NGO in Philippines would like to collaborate with Morocco, Costa Rica and Ghana.

13. SRI LANKA

Ganthihe Mudiyanseelage Bandaranayake teaches Geography and

Hydrology at the University in Sri Lanka. He found the Nigerian and Ugandan case studies presented at the workshop relevant to his work.

The field visits made him realise that for the provision of basic needs like water, community participation is very essential. He thinks that NGOs can be more effective than the Government in working with the people.

More importantly he was able to learn that it is possible for rural people with minimum educational qualification to be responsible for development of their own communities.

He feels that the concept of self-reliance in resource mobilisation of the rural communities backed up by the support of NGOs should be applied in his country.

The Tilonia experience where according to him the beneficiaries of resource and the voluntary organisation have close links can be applied in Sri Lanka.

14. NEPAL

Belbase Prem Narayan is an overseer in Nepal. In particular he found the case study presented by Betty Soto from Bolivia very relevant to his work. Her approach in motivating the community through figures Prem feels can be implemented in Nepal also.

The field visits emphasised the significance of motivating the community to get involved in development projects. The participation of women's groups at the village level in programmes was another area of learning. The visits highlighted the relevance of using local resources for development.

These three areas needs to be applied in Nepal as its culture, region and language have similiarities with India. He would be using the video-cassette presented at the workshop by SWRC Tilonia, in his field-area.

Prem wants to collaborate with Tilonia in areas like community involvement, rural latrines, solar energy, water testing and drilling for prospecting water in alluvial soil and har rock.

15. BANGLADESH

The case study from Bangladesh was presented by Marieke Boot.

She found all the case-studies relevant to her work. She however would have liked more women participating in the workshop. There were only three women participants amongst 21 invitees at the workshop

The field visits emphasised the importance of women handpump mechanics at the village level. It also reflected the fact that water supply and waste-water disposal should be handled simultaneously. She was also able to realise that women's crafts groups can be economically successful.

Having participated in this workshop, Marieke would like to reconsider her opinion about NGO's/Voluntary organisations. The workshop insights would according to her be utilised in her work.

She confers with all other participants at the workshop about the significance of community involvement and peoples own inherent strength

WORKSHOP EVALUATION REPORT

SN.	COUNTRY	WORK SHOP CONTENT	SESSIONS	WORK SHOP STRUCTURE	COLLABORATIONS (COUNTRIES)	SUGGESTIONS
1.	TANZANIA	Met the expectations	Too tight	Satisfied	All participating countries	Need for another workshop
2.	NIGERIA	Was well coordinated	More time for interactions (between participants)	-	SWRC, Tilonia, Mexico and Tanzania	-
3.	UGANDA	Should have more experiences on water supply through dams (ponds)	Time was inadequate	More time needed	SWRC, Tilonia, Mexico	Participants should be linked with the outer world through radio
4.	BURKINA FASO	Good	Just right	Well structured	SWRC, Tilonia, Morocco and Niger	-
5.	GHANA	Enjoyable	Too tight	Very Good	Mexico, Tilonia, Bolivia, Nigeria, Uganda, Niger	Future workshops to be destructured in a manner allowing time for interaction between participants
6.	NIGER	As expected	Field visits were too short	Well balanced	Tilonia, Ghana, Nigeria, Mali, Philippines	A more structured approach in workshops leading to future action.
7.	EGYPT	Above expectations	Sufficient wonderful	More time on topics like Homeopathy, Solar energy	SWRC, Tilonia, Costa Rica, Morocco	Need for a video film on homeopathy
8.	MOROCCO	As expected	Time constraints	Well organised	Bolivia, Bangladesh	Field strategies, successes, failures should be discussed in future workshops

WORKSHOP EVALUATION RESPONSES

SN.	COUNTRY	WORK SHOP CONTENT	SESSIONS	WORK SHOP STRUCTURE	COLLABORATIONS (COUNTRIES)	SUGGESTIONS
9.	COSTA RICA	Not exactly	All right	Satisfied	Mexico, Ecuador, SWRC Tilonia	-
10.	POLAND	Yes	All right	All right	Mexico	Case studies should be spread out allowing discussions after it
11.	LAOS	-	Too tight	Satisfied	Ghana, Bolivia	Workshop schedule to be given to participants in advance
12.	PHILIPPINES	Was not as expected	Too tight	Fine	Morocco, Costa- Rica, Ghana	Utilisation of time in future workshops have to be strictly followed
13.	SRI LANKA	Well planned	Time constraints	-	-	Need for evaluating impact of projects on beneficiaries
14.	NEPAL	As expected	Too tight (some times)	Satisfied	SWRC, Tilonia	Duration of workshop should not less than a week
15.	BANGLADESH	Nice surprise	Very tight	Interesting enjoyable	-	-

THE GENDER APPROACH: A STEP FURTHER IN WOMEN INVOLVEMENT IN THE WATER SUPPLY AND SANITATION SECTOR

M.Sc. Lorena Aguilar

Introduction:

Water Supply and Sanitation Situation in Central America.

A need of drinking water and appropriate sanitary installations are two of the most fundamental problems confronting the Central American countries today. Although the eighties were designated by the United Nations as the International Drinking Water and Sanitation Decade, most of the countries in the region have not been able to improve the conditions of unsafe drinking water and unsanitary waste disposal, and in some countries (such as Guatemala and El Salvador) their situations in the past years have even worsened (Table 1 and 2). These conditions have resulted from the internal crises and the regional civil wars.

Health care has been one of the areas most greatly affected by the internal strife and the wars. The countries have experienced notable financial weakening, deterioration of the infrastructure and an even greater demand for health care caused by the pauperization of the population. Although these factors refer to the whole region, the indicators allow the establishment of two groups of countries, differentiated as much by the situation of sanitary services as by the health conditions of the population. On one side, we have El Salvador, Guatemala, Nicaragua and Honduras, whose situation in this field is very deficient. On the other are Costa Rica, Belize, and Panama, which have reached satisfactory health levels, even though persistent problems remain, concentrated in the most vulnerable social groups.

Government health spending has been reduced in all countries of the region. At the beginning of the 1980s, public budgets designated between 13 and 20 US dollars annually per capita. In 1987, the spending declined to 8-10 US dollars annually, except in Costa Rica, which fell the same period from 30 to 16 US dollars, and Nicaragua, which experienced a sharp increase until 1983, followed by a sharp drop until collapsing in 1987 (International Federation of Red Cross and Red Crescent Societies, 1992).

Another feature is characterized by the limited or the non-existent access to state services. Only in Costa Rica is there a general system of public health and satisfactory health indicators for the whole of the population, though infant mortality rates are more accentuated in the case of poor families. In Honduras, El Salvador, Nicaragua and Guatemala, the indicators show that there is limited access to drinking water and sanitary installations (Table 3). In some areas the situation is so difficult, that the women must spend 8 hours per day to obtain a bucket of dirty water.

This situation is reflected in the principal health indicators of the Central American population. The cause of infant mortality are related directly to the sanitary and nutritional conditions in each of the countries. The facts show that the majority of these gastro-intestinal diseases continue being the principal causes of death in the population under one year of age. In relation to the profiles of morbidity during the 1990s, in Guatemala, Honduras, Nicaragua and El Salvador, diarrhetic diseases and acute respiratory syndromes are the predominant reasons for medical consultations, while in Costa Rica, Panama, and Belize, aquatically transmitted infectious problems tend to decline. Lastly, in certain areas of the region, the presence of endemic disease, such as dengue and malaria has increased. Additionally, new water-born diseases that were not endemic such as cholera have become one of the most serious health problems in the area.

In summary, the high incidence of intestinal infections is related to the low quality of drinking water, frequently containing fecal contamination; therefore these intestinal infections can be attributable to the lack of drinking water and latrines. The lack of general education, subsistence activity, and appropriate means of transmitting health education hinders the rural population from appreciating and understanding adequately the importance of environmental and hygienic factors. Among urban dwellers, there are also hygiene and environmental problems, as a consequence of settlements without proper sewer systems, sanitary services, or potable water networks.

"The problems faced by the region in relation to WSS cannot be solved only from a technical point of view" has been the focal point of these discussions.

Over the past years, it has become increasingly clear that the main obstacle to introduce and maintain health improvements, the use and maintenance of improved water supply and sanitation systems, is not the

technology itself, but the failure to involve the community in all the stages of the project and the empowerment of all the social actors (men, women and children).

The Need to Develop a Common Concept of Community Participation.

Before a project starts its process of implementation, there is an urgent need to clarify and define among the project team their understanding of community participation. It is common when staffs from various sectors and levels come together that they have many preconceived ideas of what community participation means. Therefore, the first step must be a process in which the project staff clarifies and defines certain concepts, reconciles any differences that they may have and combine their ideas into a coherent approach.

During the last decades, in the WSS sector, there have been many efforts at analyzing and understanding what real community participation is. Some of these methods have worked and some have not. Let us analyze some of the common ways in which the term "community participation" has been used (Srinivasan 1990).

Community Participation as Cheap Labor.

This concept is based on the assumption that the community labor contribution will increase the people's identification with the project that is being implemented. Under such assumption, the community is considered to have participated when it provides free, unskilled labour for construction and donates raw materials.

The villagers' roles are to perform unskilled construction tasks such as carrying pipes and digging trenches. On the other hand, the thinking part (designing, planning, etc.) is done entirely by the "external experts." Obviously, the only benefit derived from these type arrangements is the lowering of costs in the project.

Community Participation as Cost-Sharing.

Under this concept the key issue is not just cost reduction but cost recovery. The people's willingness to invest a part of their meagre resources in maintenance, or paying for part of the services provided, is taken as an indicator that they value the project and its services, and are therefore committed to keeping it in good conditions.

Community Participation as a Contractual Obligation.

In the eyes of some project managers, neither of the above concepts is considered sufficiently adequate. Instead, they proposed, that in order to make these type requirements more formal, there is a need to draw up a contract. The contract spells out in detail what roles and responsibilities apply to each partner in the project. The community has the option to either accept or reject the terms of the contract or it may even negotiate some changes through the formal power structure of the village.

However, there are some questions to this approach and how it involves the average community member. For example, these type contacts are mainly negotiated with the village leadership and presented at large village meetings where they may not be fully understood by the whole community.

Community Participation as Cultural Animation.

Some of the techniques that are used in a participatory approach are the group dynamics and activities. The main problem stems from the belief of some professionals (mainly of the social sciences) that the community is participating when they take part in the dynamics or activities. These activities by themselves are merely used as a collection of contrived exercises, intended mainly to liven up training sessions.

This type situation has caused the community participation to be reduced to the simple idea of taking part in a given dynamic group. It should be stated that the activities and dynamics are an essential part of the participatory process but as the means and not the final goal.

Community Participation by the Community as Decision-Makers.

A substantially different approach (than the above) is needed in order to create a strong sense of local responsibility and sustainability. Only if there is strong community participation in education and by involvement of a broad base of the community in decision-making from the start can a genuine commitment and widespread support by the whole community (men, women and children) be achieved.

Under this approach, the goal is not only to ensure sustainability of a given system (like fixing a pump); rather, it is to help people develop the outlook and competence, the self-esteem, the empowerment and

responsibility which will ensure a sustained and responsible community effort in the WSS sector and beyond.

The implementation of these type concepts will produce good results only if all the social actors are involved in equity. By way of example, this process can be analyzed through a project in Costa Rica.

Participatory Strategies for Water Supply.

This project was conducted by Fundatec (a Costa Rican NGO) between 1988 and 1989 with the support of IDRC, and was carried out in three communities in the rural area of Costa Rica.

The general objective of the project, *Participatory Strategies for Water Supply*, was to develop (after the methodology of a participatory development, a previous project, "Technology of Hand Pumps"), a series of strategies and instruments that would promote the inclusion of the community members like communal instructors in social and technical subjects of "the introduction and sustainable water supply" and "sanitary environmental projects."

We cannot speak of sustainable development without contemplating the incorporation of human phenomenon in all its aspects like improvement of life's conditions, establishment of mechanisms of equality and overall provision to provide for the men and women of the communities where the project was operating to assume the dissemination of the project and its postulates in other communities.

Objectives that gave the project its origin are as follows:

1. Train community members (women and men) as instructors in sanitary education and community organization.
2. Train members (women and men) of these communities as instructors in well rehabilitation, installation and maintenance of the UNIMADE handpump.
3. Develop and evaluate a simple and inexpensive technique based on concrete and iron for the design of shallow wells.
4. Assess a community participation methodology for supervising recently trained instructors in the sensitizing activities developed in their own community and new communities.

5. Rehabilitate 50 shallow wells and install 50 new pumps in accordance with the participatory methodology developed.
6. Evaluate and document the effectiveness of the training program of the methodologies and the participatory strategies developed.

The fundamental principle that applied for the attainment of these objectives depended upon the integration of the communities during all the phases of the project. This always functioned with all the participants of the communities (men, women, young people and children) knowing their responsibilities, roles, necessities, specific goals and proposals of the "participatory sustainable development". The process was not easy: there were many very difficult moments, but great achievements were shared. Nevertheless there prevailed at all times what a community leader spoke of, "The importance of this project is the warmth of friendship".

The project had, according to the tendencies that existed in that moment, the possibility to work only with women, given the water sub-system that was characterized as belonging to feminine surroundings, or instead to work exclusively with the men. Nevertheless a decision was made that it would be necessary that all the social actors would be integrated into the process, sustained by the fact that the project was not looking for the provision of water per se, but rather to improve the condition of the lives of the population, by means of sustainable development. In this way, there was an avoidance of making a dichotomy between the work of the women and the work of the men but rather designing a methodology that permitted us to integrate them in an equitable manner where both had the same possibilities of participation, without forgetting that their realities, responsibilities, desires and necessities though different, would not exclude the other party.

In spite of the gender theory still being very incipient in this epoch, we proposed that the project from its initial stages would begin an analysis of the situation of the genders, to be able later to impact in a positive manner not only with water supply, sanitation and health, but also aspects related to self-esteem, access and control of new areas (education) division of work by sex/ gender, and others.

Perhaps one of the elements that most influenced the project was that it had a mixed and multidisciplinary team. The process of integration of the team was founded on mutual respect, as much for the professional point of view as for the personal, a situation without a doubt that was seen reflected also in the field work.

To make understandable the development of the project in a most systematic manner, we can divide this in the following phases:

Initial Contact and Motivation of the Community.

Interviews were carried out with formal and informal leaders with the purpose of defining the existence of group leadership in the community. Readily noticeable was that the major part of the leaders were men. The majority of the women who formed part of the communal organization were placed in traditional positions (Example: secretaries) as well as in groups in the church and school committees. At the time the leaders were chosen, an explanation was given of the project and its objectives followed by means of informal meetings. At these meetings some women who had demonstrated particular interest were invited. Once the project was accepted they undertook the responsibility to call a meeting with the community.

This first meeting (in which approximately 50% of the total population attended) , as was true at the following meetings, had an objective that the people would be familiar with the project, its scope, as well as the responsibilities that were acquired to participate in the development of the same. When the community realized that the project was in earnest, the numbers of people attending the meetings increased. The techniques and instruments employed were: Explanatory posters with drawings, full explanations of the objectives about the project , and why the participation of the community was necessary, and a demonstrative water handpump was employed, etc.

Diagnostics of felt needs and surveys.

Two types of diagnostics were executed, one of a traditional character which consisted in passing out two questionnaires in order to know and determine the socio-cultural state of the community and the other part to know the technical conditions of the area. Much of the data obtained were at the same time reinforced and amplified in consultation with the community.

By means of carrying out diagnostic meetings with children, young people, men and women, using the technique illustrating the principal problems of the community by drawings, group discussions and determining together which problems were the most important of the community. Some indicators collected during this stage were: The use and management of the water by sex and age; cultural concepts

associated with the water, hygiene and health; levels of participation (by gender); access and control of resources and benefits by gender; balance of the situational context; and the sex/gender division of labour. At the same time some possible solutions to the problems were defined and how they and the project team could confront them.

Communal Organization.

As a result of previous planning, work plans were carried out considering: the many necessities of the women, as well as the men; priorities in administration and organization; ways in which to resolve problems, possibilities and limitations were defined. When the work plans were defined a meeting proceeded to elect by consensus a "water committee" so that there would be a co-executor counterpart and responsible locally for the project. The committees remained integrated among the men and women as well. It was obvious with the passage of time and judging by the integrants being trained, the women were assuming every day the leadership and direction of the committees. This situation without a doubt was a product of the the process generated within the project.

One to the elements that we considered worthy of projection relative these strategies was the revolving fund. The revolving fund emerged when the project was initiated, and established through the cuotas paid by each family benefitting by the water pump. The money recovered through the cuota (that each community established, like the cost of the water pump and an improvement of its well) was designed to acquire other solutions and permit in this way at a determined moment to reach all the families.

Eventhough the project was finished formally in 1990, until the present time, they have continued to handle their revolving funds, bringing new solutions to the problems of the water supply and other communal necessities.

Training.

The training is without a doubt the angular point in which the project rested. The same began to bring answers to a series of necessities and questions put forth by the community, as well as to set down a series of indispensable elements for the carrying out and sustainability of the project of development. All the workshops and training were both theoretical and practical, designed on the premises of non-formal

education and implemented in an established schedule in conjunction with both the men and the women. The processes of training were especially designed with the objective that the women could avail themselves to new areas of the human development. During the whole process the fact that they could learn was stressed constantly, the importance to make decisions within the context of the project and everyday things.

In the cases of the women with children that could not be left at home, there was adequate space and activities provided close by, so they could participate free of worry. The training was concluded with focus on three separate functions: One was concerned with the co-executor commcommitees, one with the communities and the other with the communal instructors.

As a result of the first phase of the project, a group of persons were sought that had taken part in the first phase of the project and those who had wished to continue learning, as well as those who had demonstrated certain intrinsic abilities, such as being able to repair water pumps. These men and women (11 and 10) were told of the objective to create communal instructors and they were accepted. These persons were instructed in the following subjects: Sanitation and hygiene, organization, administration, the rehabilitation of wells with ferrocement and installation and maintenance of the technology. Accordingly, the workshops were being developed and the instructors were defining their areas of interest. At the termination of the project there were a total of 21 communal instructors, charged with carrying out the project in the new community and maintaining the process of development in their own communities.

The procedures for all the workshops consisted of:

1. The facilitators conducted the first workshop, indicating and outlining the objectives and uses of everyone of the employed instruments.
2. Once the primary experience was carried out, the participants were divided into groups with the purpose of preparing themselves to hold the workshop one week afterwards. For this they had at their disposal a manual that indicated step by step how to teach the subjects that they selected.

3. At the end of the following week, each group needed to present the workshop to the rest of the instructors. In this way the workshop was evaluated in groups to ascertain what were their likes and dislikes about the presentation and at the termination to incorporate the manuals they had, the forthcoming recommendations, and more efficient ways for the management of the instruments.

It is important to outline that parallel to this process, the instructors were incorporating new data proceedings of living experiences or given consultations with other sources such as books, radio, etc., generating in this way an integration between teaching and their own reality, explaining the facts in the most comfortable manner.

Every one of these workshops required the development and innovation of instruments and techniques that permitted us to prepare the instructors. The process of training was long (one year) and demanded a great compromise on the part of the new instructors.

In the initial stages when the instructors felt prepared, the strategy of the project was defined. From this moment they had the responsibility of executing and implementing the project in their communities and in a third community.

The training undoubtedly was converted into one of the principal participatory strategies since it obtained its fundamental purpose: To involve the community in the execution and administration of the project. By means of training, there was acquired a very important level of consciousness in relation to health in their communities and the responsibilities to them, as if they were directly affected. The whole process was directed in establishing and leaving in the community an installed capacity toward the future. In this way our proposal was given further direction beyond the project, intending to establish the bases of an integral community development where men and women can and need to be a part of.

Evaluation and monitoring.

A participatory evaluation methodology for the transference and application of proven basic hygiene and sanitary technologies, was applied and developed throughout the project.

This involved the community passing judgment on how the process of delivering the program had been going on and how it should progress. There were three critical stages to monitor. In addition there was a continuous participatory monitoring going on.

The first stage consists of the analysis of the situation including an assessment of people's attitudes and behavior. All this acted as baseline data for subsequent evaluations.

The second stage was five to six months after the technologies had been introduced. The evaluation at this stage was mainly for mid-course corrections as data were already available on effective use of technologies, problems faced during adoption, adaptability and maintenance. A certain amount of evaluation was carried out on behavioral changes as well. During this evaluation the total project staff was involved in addition to the members of the community.

The fourth stage was the final assessment. This assessment was done against the base line data and in terms of indicators which evolved during the life of the project.

A continuous monitoring system was also applied throughout the implementation of this project. Monitoring activities were conducted by local instructors and community groups. Various techniques were developed and pretested so that the community by itself could carry out the monitoring activities (i.e., data collection and appraisal). The project team reviewed with them, on a monthly basis, the appraisal of the community and discussed ways of managing the ongoing project. The aim of this process was to allow the communities to carry out these monitoring and management activities on their own, once the project ended.

The characteristics of this monitoring system were:

1. Collection of data on a cyclical basis. This information was used as feedback, in a direct way by instructors and the communities, and in an indirect way by the project team (monthly joint review).
2. Adaptability to the particular social, economical, cultural and environmental conditions of a community, since it was carried out by them.

It is necessary to point out that community participation with a gender approach is not easy and a series of limitations at the community and institutional levels are confronted. (Table 4). Nevertheless, the WSS sector offers an advantage and a great space for the development of this type work. Health, the necessity of water and sanitation are areas which permit construction of other elements that go further than providing solutions to merely basic needs. For example, the impact on the position of women in a water supply project which involves women as pump caretakers, technicians, community water committee members and health educators can be considered, when compared with one in which women are mere users of a new handpump.

Conclusions.

The following are some of the results of this investigation:

1. The experience has demonstrated that the problem of water supply cannot be canalized or attacked as a simple technical problem, but requires a full analysis that includes very important aspects like gender, cultural attitudes and traits, community participation, in order to enumerate some.
2. Since the beginning of the project there was a necessity to understand what were the differences, the necessities, realities, responsibilities and the roles of the social actors, not to have treated it in an individual manner, but rather to integrate the specificities of gender in the development of the project.
3. The experience of the work camp demonstrated that the rural women with modest training (combined with stimulation and technical support) were converted in real agents of change. It was proved that the women have the capacity to assume important roles of responsibilities in levels of planning and administration, including the diagnoses of their necessities and decision-making, accepting and adopting of technology, as to the introduction of new types of conduct within the bosom of the family, and therefore in the community.
4. By means of the employment of participatory methodology during the process of development of the project, it was possible to obtain the participation of the communities in a real and direct way in the execution and evaluation of the same.

The involvement obtained goes from the repair of the wells to the formation of the local instructors who gave courses in the areas of sanitation, health, organization, education, well rehabilitation, installation, maintenance and repair of the water handpumps in use.

5. The technology has been a useful and consequent instrument in order to discover that the development of the peasants is clearly related to the concepts of sanitation and health.

Paralleling, it was determined that the organizational and administrative aspects are fundamentals to fully develop the concepts of appropriation and responsibility toward the technological element, as well as the dissemination of the participatory strategies.

In this manner the handpump utilized becomes the key "instrument" of a process that penetrated diversified fields like preventive health, environmental sanitation, reforestation, organization and administration, eliminating without doubt the paternalistic positions that have characterized the majority of the projects of development.

Another element introduced against this paternalism was the formation, on the part of the communal committees, of a revolving fund created with economic support of each one of the beneficiaries.

The fact of the "nobility of the technology" cannot be overlooked, because it responded to the characteristics expressed by the users with regard to that which can be repaired easily by the women and children, at its facility of operation, and also something very important, will not produce rust of the water which would change the color and the flavor.

6. A methodology was developed to rescue the humanitarian values, individual interest and the self-esteem present in the communities, establishing and recovering a capacity of transmission of knowledge by means of the formation of communal instructors.

These communal instructors, many of them housekeepers and young people (with different levels of literacy) have, by means of a process of training and interest, learned to transmit to their communities (or other communities) the mechanisms necessary to carry out the project. They now have the responsibility of disseminating related aspects with the control and management of

the water pumps, preventive health, basic sanitary measures, how to organize and administer a committee or an organization responsible for managing a water system supply among other things.

In this manner the bases have been set up of a program of reproduction (multiplication) of the participatory methodology in dispersed rural populations, which proposes to the same members of the community as an entity responsible for the development, the monitoring, evaluation and disseminating of projects of potable water supply and environmental sanitation.

7. Development is not merely about increased productivity and welfare. It is also about meeting the needs of those that are most needy, and about increased participation and equity. Therefore, development should also be concerned with enabling people to take charge of their own lives.
8. The women's situation in the sector should be concerned with not only enabling women to have access to a safer source of water or a better sanitary system. These aspects should be fulfilled in such a way that they have an strategic impact in the sense that one of the central issues of women's development is women's empowerment, to enable women to take an equal place with men, and to participate equally in the development process.
9. There is a need to "open spaces" for an equal participation of women in the decision making process; this means participation in the process of policy- making, planning and administration.

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VIETNAM - BUI THI SY (MSc.)

1. The project area is situated in the coastal area of THAI BINH province.

Rain Water

The rainy season continues from May till November, while the dry season from December to April. The average annual precipitation in the region is 1,683 mm., of which 1,423 mm. pours during the rainy season. Only 20 % of households have the facilities to store rain water for use during the dry season.

Surface Water

Surface water comprises of water in rivers, ponds and lakes. Quality of surface water is not good and polluted by household as well as industrial waste. In the dry season, rivers and canals get dried up causing a severe shortage of fresh water. 80 % of the households uses surface water without treatment.

Ground Water

Ground water is available at a depth of 15-25 mtr. with a flow of 88 m³/s

2. For rain water storage, water tanks with a capacity of 3-4 m³ have been used in combination with the other water storage facilities as buckets, basins, barrels and earthen jars.

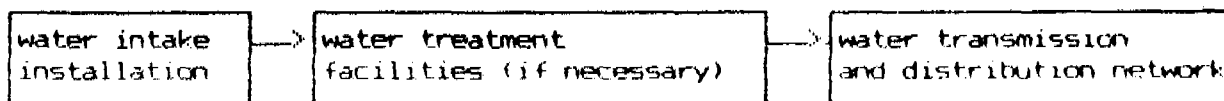
For exploiting ground water, dug wells with the depth of 4-6 m, diameter fo 1-1.5 m have been used. Due to salinity, iron and acidity, the quality of water in wells is not good.

3. The project is based in an alluvial area, so it is necessary to prevent well walls from collapsing back. This is achieved by lining the well inside with, concrete or bricks.

4. Only 40 % of the community have been involved in the project due to lack of enough capital investment.

5. From our experiments, we can draw out some remarks and solutions for rural water supply as follows :

Technology and flow chart of water supply systems



Water intake installations

For rural water supply with the use of ground water, the water intake installations are usually of the following types :

- * Small diameter drilled wells (D = 42-49 mm)
- * Dug wells for collecting shallow ground water.

With surface water resources, the water intake installations may be ...

- * Water collecting and storing pits along the banks of river, streams, lakes etc.
- * Large or small dams for retaining streams, gullies, rivulets etc.

For rain water sources, the water intake installations would be :

- * Catchment installations (roof, brick yards, big trees and pipes) for conducting water to the tanks
- * Artificial reservoirs for catching and storing rain water.

Water treatment

- * Iron treatment for ground water

The most common iron treatment method which is most suitable for the rural conditions in Vietnam is oxidation (aeration). After being pumped from drilled wells, dug wells, the water is aerated and then subjected to sedimentation and filtration.

- * Treatment by settlement method

In the river side areas, water is usually taken directly from the rivers and streams and subjected to settlement for certain time before use. The settlement may be natural or with the use of alum. This is the simplest method, but often the settlement is only a preliminary treatment.

- * Surface water treatment in slow filtration tanks

In this treatment process, no alum or any other chemicals are needed, no sophisticated equipment is required. With simple operations and control, water can be cleaned very effectively (90-95 % of the sediments and bacteria can be removed).

* Treatment of rain water with quick filtering tank

With proper mixture of filtering substance and high filtering speed, the filtering compartment for rain water is usually smaller than the storage tank.

* Water transmission and distribution network

For rural water supply, usually there are only tanks for storing clean water, rain water and taps for people to withdraw the water directly from the tanks or to collect the water into containers and transport home.

From groundwater sources, smaller diameter drilled wells installed with hand pumps.

INTERNATIONAL WORKSHOP
ON DRINKING WATER AND SANITATION
FOR GRASSROOTS ORGANISATIONS

TILONIA, RAJASTHAN, INDIA

20TH - 26TH NOVEMBER 1993

PREM NARAYAN BELBASE
BUILDING, HOUSING AND
URBAN DEVELOPMENT SECTION
LALITPUT, NEPAL
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1

Nepal, small land locked and rich in natural beauty, "The Switzerland of the East", a Himalayan Kingdom is situated in the northern hemisphere between 80.4' E and 88.12' E longitude, and 26.22'N and 30.27' N latitude. It has a territory of 147,181 square kilometers. It has Tibet (China) as its northern neighbor while India is its neighbor on the other three sides. The highest mountain in the world with a height of 8,848, Mt. Everest' welcomes all the human beings of the world.

Physical division: Physically Nepal is divided into three physical division. The Himalayan Region: - This region lies in the northern part, covers 15% of the total area of kingdom and rises from 3000 meters to over 5000 meters, the world's most famous mountains and peaks, Mt. Everest (world's highest peak), Kanchanjunga (world's third highest peak), Makalu, Manaslu, Gaurishanker, Lhotse, Langtang, Annapurna and Dhaulagiri etc. are in this region. Since the snow-line begins at 5000 meters, mountains higher than 5000 meters are always snow-covered.

The Hilly Region: This region covers 68% of the kingdom. it rises from 600 meters to 3000 meters in height and lies between Himalayan Region' and Terai Region. Two important tourist valleys, the Kathmandu valley (capital also) and the Pokhara valley lie in this region. In the southern part is the Churia or Siwalik Range 1500 meters high and is heavily forested.

The Terai Region: This region covers 17% of the kingdom and southern broad belt of low and level land. It is generally lower than 600 meters above sea level. It extends from 25 Km. to 35 Km. in breadth. This region produces the largest amount of grains, so this region is heavily populated. lord Buddha's birth place, Lumbini and sita's birth place, Janakpur lie in this region.

Political Division: Politically the kingdom of Nepal is divided into 14 Zones and 75 Districts. To develop all parts of the kingdom balanced and to increase the living standard of the people, it is also divided into 5 Development regions. There are 4000 village development committees, 36 town municipalities and 75 district development boards which work independently at heir levels.

Population: According to 1991 National population Census Result, the population of the kingdom of Nepal was 18,491,097 of which 9,220,974 were males and 9,270,123 were females. The sex ratio in 1991 in approximately 99.5 The growth rate of population is 21%. Crude Birth rate in Nepal is 37.4/1000 population and Crude death rate is 13.3/1000 population, Fertility rate is 5.8, life expectancy is 54

years, infant mortality rate is 102 per thousand, mortality rate of children under 5 is 165 per thousand and maternal mortality is 850 per 1000,000.

Education: Education is one of the important weapons for the socioeconomic development. But there are more illiterates in the kingdom. According to 1991 National population census result the literates are 39.3%. The male are 54.5% and female are 25.00%, which shows the male literacy is more than twice the female literacy. Due to illiteracy, women in Nepal are widely exploited socially, economically, culturally, politically and legally as well. In other to raise literacy the government has the plan to make 1.4 million adults literates through adult literacy programmes during eight five year plan.

Occupation: Agriculture is the main occupation. More than 80% people of the kingdom of Nepal depend on agriculture. The agricultural system is not mordernized. The government is not able to give sufficient facilities for the farmers. 2% people depend on industry and remaining 18% depend on other service motive occupations. According to World Bank's recent report Nepalese people's percapta income is 180 US \$. A land locked least underdeveloped with limit resources the kingdom of Nepal faces different types of problems.

Water and Sanitation

Water and sanitation play a major role for the health of the people. In some villages of the kingdom, till now it is fact that the people have to more than 2 hours walk for a pot of water. Women and girls in Nepal still spend vast amount of time and energy in fetching the minimum quantity of water required for domestic needs, specially in the hills. Due to lack of water they can not bath, clean and wash that cause different types of diseases. Some where the water is so dirty that it causes different types of water born diseased too. 70% diseases of the people of the kingdom of Nepal re caused by dirty water. According to the National Planning Commission only 36% of the population have got drinking water facility. So the government has the objective of providing drinking water facility to 72% of the population by the end of the Eight Plan period. At present water supply and sanitation (DWSS) related activities are carried out by the ministry of Housing and Physical Planning (MHPP). District water supply and sanitation has been designated at the sector's lead agency. It is responsible for the development of water supply and sanitation in rural villages and smaller urban areas. Drinking water supply and

sanitation has been accorded by HMGN as one of the highest priorities in the development of social sector in the National Eighth five year Development plan (1992/93 - 1996/97). The ultimate goal is to provide every citizen of Nepal with access to safe water supply. The WSS sector Review and Development plan (1991-2000) prepared jointly by HMGN, WHO and UNDP/WB-RWSG for south Asia in 1992 concludes that a more conservative water supply and sanitation coverage targets for the year 2000 should be in the order of 75% rural and 90% urban (77% overall average) for water supply and 25% rural and 75% urban for sanitation. Supply of Drinking water has also been included as one of the basic needs in the national strategies for "Health for All" by the year 2000. The safe water thus provided would help in improving the health and living standards throughout the kingdom.

Of the total physical targets in the drinking water and sanitation sector during the Eighth plan period, about 80% of the target in the drinking water sector and 54% of the target in the sanitation sector will be achieved through the execution of programmes by NGO's private sector entrepreneurs, companies and local bodies.

During the Eighth plan period, drinking water facilities will be extended to an additional 7,199,000 people, including 6,756,000 people in rural areas and 443,000 people in urban areas. By the end of the Eighth plan period, 15 million people or 72% of the total population will benefit from drinking water facilities.

Sanitation facilities will be extended to an additional 1,573,000 people. By the end of the Eighth plan 2,685,000 or 13% of the total population will benefit from sanitation facilities. This is the target of HMGN for Drinking Water and Sanitation.

I am a technical staff of building, Housing and Urban development section, Lalitpur. So I belong to Lalitpur district. That is why let me explain about some facts of Lalitpur.

LALITPUR

Lalitpur district is located in the central development region within the central hills and has elevations from 600 to 2600 metres about sea level. It is bordered by the

Bagmati river on the North, West and South. East of this district are Bhaktapur and Kavre districts. About 1/3 of the district is located in the southern part of Kathmandu valley and remaining portion of the district is hilly rural and remote area. According to 1991 population Census Result, the population of district was 258474, of which 131885 were males and 126589 were females. There are 40 village development committees and 1 town municipality. Among the 40 village development committees, there are 20 village committees in hilly portion and remaining 20 village committees and 1 town municipality are in the valley. The valley portion is facilitated by motorable roads, communication and other facilities since this portion is urban and semi urban. Traditionally, within the valley, the sources of water supply was wells, spring ponds, canals and stream. Agriculture as the main occupation but there are some small industries.

The hilly portion is not facilitated by such facilities. This portion is remote to reach the southern most part of the district requires one or two days walking beyond the end of the motorable road. Outside the valley there are no other means of transportation except by foot, steep hills and rivers make communications difficult and sometimes in the rains even impossible. The main occupation of the area is agriculture but food is insufficiency there. The people are far away from different types of development. UMN's (United Mission to Nepal, a Christian organization) CDHP (Community Development Health project) is giving emphasis on water and sanitation nutrition and health services since 1971. The poor, illiterate people faces different types of problems. Food insufficiency, different types of diseases, illiteracy and water and sanitation etc. Since the area is hilly Gravity flow Water systems are implemented for water supply in rural areas where water has to be carried over long distances. Each scheme typically serves 100-150 households and infrastructure components like schools and health posts. UDICEF provides about 60% of a project budget in the form of imported materials (pipes, tap, fittings, cement etc.) and DWSS 205 in technical supervision and skilled labour. The remaining 20% is contributed by villagers as unskilled labour. DWSS conducts all surveying and planning, oversees construction and is responsible for ensuring community maintenance of the systems.

District development board also contributes to the water supply and sanitation projects from its development budget which can be used by the user's group to construct small new drinking water projects and to maintain the projects. The budget is used according to HMGN's fiscal law.

Some NGO and INGO also help to construct the projects and maintain the project related to drinking water and sanitation. One of the main influencing INGO is UMN's CDHP

I am working in Lalitpur District's hilly remote rural area for more than 7 years. So I am going to concern with my working area only. Below is given a "working Progress"

WORKING PROGRESS

1. Demand - Community ----- Line agency
(VDC/WC/Local groups) (GO/NGO/INGO)

2. Formation of users committee:- 9 to 11 members representing the users with atleast 2 women members

3. Feasibility study by Agency with User's Committee:- Source identification, Flow measurement, Site selection for source, Average distance, Site selection for Tap posts (preliminary, 1 tap post = 5 to 10 houses)

4. Maintenance fund raising and Maintenance Worker selection:- Maintenance fund is equal to about 10% of the project. Maintenance worker must be local/user's group/able/intrested/can be trusted.

5. Work distribution:-

A. Line Agency

1. Survey/design/estimate
2. Provision of technical manpower
3. Provision of industrial construction materials (e.g. pipes, fittings, valves, cement and other Hardware etc.) upto motorable destination.
4. Work plan and monitoring
5. Maintenance worker's training and tools provision
6. Rehabilitation or major repair.

B. User's Committee

1. Planning (basic)
2. Provision of local materials (e.g. Sand, Stone, Aggregate, wood etc.)
3. Provision of semi-skilled and unskilled manpower
4. Transportation of materials (from motorable destination to site)
5. Maintenance and operation
6. Minor repair

- 6. Agreement signing between line agency and user's committee
- 7. Local material collection
- 8. Technical material collection
- 9. Construction
- 10. Testing
- 11. Maintenance workers training
- 12. Handing over.

Main source of drinking water

The people of this area used to carry drinking water from spring, small streams and big stream like Bagmati. They had to fetch the water from far distance, specially the women and girls had to spend vast amount of time and energy to fetch minimum quantity and unsafe contaminated water. Due to human habitation and animal grazing area the stream and spring water also was contaminated. The water of Holy Bagmati is already contaminated because it flows through Kathmandu valley, a heavy populated town and capital of Kingdom of Nepal. So, most people were suffered by water borne diseases. The main sources of drinking water in the area are;

- 1. Spring
- 2. Small stream
- 3. River.

Due to ground percolation and filtration, most springs are quite free of the pathonogenic organisms that causes many health problems. So, as far as possible spring sources are preferred for drinking water projects.

Small stream, although these are not as desirable sources due to the possibility of contamination, some times these sources are also used. We can not fulfil the demand of the villages by other sources. Bagmati river is not used for drinking water project till now.

Due to hilly area, there is no possibility of wells and hand pumps. Only Gravity-Flow water systems are used. These systems are piped water supply systems, so we use HDP and GI pipes. To reduce the construction amount, we use maximum quantity of HDP. In case of river crossing, rocky area and tap post GI pipes are used.

Wells and Hand pumps

In this area, there is no possibility of wells and hand pumps. The whole region is hilly from 1000 metre to 2600 metre. Some of the people have not seen wells and hand pumps. The people, who use to go to Terai and Kathmandu valley in search of job or other purposes have seen wells and hand pumps.

Soil

Here the soil is mixed type. Mostly the soil is soft and hard type. In some places, we find boulder mixed soil also. In some area, there is rocky land. Due to hilly region, the land is sloppy. We find the climate as tropical and sub-tropical. Mostly, the area has temperate climate with warm summer and cold winters. Hottest month is July. The coldest month is January with temperature of about 0 to 5 c. The rain fall is monsoon type. Mostly, the area is covered by forest and cultivated land.

Involvement of community

Line agency also thinks to participate community extremely. It is seen that the projects which were completed by extremely participation of community are maintained by them. They think that the water project belongs to them. Now the policy is that the community have to take interest from planning to implementation.

The people of the village call a meeting. They plan and conclude to demand water project from line agency. Line agency may be GO, NGO and INGO. Then they form an user's committee of 9-11 members representing the users with at least 2 women members. The feasibility study is completed by agency with user's committee. Community shows the sources and advice the suitable source because they have observed these sources (spring/small stream) for many years as if they try up for some months of the year, they know about it. Community request how many tap posts are necessary there. Technically if the project is considered suitable the number of tap posts and place should be fixed in feasibility study in front of the community and user's group. This work should be done by the overseer because the duty of construction and supervision mainly lie on him.

Then the community raise maintenance cost about 10% of total project cost. It may be less. They deposit the amount in fixed account in bank. They select a maintenance worker which is from user's group, able, interested and can be trusted. After that the work distribution is done. Basic planning, provision of local materials (e.g. sand, stone, aggregate, wood, etc), provision of semi-skilled and unskilled labour, transportation of industrial construction material (e.g. pipes, fittings, and cement etc.) from motorable destination to site, maintenance and operation and minor repair should be done complete by the community Agreement is signed between line agency and user's committee.

After that, first, they collect local materials at site and

then transport the technical materials from motorable destination to site. In construction period, they have to complete the work of unskilled and semi skilled labour (e.g. trench cutting, pipe laying and filling the soil etc). After completed the project construction and the testing work, the maintenance worker is trained. Specially the maintenance worker is involved with less salary during the whole construction period because he knows the name and parts and function of the technical material and structures and understand water supply technology during the period which is helpful in his training period and maintenance period.

At last the project is inaugurated by the chairman of the user's committee or political leader (district level or high level) in the presence of local leaders, more villagers and the members of the line agency, who are involved in the project construction. According to the agreement, maintenance, operation and minor repair are carried out by the community. The maintenance worker maintains the project regularly. He gets the salary by the user's group either in cash or in food grains.

Cost down of the Project

To bring down the cost of providing drinking water, we follow the following rules as far as possible.

1. select spring source as far as possible
2. design is made appropriate
3. maximum use of local materials (e.g. in masonry work, we use stone masonry)
4. The community should be used extremely
5. Maximum use of HDP pipes instead of GI pipes.

Conclusion

From the experiences of more than seven years in rural hilly area of Lalitpur with community, concerning with drinking water project, I faced many types of problems. Main problems are summarized as follow;

1. Some people are very clever when they make a request for water system. They will make the problem greater.
2. Due to ignorance the people can not improve their water situation.
3. Some villagers damage the pipes, move pipes or taps or cut them.
4. Local people's politics and one-sided opinion in the decision making process also, give negative results.

5. Sometimes, the villagers quarrel themselves and stop working.

6. In some areas, the people are so poor that they can not raise maintenance cost etc.

The technician can look at the problems and see if a project will be successful or not. It is most important that everything is explained clearly before a project is started, i.e. what is expected of the villagers and what is the contribution, rules and regulations of the project. We, also, need to judge whether a certain project is really necessary or not. Now, the villagers are beginning to understand the cause of difficulties and the importance of water and sanitation. Because of these, we can motivate them and explain about the advantages of clean water and sanitation for better health for human life. We can teach them how to care for the water systems, how to make plans for the future maintenance, how to get help from agencies and how to achieve good community participation. After the re-establishment of democracy in the Kingdom of Nepal, the people's thoughts are, also, changed. So, I do hope that the future of the people of this region will be bright and happy.

The role of local government in water supply and sanitation.

The self - government in Poland is very young - it is only 3 years old. The real self - government was introduced in Poland by a legal act on 8 March 1990. According to this act the unit of local self - government is called "gmina" . According to this act gmina consists of all inhabitants living in a specific area and their territory. Community inhabitants elect their representatives - Gmina (Borough/Municipality) Council which in turn selects the municipality office to fulfill undertaken decisions. According to the act of 8 March 1990 water supply and sanitation issues are the task of gmina. All water supply and sanitation facilities owned by the government are now community property. Gmina fulfill the task with the help of committees created by inhabitants for specific investments. The support of local initiatives, training people from the community, consultation and advisory services are the main task of the Małopolska Institute for Self-Government and Local Administration (Małopolski Instytut Samorządu Terytorialnego i Administracji - MISTiA).

Geographical and hydrological situation of Małopolska.

It should be mentioned that Poland has the lowest water resources in Europe.

Małopolska is the region of Poland with very poor water resources, especially those of groundwater which make up merely 1.2% of these kind of resources in Poland.

The principal river of the Małopolska region is the Vistula River. Tributaries of the Vistula complete the hydrographic system of region. The quality of surface waters falls considerably below the required standards. The state of the Vistula is particularly bad. The river waters, which make up approx. 80% of the region's water resources, do not comply with any of the prescribed quality classes. Due to the salinity of the Vistula caused by the effluent from Silesian mines, water which reaches Małopolska boundaries (Cracow region) is already too contaminated to be used as drinking water or for industrial or agricultural purposes. In Małopolska many rivers flow into the Vistula. These rivers are also very often heavily polluted particularly with bacteria. The water quality is additionally lowered by bio-generative matter, mainly phosphates, organic compounds and suspended solids. The major sources of pollution are effluent from industrial plants, domestic wastes from industrial plants, domestic wastes from housing estates, villages and animal farms, land use run-off and, additionally in the city, wastewater from precipitation collecting pipes and storm drains.

In the south - west areas of the region the average rate of precipitation is 713 mm per year.

In areas near Silesia depression sinks occurs. They are caused by coal mines. One minute of main pump working makes approximately 200m³ of water diminish from deep underground levels. The depressive sink has a diameter of 320 km. and reaches the Cracow voivodship (region). In some areas (i.e. Skała surroundings) the level of the ground water decreased 10 - 15 meters. In 1990 strikes and protests were held in these areas. People demanded the government support in building water piped supply system. Now thanks to the local initiatives and self - governments, and also to the central government support, water supply conditions are is better. Still there remains a conflict of inhabitants with coal mines.

Water supply and sanitation on Polish village.

Polish villages have - in comparison with the city - very badly developed technical infrastructures especially with regards to the water supply and the sewage disposal systems.

After the II Word War there were almost no piped water works in Poland. Those built (about 5 thousands) were mainly factory waterworks and the majority of them needed complete renovation. The situation had not changed for the next 20 years - up until

the sixties when the Parliament passed a bill concerning the village and agriculture water supply systems.

There was a similar situation in the case of sanitation. In the year 1955 no work sewage treatment plants existed and sporadic facilities were used only to discharge the rainwater.

The sixties brought some changes. In order to improve the water supply conditions village waterworks were built. The rate of constructions varied, but it never kept pace with demands.

Two kind of piped water supply systems exist: one it is collective (rural) water main - it usually covers some villages; the second kind is an of pipe installations which cover only one household. The water is usually taken from a dug well with help of an electric pump than pumped to the house building or the farm building by a hydrophone.

About 30% of water mains need modernization because water sources are depleted and the facilities are old.

Still the most common of water supply in a village hand-operated drawing water from a well (42% farms). Most commonly these are opened dug well.

Taking into consideration the fact that individual water mains take water from this kind of well too, we can say, this kind of water supply is the most important.

In practice in a village surface water is not used for drinking purposes. One of the reasons is large and still growing pollution of the river. There is no river with water of I class quality (drinkable waters), approximately 70% of rivers are too

contaminated. Not only surface water are polluted, but also groundwater pollution is still growing. According to the data of the Polish Sanitary Inspection (Polska Inspekcja Sanitarna) from 1989 in 65.9% of wells the water is bad and undrinkable, the next 6.1% is uncertain.

Solec-Zdrój general presentation

Solec-Zdrój is located about 90 km from Kraków (Cracow) in a north-east direction. From an administrative point of view it is located in the Kielce voivodship (region). From a geographical and geological point it is located in an area called Niecka Nadwiślańska. More generally it is located in the north-west part of Małopolska. Solec-Zdrój is situated only a few kilometers from the principal polish river, the Wisła (Vistula). The fact that it is located on the bank of the biggest polish river is without any positive meaning for drinking water purposes - the river is extremely polluted, and any intake is impossibility.

Geologically Solec is located on the Tertiary clays.

The sole but very important natural resource is the spring of medicinal water. There exists two springs taking water from deepness 170 m, its spring yield is 23 m³/24-hours.

Village Solec-Zdrój plays an important role of gminas (community) center. Besides Solec-Zdrój gmina consist of 19 villages (sołectwo). It has a total area of 8490 ha (with 84% making agricultural land and 8.5% forests). 5668 people, live in the gmina 64% are farmers, 20% work outside of agriculture, and the rest have two jobs (both on the farm and outside of agriculture). There is a tendency toward leaving gmina. The average migration per year makes 57 peoples running away to the cities.

The total number of farm holdings is 1340. Farms with areal 2 - 5 ha make 37% of the total number, with an area of 5-7 ha 26.3% and 7-10ha 18.3%. The majority of the soil is of very good quality, from this position it is one of very few areas in Małopolska where there is no soil degradation. There is no specialization in agricultural production. Typical kind of production include: crop growing, fodder (feed) crops growing and cattle-breeding. During the last few years in the areas with the worst soil quality vegetable growing such as strawberries, carrots, tomatoes, cucumbers etc. have been initiated. There are very few factories employing people (i.e. bakery, brick - yard) Promotion and initiation of local entrepreneurship is one of our important tasks - especially small food/vegetable processing works which needed. Now there are two such private industries. The rate of unemployment 11.1% - usually is made up of young peoples just after finishing school.

One of latest accomplishments of inhabitants is gasification

(the installation of gas supply system) in a majority of villages (11 out of 16. The gasification is connected with the priorities given by the Community Council to ecology. Elimination of coal - heating and transferring it to gas made air quality improve. Investments connected with gasification were run. by the inhabitants - they created Local Committees where they were obliged to work and pay for part of the cost of these inventions. 40 % of the investment cost was paid by inhabitants, the rest was financed from gmina budget, and from other donations (from government and from special foundations).

Present situation of water supply in a community

What characterizes the south-east areas of the Kielce voivodship (region) is a very strong lack of drinking water. Obtaining underground waters is difficult because of geological conditions. Under shallow stratum of Quaternary deposits such as loesses, clays or alluvial soils and sands (in a river valleys) occurs impermeable stratum of silt occur. Water-bearing layers which are under it are very strongly saturated by sulfates. A big number of iron and manganese sulphate the conditioning of these waters impossible.

Present total efficiency of all deep wells and surface water intakes in a area of 9 communities is approximately 457 m³/h, the

predicted water demands in the year 2006 is: $2.384\text{m}^3/\text{h}$. So present efficiency can meet only 20% of the requirements in the year 2006 (Program Budowy Wodociągu Regionalnego "Nowy Korczyn").

The strongest shortages of drinking water occur in a Solec-Zdrój. The lack of drinking water makes any development impossible. Although Solec-Zdrój has an important natural resource - medical water it is impossible to utilize it without an appropriate amount of drinking water.

All sources of water in the area of Solec-Zdrój municipality are exhibited in table 1.

The waterworks "Groczków - Solec" supplies drinking water to 240 house holds in Solec and part of the Zborów village. This water supply system was constructed before World War II. Its capacity is too small. Failures occur often, and in the summer time frequently there is no water in it. This water pipe system is used also by people from the neighborhood of Solec by use of a hydrant located on a street. Usually during dry months there is the a queue of farmers with containers to fill. Very often that additional load makes water disappear from the water works.

The piped water supply system "Groczków - Solec Zdrój" takes water from two sources:

- from the spring in Groczków
- from another water works "Wolnica - Stopnica" (located in

a different gmina (community) on a base of mutual agreement. (Związek Międzygminny "Ponidzie).

From technical a point of view the scheme of the water works is as follows. Water from the spring in Groczków gravitationally flows to the chamber near the spring. Water from the waterworks "Wolnica - Stopnica" under pressure existing in pipes also flows to the same chambers. Then water gravitationally flows to the water basin located in a pumping station area in Solec and then is pumped through the hydrophone to the existing water-piped network in a Solec-Zdrój. The part of the village Zborów (farms located under the water chamber near the spring in Groczków) is supplied gravitationally from the existing water main. Because of low water pressure in Zborów, bad technical conditions of the pipeline and very frequent failures, Community Council decided to build a new water pipe station and a new pipeline. Some technical data will be presented later.

Also open wells are in use. The depth range up to 6 m, but very often they are only 2 or 3 m. Because the it wells use subsoil and shallow waters, the quality of this water is very bad and should not be used for drinking purposes. In the north parts of the community the water conditions are better than in the rest of the area. The level of ground water is higher, and people can still use their mills during wetter seasons of the year. But in the rest of the area the ground water level decreases very rapidly (even 2 m per year) and now mills are empty all the time.

Because of geological conditions the deeper water intakes are not usable for drinking purposes. As was mentioned before the water is too mineralized. In some areas it is possible to get drinking water from deeper levels but because the cost of drilling is very high and the water resources are small, people resigned from drilling deep wells.

As you can see in table 1, a household with any kind of its own private source of water makes about 25 % of the total number of farms. But almost 100% have temporary problems with water. And these shortage of water is the major barrier of development in these areas. To overcome these roadblocks two initiatives has been undertaken. One is a long - range plan which attempts to resolve all problems, and the second - provisional, trying to resolve the problem on a short term basis.

Gmina Solec-Zdrój.

Table 1.

1. Sources of drinking water.

Type of water intake.	Number of house holds	Comments
Private open (dug) wells	767	deepness up to 6 m. diameter 1-1.5 m, bad quality of water, drying up during the summer time.
Individual piped water supply system	204	water intake in open wells - see above.
Public open mills	24	comments the same as above
Piped water supply system "Groczków - Solec"	240 (including 140 agriculture house holds)	It covers only one village Solec, and part of the Zborów village. constructed before Word War II for use of the health-resort, frequent failures,
House holds without private water intake	330	use of public wells, wells belonging to their neighbors, bringing water during all year.
abyssinian wells (with hand pump)	-	geological reasons
drilled wells		3 intakes with medicinal waters undrinkable waters, strong mineralization (103 H ₂ S mg/l, and 920 mg H ₂ S/l)
surface water intakes	-	to little flow of biggest river Rzoska, Planned intake from Nida River (located in a proximity of gmina Solec)

Provisional solution: construction of water intake station, and water main "Groczków - Solec"

There are two possible sources which can meet water needs of inhabitants of the villages Zborów and Solec - Zdrój. It is mentioned above that the spring in Groczków yields $Q = 22\text{m}^3/\text{h}$, and the water work "Wolnica - Stopnica", provides a quantity of water equal to $8.3\text{ m}^3/\text{h}$. Maximal water needed for the two villages $Q_{\text{max.}} = 58.4\text{ m}^3/\text{h}$ is higher than the availability of water resources (total $30.3\text{m}^3/\text{h}$). The meeting of water needs would be possible in the case of employing a compensation reservoir. It's task will be to compensate for water shortages during peak water demand. Needed reservoir storage capacity is about 270 m^3 . Two prefabricated ferro-concrete reservoirs with a capacity $V = 2 \times 150\text{ m}^3$ produced by "BUDWOD" company were selected. Water both from the spring and a water main will be pumped to the reservoirs, then it will be pumped through hydrophones to the pipeline network and on to the Solec and Zborów villages. New pipeline networks will be added to the old pipes (new pipes will be made from PCV and will have a bigger diameter).

This investment was initiated by the Community Council but the involvement of people was crucial for success, especially for the realization of the second part of the project - construction of the new pipeline. Total cost of this investment was 2.6

milliard (billion) zl, It was financed from several sources: from the Church Foundation for Village Water Supply, from the central government budget and from the community budget. Credit was also taken. The project will be completed by 30 Nov. A building contractor was selected by way of bidding. The bidding was won by private company Budwod from Kielce.

The second part of the project consists of building new pipelines along the old pipeline network. Assessed cost of this part of the project is about 2 milliard zl.

For this example it is possible to see how community involvement is important. In this case the first step was taken by the local authorities - a decision concerning the reconstruction of a water intake station was undertaken. In the second part of the project the inhabitants of the Zborów village were strongly involved. During village assemblage they decided to create committee for this investment. The majority of farms in this village were not connected to the piped water works. They decided to subscribe to a cost of investment (they decided to pay a total of 6 ml zl - approx. two average monthly salaries: in this year 4 ml and during the next year 2 ml), also agreed to participate in the work during building (such as earthworks, etc.). Average participation of people in an investment cuts about 30% of total cost. Thanks to this participation it will be possible to connect 120 new households to the piped water supply system. With households already connected it makes 360 farms using water works.

In the context of this investment it can be seen that at least two things force people to be involved. First is the local authority attitude. They say: "We can't make people happy by force" - and because of the shortage of financial resources they avoid investment in the parts of the municipality where any social committee (sometimes called: local initiative) has been created in a bottom - up way. Even when it is created, if people do not show great involvement - the investment has little chances to be undertaken. Of course such initiative should be supported - this is one of the tasks of the institute). The second important factor forcing people to be involved is money - usually the municipality does not have enough financial resources and a lot of support is needed. Besides central government support (very restricted) all foundations have a tendency to give such support not to the local government but to the committees. Sometimes they require establishing joint companies for purposes of specific projects for inhabitants where every member (stock holder) is personally responsible for their money. From a formal point of view these companies are investors. It is resolved after completion of the project (or up to five years after completion). The role of the local government and Małopolska Institute is then helping and cooperating with inhabitants.

Long range perspective plan: project of construction of the regional piped water supply system "Nowy Korczyn" in cooperation of neighboring municipalities.

The piped water supply system "Groczków - Solec" presented above only partially improves the situation. It will supply water to 360 households and will reach makes 27% of the total number of farms. The rest of the villages are still in a bad situation - better conditions are in the north of the community where using mills is possible, but even there the lack of drinking water hinders the development. Similar situations is occur in the surrounding communities (gminas). It was the reason for creating an agreement between 9 communities (a community union called "Nida 2000). The purpose of this agreement is to build a regional water supply system "Nowy Korczyn". Total efficiency of all deep wells and surface water intakes in a area of 9 communities makes approximately 457 m³/h, when predicted water demands in year 2006 is: 2.384m³/h. So present efficiency can meet only 20% of these requirements. The deterioration of efficiency of springs and deep wells is observable (i.e. the spring yield in Groczków has fallen from 30m³/h to 22m³/h, the spring yield in Wójaczka - from 120m³/h to 50m³/h). In some water intakes the quality of water has drastically deteriorated making the water undrinkable.

After examination the only possible source of water in this area occurs from the Nida River. Until the present time the

conception of the regional water supply system with its water intake in Nowy Korczyn has been elaborated. According to the project the water supply system will cover 9 gminas, 166 villages.

The water taken from the Nida river will be directed through an algal-bacterial pond in filtration fields, and than will be flowed by drainage to the collective wells. After purification and conditioning it will be pumped to clear water reservoirs. Next it will be pumped to the retarding reservoir on the top of the hill and then to the water piped network. The planned piped water supply system will have 9 pressure zones.

The existing water intakes and water works will be utilized wholly for the regional water works. Those which have good quality water will use it - only deficits will be compensated from the central water intake in Stary Korczyn. Nevertheless the efficiency of water intake is calculated to meet the needs of all regional water works.

The project was elaborated in a framework of agreement between municipalities by company Zakład Realizacji Inwestycji Ochrony Środowiska (N.F.O.S) in Kielce. The total cost of the investment is assessed at approximately 50 miliard zł (approx. 2.5 ml \$)

Because the water intake will be below the villages connected to the water system it is important to create sewage treatment system at the same time.

Sewage system

There are some reasons that a waste water system is important for the community. Thinking ahead the community hopes that excellent medicinal water will enable the development of sanitoriums. Also thinking in terms of future water intake the Nida River promote the development of a wastewater treatment system. From the point of view of community participation in investment situation looks a bit different then in a water supply system. There is no such engagement in building wastewater treatment plants. But in this case it is easier for community office to get financial support so the local authorities can obtain investments individually. After completing the investment the inhabitants have to pay for it. If it is sanitary a collector that have to pay so called "adiacenckie" charge (50% of the difference in property values before and after installation), or that have to pay sewerage charge. It is not very high charges and people usually does not protest.

In the area of Solec - Zdrój municipality there are two water treatment plant. One is located in Solec - Zdrój. The sewage treatment plant throughput is 564 m³/24 hours. In this year it was increased from 300 m³/24 hours. It has two steps: mechanical, and biological. [...]

140 hausholds are connected to the collector, many other households use it by discharging their emptied cesspool (approx. 300 cesspools are emptied to this sewage plant).

The second wastewater treatment plant was build exactly one year ago in the Zborów village. It is modern kind of plant named BIOVAC (produced by polish - norwegian company). Its throughput is $60\text{m}^3/24\text{hour}$. Building this plant was joint investment of thee organization. 23% of the cost was covered by the State Primary School (money from central government budget), 17% was covered by municipality, and the biggest part the initiator - Social Care House.

PROJECT WATER & DEVELOPMENT

"Environmental control with community participation in the North-Western popular settlements of QUITO"

QUITO-EQUADOR.

1. Characteristics of the project

Fundamentally the project is a proposal for popular management and for preparing the working tools of the popular sectors in the search for better living conditions of the population and to achieve a higher participation in decision making in the urban policies. Its aims towards a harmonic development of the population in relation to the society, the city and the environment.

It takes into consideration different aspects of life in the neighbourhood as parts of the whole integrated approach.

The project emphasises on a set of actions which aim at protecting the living area, satisfying the felt necessities of the population ; being a training project the contents of the training is aimed at raising the ecological awareness of the participants and the people living there, also to increase the potentiality or to create productive activities ; contributing to development and the socio-organizational strengthening of the FBPNQ and each of the different settlements.

The one philosophy and the one goal of the development of other programmes and projects which contain the neighbourhood development plan. One of the basis of the project is its impracticability without the active presence of the community, for it is the maker of its own welfare.

The direct participants, the people of the settlements, and their organizations are involved from the beginning in the formulation, execution, control of the projects, in evaluating and in proposing adjustments and changes.

The strategy is to respect the individual efforts and the collective efforts. The collective efforts satisfies the individual needs for the development of an efficient and strong economy which better the living conditions of the people of the north-western settlements of the city of Quito.

It has increased the interrelationships between different agents and participants in the North-Western region, creating a territorial integration and its communication vis-a-vis the city.

The project proposes and develops an intense horizontal communication process which

a) Empowers and raises to a public/political level, the say of the women inhabitants of the area.

b) Facilitates the enfolding of creativity from the grassroots to the affirmation of a collective identity within the process of the construction of a "cultures of diversity".

2. Locale

Local city of Quito, capital of the Republic of Ecuador, from the month of January 1993.

Specific programmes of the project are taken up in the settlements of, San Rafael, Santa Isabel and Mena del Hierro which are situated on the oriental slopes of the volcano Pichincha (height 2900-3200 meters). This group of settlements is heterogenous and diverse, however they form a defined territory having a high density of population and a greater lack of infrastructural facilities.

3. Heterogeneity in the neighbourhood

Despite the homogeneity of the territorial composition, we see a heterogeneity in the neighbourhood as a whole and in some cases in the interior of the same neighbourhood. The major difficulties existing are in the use of the soil, the level of consolidation of housing, accessibility to the basic services.

4. A proposal for the alternative development of the neighborhood, coherent and ordered.

The federation of popular settlements in the North west of Quito FBPNQ and CIUDAD are of the opinion that these popular settlements do not have much future if its immediate future is not oriented by a series of programmes in various fields in the urban, organization and economic areas, which presupposes a coherent and ordered alternative development.

5. Plan of neighbourhood development (PDV)

It marks out 5 fields; territorial, economic, cultural, communications and organizational ordering. Each programme has a double objective a) attends to specific levels b) helps in the elaboration of the rest of the programmes.

PDV considers the priority of the activities which tend to strengthen the organization and its capacity of management and mobilization on one side and on the other of solving immediate problems.

The plan must be regarded as a process and not an end in itself. continuity is the essence and there are plans for periodical evaluation to be able to adapt to newer circumstances. The pla is consulted and debated upon with the aim of having a consensus that legitimizes it and is adopted by the population and their

organizations. The plan considers concrete strategies to communicate to the people, the achievements and the problems.

The implementation of the plan takes place at three levels;

- a) development and consolidation of the existing popular organizations.
- b) coordination with outside agencies which operate in the area.
- c) process of generating and permanent functioning of a network of specific instances of management of the living area.

6. Neighbourhood management councils

For the execution of the PDV a network of management councils have been formed. These councils do not replace the existing popular organisations, on the contrary they strengthen them because they will serve as meeting ground of the popular organizations and other urban agents (private development organisations, public institutions, the church etc.) for the coordination of and formulation of policies and proposals that will reflect the feelings and preoccupations of the dwellers.

To guarantee that the management councils will really represent the neighbourhood interest and that they will defend the autonomy of the dwellers organisations, it should respond to the following principles;

a) should be ample and pluralistic, i.e. without excluding any existing popular organization, b) should have a majority of representatives of the dwellers of the area. The representatives of the external institutions must play an advisory role and not of decision making.

The decisions of the forms and mechanisms of these councils are the fruits of a previous debate.

The management councils act at a sectorial and territorial level. These sectorial components refer to the field of action proposed in the PDV, they appear as specific problems and projects within the areas of organizational, economy, territory, culture and training. At the territorial level we have to distinguish between the field of action of the neighbourhood sectors and zones.

The management councils play several roles as

- a) Forums for unity and coordination of the dwellers and their organizations.
- b) They discuss, elaborate and approve the proposals of development for the area.
- c) Negotiate with public and private institutions the

implementation of the proposals.

d) They control, evaluate and monitor the constructions and projects to be carried out in this sector.

e) Sometimes, it assumes the administration of definite projects as in this case.

7. Programme of territorial conditioning of PDV

The project "Water Development" forms a part of the territorial conditioning. One of the five programmes of the plan of development of the neighbourhood of the popular settlements of the north-west Quito.

The programme of territorial conditioning of PDV points to the planning for the urban reordering of the zone and its better integration with the city. Among its objectives, is to achieve an urban development which is not in contradiction with the maintenance of healthy environmental conditions. And at the same time promotes the evaluation of spaces and environment of public or community interest. In addition which are or can be the expression of neighbourhood identity. With this aim, a sub programme of environmental management and ecological protection has been introduced which includes the projects of environmental betterment in public areas and bettering the living areas.

8. The project of water development

This project has been possible thanks to an agreement between CIUDAD, the network of urban services in Latin America (REDES), the International Secretariat of Water (ISW), the contribution of the beneficiary community and the programme of United Nation Volunteers (UNV)

8.1 Objectives

a) Better the environmental conditions, sanitation and living areas of the settlement.

b) Protect the population from possible soil erosion provoked by runoff from steep slopes and the blockage of natural drainage.

c) Provide to the settlements green areas.

d) Better the sanitary conditions of the living areas and the rationalizing the management of water resources.

e) Train and create awareness among the community about the risks involved in living on the slopes of Pichincha, such as the ways and means of bettering the conditions of environmental sanitation.

B.2 Actions/Plans

To achieve the above mentioned objectives, the following programmes have been proposed

1. Provide healthy water in the settlements : capturing surface water, using pipes for water supply and construction of a recollection tanks and treatment of water. Water is supplied by means of an underground network with the participation of the beneficiaries through community work (mingas). Simultaneously a campaign on the management and rationing of the use of water.

2. Management of rain water by controlling and supplying them to critical areas through the maintenance and/or the construction of "cunetas" through the community work (mingas). Simultaneously a campaign for training and information oriented to develop the awareness of the people on the necessity of adequate management of the water resources and the environment. Rationing the water consumption in the settlement areas.

3. Carry out campaigns of environment sanitation, creation of green belts etc. which lead to the betterment of sanitary conditions and adds to the identity of the settlements. These actions will give the following results

a) Management and use of organic waste materials as recyclable resources for the production of compost (recollection, processing and recycling).

b) Making and managing a nursery with production of 50,000 trees of native varieties. Planting of trees along the roadside and in the open areas with indigenous species of plants from the settlement nurseries.

c) Recuperation and management of wastelands and using them as recreation areas as well as for environmental education. Here the emphasis is on the participation of children and youth of the settlement areas.

d) Documenting the whole process as a case study of the settlement areas by making audio-visuals, photographs and posters.

9. The committee for management of project "Water Development"

The management committee of the project water development has the responsibility of directing, administering and is the official voice to establish agreements and/or relations with the settlements

and other agents who in the future would go on getting involved in the process of development.

The management committee consists of two representatives of the FBPNQ : 20 women representatives of the settlements (Mena del Hierro, Santa Isabel, San Rafael, La Primavera, Jaime Roldos, La Paz).

9.1 Women as the principal actor of the management committee

The project considers the fundamental importance of the participation of women in its various components and phases, programming, execution, evaluation and follow-up. The project proposes that these women are the privileged beneficiaries.

The management committee of women looks for the well being for the community, and tries to recuperate the cooperative spirit of criticism, solidarity and education with the participation of women, youth and children.

On the other hand the FBPNQ assures that the women members of the management committee are preparing themselves as future contenders to the leadership. Moreover these women participate in the execution of the projects by providing labour in the community work.

IMPLEMENTING A COMMUNITY PARTICIPATORY DEVELOPMENT PROGRAMME : THE
EXPERIENCE FROM THE HESAWA PROGRAMME IN TANZANIA.

by
C.A. LUSHIKU

November 1993, Tilonia, INDIA.

ACRONYMS and ABBREVIATIONS :

O & M : Operation and Maintenance
HESAWA : Health through sanitation and water
SIDA : Swedish International Development Agency
ITWS : Improved Traditional Water Sources

1.0 THE HESAWA PROGRAMME :

1.1 Background, Scope and Objective :

Hesawa simply stands for Health through Sanitation and Water. The programme began in 1985 on the basis of specific agreements between Tanzania and Sweden on cooperation concerning rural water supply, environment sanitation and health education. It covers the lake zone, made up of Mwanza, Mara and Kagera regions with a total population well in excess of four million

The overall aim of the programme is to improve the welfare of the rural population through improved health education, better environmental sanitation, more and better water supplies.

1.2 The HESAWA Approach :

The cornerstones of the HESAWA programme are active community participation in decision making, planning and implementation, and human resource development. Developmental priorities are to be set by villages, with planning assistance from the respective districts. District technical departments (Water, Health and Community Development) are to advise and support the villages in making their development goals achievable as well as sustainable.

The pillars or principles on which HESAWA activities are founded include : affordability, sustainability, replicability, credibility and cost efficiency. A basic goal is that the water, sanitation and health facilities constructed through the programme should be operated and maintained to the fullest possible extent by the villagers themselves, making maximum use of local financial, manpower and material resources and capacities.

1.3 Organizational Structure

The programme operates at four tiers or levels within the government administrative framework : the zone, the region, the district and the village. Each has an important role to play as follows

The Village

- is responsible for planning and implementation of activities.
- as owners of activities, it is also responsible for operation and maintenance.

The District

- offers technical and sometimes financial support to the villages.
- trains the implementation cadet at the village level.
- monitors the village activities.

The Region

- provides technical advisory to the district as far as design, implementation and follow-up is concerned.

The Zone

- the zonal office has the responsibility for overall operation of the programme, coordinating the districts and regional plans and ensuring that the necessary resources are made available in timely and efficient manner.

1.4 Implementing Strategy

A village is brought into HESAWA programme on the basis of request for assistance. On receiving such request, the programme sends a promotion team composed of staff from three functional departments (Water, Health & Community Development) to sensitize the villagers on HESAWA concept and gender awareness. After promotion meetings, villagers are required to form HESAWA committee and open a village HESAWA account for operation and maintenance. The water committee is to be composed of five members and at least two of them must be women.

Having fulfilled the above mentioned conditions, villagers can on the basis of community participation, identify activities to be funded by HESAWA. The programme normally provides imported materials and technical assistance while villagers contribution is in form of labour and local materials. Once water facilities are installed, they are maintained by the programme for one year after completion and then handed over to the village. The village is then expected to be take care of all operation and maintenance aspects by using funds from its HESAWA account. Training and Human Resource Development inputs help to prepare the committees and other people at ward and village level to manage the water systems in the long run.

1.5 Achievement of HESAWA programme :

The HESAWA programme has made major steps towards promoting and operationalizing a community based approach to the improvement of health in the lake zone through water supply.

sanitation and health education. It has substantially contributed to new directions and new thinking in the Tanzanian water and sanitation sector as a whole and is proving to be highly relevant to national sector development. New directions include a greater focus on implementation by districts and villages, the redefining of regional roles and responsibilities, the introduction of simple low-cost water supply technologies and enhanced regional and district inter-departmental coordination and cooperation in promotion and implementation work.

To date HESAWA has undertaken activities in more than 600 villages in all 15 districts of the lake zone. Major accomplishments of the HESAWA programme are summarized in Table 1. From this table it is apparent that there is a fast growing stock of completed assets.

1.6 Conclusion

The achievements of HESAWA programme in the last 8 years have been substantial as this paper has suggested. Put together, these constitute a platform upon which further progress can be built. There are still many gaps to be filled before it can be said that programme objectives are truly being achieved.

Summary:

HESAWA is a development programme of Tanzania being implemented with assistance of the government of Sweden, under the auspices of SIDA.

The programme's overriding objective is to improve the health and welfare of the rural population through improved health education, better environmental sanitation, more and better water supplies.

The programme operates at four levels within the administrative framework i.e. : zone, regional, district and village levels.

Its implementation strategies include

- 1) Involvement of people in planning and implementation of their own activities.
- 2) Human resource development.
- 3) Adoption of low cost technologies in both water and sanitation activities.
- 4) Integration of water and sanitation activities.

Achievements of HESAWA made to date are substantial especially in increased coverage of improved water supply and the creation of an improved potential for reduction of diseases. However, there are still many gaps which remain to be filled before it can be said that the programme goals are truly being achieved.

TABLE 2.1: SUMMARY OF ACCOMPLISHMENTS FOR KEY ACTIVITIES

	Shallow Wells			Piped Schemes			ITWS		
	To end ¹ 90/91	To end 91/92	To end ² 92/93	To end 90/91	To end 91/92	To end ³ 92/93	To end 90/91	To end 91/92	To end 92/93
Kagera	244	336	400	32	40	50	157	206	280
Mara	152	217	270	4	11	12	153	189	220
Mwanza	715	913	1,104	4	7	10	178	212	280
Total	1,111	1,466	1,774	40	58	72	488	607	780

	Village Health Workers			Caretakers & Attendants			Village Funds			Pump Mechanics		
	To end 90/91	To end 91/92	To end 92/93	To end 90/91	To end 91/92	To end 92/93	To end 90/91	To end 91/92	To end 92/93	To end 90/91	91/92	91/92 + 92/93
Kagera	254	284	326	577	1,019	1,284	245	329	439	N/A	2	9
Mara	128	168	206	141	245	285	98	142	194	N/A	6	9
Mwanza	148	212	316	525	929	1,203	346	447	671	N/A	11	36
Total	530	664	848	1,243	2,193	2,772	689	918	1,304	N/A	19	54

- 1 First 5 years of programme
- 2 Incorporates Activities included in 1992/93 Work Plan.
- 3 Includes those in committed planning reserve for 1992/93.

Involvement of local community in decision making on drinking water and sanitation.

Experience of the Volunteers' Association for Development in the Province of Barn (Burkina Faso).

1. What is A.V.D ?

Further to the great drought of 1973 in Sahel, a group of reflection and solidarity emerged in Barn with farmers, herders, men and women united in their effort to find non profit and collective solutions.

Further to a call launched by this group under the name of Association of Brigades for Development, a new organization emerged, where the concept of volunteer was introduced to mean the free, conscious and voluntary involvement of young and adults into development activity.

The A.V.D was created with the motive of self-promotion and Solidarity, and with the objectives

1. To coordinate and plan dynamic group's activity in the areas of development and environment.
2. To raise the financial and technical resources needed.
3. To follow-up assess and extend the various projects.
4. To evolve training sessions for young people.

2. Our programme

Location : in Burkina Faso (West Africa), with a south sudanese climate, in the province of Barn (161294 inhabitants).

The role of the community : To involve and ensure participation of beneficiaries to activities, implementation and control over local hydrology.

Village people are organized in groups which discuss and decide upon a project submitted in a proposal to AVD. Each grouping needs to get local authorities approval after a preliminary study, a meeting with the village is organized in order to discuss details of implementation and to test its degree of commitment.

Meeting with the village: An open discussion () involving all inhabitants and project officers ends up with the selection of water works (wells, drilling, hand pump). Tasks are allocated and

the local people detail (using traditional and modern tools of local materials, human investment, training). A management team is set up democratically. This will be the link with AVD.

Preparation to the feasibility study : AVD technicians prepare a feasibility study on the basis of ideas and decisions collected from the village meeting.

Acceptance of the project : A second meeting with the village will be aimed to ensure correct translation of local concerns in the project and to make further amendments and corrections.

Implementation of the project : The starting point is a signed agreement between the financial partner and AVD, and between the project village and the financial partner. These documents detail mutual obligations and the contribution of the village.

3. Water and sanitation related activities

- building up wells of large diameters and surrounding areas, along with drinking water of good quality.
- public latrines : maintenance is ensured by local people.
- bacteriological analysis of water in order to assess the level of faecal coliforms.

4. Our perspectives

Given our experience in waterworks and involvement of local people, we want to extend our endeavour to new villages; this requires the financial support of outside NGO's and new partnerships with them in order to assure both the sustainability of our intervention in water and sanitation and to find out the best solutions for servicing poor communities.

PROJECT PRESENTATION

PESA LEVEL II WATER SUPPLY PROJECT PESA, BONGABON, NUEVA ECIJA, PHILIPPINES

1.0 GENERAL PROJECT BACKGROUND/RATIONALE:

Despite the various development projects and activities of the local government units of Bongabon, Nueva Ecija to improve its physical, socio-economic, cultural, political and peace and order situation, there is still a need to increase these efforts. Developments were somehow achieved due to the "extra attention and assistance" provided in the area after the July 1990 killer earthquake that devastated most part of the province of Nueva Ecija.

With the local government, a number of civic-oriented individuals, groups and non-governmental organization (NGOs) enjoined efforts through the introduction and implementation of infrastructure projects such as construction and rehabilitation of bridges, school buildings, markets, loan and marketing assistance to livelihood projects to augment the peoples income and the like. Along the process, more and more residents of the municipality have been involved in worthwhile activities which somehow increased their awareness on the need to be part of the community development activities.

However, despite these growing changes that have been taking place, it could not be denied that there are still aspect of the area's development that require considerable attention. Among which is the provision of potable water supply. In view of this situation, the Lusok Projects Inc. (LPI) through Tulungan sa Tubigan Foundation, Inc. (TSTF), submitted to the Philippines-Australian Community Assistance Program (PACAP) a request for financial assistance, which was fortunately approved on March 1992. The first phase of this project started in April 1992 and was completed last March 1993.

The project involved the construction of 8 units of shallow wells and 9 units of deepwell handpumps covering 10 barangays of the municipalities of Bongabon and Laur, Nueva Ecija. To date, these handpumps augment the existing sources of potable water supply in the assisted barangays. However, it was still recognized that there is an urgent need for an additional project in Barangay Pesa. Majority of the residents of Barangay Pesa have expressed their concern for their health condition particularly that of their having inadequate supply of drinking water and only 60% of the households have toilets

It remained a fact however, that within the period of August to September 1992, 20 cases of gastroenteritis and or diarrhea has been reported by the Sanitary Inspector of Bongabon, Nueva Ecija. Other water-borne diseases such as H-fever (20 cases), parasitism (3 cases), skin allergies, paroncle, and goiter are

prevalent in the area. And in connection with the water supply condition in Brgy. Pesa the latest development showed that the water level of the existing deepwell handpumps have gone down to a critical level where pump discharge could no longer support the basic requirements of the people. Before, fetching of water in Brgy. Pesa starts at 2:00 A.M. up to 10:00 P.M. Some are getting their supply of potable water from nearby barangays which are 1.5 kms to 3 kms away. The residents would either walk or ride a tricycle to be able to have water. Bathing and washing on the otherhand are being done in the irrigation canal passing along the street.

Inasmuch as it were the people themselves who perceived/felt the need to take the necessary actions to have access to potable water supply, they identified an existing well which is being used to irrigate a vast onion and rice fields. The well has a depth of about 140 feet with a 10" Østeel pipe. The installed turbine pump has a discharge of about 170 gpm. This flow is much more than enough for the potable water supply needs of the beneficiaries.

Everytime water is needed, individual farmers bring their own gasoline or diesel engines to run the turbine pump. They use the same engines to run their rice threshers and farm tractors. Thus, water from this well is not always available for drinking purposes of the beneficiaries. Besides, this well is about 550 meters away from the nearest cluster of houses. There are no pipes to transmit water from the source to the service area. Drilling new wells may not be feasible. Experience in the recently completed project revealed that the underground condition in Brgy. Pesa is composed of loose gravel and sand formation down to about 60 ft. This condition will not be favorable using small mechanized or manually operated drilling rigs. Thus a level I system is not be feasible.

To make water available for the beneficiaries, a level II water system has been proposed. A diesel engine has been recommended to run the turbine pump. Water will then be stored in an elevated steel tank, 5000 gals. in capacity and about 8 meters in height. The stored water will be transmitted through a 2"Ø PVC pipe and will be distributed to 8 units concret public standposts with two public faucets each.

2.0 PROJECT BENEFICIARIES

The targetted beneficiaries to be served in Barangay Pesa has 258 households and a total population of about 1,650. The sources of income of the beneficiaries are from palay and onion production and seasonal employment. With the family heads income averaging to P2,500 - P3,000 a month, the beneficiaries cannot afford to install nor restore damaged wells because of financial constraints.

The project beneficiaries have already formed the Brgy. Pesa Water and Sanitation Services (PWSS) in 1986. This was facilitat-

ed through the project of the Department of Public Works and Highways (DPWH) to operate and maintain an INDIA MARK Deepwell handpump which they provided the community.

The TSTF-LPI partnership in its first project with PACAP's assistance has proven the significant involvement of women in the management of water supply facilities. It is integrated in this subsequent project that the women of Barangay Pesa, are identified as the primary target of development. It has been recognized that women, as primary users of water and promoters of domestic and community hygiene, are major factors in these projects. This does not mean however, that the husbands or males will be left out not be involved in the project. The continuing sensitivity of women and men of their active roles in the barangay would increase their awareness of their importance to the project and thus expect for a continued sharing of responsibilities.

3.0 PROJECT GOAL AND OBJECTIVES

Goal : The Pesa Level II Water Supply Project aims to improve the health and sanitation condition of the residents of Barangay Pesa .

Objectives : At the end of nine (9) months, Tulungan sa Tubigan Foundation, Inc. in collaboration with Lusok Project, Inc. (LPI) and the residents of Brgy. Pesa would have achieved the following objective:

1. Installed one (1) unit of level II water supply system:
2. Organized eight (8) water committees and trained sixteen (16) community leaders who will be responsible in the planning implementation, operation and maintenance of the water supply systems.

4.0 PROJECT STRATEGIES AND METHODOLOGIES

The project has been implemented by Tulungan sa Tubigan Foundation, Inc. (TSTF) with a project holder or proponent in Bongabon, Nueva Ecija, the Lusok Project, Inc. (LPI). Specifically, all the technical activities to include survey, design, estimates as well as canvass, purchase and transport of all materials from Manila to the site, will be the responsibility of TSTF.

While LPI directly implements the project with the active involvement of the residents of Brgy. Pesa, TSTF will likewise provide organizing, training and technical assistance. TSTF will increase and strengthen the knowledge and skills it has initially imparted to LPI as an institution and to its staff, in the first year of PACAP's assistance covering the municipalities of Bongabon and Laur, Nueva Ecija.

To be able to have a legal personality in dealing with the member beneficiaries and with other government and non-government

organization. TSTF registered the project with the Local Water Utilities Administration (LWUA) which handle the registration of all level II project in the country. Likewise, a Water Right Permit was obtained from the National Water Resources Board (NWRB) who is responsible for the granting of all Water Rights in the country. The newly registered association, PESA RURAL WATERWORKS AND SANITATION ASSOCIATION (PRWSA) will be developed towards becoming a viable organize association with capabilities not only in managing water supply and sanitation projects, but also, other developmental projects.

The social (software) and technical (hardware) know-how has been transferred to the partner agency and the beneficiaries through a classroom method and actual field demonstration. The training activities cover topics about the project itself, work planning and the management, operation repair and maintenance of community based water supply and sanitation projects.

5.0 BENEFICIARIES PARTICIPATION

The project implementation basically start with the validation of the need of the people. LPI managed to gather from a considerable number of residents their specific problems and needs in the community. Since water supply is their number one problem, LPI and the beneficiaries work together in coming up with a project proposal. The beneficiaries during the formulation of the proposal were involved in activities such as household survey, profile survey, providing/donating right-of-way for the pipeline routes, donating the well site and attending meetings with LPI.

During the construction of the system, the beneficiaries has been divided into sub-groups. Each group has been given an assignment specifically with activities involving: excavation, pipe laying, backfilling of the trenches, installation and concreting of public faucets, pump house construction, leak repair, installation of the Diesel engine, construction of valve boxes and taking care of the small watershed area beside the pump house.

Upon turn-over of the project to the beneficiaries, the association will be responsible of formulating their own systems and procedures or guidelines to effectively and efficiently actualize their plans. Included in their formulation of organizational systems is the identification of a useful monitoring and evaluation scheme which needs to be facilitated as the project continues/expanded.

6.0 ECONOMIC AND FINANCIAL CONSIDERATIONS

As the amount requested from PACAP covers expenses for the construction materials, training personnel, and other administrative expenses, equivalent counterparts has been provided by TSTF, LPI and the beneficiaries. The project will be completed with the corresponding contribution of the implementing partners in cash and in kind. This contribution has been in the form of

unskilled labor during actual construction, formworks, attendance and active participation in meetings group discussions, etc. and in the collection or provision of indigenous materials and the like.

To ensure the sustainability of the project, the implementing partners, especially the beneficiaries will see to it that the water supply facility is well-maintained. Moreover, a fee collection system has to be established and continuously implemented to prepare for the breakdowns and other mechanical or manmade problems that they may encounter in the future.

Inasmuch as the project is not profit-oriented but more on the improvement of the community primarily on its health and sanitation condition, it is expected that the people would have more opportunities for economically productive activities. It is understood that having an effectively and efficiently-managed water supply project, more time could be spent for other developmental undertakings, particularly income generating project and activities.

7.0 MONITORING AND EVALUATION

The theoretical and hands-on training of the beneficiaries in the operation, maintenance and management and the actual construction of the project will largely contribute to the sustainability of the water system. This training is expected to enhance the association's capabilities to manage - plan, implement, monitor and evaluate water supply and sanitation project.

As the water system continues to deliver the services expected to it, the association will sustain its organizational activities and maintenance efforts. This will be done in the implementation of a regular fee collection, proper operation and maintenance activities and continuing hygiene education. The association will be encouraged to explore the possibilities of engaging in other development project to ugement their operation and maintenance capacity. In this manner, the system may be expanded and later upgraded to the next level.

8.0 ACTUAL ACCOMPLISHMENT

As of the second week of November, 1993 the Water Supply Project is 80% completed. Listed below are the different Water Supply Project components which are already completed.

1. Clearing and grabbing
2. Excavation and Backfilling of trenches
3. Purchase and delivery of all materials
4. Installation of all pipes and fittings
5. Construction/cementing of valve boxes and thrust blocks
6. Concreting of public standpost
7. Construction/painting of the pump house
8. Trial run of the system
9. Concreting of Elevated Tank footings

It is estimated that by the first week of December, the last component of the system (construction and fabrication of steel water tank) would be completed. It has been also scheduled that the water supply project would be turned-over to the association on the 13th of December, 1993 to coincide with the feast of their patron saint.

Another accomplishment of the project is credited to the networking of the association. The PRWSA was able to solicit additional funds to finance the extension of the system and to increase the number of public standpost from the previous number of eight (8) to twentythree (23). The fund will be use to purchase additional lengths of PVC pipes and fittings. The donor agency, Adventist Development Relief Agency (ADRA) had already deliver the said PVC pipes and fittings to the project site. However, the beneficiaries wont be able to install the pipes and fittings until the system is turn over to the beneficiaries.

9.0 SPECIAL CONSIDERATIONS

The implementation of the project will largely have a positive effect on the environment. The municipality of Bongabon lies at the foot of the Sierra Madre mountain range. As water supply will be available, the beneficiaries would in effect improve their physical surroundings. This will be of a great help and support to the massive campaign launched by the Department of Environment and Natural Resources (DENR) against exploitation and damages to the environment, specifically illegal logging. This project in effect would be of advantage to the area since the source is already being planted with ipil-ipil and madre de cacao trees with 100 - 200 meter radius to protect the watershed.

10.0 PROPONENT PROFILE

Tulungan sa Tubigan Foundation, Inc. (TSTF) or Helping for Water is a non-stock, non-profit private organization established in 1986 with the goal of improving the quality of life of Filipino through the provision of adequate and safe drinking water supply. It is with the realization that then president, Her Excellency Corazon C. Aquino posed a challenge to the private sector to help in providing water in our still numerous communities without this basic service. In response, the Philippine for Business and Social Progress (PBSP), an association of private companies for the social and economic upliftment of poor Filipino communities under its Chairman, Rizalino P. Navarro and President Bienvenido Tan, launched the Tubigan ng Kalayaan Program.

This initiative later led to the conceptualization of an independent entity that would specialize in assisting depressed communities, design and implement potable water project and in the process help organize and train them for the self reliant operation and maintenance of these facilities. With assistance from PBSP, the Sycip, Gorres Velayo and Company (SGV), and a core

of volunteer individuals, the Tulungan sa Tubigan Foundation, Inc. was created. The foundation was formally launched on January 22, 1987 in a ceremony in Nueva Ecija graced by Pres. Aquino wherein PBSF turned over its water projects to TSTF.

TSTF provides financial, training and technical assistance to level I and selected level II water supply systems. For level II systems, the source is either a mountain spring or a mechanically pumped well. Water is distributed through a piped network and public standpost. For gravity-led water system, there is no mechanical or moving parts to maintain. Only the leather gasket and the faucet is periodically changed. Thus, operation and maintenance is simple.

Moreover, in TSTF's efforts to make available appropriate sufficient potable water supply system, the foundation engages in applied research on devices, method of technologies pertaining to potable water supply.

DRINKING WATER AND SANITATION PROBLEMS IN
THE AFRAM PLAINS; CASE STUDY: AWASAP

1.0 INTRODUCTION

1.1 Afram Plains Area - Location, Size and Physical Features

The Afram Plains is found within Latitudes $6^{\circ} 45'$ and $7^{\circ} 13'$ North of the Equator and Longitude $0^{\circ} 10'$ East and 1° West. It is enclosed by River Afram in the South, South-West, River Obosom in North, North-West and the East by the Volta Lake. Its enclosure by the Rivers nearly makes it a Peninsular.

The total land coverage is about 4285sq km with a population of 100,000 as at 1984.

The physical terrain along the rivers are gently undulating with broad valleys, while the interior are relatively flat with interspersed hills with average elevation of 50 - 100m.

The most wide spread soils here are clay loamy and sand believed to have been eroded from Voltaian sandstone.

The region falls within two climatic belts namely the Wet Semi - Equatorial and the Tropical Continental (Savannah) type. The Semi-Wet Equatorial type is found along the source of Rivers Obosom and Afram in Huyanso in the South West. The Savannah type which covers about 85% of the Region extends northwards.

The mean annual temperature is about 27°C . Rainfall is of double maxima, - from May - June and September to October. The mean annual rainfall of 125 - 250cm recorded in the West - Semi Equatorial occurs in June, while the peak of 100 - 115cm recorded in the Savannah type occur in September.

300 people for one community latrine
costs 100 US \$

The vegetation is of the interior wooded savannah type. It is made up of tall grasses, baobab and acacias characterised by shea trees adapted to the environment as a result of human influence.

1.2 The Population 1984 Census Returns

According to the 1984 census returns 100,000 people inhabited the Afram Plains. These people lived in 434 settlements of various sizes, ranging from a settlement containing 1 person to that containing 2,857 persons.

1.3 Education

The people in the Afram Plains generally have a low level of education. For the population aged 16 years and over, the mean years of schooling is 5.5 years.

1.4 Economic Activities

Economic Activities in the Afram Plains can be put into two (2) main groups:-

- a) Fishing, and
- b) Farming

Farmers form 55.2% of the population, making it the prevalent occupation in the Afram Plains.

2.0 WATER SOURCE AND SANITATION PROBLEMS IN THE AFRAM PLAINS

2.1 Water Sources and their Use

The main source of water in the Afram Plains is river water. There are three (3) rivers, Volta, Afram, and Obosum. These are mainly used by the people living along their banks. Rain water collection are used only seasonally. Majority of the people and their animals depend on water sources which are mostly contaminated and are usually obtained from Ponds, Dug-outs and Streams.

On the other hand these sources run dry during the dry season which starts from November to April. Apart from the water shortage and its being contaminated, the major problem of the people is to travel long distances in search of water during the dry season. However due to the advocacy role AWASAP is playing, there has been intervention by some Organisations.

<u>Organisation</u>	<u>No. of Potable Water Points</u>	<u>No. of Communities</u>
Catholic Church	28 bore holes 6 Open Wells	26 communities
AWASAP	Hand dug Wells with Pumps,	7 communities
World Vision International	107 Bore Holes	71 communities
Volta River Authority	3 Mechanised Bore Holes ¹	3 Communities
UNICEF	3 Bore Holes	2 for District Hospital 1 for Secondary School

In all there is a total of 147 Potable Water Points which covers only 40% of the population. Out of the 432 villages, only 82 villages have so far benefitted. Criteria used in selecting the beneficiary village were:

- a) Villages with population of over 500 infested with the Guinea Worm disease were rated as Category A;
- b) Villages with population of over 500 without Guinea Worm disease but with Mechanised Agriculture were rated as Category B.

The above information was retrieved from the Guinea Worm Eradication Programme Report of the Afram Plains which was prepared by the Ministry of Health and AWASAP, also from the Agric. Mechanisation Project Report -Afram Plains (FAO Ghana Government), and the 1984 Population Census and Extrapolated up using the Projection Formulae.

¹ Not Working

2.2 Waste Disposal

Human Excreta

Apart from the District Capital (Donkorkrom) which has two (2) Bucket Public Removable Latrines, (which is not in a satisfactory condition), the rest of the Villages rely on open trenches without roof and indiscriminate defecation commonly called FREE RANGE.

AWASAP has been able to construct 11 Low Cost Ventilated Improved Pit (VIP) Latrines for only 4 communities by a community participatory method.

In collaboration with the World Vision International AWASAP has started training of Local Artisans; Masons and Carpenters in the construction of the VIPs with locally available materials. This will help eliminate over reliance on outside Technicians.

2.3 Dry Refuse

Majority of the people heap refuse behind their houses, whilst some of the villages have public refuse dumps. This refuse dumps usually turn into big mountains, because nothing is done to them.

2.4 Waste Water Disposal

By far majority of the people in the Afram Plains dispose of their waste water by throwing it on the ground in and around their houses. This is normally done during cooking and washing. It does not cause much problem since a small amount is used.

Sometimes bath houses and spill over from the Wells and bore holes cause much concern to be addressed.

AWASAP through the Health Education Programme highlights on the problem of disposal of waste water by constructing soak-away pits.

2.5 ANIMAL WASTE

Majority of the people rear animals such as goats, sheep, cows, fowls and pigs. These animals go astray looking for food this infact has created a habit of animal droppings all over the villages thereby becoming another source of contamination. These problems are in the increase because the legislation that caters for this problem is not adhered to by the authorities responsible.

3.0 AFRAM WATER AND SANITATION PROGRAMME ACTIVITIES

3.1 Brief History

AWASAP is a local NGO formed and based in the Kwahu North District of the Eastern Region of Ghana commonly called the Afram Plains. The organisation's priorities are:-

- a) Water
- b) Sanitation
- c) Health Education

as an integrated approach to rural water delivery.

The Project was initially designed to facilitate the construction of Hand-dug Wells for the inland villages. Out of the 19 Hand-dug Wells being constructed only 9 has been completed and are fitted with India Mark II Hand Pumps.

The average depth of these Wells are 75 feet and through very hard rocks which could not be broken with compressors.

The geology of the ground was much harder than was anticipated. The rocks can sometimes only be broken at a rate of few inches a day even by compressors.

Since it was realised that Hand-dug Wells were not the only option, emphasis has been made on the facilitation and maintenance of 28 Bore holes which was funded by the Catholic Church, and fitted by India Mark II Hand Pumps. Most of these Pumps fell into disrepair.

Health Education and Sanitation has also been emphasised since Potable Water cannot go alone. AWASAP is funded by WaterAid a British NGO with an Office in Ghana. The operators of AWASAP can be seen at four levels:-

- a) Management Board
- b) Project Manager
- c) Supervisors, and
- d) Community

The above helps us in the use of community participatory methods of implementation.

3.2 Community Participation

Initial reconnaissance visit is made to the community to identify location and some baseline information ie., population, water sources, sanitation facilities and finding out of the presence of any other Organisation working in these communities. Meets with the Chiefs and Elders and some Opinion Leaders of the community. We then arrange for a second meeting which involves all the community members and other identified groups.

1. Education

During second meeting the community is educated on the Project, this is to generate and create:-

- a) awareness
- b) understanding
- c) interest
- d) commitment
- e) ownership

and build a link between water and health. Resource identification and mobilisation.

2. Watsan Committee

A Water and Sanitation Committee is formed by the communities to take up full day to day responsibilities of the Project. The Committee must be composed of four men and three women. The number could be high or small this depends on the size of the community. This Committee is responsible for organising meetings, mobilising funds, preparing progress reports and controlling material supply by the Programme Office.

Sites are chosen for the start of Wells. These are done with some baseline information from the village. When digging starts the projects supply materials and stool, and the technical issues. The communities's Watsan Committees are solely responsible for the safe keeping of the materials and making sure that sand and stones needed for the caissons are ready at Project sites. They are also responsible for the accommodation of Project staff members who might be working on the Well.

3.3 Maintenance Fund

Since all the Wells have Hand Pumps (India Mark II) the communities are asked to deposit an amount of #75,000 (seventy-five thousand cedis) (one hundred US dollars - \$100). We open a bank account for them by sending about three or four Committee Members who will be responsible for the operation of the bank accounts. The elected Committee members are to see to it that the money is taken extra care of.

3.4 Pump Maintenance

Volunteers

Four or five persons composed of men and women are selected by the communities and trained as Pump Maintenance Volunteers (preferably mechanics or anyone with some technical knowledge). The Programme makes available the needed parts at a central point where the communities can purchase at a fee.

This should mean that the villages can do the routine maintenance themselves with the help of the trained personnel and only call on the Project Pump Supervisor if there is a serious problem. When the Pump is faulty and has to be dismantled, the volunteers and some members of the village remove the long pipes without using any mechanical means, this is called the "All Hands on Deck". One person gives instructions, thus ensuring safety.

3.5

Problems

Due to lack of Portable Water in the Afram Plains most of the intervention made for provision of Portable water was without future reference to maintenance problems.

This infact has created a very challenging issue. Initial communities were made to pay ₦30,000 (\$42.00) into their Bank Account, this was later raised to ₦70,000 (\$100). Due to the high inflationary rate these amounts could not sometimes meet the cost of the Pump parts because the pumps were installed about ten years ago. Due to the above credit facilities were given to the villagers. This also could not work because most of these villages could not feel ownership of the Bore holes and does not feel that they have to maintain them. The system now in place is that the villages have to pay before pump parts are released.

Some of the villages who are fortunate to have bore holes are refusing to use them, because caisson of the galvanized pipes which often changes the colour of the water and taste. Our programme has been able to convinced World Vision to provide stainless steel pumps. As at now 91 bore holes have been installed with stainless steel pipes, rods and cylinders. By the end of January, 1994, we hope that all the 147 India Mark II Pumps will be rehabilitated with Stainless Steel parts. This would facilitate the maxima use of the boreholes.

Health Education

This is one of the other major components that is in our programme, it is geared to create awareness in the use of wholesome water for the precaution of water borne diseases.

To encourage behavioural changes in hygiene practices in the short term and change in attitude regarding taboos and superstitions in the long term/

Village Health Co-ordinators, who are selected by the communities are trained at a three day workshop which emphasis on training simple hygiene related messages and training techniques. The VHCs go back to the villages and pass on what they have learnt in another form organised by themselves.

Methodology

Since most of this people are illiterate emphasis were layed on small group discussion and the use of picture books to generate discussion with role plays and songs.

In view of this, WaterAid supported and production of five picture book and accompanying flip charts and slides set with simple messages.

This materials were develop based on baseline information gathered at the project area on existing behaviour prevailing practices and taboo, culture, etc. Also interview with officers of the Ministry of Health. The design was in collaboration with the Non-Formal Education Division of the Ministry of Education and the Ministry of Health.

The books are:-

- a) Safe Water Good Health
- b) Guinea worm
- c) Bilharzia
- d) Waste Water and Health
- e) Good Habit Good health

Supervision

The Project has one staff who monitor and organise VHCs since it is very difficult for one person to support this programme. There is a collaboration with the existing Ministry of Health Staff working in the Afram Plains. AWASAP organizes Health Education training technics to this staff so that they could help in this programme.

Collaboration

AWASAP as an indigenous NGO based in the Afram Plains has been placed at an advantageous position since it has a lot of information about the Afram Plains therefore acting as a contact point for other NGOs interested in the operation of the area. It is interesting to note that because of the peculiar nature of the area it has large number of NGO working in such a District in Ghana. This NGOs are World Vision International, Advent Relief Agency (ADRA), Ghana United Nation Association (GUNA), Ghana Red Cross, Catholic Church, Reccioae Comprazome (R&C), Presbyterian Church of Ghana and Water Aid which supports AWASAP.

AWASAP also collaborates with the existing government departments such as the Ministries of Health, Education, Agric and Community Development. AWASAP has been able to bring all these NGOs and the Ministries together to form a group that could co-ordinate all the activities especially for NGOs to avoid duplication. This infact has made it possible for facilities to get to villages which really needs it not those who wants it.

Future Role

1. In future AWASAP hopes to collaborate better and to attract other NGOs to the area and to increase Potable Water and Sanitation facilities points.
2. AWASAP see itself as playing a leading role in the Government of Ghana's rural water and sanitation delivery programme at the district level.
3. To also create the understanding of the link with water and health.
4. To also build up a maintenance system which would be managed by the Communities themselves.
5. Be a mouth piece for the villages and the Government.
6. Creating the need for Potable water and sanitation facilities.

EMAD ADLY

CRS/EGYPT

I. Project Identification:

Project No. : EG-8D-012

Project Title : Health Education and
Environmental Sanitation

Project Budget : \$64,560.00

Project Holder : - CDA of Ard El Moulid
- The Catholic Youth
Association
- Association of the
Cultural Center
Attendants.

Project Site : - The city of Minia
- The town of Malawy

A. Project Summary:

The Health Education and Environmental Sanitation Program, a project with two closely related and complementary components, is assisting two communities of Minia Governorate, the Ard El Moulid section of the city of Minia, and the Benn El serralet-neighborhood of the town Mallawi. The project is helping local institutions respond to the urgent problems in their communities, specifically environmental pollution and lack of knowledge of good health, nutrition and sanitation practices. CRS's total contribution to the project amounts to \$ 64,560.00.

The goals of this project are to raise the awareness of the target populations of the two project areas regarding health, hygiene and nutrition, while improving the quality of their environment. At the same time, the project will develop the capabilities of local institutions to assist their communities in improving their living conditions.

To accomplish this, an appropriate system has been established by the implementing CDAs in each target area, for garbage and waste water collection and disposal. CRS/Egypt funded the purchase of a tractor with a detachable trailer and three mobile tanks to collect waste water and garbage. Operating and maintenance costs is being paid by the counterpart through user fees collected from the beneficiaries. As the number of beneficiaries expand, the user fees are expected to cover staff salaries and health education activities.

An administrative body has been organized by the counterpart CDAs in each target area consisting of community groups and individuals capable of managing and maintaining the project. In each area, an executive committee has been established, comprised of the board of directors of the selected local Community Development Association (CDA) and local government officials. The executive committee operates project equipment, manages the finances of the project, monitors program activities and reports on progress to the CRS project officer. A youth committee and an advisory committee, comprised of local religious leaders and other respected local figures and a number of women representatives, participate in decision making and project implementation and attend monthly meetings with the executive committee.

CRS has carefully selected the counterparts for its project because of their experience, enthusiasm and particularly their human resources. These CDAs have strong connections and open communication channels with the community, especially youth and women.

The project is entirely managed by community groups after being trained to fulfill their responsibilities. The project makes extensive use of local residents, particularly youth and women, as both health visitors and representatives of the beneficiaries.

The total number of targeted beneficiaries, which includes all residents of the Ard El Moulid section of the city of Minia and all residents of the Benn el Sarraiet neighborhood in the town of Mallawi, equals 12,000 people.

this project has been designed to maximize community participation. CRS/Egypt anticipates highly positive results from this program and will develop a plan for replicating it in other parts of Egypt.

The following is a summary of CRS' financial contribution:

Personnel	\$22,010.00
Training	\$ 891.00
Equipment	\$30,088.00
Administration	\$ 3,803.00
Evaluation	\$ 1,305.00
Contingencies (10%)	\$ 6,462.00

Total	\$64,560.00

Project implementation:

- After signing contacts with the local three counterparts, a meeting was held and included CRS representatives, local counterparts' board member and Governmental officials to announce the project to the local governmental officials, later on public meetings were held to announce the project to the community.
- The Administrative, Advisory and Youth committees had been established.
- Training sessions were held in the cultural center for the youth committee on the health problems, environment pollution and hazards of garbage disposal in streets and communications. Refreshing training sessions were held every six months.
- A questionnaire was designed to measure the health status and attitudes of 400 families of the beneficiaries and distributed by the members of the Youth committee to the families in the 2 areas.
- A tractor, trailer and 2 mobile tanks had been bought by the 2 counterparts and the staff had been hired.
- Health Education messages were designed to suit the literate people and distributed in streets and homes by Youth groups to educate the people about the project, its goals and activities; and the health hazards of improper handling of house-waste. A monthly small fee of LE 1 is collected from each house to cover the operation expenses and the staff salaries.
- At the end of the project cycle 3000 families were reached in home by members of the Youth groups and 3500 families are provided with the garbage and waste water collection services.

Factors affecting project implementation:

Before the end of the first year of the project life, the project activities had been affected by the unstable security circumstances in Minia Governorate, for instance: in Ard El Mould where a conflict happened between the government and the Moslem fundamentalists, fee paying rates had shown a fluctuating and dropped. Also in Malawi, the situation was more complicated, because of the religious affiliation of the association (the catholic Youth Association) which lead some of the community members/groups to assume that the fees collected will go to the catholic church in Malawi, and it needed special efforts from members of steering committee to indicate that fees collected are used for the maintain and improve of the project activities.

CRS recruited a consultant to make a final evaluation of the project, the consultant recommendations are:

- 1- CRS in selecting the local counterpart should have to avoid NGOs with religious nature to avoid the conflicts of interests.
- 2- CRS has to put in consideration the end stage of collected waste water and garbage to preserve the environmental impact of the project.
- 3- Project sustainability which depends on community participation to ensure the project continuation.

CRS intended to expand the project to another areas of Minia putting into consideration the lessons learned from the previous project. CRS designed an integrated environmental sanitation project which covers the slums of Minia to improve the life quality of poor residents of these areas. The concept of this project is to assist in establishing an Environmental protection Association which will handle the following activities:

- 1- Collection of waste water and garbage from the slums for a symbolic fee.
- 2- Establishing small scale enterprises for solid waste recycling through a credit program for the unemployed youth living in these slums.
- 3- Establishing a compost plant for transforming the collected garbage into fertilizers used in reclaiming the desert land surrounding Minia.
- 4- Developing health awareness campaign targeting the residences of these slums through both local T.V. and Radio station and the public meetings with local leaders.

The project duration is 3 years and the estimated project cost is \$ 1.5 millions. It will improve the environment of Minia Governorate as the city council used to collect the garbage and burn it just outside the town which causes a serious environmental crisis.

WATER UTILIZATION PROBLEMS AND PEOPLE'S INVOLVEMENT IN WATER RESOURCE DEVELOPMENT PROJECTS IN THE DRY ZONE VILLAGES OF SRI LANKA.

1.0 Introduction

Water is a scarce resource in the Dry Zone of Sri Lanka. It contained nearly two third of the territory and a majority of the rural population in the country. A greater part of the year except for monsoonal rainy periods from November to February and from May to September the dry Zone experiences scarcity of water. When both monsoons are failed, the Dry zone experiences a spell of drought and people have to face many water utilization problems. The major problem is the inadequacy of water for paddy rice cultivation which is undertaken through small reservoirs or tank irrigation systems. The other problem is the lack of water for domestic use such as drinking, washing, bathing, and cooking and also for animal husbandry. On the other hand, the water scarcity and bad quality of water affects the health and sanitation of the rural population. Thus water is the determinant factor of the socio-economic as well as physical quality of life of the Dry Zone people. Hence, people's perception to water resources and their habits, practices and methods of water utilization and specific adaptations to water scarcity are important issues in the social development planning of the Dry Zone.

This paper deals with the nature of different water sources available in tank villages, problems associated with the utilization of them, and methods and practices of water utilization in the Dry Zone of Sri Lanka. Author's experience working with rural people and findings of field researches undertaken in the northwestern part of the Dry Zone of Sri Lanka are utilized here.

1.1 Tank villages.

Northwest and northcentral parts of Sri Lanka is called Wew Rata or tank country where over 15000 of tanks have been concentrated. Tanks are made by damming rivers or streams. Within the same river valley, many tanks are in existence. The village associated with the tank is called Wew gama or tank village. Tank villages are the major settlement type of the region. The settlement site of a tank village is located below the tank bund (dam) or either sides of the dam. Paddy fields are located below the tank bund some away from the settlement site. Normally a village comprise about 100 dwellings with a population of about 300.

Sociologically a village society consists of a single cast called Govi gama. Individuals are associated by family relationship specially through inter-family marriages within the same village (endogamy) or nearest villages (exogamy). Population of a village consists of about 60 families. Every family owns a paddy plot in the paddy tract which is fed by the tank. Tank is a common property of the village on which economic condition of the villagers is entirely dependent. Water is considered the most valuable resource than the land in these societies. Many formal and informal social organizations are in existence in villages. Village Development Society, and Youth Farmers Society are some formal institutions formed by all villagers and farmer groups are an informal organization formed only during cultivation seasons.

1.2 Hydrological Characteristics of Tank Villages

Usually tanks are filled with water during the major rainy season (November to February), but tank water levels decline rapidly due to discharge of water for paddy cultivation and due to losses of water by high evaporation and deep percolation into the ground. Hence, the water availability of a tank confines to three

or four months after the filling up the tank. Ground water levels which occur at about 6 meters below from the surface also subject to rapid decline during the dry season. Ground water levels in the vicinities of the tank which are artificially re-charged by tank water also decline after the complete drop of the tank water level. Settlement sites dwellings which are located in highlands experience lack of water in the early times of the dry season because ground water levels of such areas fall rapidly than those of the area below the tank bund. However, by the mid of the year people of tank villages have to face many problems related to the lack of water. Hence village communities have specific habits and methods of water utilization, which are practiced by individuals as well as by the whole society. Such methods can be discussed under several water sources as follows.

1. Tank water
2. Ground water (Domestic wells)
3. Ground water (Common or public) wells
4. Ground water (Tube wells)
5. Ground water (Agro-wells)

2.0. Tank water utilization.

2.1 Tank as a Source of Drinking Water

Tank water is mostly utilized for paddy cultivation. In domestic utilization, it is used for bathing washing and cooking purposes rather than drinking. It was revealed from a study made by author that only about 10 to 12 percent of the total population of a village uses tank water for drinking. This is because wells have become popular water sources and because of the difficulty of drawing water from tank for daily domestic needs.

It is evident that in the early times when these villages were originated people had not known of wells and tank was the only source of water for all purposes.

However, even today, rural people believe that tank water is suitable for every purposes than ground water because ground water of these areas is characterized by salinity. Many habits and practices are in existence in these societies in relation to tank water utilization. It is believed that at two stages tank water is unsuitable to use for drinking.

1. Rainy season. After rains, water collected into tanks by surface run-off is contained polluted materials. People avoid drinking tank water until such particles are washed away from over spill of the tank because they believe that tank water is suitable for drinking after large particles contained in water are washed away and micro particles, like silt are deposited in the tank bed. Thus the early two to three weeks after filling of the tank, people avoid to use tank water.

2. Dry seasons (from June to September). At the stage that water level of a tank declines to the level that a person cannot be bathe in the tank, water is believed impurity. At this stage water appears as puddles on tank beds. Such water is often subject to pollute by animals and human activities.

2.3 Methods of Water Drawing from the Tank

Mostly tank water is drawn for domestic purposes by housewives. Usually 2 times per day water is obtained by them. Pots which are made of clay are used for this purpose.

A normal sized pot is contained about 28 liters of water and about 12 of such pots are used per day a family. People believe that two times of the day are appropriated to obtain water from the tank namely

1. From 5 -7 a.m and 2 from 12-2 p.m.

At the time from 5 to 7 a.m. tank water is purified because water becomes calm and quite in the night resulting in the deposition of particles contained in water on the tank bed.

At the time from 12 to 2 p.m tank water also becomes calm and quite because people do not bathe during that period. Usually villagers use to tank bathe in the evening time, from 4 to 6 p.m.

2.4 Tank Water Purification

Three methods are utilized for the purification of tank water

1. Filtering
2. Boiling
3. Adding materials into water

Filtering : Filtering is done at two stages

1. Usually tank water is filtered at the movement that water is filled into pot from the tank. A piece of clothe is used for the purpose. Specific places in the tanks called 'Kala Mankada' are used to collect water. Such places are not used by other people for bathing or any other activities.

2. Water got into the kitchen is again filtered by the help of a piece of clothe. Filtered water is kept at a specific place which has been made in the kitchen called 'Kalagedi pola'. Water brought to home is divided into two purposes namely (1) for drinking and (2) for cooking. Water reserved for drinking is kept at a separate place specially made for the protection from insects.

Water Boiling

Boiling is not a popular method of water purification among village people. A survey conducted by the author revealed that such method is utilized only 6 to 10 percentage of families of a village. This is because of several reasons

1. They do not use boiled water as they prefer the taste of water to be unchanged.
2. For the boiling of water an additional time and fuelwood are being required. In recent times, firewood has becoming a diminishing resource of the village environments.
3. They believe that filtered water is fully safe and no further method of water purification is needed. They have no an understanding of the scientific significance of the water boiling method.

However, in recent times, there is a tendency of the utilization of boiling method as a result of the advice given by village level medical officers and official communication media.

Adding Materials into Water

Materials such as firewood carbons, some varieties of seeds flowers etc..are added to water in order to purify and to keep water re-fresh and cold.

'Ingini seed' (a local variety of seed) is the most popular material used for this purpose. People believe that silt and other micro particles contained in water are rapidly deposited in the bottom of pots after adding ingini seed in the inside of pots. Housewives used to rub this seed in pots before filling with water. Once this is being done, the water pot is kept for 2 or 3 hours untouched to secure the best result.

Firewood carbon and varieties of flowers are put into pots at the moment that water is collected from the tank. Village housewives use another method to keep water in cold. New pots which are used to store drinking water are being filled with paddy dust, and burnt them by using firewood until the colour of pots turn into black and emits particular smell. Water stores in such pots becomes cold and taste for longer time for about 2 Or 3 months. People make use such water during dry seasons.

3.0 Ground Water Utilization for Drinking

Ground water or well water is the most popular source of drinking water in Dry Zone villages of Sri Lanka. Open wells (domestic wells) are the major type of water source. Every homestead has a domestic well located in proximity to the house. Three types of domestic wells are utilized by villagers

1. Permanent wells
2. Semi-Permanent wells
- 3 Temporary wells

Permanent Wells: which have been built by cement metal and bricks. These wells are usually located at the vicinity of houses at a distance of about 40 to 60 meters away from the house. Mean depth of such a wells is about 5 meters in lowling areas (alluvial deposit), such as areas below the tank bund while it is 7 meters at elevated sites. Normally diameter of a well is 4 meters. Water is drawn with the help of a wheel and chain. Water is re-charged into these wells from a clay stratum consists of weathered gneiss rocks. Water is available for 4 or 5 months after rainy season.

2. Semi-Permanent Wells: which have been partly built with metal or bricks. Normally parapet wall is not available. These are located in areas where ground water is occurred at a higher level (near surface) such as area below the tank bund. Water is used both for drinking and minor crop cultivation. Normal depth of such wells is about 3 meters with a diameter of 5 meters. Water is recharged into these wells from sandy clay stratum and water is available for a short period confining to 1 or 2 monthes after rainy season.

3. Temporary Wells: which stand as dug holes or pits without a protection wall with a depth of about 3 meters below the surface. These wells are mostly located in areas in close proximity to irrigation canals or paddy fields and on tank beds. When tanks are dried up during the dry season, villagers excavate wells on tank beds to extract ground water, available in the clay stratum occurs near the surface. These wells are utilized for drinking as well as for other domestic purposes.

Usually people do not use any methods for the purification of water drawn from domestic wells. According to people's view, well water is often pure because such wells are used only for drinking, not for washing clothes and bathing.

Common Wells or Public Wells.

Wells which are made by Government or social organizations are known common wells. Two or three such wells are in existence in a village. The depth as well as the diameter of such wells is higher than those of other wells. The mean depth is about 8 meters and the diameter is 22 meters. Wells are normally located at a central place of the village or in an areas where domestic wells

are less available. Water of such wells is available for a longer period but these wells are not popular among villagers due to many reasons

1. As the depth of such wells is greater, water is characterized by high level of salinity content. People believe that water salinity is higher in deep wells. It was revealed from a survey conducted by the author that the degree of salinity increases by about two times as the depth of a well is increased by about 1.5 meters.

2. As common wells are utilized for many purposes other than drinking, such as washing clothes, bathing and making use for animals. Therefore water is often subject to impure.

3. Distance to common wells from individual dwellings has become longer as settlements have spread to highlands of villages from old settlement sites.

Tube Wells.

Tube wells are a recent method of water utilization in Dry Zone villages of Sri Lanka which have been introduced by Government and non-government organizations. Tube wells are a type of deep well by which water is drawn at a depth of about 20 meters. Two or three tube wells are in existence in a village especially in elevated grounds where open wells are not available.

The main purpose of the introducing of such wells is to utilize high yield of ground water as a solution for the problem of the shortage of drinking water. But these wells have become failure for many reasons

1. Water drawn from such wells is characterized by salinity. The magnitude of the degree of salinity is so higher that water taken from some wells make damages to pots when water is filled. It is also claimed by people that water drawn from tube well is contained not only mud, and sand but also metal particles of the corroded tubs of the wells. Therefore in most villages, people avoid drinking of tube well water.

2. People believe that water drawn from closed wells is impure, poisoned and not suitable for human body as water is not open to air and sunshine.

2. Tube wells are utilized by hand pumping system (Indian made). Only one person could get water at a time, but open wells have the advantage of using many persons at the same time.

3. Most tube wells have gone out of use, due to high degree of technical failures. Most of such tube wells have not been repaired by the authorities, and people too do not have the knowledge to repair them.

Agro-Wells

Agro-wells are a very recent phenomenon in Dry Zone villages. The main purpose of such wells is to utilize ground water for minor crop cultivation. But in recent times, they are used for drinking purposes. These wells are located in proximity to irrigation canals or paddy fields. Mean depth of such a well is 7 meters below the surface and diameter is 6 meters. A large volume of water can be drawn from such wells. The Government's interference in the making of agro-wells is two fold.

1. The Government provides financial assistance to the people who needs wells. A group of villagers consisting of minimum of 5 persons who have irrigable lands in the same location are eligible to apply for the grants. An amount of Rs25,000 is given to a group for the construction of a well. This aid is provided through the leader of the group.

2. The Agricultural Development Authority provides financial assistance to individuals. Under this scheme a grant of Rs 20000 is provided for the construction of a well and another Rs 15000 is provided to buy a motor pumping machine for a person.

4.0 Water Utilization Problems

1. Though many water sources are in existence in Dry Zone villages, water scarcity is a serious problem because all above mentioned water sources become useless during the dry period. When the major water source of a village, tank dries up, ground water levels in the vicinities of the tank decline resulting in enabling of drawn water.

2. When ground water levels decline, water salinity increases. People have to depend on a few wells which are free from salinity.

3. When all wells are dried, people have to travel a long distance for alternate water source such as large tanks or rivers located outside villages. Normally one person travel nearly 2.5 Km for a one journey per day. This is a heavy burden to women and children. In some villages, people use tractors or carts to bring water from out side villages. Village level social organizations involve in this activities.

3. Many health and sanitation problems in relation to the use of polluted water as well as saline water are evident in villages. Dental diseases, related to the use of water contained high content of fluoride are mostly evident. A survey conducted by UNICEF (1979) has shown that nearly 40 per cent of school children of this area are suffered from dental fluorosis. Eye infections, skin diseases, and diarrhea are spread over during water shortage periods. Children who use to bath, wash and sometimes drink polluted water remains in tank beds, often suffer from such diseases.

4. Deep wells (tube wells) provide a sufficient quantity of water but frequent technical failures, bad water quality and high user rate per well cause water utilization problems for the village communities.

4.1 People's Involvement in the Implementation of the Water Resource Development Projects

Common wells, tube wells, and agro-wells are the only projects undertaken by Government with direct or indirect interference. Common wells are not made in recent times. Most common wells which are now available in villages are those made by Government in 1960s. Thus people's involvement in the implementation of water resource development projects in villages, is evident only in the case of tube wells and agro-wells. People's participation to such projects can be discussed under several aspects.

1. Site Selection for Tube Wells

When relevant officers visit the villages for selection of sites for the construction of tube wells local people (individually as well as collectively) involve in proposing the

sites at which wells should be made according to their need. However, the places which are shown by villagers are being overlooked by the authorities very frequently. Villagers propose the places convenient to a large majority of the population, but officers consider the technical and geological factors or convenience.

2. Social Organizations

Village Development Society is the most popular informal social organization which directly involves in requesting tube wells for villages from the Government. In addition, institutions such as the village temple, and the village school also lead the people in demanding tube wells.

3 Individual's Involvement

Most individuals voluntarily offer a piece land from their own lands for the construction of tube wells. Thus, in most villages, common tube wells can be seen in personal lands, located either sides of roads.

4. Maintenance of Wells

Peoples have a good response to the tub wells. Village people are often concerned with technical failures and bad quality of water of tube wells. They report such problems to the relevant authorities for immediate solutions. But most such problems have not been resolved. It was revealed that more people desire to get the technical knowledge and skill for the repairing of tube wells. But Governments' attention has not been focused for this matter.

Agro-wells.

As mentioned earlier, villagers involve in this project in two ways.

1. Farmer Groups

A farmer groups consisting of at least 5 persons, who have at least 1 acre of land in the same location demand financial assistance provided by Government for the construction of agro-wells. In recent times, many problems have arisen in this group system. The leader who has direct contracts with the government officers, attempts to get the advantages from the well for his personal purposes rather than for collective utilization. On the other hand, Government officers do not pay adequate attention to the site selection for tube wells, land ownership of the farmer groups, and supervision of the construction work of wells.

2. Individual Finance Assistance System

Individual farmers can also apply financial assistance from the government for the construction of agro-wells. Individual finance aid system has become popular in villages. However, both these systems have problems. The amount of grant Rs 25000 is too insufficient to complete a standard sized well. According to the people's view more than Rs 50000 will cost to construct such a well. It is a difficult task to the poor people. Thus personal finance aid scheme has made advantages only for well-to do farmers in villages.

However, there is a greater possibility to utilize the peoples participation in the implementation of water resource development projects in Dry Zone tank villages of Sri Lanka. Experience from different parts of the World will be useful in such an effort.

WATER AND SANITATION INTERNATIONAL SEMINAR
YACUPAJ - PROJECT
Potosí - Bolivia

Betty Soto T.

I. - INTRODUCTION

The Yacupaj Project, as a Project of Basic Sanitation for Scattered Villages in the Department of Potosí - Bolivia, emerged as an initiative of the PNUD/World Bank Water and Sanitation Program with the aim of "improving the economic and health conditions of the inhabitants of the rural communities, supplying drinking water, sanitation and education on sanitation, using sustainable institutional and financial strategies, with appropriate technology and a particular focus on communitary management and an active involvement of women".

II. - REGIONAL CONTEXT

The Water and Sanitation Program chose to work in Potosí, because it is one of the most depressed Departments of the country, with scattered rural villages. It has a population of 654.370 inhabitants, an annual growth rate of 1.2 per cent. Above 65 percent of the population of the department is found in the rural area, and from this total 41.5 percent are women. The majority of the inhabitants live in scattered small communities constituted of groups of 2 to 5 families and the nearest group of neighbors live at a distance of 0.5 to 1.0 kilometers.

The inhabitants of these scattered rural communities are among the poorest in Bolivia and in Latin America. The per capita income has been estimated in \$us 80 per annum, compared to the national average of \$us 360. The health indicators in the area in which the Project works, reveal that one out of four children die before they are five years old. Life expectancy is of 32 years, 46 percent deaths occur during the pregnancy period, 40 women for every 10.000 children born alive die as a consequence of diseases related with childbirth, and women's illiteracy reaches 66 percent.

In the rural areas, only 18 percent of the households have direct access to drinking water and most people get it from streams, wells, rivers and ponds. This figure is smaller in the scattered population and less than 7 percent have sanitation facilities available.

In order to face this general situation it was determined to establish the priorities and selection of three provinces out of

the 16 of the Department on the basis of a selection of 14 criteria. Trying to prevent the concentration of activities in only one subregion with similar conditions, thus choosing:

The Province of Chayanta in the Northern Subregion, which is one of the most depressed, with a death rate of 285/1.000 among children under two years of age, an illiteracy rate of 80 percent an annual migratory rate of 0.34. Death rate among children under one year of age is of 176/1.000 and there are more than eleven development institutions, some of them with an ample experience and influence on the rural population.

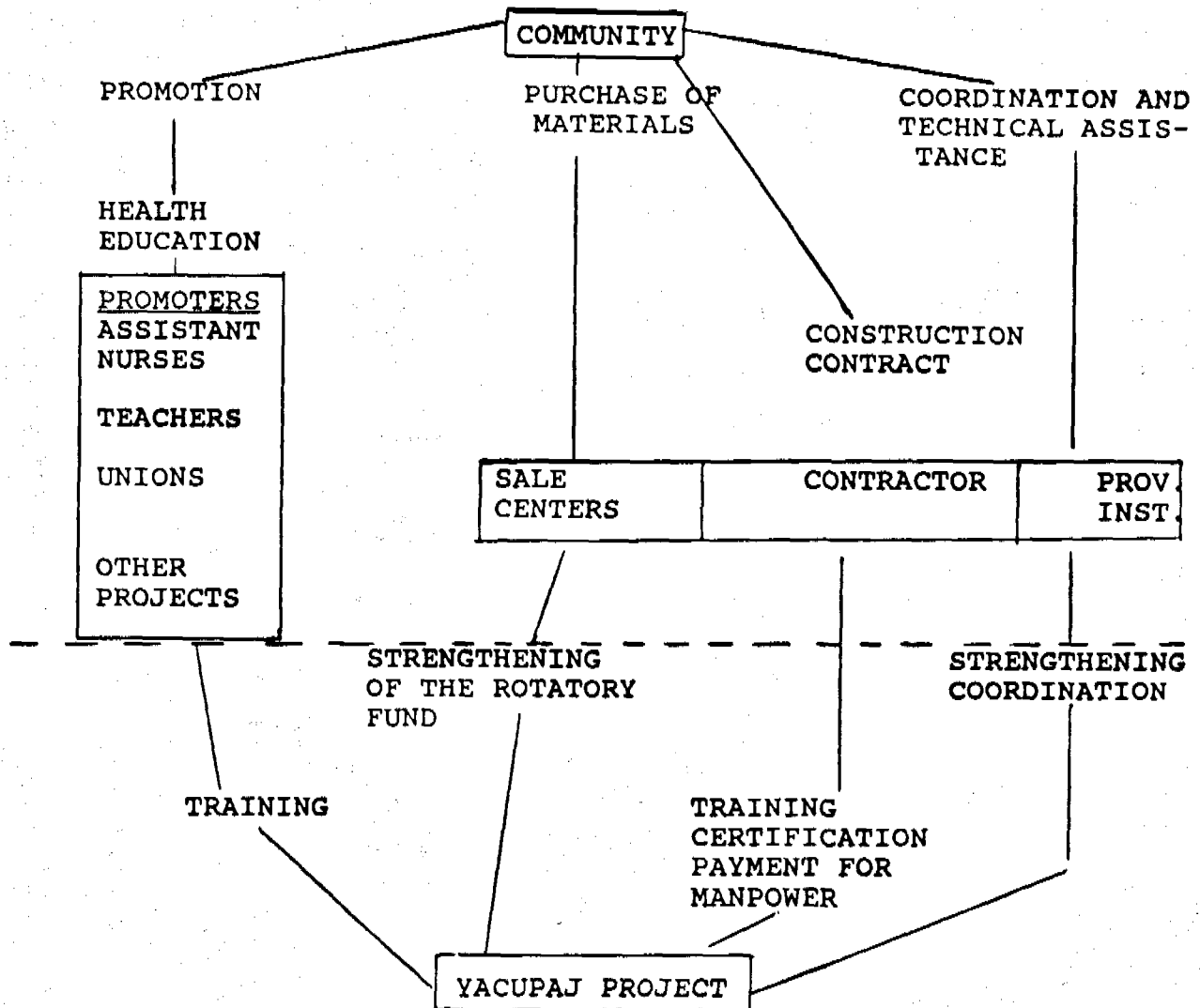
The Province A. Quijarro in which the level of poverty is determined by a death rate among children under two years of age is of 264/1.000 and an illiteracy rate of 38 percent. Death rate among children under one year of age is of 142/1.000. There are no development institution.

And the Provinces of **M. Omiste** and **Sud Chichas** in the Southern Subregion, are considered the least depressed.

III.- IMPLEMENTATION STRATEGY OF THE YACUPAJ PROJECT

The starting point of the design of the Project's strategy was the fact that all the communities have access to drinking water although variable both in quantity and in quality. The challenge is to generate demand at the community level for an improved service, in terms of quality, reliability and quantity. This demand is generated by means of action of social promotion that the Project carries out, with a strong emphasis on hygiene and health. To meet with the demand, the Project has prepared a series of technical options for supplying water and sanitation, and for each of them, the Project provides a established sum of money and the community provides the rest leaving the final selection of the technical option and the selection of the form of payment to the community, whose duty is to organize and plan how to carry out the construction of the work.

The objective is to provide the highest level of service that it would be economical feasible for the community and can be managed by the them in the long term. The implementation strategy is summarized in this diagram:



In the implementation of this strategy the participation of men and women is considered, having in mind that both of them share responsibilities in the productive process and in the commercialization of agricultural product and in conducting the household, but besides that, a woman constitutes a multiple element who also performs the task of an educator, a manager, a home doctor and she is the main collector and user of water, activity for which she must walk 6 km. daily an average of 1 to 2 hours. It is considered important to involve her in the Project because of the role she plays within the family and the community in decision making, since she introduces changes in the household and she safeguards the sustainability of the works because she resides permanently in her household and her community.

IV.- SOCIAL METHODOLOGY

The Methodology employed in implementing the strategy is a participatory methodology of adult education which advocates that the educational activity must start from the real conviction of the expressive and creative abilities of people, being one of the fundamental functions of the educational process to develop this potential. Hence, using the SARAR participatory methodology it is intended to obtain conscious and lasting changes of conduct, considering attitudes and not only knowledge, all of this using supporting materials: visual educative techniques, audio - visuals, cartoons, etc. within the frame of the cultural values which stand out the importance the role of women and the family to stimulate the participation and reflection about reality. This allows us to approach, to know the community and exchange information; motivating the community to prepare a self - diagnosis, to define priorities and identify the ways of solution.

In order to face the water and sanitation priority, most communities organize themselves to plan actions that will be performed in coordination with the Project.

During the process there is a permanent motivation in order to get more women's participation, an answer that is nor easy to obtain because of the male jealousy, shyness and lack of experience among women. However, in order to get this in the communities, first one must work with the authorities and the families using specific support material which allows the establishment of women's role with respect to water and sanitation and their priorities, until they understand and allow the active participation of women in communal meetings, time in which continues the motivation for women to participate. The continuity of sessions with women depends on the care and programming on their part to meet their needs, specially concerning matters of health. The answer obtained so far is good and it is satisfactory for us.

With this methodological approach, the survey workers are trained, providing them with theoretical and methodological elements that subsequently will allow them to develop actions at the community level and train support promoters.

V.- COMMUNITARY AND WOMEN'S PARTICIPATION

In this process of the Project's implementation the necessary efforts have been made in order to get the community and women's participation in a more dynamic way, having obtained an answer in the following activities:

- a) During the self diagnosis and collection of information.
- b) Acceptance and decision to work for the Project.
- c) Contract with the mason, especially for household works.

- d) In selecting the place to allocate the work and in the construction.
- e) In the opening and presentation.
- f) In preventive maintenance and domestic care.
- g) Health education.
- h) In assuming responsibility in communal stores.
- i) In appointing the Water Committee.

In spite of the fact that women's participation in these activities is notorious and their contribution valuable, they still do not argue or speak in the meetings, on the contrary it is the man who speaks in a loud voice; for this reason the Project did assure the members of the community and especially the women that their decision, arguments and participation represent a valuable contribution for the democratic progress of the community. For example: in the training and election of the water committee, women generally do not accept to assume responsibilities because of lack of experience and because that was an exclusive role of men. After the work time and through the process of motivation and training generated, one begins to see that women accept to assume roles within the committees, with a low percentage as a main leader (2 %) but greater in other posts.

In order to arrive to this stage, the Project promotes the participation of the family and of women by means of communal meetings with the help of educational material, designed for the different steps of implementation of the Project. This material is neuter and in some cases specific to improve motivation, reflection and analysis and obtain an answer, which is not the same in the three areas of work. Thus, in the steps shown before, women's participation in the Province M. Omiste is clear and determined. The woman facilitates the process and the relation to the Project this is due to the educational level she has. Through reflection and continuous analysis, mainly she leads and assumes responsibilities and why not say it, by cultural delegation she decides in the meetings and in the family when the husband is away. That is how, in this province, the work experience with women is acceptable and we can now see the changes of behavior concerning practices on water, sanitation and hygiene. Furthermore it has been proved that her participation and advance is decisive for the development of the implementation of the Project and assures the sustainability of the works.

On the contrary, in the Province of Chayanta, the women are introvert and shy because of the dominant manliness. The illiteracy rate which reaches to an 80% is an indicator of the educational level and explains up to a certain point the minimum answer observed. However, she has a place in the family as a whole, the population and she is also involved in the process, but she is not a leader and decision maker this is concealed within the Andean cultural model and the communitary model that does not fragment its components; that is why an open leadership is not seen and there would not "seem" to be an answer similar to that of other regions.

For this reason the efforts were redoubled in the work and other elements of motivation were included as well as support to fulfill with the cycle determined by the strategy.

VI.- ACHIEVEMENTS OBTAINED

In a general manner we can mention:

- Acceptance of the Project and the work methodology.
- Generation of demand towards the construction of works of water and sanitation.
- The organization of the community and the creation of a space to share with the Project and go on with the process of analysis and reflection generated by the Project or by other events.
- Women and men's self reflection on the importance of their roles.
- The recognition and acceptance of women's participation in meetings and other communal activities.
- The participation and decision in selecting the suitable place for the construction of the work of water or sanitation, which makes it easy the task of collection and its use.
- The access to the nearest source of water, which diminishes the time spent in the collection and the existence of better water of better quality and in a greater quantity.
- They are users of latrines, which are placed at a shorter distance from their homes and they are less exposed to the inclemencies of weather.
- They have water available for use in greenhouses, vegetables, reforestation, handicrafts, weaving, etc. thus improving their diet and their economic income, etc.
- The decrease of diseases of hydric origin.
- The support of voluntary promoters trained in organization actions, carrying-out of the works and health education.

VII.- DIFFICULTIES

Along with the achievements in greater or lesser proportion depending on the area of work, there are difficulties which is necessary to comment and they are the following:

- The high degree of dispersion of the communities determines the work to be slow and costly.
- High rates of seasonal migration which has an influence on the instability of 50% of the population.
- The traditional assistance method that so far have had many programs for the community.
- The existence of a cultural pattern that discriminates and it makes the women's proper needs seem insensitive.
- The excessive shyness and introvert attitude of women, noticeable in some places by jealousy and manliness of men.

- Both men and women do not easily accept, women assuming the role of promoter or that she would run some sort of communal organization, or that she would be contractor of works (trained mason).
- Lack of economic resources.
- The intense cold weather.

All of this made it possible to understand the real importance of working or involving engineers, social personnel, doctors, etc, that is to say interdisciplinary teams to consider the different elements of a water and sanitation Project and not only the construction of physical works in order to carry out a good study of the available hydric resources, the seasonal variations, quantity and quality of water, its collection, its use and the type of problems related with it. Also allows to learn about the different diseases associated with water, its seasonal character and correlate all of this with the activities that are developed in the community at different times in the year, which are an indication of the different needs of water. This knowledge and information was used as the basis to introduce changes in behavior and the appropriate technology. It is also for the community as a whole to understand and accept the potential contribution of women to the effectiveness of a improved supply of water and sanitation, because she is the main user of the works and makes it possible for women to know the new information on how can affect in improving the quality of life and of their families the support of a Project.

ANSWERS TO THE QUESTIONS OF THE QUESTIONNAIRE

- 1.- Which is the source of drinking water in your area of work?
- 2.- What is the depth of the open pits, depth of water and what is the diameter of the pits?

WORK AREA	SOURCE OF WATER	DEPTH OF THE WELLS	DEPTH OF WATER Dry	Rain	DIAMETER OF THE WELL
Prov. Chayanta	Hillside pouring	-	-	-	-
Prov. Quijarro	Well	4 - 6 m.	1 m.	2 m.	1 m.
Prov. M. Omiste y Sud Chichas	Well	8 - 15 - 30 m.	0.50 cm.	2 m.	1 m.

Hand Pump installed:

Yaku Pump	depth 4 to 15 m.
Soga Pump	depth 5 to 10 m.
India Mark II	depth 30 m.
Balde Pump	depth 5 to 10 m.

3.- Is the Project located in an attractive area or a stony zone?

The Province of Chayanta and part of the Province of Sud Chichas are attractive, they have plentiful of hydric resources and the ground is little uneven.

In the Provinces of Quijarro and M. Omiste there is the plateau, mostly with shallow wells, digging is difficult because of the presence of big stones.

4.- At what extent has the community participated in planning and implementing the processes?

In most of the communities of the work an excellent level of communitary participations was obtained as an answer, from the self-diagnosis up to the conclusion of the works; it is described in detail on the first sheets of the present work.

5.- What new ideas have been introduced in supplying drinking water at a low cost?

- Self management of water and sanitation services of the part of the community.
- Participation of provincial and departmental institution from the design of the strategy up to the carrying-out, monitoring and evaluation.
- Generate demand in the communities and work under request.
- Establish a financial policy that secures a contribution in cash of the community in order to secure the sustainability of the works and a better distribution of the subsidy; that 70% of the cost of the investment reaches more communities than a subsidy of a 100%.
- Promote an active participation of women in making decisions.
- Use of appropriate technology, locally manufactured, present technical options to the community so that it will choose the level of services which suits its interests.
- Secure the sustainability of the works constructed through the technical capacity to maintain them and a provincial system to provide spare parts.
- The Project works with three types of works: demonstrative fields, demonstratives works and communal works.

MALI - Par Abdel Kader SONOGHO

1. Sources of drinking water :

- traditional open wells
- protected (improved) open wells
- drilled well + hand pump
- river.

2. Depth of the wells between 12-20 metres, water level 4 mtr.
Width of the well : 0.8 mtr. for traditional wells, 1.4 mtr. for improved wells (reinforced concrete).

Type of handpump : India-Mali produced by Emama in Sikasso, Mali.

3. The project area consists of areas that are never flooded (35 km. away from Bamako) and flat areas that are sometimes flooded in Mopti administrative unit. Our programme will be carried out in 1994-95 in Dioro/Segou DivisionThe soil is sandy or

4. There is lot of community participation in the project activities. Community participates first in feasibility study with the staff responsible for teh study and then in the planning of the activities. Community participates in implementation and takes responsibility for non-skilled labour, local materials, food and lodging for the well-makers. After a year of activities, the community takes over the management of project with supervision from GRAT staff.

5. The construction of improved (protected ?) wells with a great width (1.8 mtr.) at strategic points to replace traditional wells is a new idea introduced to reduce the costs for drinking water supply of the villages and improve the quality of the drinking water.

Winds of the Sahel

Introduction

The dry Harmattan winds continue to erode the sandy soils of the Sahel but some communities have begun to fight back against the desert and more may follow. Wind pumps for small scale irrigation are beginning to create small pockets of green that represent a step towards environmentally sustainable development and also important for many in these communities the wind pumps provide food and a source of income.

Six years of study and application of wind pumping technology has recently been completed in Niger, Burkina Faso and Mali and has brought communities and technical specialists together in an exercise of cooperative learning. The results have shown that wind pumps can provide an effective and reliable water supply system that can be managed by the people who use them. But this work began some years earlier.

During 1981 women of Chikal village in Niger began to speak out about problems of malnutrition during meetings that were part of a community health program. This was at a time when the military government discouraged community gatherings seeing these as potential threats to state security. But rural health clinics for mothers and children provided a way for people to come together and discuss common problems. As the discussion begun by the women broadened to include the community at large it was agreed that the question of food security had to be addressed. Average annual rainfall had been declining to below 250 mm and crops were failing two years out of three. While community wells existed and ground water was plentiful the prospects of raising sufficient water for gardening from 30 m or more below the surface seemed remote and difficult. A small NGO began working with the community to look at some technological choices. Several options were examined and some tested in the village. Hand pumps were good for domestic water but required too much labour for irrigation, animal traction pumps provided more water but there was no fodder for working animals during the dry gardening season, diesel pumps did not last under village conditions and there were no mechanics who could maintain them. Diesel fuel would have to be brought in by camel or donkey when supplies in the closest town were available. Frequently they were not.

One resource that did reach Chikal was the wind. Throughout the dry season when gardens were possible the Harmattan wind carried away the sandy soils and made life difficult for all who had to breathe the dust laden air. Turning the wind from a problem into a solution seemed worth investigating.

As the idea began to take form a variety of techniques were used in analysing immediate and long term problems. Popular theatre provided a vehicle for discussing communal ownership: what should be considered a shared asset, what tasks would be done individually, how would decisions be taken and funds raised when necessary. The drama was "problems posing" and encouraged discussion but gave no answers. Solutions had to come from the community.

The following dry season an initial cooperative group established the first wind irrigated garden. By the time the first crop was harvested and sold interest and confidence in the system had

started to grow. The main teachers of the new water system became the members of the first cooperative.

Mechanics who are normally members of the garden group are trained in all normal maintenance operations and most repair problems. Only the initial installation and the lowering of the wind pump itself (usually not required within the 20 year lifetime) requires the intervention of the base technical team. Management of the wind pump varies from site to site. In some cases water is sold and funds kept aside to cover repairs or other community activities. In other cases water is provided free of charge but all garden participants pay into a maintenance fund based on the surface area of their plots.

Following this earlier work a technical team helped examine the questions of finding out how much wind is available, what types of wind pumps would work, how these would be best installed and what types of skills would be needed to allow users to maintain the equipment. The technicians continued to work closely with Chikal and other villages. During this time the senior government researcher working with the program decided to establish a local NGO (the first of its kind in Niger) to work on community level environmental problems including the installation of renewable energy pumping systems. The project engineer has since moved with his family to Chikal village and is now part of the community.

Broadening of the Chikal experience is now being supported through a variety of communication means. In the immediate area direct community to community exchanges allow information and skills to be passed on. To reach greater distances video recordings of gardening in one community have been shared in more remote areas and also with government and funding agencies. Traditional music has been used to convey general themes or messages. Video is also used to capture the innovations of one community and share these with others. Training for both gardeners and mechanics also incorporates video materials. Training through video and face to face interactions The experience of Chikal has begun to reach across Niger and to Burkina Faso and Mali as well as other parts of the Sahel.

The ability of wind pumps to provide water for commercial purposes has been key to the success of the wind pump installations. The revenues cover not only the costs of maintenance and repair but provide a full return on the capital investment within two years. By being self financing allow for wide scale replication.

Technical Summary

A variety of technical studies and testing has been carried out in support of the wind pump program. These include an assessment of the wind regime potential, testing of a variety of pump designs, optimisation of system components, socio-economic studies, and the development of training programs and materials.

Resources and Matching

Wind resource mapping with 11 automated data loggers now provides six years of detailed information on wind regimes across the Sahel. Mean windspeeds show a strong correlation with latitude increasing from 2.5 m/s at Ouagadougou in the south (12.5 N) to 5.5 m/s at Agadez in the north (17 N). Exploitation of the wind energy resource particularly for water pumping is viable over most the Sahel. While annual and inter annual variations exists the extensive data base now available enables two site correlation techniques to be used to properly match rotors, pump size and storage capacities with local applications.

Irrigation of small, communal gardens represents the most frequent type of wind pump end use. For these cases the optimization of system components for wind patterns with significant diurnal variations (typical of the dry season garden period) has shown some unexpected results. With storage tank capacity set equal to mean daily output, reliability in water supply actually improves when the cut-in wind speed is increased from 1.1 to about 1.5 times the mean wind speed. This relatively high start up speed allows the system to operate more efficiently during the stronger mid day windspeeds and provides for the most cost effective installation.

Wind Pump Testing

A variety of classical (Aermotor, Dempster, Southern Cross) and modern (Dutch Delta 12, Kijito, CWD 5000) wind pump designs have been tested and found to be technically viable when properly maintained even under the extreme dust conditions.

A survey of 37 wind pump sites across Niger showed that the majority of repair problems were below ground and included worn or failed pump seals, and rusted or damaged rods, couplings and pipes. Service and repair of below ground components has become the main theme of the post installation program.

The local manufacture of wind pump equipment is being initiated carefully. The attempted commercialisation of prototype designs has in some parts of the Sahel led to major equipment failures and discouraged the use of wind pump technology in general. Quality control in manufacture and quality in provision of timely and cost effective service will be critical for any successful manufacturing operation. A joint venture is now under way to link an international commercial manufacturer (Dutch Industries, Canada) with a local Sahel company (PTE - Sahel Tech) to establish local sales, service and eventual manufacture of wind pump equipment.

Socio-economics

The sustained commercial revenues from the wind pump / garden activities provide the economic basis for wider use of wind pumps. The communities surveyed have

consistently demonstrated an ability to generate revenues in excess of US \$ 4000 from the communal harvest allowing for repayment of all investment costs for most sites within a 2 year period. Over 90% of the garden produce is marketed locally without the need for transportation infrastructure, storage facilities and the ability to compete in the frequently over supplied urban markets. The monetary gains from the wind pump garden programs provide both the means for covering repair costs and the motivation to overcome the social and organizational difficulties that frequently plague communally managed water supplies.

Most of the 60,000 water points across the Sahel remain under utilised and represent a significant potential market for wind pumps. Improved access to commercial credit allowing for the installation of wind pumps on a cost recovery basis will be a key factor in helping develop this market.

Training and Capacity Building

Capacity building has been a key factor in the success of the program with emphasis on developing the human skills and institutional structures required to advocate, install, and maintain wind pumps as well as the ability to deliver user level training. With these capabilities in place the prospects for expansion of wind pumping technology in the Sahel appear to be good.

UWTPM is in the form of a Board of:

NATURAL RESOURCES MANAGEMENT SUPPORT PROGRAM
CASE STUDY ON PILOT DAM AND VALLEY TANKS
WATER SUPPLY IN NYABUSHOZI COUNTY, UGANDA

1.0 INTRODUCTION

The Natural Resources Management Support Program in Uganda is an umbrella organization designed to promote Private Voluntary Organizations PVOs, Non-Governmental Organizations, NGOs and Community based organizations CBOs involvement in Natural Resources Management Activities in the country.

The primary goal of the program is to enhance the capabilities and capacities of International and Indigenous PVOs, NGOs, and CBOs to develop policies and programmes aimed at restoring and/or maintaining environmental stability and the Natural Resources base.

The project has three board objectives namely;

- (i) Create broader awareness of Natural Resources Management needs and opportunities among PVOs, NGOs & CBOs and increase their commitment to effective natural resources management.
- (ii) Enhance the technical capabilities of PVOs, NGOs and CBOs in natural resources management technologies such as soil conservation, water conservation and supply, agroforestry, conservation of biological diversity, e.t.c.
- (iii) Strengthen the organizational capabilities of PVOs, CBOs and NGOs involved in Natural Resources Management activities in such areas as programme management, design, monitoring and evaluation, financial management and accounting.

The program has an open collaborative style of operation through a forum comprising of PVOs, NGOs and CBOs having programmes in Natural Resource Management NARM, - Forum with a voluntary membership of 135 organizations countrywide.

The forum discusses issues and generates programmes in natural resources management to which support can be directed.

Being a field based project, funding is allocated for incountry training, technical assistance, information support and direct project funding.

The NGOs propose the projects and the program works with them to secure funding and in implementation.

The NARM-Forum identified 6 themes under which support is provided namely:

- (i) Afforestation and Reforestation
- (ii) Bufferzones
- (iii) Appropriate Energy Development and Conservation.
- (iv) Sustainable Agriculture including soil conservation, agroforestry, food production, fish farming and range management.
- (v) Water management and
- (vi) Conservation Education and Awareness

The guiding principles in implementing of community projects emphasized by the programme are:

- (i) The projects must be demand driven and have to be identified by the beneficiaries.
- (ii) The community must contribute towards the cost of the project.
- (iii) The projects have to be managed by the community through a project implementation team elected by the beneficiary community members. This case study discusses a community water supply project, proposed by the community of Nyabushozi county, on South Western Uganda and supported by the Natural Resources Management Support programme under the theme Water-management as identified by the NARM-Forum.

2.0 BACKGROUND

2.1 Introduction

Nyabushozi county is located in Mbarara District in South-Western Uganda and is home to L. Mbuoro National Park with the greatest bio-diversity of fauna in the country.

2.2 Climate

The county lies in a semi-arid climate with mean annual rainfall between 600-800mm, and minimum annual rainfall between 400-700mm. The seasonal rainfall pattern is bio-modal with short rains between March and April and long rains between September and December. In between are dry seasons namely the long dry season between May and August (4 month) and the shorter dry season between January and February.

This rainfall pattern is however highly variable with extended droughts becoming more frequent and severe in the recent past. Annual pan evaporation is uniformly high throughout the year varying between 13420-1560mm. Potential evapotranspiration is estimated at 1295mm and actual evapotranspiration based on water balance estimates of one river in the area is estimated to be 79/mm. All these estimates are above the mean annual rainfall of the area.

2.3 Topography and Soils

The topography of the area is generally flat low hills, slightly rolling. The low hills are separated from each other by wide flat valleys with gentle down stream gradients. The micro-relief on the valley bottoms is often uneven owing to mounds of earth usually formed around grass stands. It would seem that when it rains most of the water is held between the mounds and lost to evapotranspiration thus reducing the runoff down stream over clay and the hillslopes are covered with lateritic soils.

Anticipated seepage losses from dams and valley tanks is therefore minimal. The sandy clay also offers excellent material for the core of dams while the murram is good material for the fill of dams.

2.4 Surface Runoff

Surface water runoff is seasonal in most parts of the county. The only perennial water bodies are on the outskirts to the south and south east namely R. Rwizi, L. Mbuoro, L. Kachera (and the connecting swamps), and Kizimbi Swamp (which dries up during prolonged dry seasons); all within and or surrounded by LMNP. The two pilot sub counties of Kenshunga and Kikatsi do not have any perennial water bodies.

Based on estimates of Hydrological Net Precipitation (HNP), computed as the difference between the mean monthly rainfall and potential evaporation, surface runoff is probably in six months of the year (corresponding to the rainfall seasons) with over 40% of the annual runoff is basically overland flow after heavy rain storms with no baseflow component and subject to the recurrent droughts. It has therefore been inferred that the 1:5 year drought period with no surface runoff is 10 months.

Table 3.1: Mean Annual Hydrological Net Precipitation in mm

Month	Rainfall (mm)	Open Water Evap. (mm)	Potential Evap. (mm)	Actual Evap. (mm)	HNP (mm)
Jan	30	110	103	63	0
Feb	40	105	98	60	0
Mar	70	120	112	68	2
Apr	100	120	112	68	32
May	60	120	112	68	0
Jun	10	120	112	68	0
Jul	30	130	121	74	0
Aug	50	125	116	71	0
Sep	90	120	112	68	22
Oct	90	110	103	63	27
Nov	120	100	94	57	63
Dec	70	110	103	63	7
Year	760	1390	1295	791	153

2.5 Vegetation

Vegetation comprises of savannah grasslands interspaced with acacia spp and in other areas the semi-arid cacti species.

2.6 Socio-economic Base

Nyabushozi has a population of 70,000 people with 10,000 families. The mainstay of the people in Nyabushozi is Pastoralism. Because of the rainfall regimes, and soils it is not possible for the people in Nyabushozi (called Bahima) to grow crops. They rear the long horned Ankole cattle on which they depend for all their requirements. They undertake seasonal migrations in search of water during the dry season and mostly into L. Mbuho National Park.

These migrations have been a source of conflict between the community and Park authority. Often they have lost cattle to Wild animals. The average number of cattle per family is 8.0.

2.7 Water Use and Demands

The greatest cause of nomadism among the Bahima has been lack of water. This is because the water comes mainly in one season and they lack facilities for storing this water.

The area has potential for surface water if it is trapped during the rainseason.

Ground water can only be accessed by sinking of deep boreholes. The seasonal migrations due to lack of water have resulted in heavy environmental degradation as areas around the few water points including L. Mbuero are overstocked and overgrazed during the dry season leading to soil erosion.

Cattle keeping is the main socio-economic activity in Nyabushozi county with over 98 % of the households owning 80 hc of cattle on average. Adequate and reliable livestock water supply is therefore very crucial for socio-economic development of the area. The area lies in a semi-arid enclave with recurrent droughts. There is only seasonal surface runoff with no perennial streams and groundwater seems to be limited, more so the present method of abstraction cannot meet the relatively high livestock water demand. The only viable option for livestock water supply is therefore storage of surface runoff in dams and valley tanks.

Up to 1970 several dams and valley tanks were provided in the area but most of these have silted up and the capacity of the few reliable dams has been overstretched by the increased number of livestock. Within the pilot area there are only 17%. During the dry season there is severe shortage of water and most of the cattle keepers, after overcrowding and or depleting the nearby communal water, if any, migrate permanently mostly towards the south to R. Rwizi and L. Mbuero through LMNP and to L. Kakyera through the commercial ranges. In addition to encroachment on the park and the environmental degradation thereof, this has led to water borne diseases for both the livestock and humans, deterioration of the land especially along the cattle routes and around the water sources, disruption of social services and conflicts enroute etc. It was accordingly recommended that in order to reverse the above adverse effects adequate and reliable water be provided within easy reach of the homesteads. In the short to medium term this may be achieved through communal facilities though in the long term the strategy should be to assist the communities to develop their own farm ponds.

For 100% coverage in the pilot subcounties 34 dams or valley tanks would be required.

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Harambee
Tilapia

3.0 PROJECT IMPLEMENTATION

3.1 Inception

Following a request from the community representatives of Nyabushozi through their local NGO, Nyabushozi Development Agency (NYDA) for the programme to assist them in their development initiatives, more specifically to assist the nomads to settle down to sedentary life, the programme organized a workshop for 80 elected community representatives with the aim of sensitizing them on how they could identify and tackle their problems using a Participatory Rural Appraisal methodology.

Following the Workshop various meetings were held by the community members to identify and rank the problems in order of priority. WATER emerge universally as the most pressing problem in all the meetings.

3.2 Selection of Sites

Successive meetings identified critical areas in the region where support and effort should be concentrated. Three subcounties most affected by water shortages leading to transhumance were identified.

Other criteria used by the community representatives on zeroing down to particular localities included population of both people and livestock and commitment of the local people to support the project in a particular area.

Follow up meetings were held with the communities of the identified subcounties to determine specific sites where water sources could be located.

A water expert (hydrologist) was contracted by the program to undertake a survey and determine the technical feasibility of sustainably establishing water sources at the sites identified by the community through the peak dry seasons and to determine the nature of the water sources in as far as they could be valley tanks, dams, boreholes piped water from L. Mburo.

Problems associated with identification of final sites included:

- * Land ownership
- * Accessibility

After a careful assessment of the cost and feasibility of the four alternatives, the community settled for dams as the most appropriate and more sustainable. The pilot sites (3) were finally selected.

3.3 Technical Design

The community identified siltation as the major cause of dam destruction and attributed this siltation to people and animals moving into the water there by forming tracks which bring in silt. The design selected was meant to offset this problem.

Based on the consideration of the gap in supply, the community priority, technical suitability and reliability of the sites, land ownership and accessibility to the proposed sources the following three were selected for the pilot programme:

- (i) Excavation of one valley tank involving 18,000 cu.m of earthworks and including inlet channel construction, plumbing work, construction of cattle troughs, fencing etc. at Nyakigando in Nombe/Rwabarata Parish, Sanga Subcounty. Estimated cost for full development \$40,000.
- (ii) Construction of one dam of 210 m wall involving 9,500 cu.m of earthworks, spillway, pipework for gravity supply, cattle troughs, fencing etc. at Kyamirabye in Embaare Parish, Kikatsi Subcounty. Estimated capacity of reservoir at normal pool level is 97,0000 m³ (21 million gallons. \$52,000.
- (iii) Rehabilitation of Twenyambi Dam in Rushere Parish, Kenshunga Subcounty, involving excavation/expansion of the central valley tank by 7,000 cu.m of earthworks, extension of inlet channel by some 1300 m, plumbing work, cattle troughs, fencing, bush clearing in the reservoir area etc. Estimated cost of full development \$30,000.

The dams would be fenced off to stop livestock drinking direct from the dams and bring silt/mud into the dams they also decided that the dam embankments be planted with grass to prevent backwash of the soil/clay into the water.

They further decided that hand pumps and plumbing work be put in place to enable the drawing up water from the dams into drinking troughs to be constructed beyond the perimeter of the fence to prevent siltation.

3.6 Costs

The construction costs are shared out between the community and the programme.

Since pastoralism is the mainstay of the beneficiary community, the community members agreed on a fee to be levied per head of cattle owned by each individual. The more animals, the more money.

Following that formula, costs were shared out as below:

<u>Item</u>	<u>Source</u>
1. Earth Moving Equipment	Programme
2. Barbed Wire	"
3. Nails	"
4. Cement	"
5. Sand	Community
6. Hardcore	"
7. Aggregate	"
8. Pipes	Programme
9. Fencing Posts	Programme/Community
10. Live fencing	Community
11. Labour: Skilled	Programme
12. Semi skilled	Community
Unskilled	Community
13. Hand Pumps (2 per dam)	Program/Community

3.7 Implementation:

- For each dam, a water committee was elected to mobilize the community contribution and to oversee construction work. It is also responsible for handling donor funds from the programme. Each committee opened a bank account for safe custody of their monies.
- A contractor was hired in consultation with the community to undertake the work because dam construction is very technical work which the community couldn't do on their own. Large Plant Machinery is used.
- So far under this arrangement 3 dams have been constructed.

4.0 MAINTENANCE

The dams are managed and owned by the users. Full time persons are hired to maintain the dams and operate the pumps.

The community contributes a small fee per animal per month which is banked and used for maintaining the dam and paying the workers. One community member is being trained as a pump technician to repair the pumps if and when they breakdown.

The community has come up with bye-laws to guard against misuse of the facilities with penalties included.

5.0 LIMITATIONS

However, there had been many occasions when the community could not propose ideal sites for dams because of lack of accessibility (access was through lease hold land) to these sites and in some cases ideal sites lacked holding grounds where animals could be kept before or after watering and they had to be disqualified.

Due to the magnitude of the water problems, there was competition among the community as to where the dams should be sited. Each parish wished the dam in their area to minimize walking distances. Therefore, it may not be possible to have proportionate contribution from the community towards the dam as most community members, under-declare the number of animals they have in order to contribute less as it has been agreed in the meetings that everybody contributes according to the number of animals he has. The rate being US \$1 per animal.

AN ABSTRACT OF THE PROVINCIAL MASTER PLAN ON
RURAL DRINKING WATER SUPPLY AND SANITATION OF PHUKHANH
(up to the year 2000)

I. NATURAL, SOCIO-ECONOMIC CONDITIONS RELATING TO DRINKING WATER SUPPLY
AND SANITATION IN PHU KHANH PROVINCE .

1. Natural conditions :

- 1.1. Geological location : $11^{\circ}42'50'' - 13^{\circ}43'50''$ North Latitude
 $108^{\circ}36'00'' - 109^{\circ}27'45''$ East Longitude .

Total superficies are of $9,804 \text{ km}^2$, stretching along the Meridian with the length of 200 km and width of 30-80 km .

1.2. Topography, morphology, geology hydrology and ground water resources :

Topography : is complex, it is the Eastern magine of Northern Truong Son mountainous ranges with many high mountains (1500-2000m) adjacent to the East sea, and with low mountain ranges dissected with many small slope passes and narrow plains . The topography is rolling from West to East .

* Mountainous and Midland topography :

High mountainous area is rolling from North East to South West, slope is very high. Water reservation and regulation capacity is poor .

Midland area : with low dunes and hills, topography is rolling and undulating with slope of $3 - 5^{\circ}$. Water retention and regulation capacity is poor due to the expanded deforestation. High mountain and Midland areas consist of 75% of the provincial lands .

* Plain topography : The average elevation (above mean sea level) is not so high, topography is leveling with fertile soils. Population

is very high .

- * Coastal area with low average elevation, topography is rather even, the sandy stretches and sandunes have also rolling and undulating topography .

Morphology :

Low mountainous area with acreage of $6,000 \text{ km}^2$, height : 300-1,600 m; strongly dissected; the depth of the sediment layer : 0-0.5 m to 1 m on granit stone .

Van Hoa plateaux : 600 km^2 ; height: 400 m, Dac mountain peak : 654 m; foundation is composed of spitting sediment stone of Triat era with the bassalt spitting layer Peoxen of 0.5 - 1 m depth. Weathering layer is of 2 - 5 m depth .

Valleys alternately with streams and Ba river : Bottom is composed of ngoc Linh complex stones . They are instrusion onces : Mezozoi, Kainozoi, and spitting sediment of Mang Giang layer .

Coastal plain : 300 km^2 ; elevation 5 - 10 m . It is deposited annually by sediments of the sea .

Sandunes along the sea : layer ; 20-40 m, it composts of quartz and some of fenspat mica .

Aquifers :

Aquifer in sandune area belongs to the Holoxen (MvQIV) marine sediment. Total acreage of 400 km^2 , distributing unevenly along the sea with average thickness of 20 m, some parts can reach 40 m. Water level (far from the earth surface) is from 3 to 12 m (average: 1-3 m); the difference between 2 seasons is 1.04 m; average water flow : 0.01-0.7 l/s; water flow in drilled wells : 0.05-0.94 l/s (average : 0.1-0.21/s); $K = 1.93-20.6 \text{ m/ngd}$. Water is mainly of clorubicarbonat natri with total minerals $M = 0.40 \text{ g/l}$; $\text{PH} = 5.5$; $N, K = 0.56-51.66$. Water here is of good quality, with not abundant reservation. Water retention capacity is poor .

Complex aquifers of marine and riverine sediments of Plastoxen, and Holoxen (maQIII-IV) systems with total acreage of 400 km², distributing scatterly in coastal plain with water layer of 15-48 m depth . Water level (far from the surface) is 0.27 - 4.60 m (average : 1-3 m); the difference between 2 seasons : 1.24 m; water flow : 0.21/s, in wells: 0.08 - 0.7 l/s (average : 0.1 - 0.21/s); K = 22 - 26 m/ngd. Water is composed of clorubicarbonat natri and bicarbonat clorua natri with total minerals M = 0.32 - 16.41 g/l; PH: 6.3; ion K and N : 0.84 - 5.00. water is of good quality. Water reservation is not abundant .

Complex aquifers of Para Plastoxen (N₂-Q₁) spitting, with total acreage of 500 km², distributing scatterly in the rather high areas. Water level: (-0.4) - (-6) (average: (-1m) - (-4m)); water flow in the free points: 0.01 - 0.78 l/s, in well : 0.1 - 0.28 l/s (average : 0.1 l/s); K = 13.47 m/ngd; water is composed of clorua bicarbonat natri canxi; good quality; water reservation is not much; water retention capacity is rather good.

Complex aquifers of Neogen sediment of ba river : 20 km²; K = 2.61 m/ngd. water is composed of bicarbonat clorua natri magie canxi with total minerals M = 0.15 g/l. Water is colourless, with fresh taste; low water reservation .

Aquifers distributing unconsquentially in Cretta (Kldd) spitting stone: with total acreage of 700 km²; water flow : 0.1 - 0.5 l/s, mainly 0.1 l/s in free point, and 0.085 - 1.16 l/s in well; K = 3.03 m/ngd; water level : (-0.6) - (-3.8m), mainly (-2.0) - (-4.0m); water is composed of bicarbonat natri with M = 0.36 g/l; good quality; low reservation and good retention capacity .

Complex aquifers of unconsquential water reservation of Jura (T1 - 2bd) sediment with total acreage of 584 km², distributing along the geological dissects and some of the mountains; water level : (-0.2) - (-3.6m), mainly (-1) - (-3m); well water flow : 0.01 - 0.7 l/s, mainly 0.1 l/s; K = 0.044 - 0.14 m/ngd; M = 0.24 g/l bicarbonat clorua natri; good quality; low reservation and good retention capacity .

Triat spitting sediment of Mang Gang (T1 - 2 mg) system : Water flow in free points : 0.01 - 0.78 l/s; water flow: (-0.6) - (-3.04m); M = 0.13 g/l bicarbonat natri cloruanatri . Water is fresh with low reservatic

Aquifers in the creches of Paleszoi, Mezozoi, Kainozoi : 400 km² distributing in all mountainous areas ; water level : 0.76 - 6.60 m, mainly from 1 to 3 m; water flow in free points : 0.01 - 0.78 l/s, mainly 0.01-0.72 l/s; water flow in well : 0.01 - 0.45 l/s; M = 0.10 g bicarboriat cloruanatri; good quality; low reservation .

General observations of ground water :

Shallow ground water : water level : 1 - 4 m, maximum: 5 - 12 m. The (MVQIV) (maQIII IV) (ndQ) (N2Q1) systems will be the residential points; Low water flow and reservation; good quality .

Deep ground water : The aquifers in sediments with depth : 20 - 50 m; flow : 0.83 - 5.55 l/s; large difference of water level between 2 seasons : 2 - 3.3. m .

The aquifers in the weathering paren rocks : Flow : 2.5 - 4.2 l/s; water level : 40 - 60 m, difference between 2 seasons : 1.4 - 8 m. Water flow and water reservation are not much; water quality is good .

2. Socio-economic conditions :

2.1. Population : 1,334,935 inhabitants, in which employed in agriculture : 1,085,410 (80%); number of households : 197,636; population growth rate: 1.8%; Kinh peoples : 1,276,263 persons (95.6%); population concentrated coastal plain with high density; other minority peoples : 58,672 persons (4.4%) live scatterly in small communes with very low cultural life, poorly developed production and with many backward customes .

Residential points : a) Coastal area : 92 communes and towns
b) Plains : 42 - -
c) Midland and :
mountains : 82 - -
Whole province- : 217 communes and towns.

They are grouped in 265 agricultural cooperatives, 261 production units and 22 agricultural stations .

2.2. Estimated population by each period : (up to the yeat 2000)

Population growth rate :

1986 - 1990 : 1.6 - 1.7%
 1991 - 1995 : 1.45- 1.5%
 1996 - 2000 : 1.17- 1.2%

Estimated population by periods (natural growth)

Periods	1986		1990		1995		2000	
	Popu.	H.hold	Popu.	H.hold	Popu.	H.hold	Popu.	H.hold
Coastal area	460,565	81,831	506,700	95,600	553,500	110,700	586,200	122,120
Plain area	356,505	65,140	392,200	74,000	428,500	87,000	454,200	94,620
Midland area	268,340	50,665	296,500	55,550	324,000	63,500	343,600	71,660
Whole province	1,085,410	197,636	1,193,400	225,150	1,306,000	261,200	1,384,000	288,400

Estimated population by periods (with regularization)

Periods	1986		1990		1995		2000	
	Popu.	H.hold	Popu.	H.hold	Popu.	H.hold	Popu.	H.hold
Coastal area	460,565	81,831	506,700	95,600	553,500	110,700	586,200	122,120
Plain area	365,505	65,140	372,200	70,220	388,500	77,700	414,200	86,300
Midland area	268,340	50,665	314,500	59,330	364,000	72,800	383,600	79,980
Whole province	1,085,410	197,636	1,193,400	225,150	1,306,000	216,200	1,384,000	288,400

II. EXISTING RURAL WATER SUPPLY AND SANITATION :

1. Water resources :

Rain water : used from September to December for coastal area (20%) of the total water), plain area (5%) and mountainous and Midland area (5%) .

Surface water: used from January to December, mainly for mountainous and Midland area (55-60%), plain area (20%) and coastal area (10%) .

Ground water :- used in dry season from January to December for mainly

the coastal area and the plain area (70% and 75% respectively) .

Thus, the ground water is highest used (65-70%) by shallow wells, and then surface water (20-25%) and rain water (5-15%) .

Most of the surface water is polluted by dirty wastes, it can not meet the standards of hygiene. The ground water in the coastal area is contaminated by salinity and acidity, can not ensure good quality.

2. Existing water supply facilities :

- * Tanks, jars of various capacities ;
- * Shallow well without platform, well edge has been formed by stones;
- * Deep wells built with bricks : The well and well edge are paved with bricks and cement. These wells often accompanied by water tank of 1-m³ capacity upwards are popularly used by the local people. Some parts of the coastal region are intruded by salinity and acidity at the depth of 3.5 m , the wells can not be deep, so that rain water catchment tanks are necessary .

The province has 576,810 persons (53.1% of population) served by the above-mentioned water supply facilities with the total onces of 104,726 units in which tanks and jars of 1,875 units (1.8%), only 840 units (44.8%) are of the required standard; shallow wells are 24,568 units, in which 12,350 units (50.3%) are up to the mark; deep wells built with bricks are 78,283 units, only 5,299 units (6.9%) are good. Thus in the total of 104,726 facilities of various kinds, only 66,181 (63.2%) units can reach the minimum standard , the rests are not acceptable .

3. Existing sanitary facilities :

Pit latrines, double vault compost latrines are used popularly in the province because of low cost and as crop fertilization . Septic and semi-septic latrines are most hygienic; but costly, thus they consist of only 12.1% of the total facilities .

Total sanitary facilities are 130,281 units, in which 52,948 units (40.6%) are acceptable, serving 118,681 households (59.9% of the total

number of households) . The coastal area has lowest percentage (40.9%); People make water and "relieve themselves" at random causing great unhygiene .

4. People's health :

Due to the shortage of drinking water and the untreatment of the unfresh water resources, so that local people are often suffered from water-born diseases such as : cholera, dysentery, typhoid, polio, diarrhea, amip dysentery and soreeyes .

Water-born diseases are as follows ($\frac{1,000 \text{ morbidity}}{\text{mortality}}$)

Years	1980	1981	1982	1983	1984	1985	1986
<u>dDiseases</u>							
Cholera	$\frac{10}{0}$ 0.01	$\frac{1,029}{15}$ 0.83	$\frac{62}{1}$ 0.05	$\frac{340}{8}$ 0.30	$\frac{2}{0}$	$\frac{1,246}{15}$ 0.94	$\frac{1,306}{18}$ 0.98
Dysentery	$\frac{1,910}{15}$ 1.61	$\frac{2,723}{17}$ 2.20	$\frac{2,095}{11}$ 1.69	$\frac{1,433}{9}$ 1.42	$\frac{1,477}{4}$ 1.21	$\frac{2,116}{5}$ 1.59	$\frac{2,158}{11}$ 1.61
Typhoid	$\frac{71}{4}$ 0.06	$\frac{36}{1}$ 0.03	$\frac{35}{0}$ 0.03	$\frac{29}{3}$ 0.02	$\frac{23}{1}$ 0.02	$\frac{54}{2}$ 0.04	$\frac{39}{11}$ 0.03
Polio	$\frac{109}{1}$ 0.09	$\frac{35}{1}$ 0.03	$\frac{41}{3}$ 0.03	$\frac{76}{2}$ 0.06	$\frac{108}{13}$ 0.08	$\frac{57}{3}$ 0.04	$\frac{60}{3}$ 0.04
Women's diseases	$\frac{8,806}{0}$ 7.12	$\frac{9,115}{0}$ 7.33	$\frac{12343}{0}$ 9.62	$\frac{13281}{0}$ 10.16	$\frac{18970}{0}$ 1.43	$\frac{62932}{0}$ 47.14	
Diarrhea	$\frac{26596}{47}$ 2.21	$\frac{2,566}{75}$ 2.07	$\frac{20925}{54}$ 16.82	$\frac{18623}{28}$ 14.50	$\frac{20671}{19}$ 15.82	$\frac{2,005}{28}$ 1.51	$\frac{22476}{23}$ 16.85
Amip dysentery	$\frac{847}{8}$ 0.70	$\frac{881}{18}$ 0.71	$\frac{785}{1}$ 0.63	$\frac{427}{1}$ 0.38	$\frac{569}{0}$ 0.44	$\frac{568}{0}$ 0.43	$\frac{632}{3}$ 0.47
Soreeyes		$\frac{36060}{0}$ 29.16	$\frac{45000}{0}$ 36.18	$\frac{39220}{0}$ 30.59	$\frac{30247}{0}$ 23.14	$\frac{37000}{0}$ 27.81	$\frac{191538}{0}$ 143.5
<u>Total</u>	$\frac{30378}{83}$ 25.26	$\frac{52919}{131}$ 43.76	$\frac{78799}{73}$ 63.35	$\frac{73763}{56}$ 57.38	$\frac{66932}{37}$ 51.22	$\frac{62534}{53}$ 47.0	$\frac{28721}{70}$ 211.0

II. RESULTS OF THE SURVEYS :

1. Objectives to be achieved up to the year 2000 :

Each household must have one water supply facility and one sanitation facility. Water requirement will be met by 50-90 l/day and 120-160 l/day in periods 1985-1990 and 1991-2000 respectively .

2. Estimated cost on water supply and sanitation facility construction:

Shallow/deep well : depth 9-10 m; diameter : 1.05m; well edge :0.75-0.8m; well platform : 3 x 3 m; composed with concret and iron; new construction : 62,560 dong and reparation P 31,330 dong .

Drilled well : Length of auger pipe : 35-40 m; filter pipe diameter \varnothing 49 m ; well platform : 20 m²; composed with concret and iron ; new construction : 193,900 dong .

Water tank : capacity : 1, 2, 3 m³, 5 m³; type 3m³ : 2.5 x 1.6 x 1 m; composed with concret, iron and bricks . new construction : 47,650 dong and reparation : 15,500 dong .

Double vault compost latrine : 1.52 x 0.90 x 0.65 - 0.70 m; composed with concret and iron ; new construction : 17,650 dong and reparation: 7,580 dong .

Septic and semi septic tank : size : 2.7 x 5 x 1.7 m; composed with concret and iron with 2 catchment vaults, 2-3 sediment vaults, 1 filter tank ; new construction : 142,210 dong and reparation : 23,325 dong .

Pit latrine : size : 0.7 x 0.7 x 0.7 x 1 m with concret cover .

3. Investment :

Total investment for both new construction and improvement of water supply and sanitation facilities up to the year 2000 is 21,099,073,000 d.
Average investment per household : 73,150 dong;
Annual investment per household : 5,630 dong.

Exchange rate

1 US \$ = 10 000^d Vietnam currency .

I/. GENERAL INFORMATION

1.1 COUNTRY : LAO PEOPLE'S DEMOCRATIC REPUBLIC
(LAOS)
LOCATION : Centre of Indochina . (Southeast asia)
BORDERS : CHINA, VIETNAM, CAMBODIA,
THAILAND, MYANMAR.
AREA : 236.800 Square kilometers.
POPULATION : 4.500.000 (1993)
PROVINCES : 17 Provinces.
CAPITAL : VIENTIANE.
ANNUAL GROWTH RATE : 2.90 %
RELIGION : BUDDISM.

1.2 CLIMATE

TEMPERATURE : Maximum - 38 deg. C
Minimum 10 deg. C
RAINFALL : 2000 - 2300 mm.
WIND : Northeast & Southwest moonsoon.
SEASONS : Rainy season (May - October)
Dry season (November - April)

1.3 ECONOMY

- Exchange rate : 720 Kip / 1 US \$
- Inflation rate : 6 %
- Gross domestic production growth 1993 : 7 % (est.)
- Total exports : 85 US \$ million.
- Leading exports : Textile.
Timber
Electric power

(Far eastern economic review, 4 th NOV / 1993. page : 30)

II / WATER SUPPLY

2.1 URBAN AREAS

Water Supply needs are the responsibility of the Ministry of Construction, Post and Communication. Urban Water systems provide clean water through proper water treatment plants that are distributed to individual users complete with water meters. Even though the municipal water systems are somewhat modern, they only serve 6 % of the urban population.

The Maekhong River is the biggest river in Laos and flows a total length of 1850 km through Lao.PDR . This river is the main source for all the urban water works in the country, but those who live in the suburbs continue to use local water source for example: wells, bore holes, and/or small streams, and springs.

2.2 RURAL AREAS

Mennonite Central Committee is an NGO from North America that tries to help respond to the clean water needs of two Northern Lao provinces and one central province through constructing Gravity Fed Water Systems (GFWS) and boreholes, respectively.

In the areas where MCC works, villagers use streams as their major source of water. The Northern provinces are rocky mountainous areas, therefore making it difficult to provide boreholes. Gravity Fed Water Systems are more appropriate. The central plains are close to the MaeKhong River and are more appropriate for boreholes construction.

The main source for GFWS in the Northern provinces is streams and springs. These systems are usually clean as the water source are in isolated mountainous area. Also no chemical water treatment is used. In the central plains PAT handpumps are commonly used with boreholes. PAT machine drills are used to drill the boreholes. Villages are satisfied with this kind of handpump because repair and maintenance is convenient. This kind of handpump has an open top for easy repair. The water table on the central plains is usually about 10 - 15 meters from the surface. Below the water table is a hard pan of layered clay.

III / COMMUNITY INVOLVEMENT

Villagers see the importance of having a clean water system, therefore it is necessary that they are involved from the beginning in the process of providing a water system. They are involved in the planning, providing local construction materials and supplying the labor for constructing the system. They will also host the technician who works with them in creating the water systems. Usually, the villagers will take responsibility for 30 % of the cost of shipping the materials.

After the water system is complete, the local community takes ownership and will organize a committee to be responsible for upkeep and repair of the water system. Each family will contribute a monthly fee to help pay for materials that are needed. Each community will decide how much they should pay.

MCC works in two Northern mountainous, isolated provinces of LAO PDR. Traditional village life is still dominate, with many varied ethnic groups. The following is found :

I / . COMMUNITY

- a. People are limited of Education. Low level of Educate.
- b. Communication with other provinces within Lao.
- c. Lack of technical resources.
- d. Lack of Clean Water Supply.
- e. No use of latrines sewage systems.

II / . TECHNICAL

- a. Water source for GFWS are usually streams or rivers. The erosion of rain water during the rainy season collects silt or clay into the intake, filtration and pipeline.
- b. The materials for construction are not available in local area.
- c. Destruction of water shed.

III / . ACTIVITIES FOR SOLVING PROBLEM

MCC Intergrated Rural Development Project focus on the following :

- a. food security (produce agricultural goods enough for family consumption for each year)
 - * Alley cropping
 - * Family garden
 - * Rice bank
- b. village health worker able to deliver basic health service to the villages (complete immunizations, available family planning alternatives, malaria control, treat simple diseases, access to appropriate medication)
- c. All chikdren will have access to at least five years of primary school.
 - * Supplies for scholl struture
 - * Educational materials
 - * Upgrading of teacher skill.

CASE STUDY

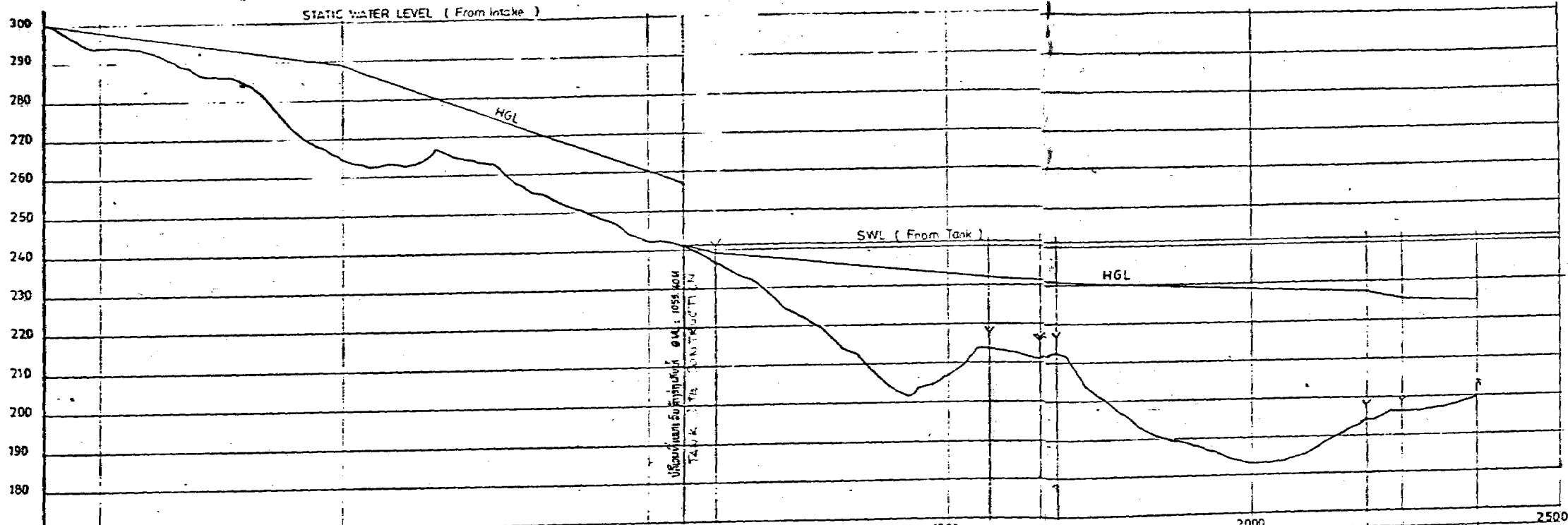
* PROVINCE : Phon Sa Ly province, Boun Neua district.
* REGION : Northern
* EXISTING SOURCE OF DRINKING WATER : Stream
* SAVE YIELD : 10 LPS
* PROJECT CONSTRUCTION : Piped Water Supply Systems
* POPULATION : 923 people, 125 families
* LENGTH OF PIPE : Main line = 2374.00 M, Distribution line = 850.00 M
* HEAD FROM SOURCE TO VILLAGE : Lowest point = 117.00 M
* DURATION OF CONSTRUCTION : 38 days
* LABOR : 2139

COST

* EXPORTED MATERIALS : 7000 US \$
* LOCAL MATERIALS : 350 US \$
* TRANSPORTATION : 950 US \$
* AVERAGE PER CAPITA : 9 US \$

ໂຄງສ້າງແຮງລະດັບ ມາດຕະການ ເນື່ອງ ບຸນເນືອງ ແຂວງຜົ້ງສາລີ

PROFILE OF GFWS OF BUNNELA DISTRICT



Remarks	100	500	1000	1500	2000	2500						
Distance	100	500	1000	1500	2000	2500						
Total Dist	100	500	1000	1500	2000	2500						
Pipe	5	29	48	50	55	73	76	99	112	119	123	127
Material	HDPE PIPE 63 mm CL II L = 500.00 m	HDPE PIPE 50 mm CL II L = 554.40 m	HDPE PIPE 63 mm CL II L = 593.50 m	HDPE PIPE 50 mm CL II L = 532.10 m	HDPE PIPE 50 mm CL II L = 178.80 m							
Flow	2.250 LPS	2.150 LPS	2.025 LPS	1.800 LPS	1.600 LPS							
T. HL	288.600	284.720	284.720	282.299	281.199	280.944						
HGL												
Elevation			282.928	284.492			282.495	281.251	282.300			