WOMEN AND WATER

Domestic Shallow Well Water Supplies
The Family Handpump Scenario

ASIAN DEVELOPMENT BANK
AND
UNITED NATIONS DEVELOPMENT PROG
Proceedings of Regional Seminar, Manila, 29 August

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to US$1.00

September 1989

Bangladesh	32	Taka
India	17	Rupees
Indonesia	1,800	Rupiah
Pakistan	21	Rupees
People's Republic of China	3.7	Yuan
Philippines	22	Pesos
Thailand	26	Baht

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UNITED NATIONS DEVELOPMENT PROGRAMME

These Proceedings represent the findings of a "Regional Study on Domestic Shallow Well Water Supplies" which were presented at a Regional Seminar "Women and Water - The Family Handpump" held in Manila, Philippines, from 28 August to 1 September 1989. The Study and the Seminar were funded by the United Nations Development Programme and executed by the Asian Development Bank. The views expressed in the papers and discussions are those of the authors and speakers and do not necessarily reflect those of their employers or governments.

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Additional copies of this publication are available upon written request from the Water Supply Division, Asian Development Bank, P. O. Box 789, 1099 Manila, Philippines.

FOREWORD

Despite the special global efforts of a Women's Decade (1975-1985) and a Water Decade (1981-1990) in the rural areas of the developing countries of Asia, there is still a great deal to be done to improve life for women on the one hand and water supply and sanitation on the other. These two areas of concern are intricately entwined. Women are the main procurers and users of water and primarily responsible for hygiene and sanitation in the home. But distance to an adequate water source, ignorance of hygiene and sanitation and restrictive cultural practices have all combined to make life difficult for rural women.

Governments have been trying to address these problems but their efforts have been greatly constrained by a lack of financial resources and a top-down approach which does not always promote sustainability. Hundreds of millions of rural people in Asia are still without adequate water supply and sanitation and have little prospect of improvement in the near future. It is time to try alternative development mechanisms.

In response to a request from the United Nations Development Programme (UNDP) for regional projects to be funded under the 1987-1991 UNDP Inter-Country Program, the Bank prepared and with UNDP approved in November 1988, a "Regional Study on Domestic Shallow Well Water Supplies". The countries included in the studies were Bangladesh, Indonesia, Pakistan, Philippines and Thailand.

The objective of the study was to explore the extent to which individual families in the developing countries of Asia can satisfy their basic water supply needs by self-help through family-owned shallow wells (mostly with handpumps), and the extent to which such a strategy would involve and benefit women.

In July 1985, the Bank approved a policy on the role of Women in Development (WID) which includes improving its own knowledge about the role of women in the social and economic development of Developing Member Countries (DMCs) by sponsoring or co-sponsoring workshops, seminars and training courses focused on practical ways of involving women in development and by exchanging information with other bilateral and multilateral development agencies. In support of this policy, the Bank consciously designed the scope and implementation of the country studies with a focus on women. The government agency for women's affairs was chosen as the executing agency in each study country and the consultant team leader in each country was specifically designated to be a female sociologist.

Surveys were conducted in 20 representative villages in each study country and the results presented at country seminars conducted during July-August 1989.

Then on 29 August-1 September 1989 at a regional seminar in Manila, with the theme "Women and Water – The Family Handpump", the collective results of all the studies were presented and are summarized in these published Proceedings. It was satisfying to note that more than 60 per cent of the participants at this seminar were women.

The seminar participants were unanimous in their support of the need for self-help family water supply and sanitation pilot projects in each of the study countries; the scope would include components of drainage, health and hygiene education, training and income-generation in an integrated package. All agreed it was essential that the projects focus on women.

In publishing the Papers and Proceedings resulting from this study and seminar, the Bank in its role of catalyst, seeks to promote interest in this alternative development mechanism which embodies several of the Bank's key areas of interest today, including women in development, poverty alleviation and NGO cooperation.

It is hoped that these Papers and Proceedings will be particularly useful to government agencies for women's affairs and NGOs on the one hand and bilateral and multilateral funding agencies on the other. The Bank will work closely with both to help fruitful partnerships evolve.

On behalf of the Bank I wish to place on record our gratitude to the United Nations Development Programme for funding the study and the seminar.

I wish to congratulate the governments of the participating DMCs on their support to the studies and their impressive performances in conducting the country seminars.

I should like to extend my thanks to the participants and observers for their contribution to and attendance at the seminar. More especially, I would like to thank the ten local consultants who prepared the country papers, Ms. Mayling Simpson-Hebert, Ms. Deepa Narayan-Parker and Mr. Gerhard Tschannerl, the resource persons who provided background papers, and our Rapporteur, Ms. Lena Acharya. My special thanks go to Mr. Arthur McIntosh who conceived the study and who doubled as resource person and coordinator for the Seminar and to Ms. Mildred Bobila who played a major role in the organization of the Seminar.

S.V.S. Juneja
Director
Infrastructure Department
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PREFACE

More than 70 per cent of the population in Asia live in rural areas, yet rural water supply and sanitation traditionally receives less than 20 per cent of the government expenditure for the water supply and sanitation sector. It might therefore be concluded that the rural sector is reasonably well served. However, this is not so. In most of the countries in Asia more than half the rural families have no toilet facility and must fetch water several times a day from a water source over a hundred meters from their home. Often that water is of poor quality.

It is not very economical to supply pumped, piped and treated water to scattered rural communities of small populations. Furthermore there are major institutional problems to be overcome in operating and maintaining such a system. Similar problems exist but to a lesser extent, with deepwells drilled for rural communities to extract by handpump a good water supply.

There is, however, an alternative development mechanism, not greatly influenced by financial and institutional constraints, which has considerable potential. It is the concept of self-help family water supply through private shallow dugwells and tubewells. Millions of families in Asia already own their own well – many with handpumps, but how many more might do so, given incentives of easy credit, economies of scale provided by a project, the guidance of a competent grass-roots NGO and the support of a village women's organization? This was the basic question addressed in the "Regional Study on Domestic Shallow Well Water Supplies" recently executed by the Bank in Bangladesh, Indonesia, Pakistan, Philippines and Thailand, with UNDP funding.

It was interesting to observe that as the study progressed there was a distinct shift from the original emphasis on the family handpump and shallow wells with "women" in a supporting role, to a strong focus on women as agents for self-help family water supply and sanitation in general. This was particularly evident when the studies concluded with the regional Seminar "Women and Water – The Family Handpump" in Manila 29 August-1 September 1989.

The Seminar provided an appropriate forum for presenting facts, attitudes and aspirations about self-help family water supply and sanitation in Asia, including a range of ideas about the nature, scope and implementing arrangements for potential pilot projects.

Many different interests were represented, including government, women, NGOs, international funding agencies and consultants (engineers and sociologists). While this did not facilitate ready agreement on a number

of issues addressed in the working group discussions, more importantly it allowed the different perspectives to be considered in any future endeavor. It could be concluded from the Studies and Seminar that:

(i) While there is a significant demand specifically for the family handpump, there is a very great demand for some form of self-help family water supply and sanitation in rural Asia.

(ii) Family water supply and sanitation will greatly benefit village women.

(iii) Village women are willing and able to take the lead role in implementing self-help family water supply and sanitation projects.

Dealing as it does with the results and recommendations of a study as well as the papers and proceedings of a seminar, considerable journalistic license was needed and taken in producing this publication. There was a need to reduce repetitive material common to all the studies, to retain the style of the original authors, to check accuracy, to eliminate irrelevant material, to incorporate special features found in the original reports which were not included in the country papers, to present the material in an interesting format and to illustrate the different approaches used. The understanding and forbearance of the original authors and governments are sought. It will be helpful therefore to view the study and this publication as presenting a general picture of the existing situation and an indication of the nature and scope of self-help development preferred by women at the village level.

The Bank will make every effort to distribute this publication widely, not only to the participating countries but also to other DMCs and especially to those developed member countries which have already demonstrated a strong interest in supporting women in development. The participating government agencies for women's affairs may wish to review the full country reports produced by the local consultants, as well as the findings of their country seminars within the overall context of these Proceedings. A source of grant funds in the order of $100,000 would be required in each country to initiate a pilot project – mostly to seed a revolving credit fund, but also to fund the management and administration of the project. Obviously, the appropriate high level authorities in government must be convinced of the merits of a pilot project, for it to be allocated due priority within a national program. As indicated by a consensus at the Seminar, it will be preferable for governments to entrust to NGOs the major role in any future implementation.

I would like to especially thank the five local consultant sociologists who worked under considerable time constraints to contribute so much to the studies and the seminars: Christina Sudjarwo, Lily Hidalgo, Kishwar Ijaz, Tajkera Khair and Kamontip Khatikarn. The hopes and aspirations of rural women for a better life have undoubtedly been lifted by your efforts.

A. C. McIntosh
Seminar Coordinator

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SUMMARY OF PAPERS AND PROCEEDINGS

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I. INTRODUCTION

The Asian Development Bank (the Bank) recognized some years ago that many development strategies designed to benefit the economically weaker sections do not take into account the women's perspective. In 1985 the Bank approved a policy strengthening the involvement of women in its lending and technical assistance operations, mainly through its Projects Departments. Water supply with sanitation was identified as one of the key areas for women's involvement. A seminar (Manila, August 29-September 1, 1989) to discuss the theme of women and water, emphasizing the family ownership of handpumps, was held by the Bank following field studies conducted in five of the Bank's developing member countries (DMCs). The studies and the seminar were funded by UNDP.

The Seminar, administered by the Bank's Water Supply Division, marks a further step in the Bank's declared intention to adopt a pragmatic approach in facilitating women's participation in development. It is expected that a home-based water supply source would reduce the work burden of women, improve their health and encourage them in participatory and possibly even income-generating activities.

The composition of the group of delegates was indicative of the Bank's hope that governments, too, would feel encouraged to involve women in the design and implementation of water and sanitation projects, making the final product more relevant to their needs and thus more successful. With this in view, the Bank invited representatives of women's departments and women and water-oriented non-government organizations (NGOs), rather than the government water supply departments. Moreover, the sociologists conducting field surveys required by the Bank were also women.

There was yet another shift in focus from the Bank's usual field of operations. This was the move from an essentially urban concern to a rural one and away from a piped water system, or a government supported community supply, to a family ownership strategy. In exploring this area, the Bank hoped to assess the extent to which new strategies will help to involve rural families in the development process and encourage sustainable schemes with a bottom-up approach.

While community tubewells have been favored by governments so far as an alternative to piped water supply in rural areas, it is well known that many households and villages already utilize the simple, shallow tubewell or dugwell with suction handpump as an alternative source. Market trends highlight the demand for these relatively inexpensive handpumps. The fact

that it is a home-centered alternative and self-owned adds an attractive dimension, particularly that of greater sustainability through better maintenance. As such it encourages self-reliance.

A major impediment to self-ownership strategies has been the provision of easy credit terms. In several of the Bank's DMCs, however, workable methods have evolved over time and have met with a considerable measure of success. With necessary modifications and with NGO assistance, appropriate models could be replicated for family-owned water supply and sanitation facilities.

Government agencies have, through their basic needs programs, tried to reach people on the lowest rung of the development ladder, but it is now recognized that the more location-specific and personalized methods of NGOs and voluntary agencies are needed to implement projects which require the people's participation for sustainability. The Seminar urged that, wherever it was practical, NGOs and governments should cooperate in project planning, design and implementation and loan disbursements.

The participants were welcomed by the Vice-President (Projects) of the Bank, In Yong Chung, who in his opening remarks underlined the Bank's role as a catalyst rather than a funder for such efforts. He hoped that governments too, would see themselves in a similar role and entrust such endeavors more appropriately to NGOs. Dr. Mita Pardo de Tavera, Secretary of Social Welfare and Development of the Government of the Philippines, in her inaugural address, drew attention to the need for poverty alleviation through self-help quoting Mahatma Gandhi "... the poor of the world cannot be helped by mass production, but only by production by the masses." She pointed out that the goal was to improve the quality of life for the disadvantaged and to enable women to lead more productive lives. Dr. Mohammed Farashuddin of the UNDP underscored some of the main experiences of the Water Decade which is coming to a close. He said that the cost of even the most basic needs was proving too high for the poor and that services may never keep pace with the population growth. Hence, it was important to develop the required mechanisms at appropriate technological and institutional levels. The family or self-owned water supply strategy may be the right step in that direction.

Resource persons drew attention to the various issues which need to be considered in a family handpump scenario. The summary of papers and proceedings that follow will elucidate some of the most pressing needs as well as some legitimate doubts that were articulated. The edited country papers reflect only a part of the effort made by the national consultants, sociologists and engineers to assess the need and demand for the handpump option. The papers were as follows:

1. The Family Handpump, by Arthur C. McIntosh
2. Women and Water, by Mayling Simpson-Hebert
3. Country Paper – Philippines, by Lily Hidalgo
4. Country Paper – Thailand, by Kamontip Khatikarn
5. Country Paper – Indonesia, by Christina Sudjarwo
6. Country Paper – Pakistan, by Kishwar Ijaz
7. Country Paper – Bangladesh, by Tajkera Khair

Country overviews were presented by G. S. Ghosh of India and Shen Lunzhang and Chen Fengshu of the People's Republic of China. A presentation on NGO working was made by Kaye Bysouth. Another on drilling was given by Mr. Kenneth Cheetham. Representatives of multilateral agencies such as the World Bank, ADB, UNDP, UNICEF and WHO also presented papers, contributed to the discussion and participated in the working groups. Dr. Ali K.T. Basaran, representing WHO, took an active part in the discussion and contributed some thought-provoking ideas and information on the status of technology improvement in the region. He also explained the programs of his organization during the Decade. Cesar Yniguez, representing UNICEF, highlighted the need for an integrated approach to water supply strategies and explained UNICEF's approach to providing basic needs.

II. THE TECHNICAL ASSISTANCE BACKGROUND TO THE SEMINAR AT MANILA

Five countries, Bangladesh, Indonesia, Pakistan, Philippines and Thailand, were chosen to conduct studies and country seminars because of their known strong involvement with dugwells, tubewells and handpump water supplies. The People's Republic of China and India were excluded because of size, but were invited to present country overviews.

The studies and seminars were held as part of the Bank's cooperation with UNDP in regional projects. The technical assistance comprised three parts:

- field surveys of 20 villages and associated country data collection in each of the five study countries;
- country seminars in each of the five countries; and
- a regional seminar in Manila.

The objective of the studies was to explore the extent to which individual families in the developing countries of Asia could satisfy their

basic water supply needs through family-owned shallow-wells with handpumps and the scope for such a strategy to involve and benefit women.

Guidelines for the surveys were prepared by the Bank, but national consultants were expected to use their own judgment in implementation. The consultants' individual efforts were supplemented by women leaders taught to carry out surveys in the villages and trained professional interviewers.

Country seminars to discuss the consultants' findings were held in the study countries and were organized by the national government agency for women's affairs. The seminars were attended by the governments' related departments, NGOs, drillers, handpump manufacturers and credit institutions as well as representatives of the surveyed villages.

III. THEME PAPERS

Theme Paper – The Family Handpump

Arthur McIntosh defined the term 'family handpump' as a handpump normally owned by an individual family and used by not more than 20 persons. It would most often be used on a shallow dugwell or tubewell, where the maximum depth to water level did not exceed 12 meters.

Water Decade experience had indicated that a bottom-up approach involving women was needed in water supply development and that minimal improvement with maximum coverage was desirable. The family handpump was an alternative development concept to the more conventional community water supply with deep wells and handpumps or piped water supplies. It had the potential to satisfy a significant slice of the total demand for improved rural water supplies in Asian countries, without a heavy drain on government resources. Family handpumps are nothing new. There are several million in use in China, over a million in Bangladesh and hundreds of thousands in other Asian countries. These are mostly suction handpumps which are cheaply produced by local manufacturers, available in the village market, durable enough for their light use and easily maintained by their users. When compared with the community handpump, the family handpump offers several advantages, including privacy, convenience, savings in time and energy, more health benefits, prestige and reliability. It is seen as a distinct benefit to women – the main procurers and users of water. The disadvantages relate mostly to

its potential for creating drainage and pollution problems if good engineering and community co-operation are not integrated.

Many families in Asia have already helped themselves to obtain a family handpump. How many more families might be interested in doing the same, given appropriate incentives such as easy credit, economies of scale provided by a project and the joint strength and support of a village women's group? This is what this study and seminar is all about.

A learning approach which included the integration of water supply, sanitation, drainage and health and hygiene education was advocated. If necessary, professional marketing techniques could also be used to artificially stimulate demand. On the question of affordability, the potential for government subsidy could be assessed by comparing per capita investment by government for conventional community water supplies. A scenario for a pilot project might involve an agreement between government and the funding agency, selection of an NGO by government and direct transfer of seeding money for a revolving fund to the NGO. The NGO could select the target villages, then design and implement the project with the village women. Government could be called upon to provide engineering and health education support.

Theme Paper – Women and Water

Mayling Simpson-Hebert traced the steps by which governments and international agencies have, during the Women's Decade (1975-1985) and then the Water Decade (1981-1990), sought to highlight the role that women should play in the field of water supply and sanitation. It is now widely recognized that in developing countries, women should be the focus of water supply and sanitation projects. They are the main procurers and users of water and they are primarily responsible for health in the home. Researchers have found that women face grave risks to their health from carrying water all their lives, including serious injury from falls, disfigurement and complications during pregnancy. The hours spent hauling water result in chronic fatigue and prevent them from participating in other useful activities, such as income-generation projects, literacy classes or training courses. Thus it has become accepted that women must be actively involved in the designing of projects, including even the engineering of simple water delivery systems and latrines and that they should become at least co-owners and managers of their own water sources.

Closely linked to women's improved access to water is the issue of better family health. However, although considerable progress has been made at international and, to a lesser extent, central national government

levels, those working at the field level recognize that much remains to be done. The involvement of women presents deep-rooted cultural problems at the village and community level. However, successful approaches have been found to overcome many of these obstacles. It is important to learn women's perceptions, which especially in Asia can be quite different from those of men. For example, men may not place much priority on a latrine in or near the home but for women it is often a high priority. Likewise with family handpumps, for women who carry water, it may assume a much higher priority than for men. "Women's participation" has different interpretations in different countries and different cultures. For some, it may mean that a women's NGO facilitates the project; for others it may mean both men and women interviewers, for others still, it may mean village women's participation. It is important to define these goals during project formulation.

NGOs are in an ideal position to facilitate women's participation at the village level. They are perceived as more sympathetic to local needs and more flexible and responsive in meeting them than government agencies. The family handpump project offers greater hope than community projects for involving women. This is because it focuses on the home and especially in societies where women are socially prohibited from leaving the home alone, the family handpump allows them greater control over their time. It may be that through such a facility or program they become involved in larger community roles. It is a possibility that a family handpump project would target village women as credit managers. It has become increasingly known that women have a more impressive record in this field than men.

The two most important benefits of the family handpump are its positive effects on women's health and hopefully the entire family's health, and the production of leisure time for other useful activities. However, a family handpump project should not be designed in isolation. It must also include drainage, latrines and hygiene education. It should also be flexible in considering the special needs of families who do not have collateral of property to secure credit.

IV. COUNTRY PAPERS

The Bangladesh Country Paper

Tajkera Khair, the Bangladesh consultant, explained the methodology followed for the study and the problems of insufficient information available in Dhaka, making it difficult to conform to a

prescribed questionnaire in the villages surveyed. Women in the villages surveyed were found to be engaged in post-harvest activities and in animal husbandry, in addition to their usual home tasks. Thus they were already part of the labor force. Twenty-five per cent of household heads had ownership of their homestead but not of their agricultural land.

The general level of health of women and children in particular left much to be desired. It was clear that better water supply systems are urgently required. The increasing rate of child mortality borne out by national statistics is a matter for concern and the government should note that an inadequate water supply may be aggravating the issue. Certainly health risks to mother and child would be reduced with a better water supply. Bangladesh has high seasonal variations in the water table, thus wells are not always usable. Many shallow aquifers run the risk of pollution, both inorganic and organic, from poor hygiene. Therefore an integrated water supply and sanitation project would be appropriate.

A source of water near, or better still in the home, would reduce the work burden and improve family health. Generally, people have to cover 100 to 200 meters distance to fetch water and, in some instances, three to four km. Water salinity is high in some areas, but still acceptable for purposes of washing or bathing. In other areas, rainwater is stored in unhygienic jars for up to six months as a sweet water alternative to the undrinkable saline water from dugwells.

In the last decade however, there has been a massive exploitation of aquifers through shallow irrigation tubewells, as a result of which the water table has been lowered and underground resources depleted. Thus in some areas, particularly in the north, dugwells with handpumps may not now be so popular or feasible. Of the households surveyed, 24 per cent used public wells, 16 per cent had their own wells and 60 per cent used pond, river, canal or a neighbor's well. Only 2 per cent of households surveyed had adequate sanitation facilities. About 37 per cent used the temporary "hanging" latrine and the remainder used no facilities at all. Local technical factors should be examined before handpumps are promoted, so that sustainability is ensured.

Bangladesh rural development is well supported by rural banks in the formal and cooperative sectors. The study found that often the less affluent villagers were willing to pay more for a handpump than households which had greater assurance of water. Credit facilities were acceptable with certain conditions, i.e. no interest charged, no collateral required and there should be a three to four years period for repayment, at not less than Tk30 per month. However, the mechanism for implementation would have to be decided locally.

Income-generating activities seem to be more attractive than an improvement of water supply alone. Water supply strategies, particularly that of the family handpump, should therefore be linked to training, technology transfer, and teaching entrepreneurial skills. The consultant felt that sanitation, drainage and health education are also important supporting components of a handpump project.

In the discussion, doubts were raised about the real participation of women in the survey. It was explained that households are indeed dominated by men, but special efforts were made to include women's opinions. This was done by employing various strategies such as timing meetings to suit women. It was also pointed out that credit facilities operated by NGOs for some time now in Bangladesh have prepared a better climate for women as recipients of loans.

The question of the cost efficiency, affordability and availability of appropriate pump technologies in developing countries was also raised. Research was still being conducted in order to make better quality pumps at lower cost. The Tara PVC direct action handpump was an example.

The Indonesian Country Paper

Christina Sudjarwo, the consultant from Indonesia, said that in her country the surveys were confined to the island of Java because of logistical problems. In the villages under study, it was found that 73 per cent use dug wells and 11 per cent tubewells. Only 20 per cent of the wells were sanitary, others were of a very primitive kind. About 25 per cent of the handpumps were found to be out of order. It was noted that the rate of failure in community handpumps was higher, i.e. about 55 per cent. The breakdowns were due to (1) poor quality of handpumps; (2) lack of interest; (3) inaccessibility of spare parts; and (4) corrosive water which damaged the pumps and galvanized riser pipes, thus increasing the iron content of the water.

Sanitation in general is very primitive or neglected with only about 10 per cent of the community having properly constructed latrines. The primary concern is for a water supply over sanitation, mainly out of ignorance of the implications for health. Water sources and latrines are often closely placed, without much thought to hygiene, therefore health education and sanitation facilities should be included in a project package.

There were problems connected with prevailing trends in handpumps. Service costs and drilling costs are often too high. The handpumps are all manufactured in the country, though they have foreign names. Most of them have weak mechanical parts. PVC handpumps are being tried out to combat the problems of corrosion, quality of water and

breakdown, but the costs are beyond the reach of villagers. Price structures and market forces make it difficult to expect any improvement in manufacturing standards, while the villager is ignorant of the quality of handpumps. The rather strong seller's market clearly indicates a high demand for handpumps in Indonesia.

Women suffered most from the lack of an adequate water supply. Of the study respondents, 43 per cent were women, 39 per cent were men and the balance both men and women. Women are generally not in a position to make a decision about investments or to decide whether or not to avail of credit facilities. This is partly due to lack of experience, which will have to be overcome by appropriate assurances and participatory activities.

The distance to a water source can be as much as one kilometer; however, women did not always think that hauling water was a hardship. In some areas, people seem to prefer only dugwells and no handpumps. A major cultural consideration was that dugwells had an important property status from generation to generation. Water quality was better, the women felt, from dugwells than from tubewells with handpumps. No maintenance was required and a dugwell could easily be repaired. Moreover, there was some indifference to the combination of dugwell and handpump for fear of cost escalation. In other areas (East Java), handpumps were clearly favored. Health was a low priority matter, convenience was more important.

The preference for individually owned handpumps compared with shared ownership was as high as 94 per cent, mainly due to the concern over repayment of loans and to avoid tensions between co-owners. People preferred to keep their peace with the community they live in. They would prefer to allow their neighbors free use of the facilities rather than enter into financial wrangles with them.

Self-financing projects had to be explained, as villagers were used to receiving the benefits of government projects. But when easy terms of credit were discussed, interest in the scheme improved. An agreement has to be reached as to whether loans will be in the form of cash or services or in kind. This would be a decision taken on the advice of the implementing agency or NGO and village committee.

The areas surveyed had no involvement with NGOs. It was suggested that the implementing agency for a project should be capable of working socially in villages. It should be flexible and have management and organizational capabilities to administer credit schemes and organize technical assistance.

In the discussions, it was confirmed that for any measure of success, the entire community, as well as individual families, must be involved. At first it could be difficult to involve only women, so both men and women

would have to be consulted in pump selection, the way credit would be disbursed and other aspects of self-financing. The package that NGOs may like to consider should be as follows: handpump, credit, servicing manuals and guarantee, along with training projects for both men and women. Women's needs and aspirations should be considered at project preparation time, to enhance the design of the scheme. Implementing agencies should also train more local drillers, as contract drillers are more expensive. This will also help the village unit in income-generating programs.

The Pakistan Country Paper

Kishwar Ijaz and Sultan Ali Barq, consultants, and Sajid Husain Rizvi of the Ministry of Women Development, jointly presented the situation in Pakistan. It is recognized that much of the population live in villages which are overlooked in the government planning programs. Of the households surveyed, 60 per cent had their own private wells, 10 per cent used public wells and the rest either canal, spring, river or neighbor's well. Only 10 per cent have any sanitation facilities. The shallow, family-owned well with handpump has some obvious advantages as a strategy to reach the most deprived more rapidly. But in Pakistan, geological, geographical and socio-economic factors vary greatly, making it difficult to accept shallow-wells as a widespread solution. Cultural factors and language differences also make for difficulties in getting accurate information. In parts of Punjab, the handpump, individually owned, is very popular but not always a source of potable water. It has also created in many locations a severe drainage and pollution problem for the community. While community leadership for local problem solving is weak, self-ownership tendencies are well established in economically developed areas, probably as a direct result of cultural influences, whereas in others, the expectation is that the government will take care of the water supply.

The seclusion of women, combined with general indifference to sanitary amenities, is the cause of much hardship. Even in Punjab, for women, water was a second priority, while latrines (for them, not necessarily for the men) were the first. In areas of Sind where the scarcity of water was grave enough to have to use animals to cart water over great distances, bathing places and latrines again were not in evidence. The females of the family used a corner of the house with little or no privacy. In other arid areas such as Baluchistan, stored rainwater was used for drinking and as usual, homes had the most rudimentary lavatory facilities. It was apparent that the problems in Pakistan appear to be location

specific and will have to be tackled on this basis. Women's needs are so disregarded that the inclusion of women in decision making processes may be very slow to realize, as also the entry of women's organizations into very conservative areas.

Government surveys have not yet reached some of the villages covered in the present study. While some villages may have excellent facilities, others (about 10 per cent) have had no links with development programs. Ancient methods of dealing with water and sanitation predominate and self-help is often all they have in these villages. The options are very few for these people, as government programs are not likely to reach them in the near future. Significantly, the Government is only now examining a domestic rural water policy.

There are more than 6,000 NGOs in Pakistan but they are mostly concentrated in urban areas. Though NGOs would be useful motivators and conduits, perhaps more successful in such small-scale operations, they would still require some assistance from the Government, especially in far-flung areas.

In these already difficult circumstances, an isolated project focusing on a family handpump may not be sustainable, if it has not taken into account other factors and needs which are important to the success of a water supply program in the context of Pakistan. The right combination of health education, technical information and assistance and continued encouragement and inputs is needed, even after a project has been stabilized. A large enough pilot project was recommended to assess the impact of modernization and the significant factors which come into play when old systems are disturbed, particularly the economic and cultural ones.

Handpumps have the advantage of a quick disbursement possibility, thus meeting an urgent need which the Government may not be able to address for some time. The cost of a suction handpump for an average size family in Pakistan has been assessed at US$8 per capita per annum which is of course much lower than many figures for deep set community wells. On the other hand, shallow wells may not be appropriate everywhere owing to low water tables. In Pakistan, many of the more remote villages can slip out of the focus of development agencies, therefore it was urged that handpump projects be pursued to initiate a process of development in some of the most deprived villages. A handpump project should be seen only as a first step in development and not as the final solution.

The Philippines Country Paper

The Philippines country report presented by Lily Hidalgo covered intensively some of the more significant aspects of the water supply needs of rural families in a developing country, where resource constraints do not allow the benefits of piped water to all. In the surveyed villages, about half of the households already had private family-owned wells with handpumps. In contrast to some of the other country studies, it was found 70 per cent of the households surveyed had private latrines. As many as 73 per cent of the households (which did not already have a handpump) were interested in easy credit facilities for a family handpump. The cost and credit repayment implications for households wishing to invest in their own water supply were carefully examined. Naturally, easy credit terms would be an important consideration, particularly if women are to be involved in decision making. It was noted that some of the households under the survey earned only US$140 per capita per annum and many have no property and would not be able to meet the requirements of a formal banking system. In the Philippines, it was felt, funding and seed money as well as technical support would best be provided by NGOs and the implementation of projects be undertaken by women's organizations. The Department of Social Welfare and Development would be the lead government agency.

The survey found preferences for shallow dugwells in some regions and shallow tubewells in other regions. As professional drillers from outside are both expensive and unreliable, it is necessary to build local capabilities and skills. As a spin-off, skills in simple drilling techniques, maintenance and repair could become an income-generating program, thus technology transfer to the village would be an important component of a handpump project.

The reluctance or eagerness to avail of credit facilities depends, it was found, on the investment required and the terms of credit, especially for the landless, tenant-farmers, fishermen and casual laborers, as their cash flow lasts only for the season of employment. The better off also hesitate to invest in property enhancement in case of loan defaults, where their property may be at risk. The landless fear eviction. Squatters on government properties, however, are quite eager to improve the locality, as any development of the land firms up their claims on the land. The question of how to give the family credit, whether in cash, in kind or partly in services would require further examination. Cash, it was feared, may be used up for other perceived priorities such as other income-generating activities. Often the view of respondents was that they did not want to shoulder the burden of loan repayment and that the Government should

provide piped water or take care of the water supply. There was also the problem of a provision for insurance and the question of who bears the losses if the pump, once bought, the well once drilled, the water turns out to be unusable.

The question of water quality from the perspective of the end-user and from the perspective of health standards, was also raised. In addition to bacteriological contamination, iron content and salinity were two water quality problems. The quality of pumps, too, left much to be desired. Experience has shown that gaskets and bearings in handpumps wore out too frequently and that better quality handpumps must be supplied or designed so as to minimize the risk of bad investment for the poor.

The discussions which followed centered on the novel adaptations by the villagers of conventional technology to improve water supply sources, such as homemade pipe extensions of handpumps, so that water could be carried directly to the required point of use. It was noted that sanitation, drainage and good anti-pollution measures were closely linked to the success of a handpump project.

The Thailand Country Paper

The Thailand country report presented by Kamontip Khatikarn showed there was a strong preference for dugwells, but little demand for either tubewells or handpumps in the study areas. Many family-owned dugwells in the survey areas were found to be poorly maintained and not clean. It was therefore a priority consideration to improve existing structures in these villages in Thailand. More than half the households in the study area do not have their own wells and want to have wells. While the covering of old dugwells may not be feasible for socio-cultural reasons, it is possible to provide openable galvanized iron sheet covers or alternative sources such as shallow tubewells with pumps. These, if the water quality is acceptable, may be easier to protect from pollution. Water quality with regard to taste, smell and color as well as water quantity were important considerations in the villages surveyed. Rainwater collection in concrete or ceramic jars is a widespread popular form of family water supply in Thailand especially where the groundwater table is deep and expensive to exploit.

Handpumps may be accepted where electric power is a problem, but the survey showed that there is a definite preference for electric pumps which are readily available and affordable. The electric pump is an important status symbol among Thai villagers. The ingenuity of local mechanics has made it possible to lower costs and adapt pumps to the market demand.

It was recommended that credit disbursement and project implementation should be undertaken with practical and pragmatic considerations in mind. It was felt that disbursement of funds by NGOs may not always be feasible. While NGOs are preferred as conduits for funds and for implementation, in some areas government agencies may be more effective, or it may require a combination of NGOs and Government to implement a project. A revolving fund was strongly supported by the Thai delegation as a preferred method for disbursement.

Strategies must take into account felt needs, local culture, sanitation, drainage and the locally accepted economic depths of wells. Sharing of ownership of pumps, especially electric pumps, is not popular and to be avoided. However, custom allows neighbors free use of water from a privately owned handpump. Supplementary income generation has often greater appeal than an improved water supply and should be a component of an integrated project considered by the implementing organization, rather than an insistence on providing a handpump as the focus of the project. A common misconception is that the provision of a water supply is the Government's concern. As the intention is to encourage self-reliance among households, an inter-agency approach is needed to solve this with education and persuasion from NGOs, health agencies and government assistance.

In the discussion it was noted that some villages had been furnished by the Government with model sanitary facilities, in the expectation that such examples would encourage villagers to set up their own latrines. The implementing agencies would in fact require considerable assistance from the Government especially on technical matters. A pilot project of some size and duration to correctly assess needs was recommended and the training of women in institutional administration was stressed.

The China Overview

The country overview for the People's Republic of China was presented by Shen Lunzhang. China, because of its size, presents a wide range of geographical factors which demand a variety of approaches in dealing with rural water supply. There are also problems of excessive inorganic pollution of aquifers. The Chinese government took up the challenges of the Decade and stepped up the pace of programs intended to supply rural areas with appropriate water and sanitation systems. With the assistance of multilateral donor agencies the Government manages an average increase in coverage of 7.75 million people per year.

While piped water systems are being extended to cover some rural areas, China takes a pragmatic approach in dealing with its objectives, i.e.

"effective projects based on practical considerations." Thus improved but traditional lifting methods from shallow and deep wells, rainwater harvesting with underground storage and handpumps, and simple jetting methods for shallow tubewells are all employed. The Government already supports family-owned well and handpump strategies through subsidy of costs amounting to about 40 per cent of capital investment. Millions of wells have been constructed during the Decade under this program. Rainwater collection has also been given serious consideration in China with simple techniques for filtering the runoff. Guidelines have been developed to assist farmers in designing better wells and evaluating water quality. Drilling teams are available in areas with terrain too difficult for home drilling methods. In the realm of handpumps, more than 80 different types have been developed and Chinese manufacturers produce around 150,000 handpumps every year.

The India Overview

Mr. Ghosh explained that the emphasis in India had been on providing rural areas safe drinking water through the Government's community handpump program. The shallow well and suction pump did not assure a safe or perennial water supply. The India Mark II deep well pump was a technology indigenously developed and installed as a community water facility. The placement of these pumps was according to criteria set by the Government's Water Technology Mission. Some conceptual questions arising out of the country appraisals already presented were raised by Mr. Ghosh: is the intention only to subsidize urban piped systems and leave rural areas uncovered - do we expect only the poor to be self-reliant? He hoped that the shallow handpump was only an interim measure and that governments intend to provide potable water.

It was pointed out that a water policy must note that pump technologies have to be further developed, (India Mark III handpump is being developed); and water supply cannot be an isolated program, it has to be examined with drainage and other technologically related factors, to prevent the pollution of aquifers already widely threatened by inorganic elements.

When dealing with the question of loans and credit to women, the repercussions of disturbing established socio-economic patterns should be kept in mind. Income generation and raising of women's status has to be carefully examined before providing loans to women. By suggesting a shift in focus from a deep community tubewell to a family-owned cheaper shallow well, the poorer villager may be exposed to greater contamination, he feared.

V. INSTITUTIONAL AND OTHER PAPERS

UNDP-PROWWESS

In accordance with its special emphasis on women in development, the UNDP set up a project on the Promotion of the Role of Women in Water and Environmental Sanitation Services (PROWWESS), which was established in 1983 in the UNDP office in New York. PROWWESS has had special field experience in data gathering methodologies which would correctly reflect women's needs (and community needs) and involvement in water supply and sanitation programs. Deepa Narayan-Parker described some of the objectives, where the main emphasis is on:

- human capacity development through NGOs,
- the use of participatory principles and techniques in place of conventional surveys, and
- the training of trainers.

Participatory techniques in the experience of the PROWWESS group are likely to portray people's needs more accurately. The methods involve people directly in identifying their own priorities, rather than through the usual questionnaires and criteria set by others or outsiders which have resulted in distortions especially when dealing with village communities. Some illustrative case studies from Asia and Africa were presented in brief. In formulating these projects, replicability, sustainability and consistent use were central to the working factors.

PROWWESS shared some of its experience which was relevant to the Seminar and might be borne in mind by the participants when formulating future projects:

1) Strong leadership in an NGO is more important than the size of the NGO;

2) The process of involving women has to be supported and hastened or women will be left out for much longer. Women's involvement should focus on participation and decision making, not result in increasing their workload; and

3) In Africa (Lesotho) a latrine program showed that:

   a) a concentration of work in a small area and a period to allow the project to stabilize was more effective than focus on the

disbursement of funds. Indirect subsidies through training of entrepreneurs (men and women) were more effective. The Government in this case resisted subsidizing;

b) a revolving fund approach was preferred; and

c) social marketing was found more useful when linked with participatory methodologies.

ADB and Women in Development

The Bank's women in development (WID) specialist, Yuriko Uehara, outlined the concern of the Bank for including the active participation of women in the Bank's operations. It has been recommended that Bank staff should take into account the implications for women in its project preparation processes. This may entail involving women at the feasibility stage, to avoid potentially adverse effects on women resulting from a Bank-financed project. Therefore, the scope and thrust of the Bank's projects would have to include the women's perspectives.

The Bank had already addressed women's concerns in the water supply sector when it commissioned a study and prepared guidelines on how WID considerations could be integrated into water supply programs. The studies were conducted in three countries viz: Indonesia, Papua New Guinea, and Sri Lanka. The consultants examined mainly the urban poor sector; however, such a study has its implications for the rural sector as well. Some of these were as follows:

- consulting women on design, location, financing;
- providing technology that would address needs and be easy to maintain by women; and
- providing women with greater skills for better water management

This report has already proved very useful to Bank staff in project preparation. The WID specialist hoped that the Seminar would prove a starting point for the greater involvement of women and that the lessons learned from the Women's Decade and the Water Decade would provide sound direction to future projects.

The Bank, she said, has encouraged a dialogue with NGOs and has started to include projects involving smaller communities in rural settings. The family handpump option could open new avenues for women to participate in development.

The World Bank and Handpumps

The participant from the World Bank, Gerhard Tschannerl, pointed out that millions of shallow well handpumps are already in use in Asia, most of them individually owned and shared by a few other families. The private sector in water supplies in developing countries has been active for a very long time. The main limitation, as resources become scarce and population grows, is that poorer sections of society cannot afford deeper set wells. Such wells would assure a perennial source of water. But with greater exploitation of underground aquifers, the water levels in many parts of Asia are falling, reducing the utility of shallow wells. For the rural poor, the deep set wells are too expensive.

The World Bank and UNDP have been working together for several years now on a global handpumps project involving laboratory and field testing of hundreds of types of handpumps, mostly for deepwell conditions, to improve the equipment available and especially its maintenance in the field. These pumps are however mostly for community water supply as distinct from family water supply.

The delegate shared some of China's experience with piped water supplies and its pragmatic approach to the available and appropriate technologies. Most treated water supplies are more expensive and have recurring operational costs. This is not so with handpumps where there are none of the costs mentioned other than for repair and maintenance. Technologies have to be developed to overcome some of the problems associated with the present generation of suction type handpumps. These include contamination during priming and of the groundwater itself.

The latter in fact does raise some significant issues. The falling of groundwater levels is an important point as the simple suction pumps become inoperable, resulting in losses incurred by the villager. The second issue is the growing contamination by fertilizers and other inorganic substances which cannot be removed by boiling or by simple filtration.

Finally, affordability may have to be calculated on a per capita basis and judged against the cost of encouraging cheap handpumps which may be bad investments for the poorer section. Thus the choice of technology will be an important deciding factor. The delegate said that while handpump technology and a private ownership strategy would undoubtedly play an important role as an interim measure, piped water schemes must continue to be the goal of a water supply to the rural areas.

NGOs

Kaye Bysouth, representing an NGO, the International Development Support Services, Australia, shared some of the experiences of her organization working extensively with NGOs in Asia. She pointed out that governments had difficulty in reaching the very poor and even if they did, their programs had often failed because they were not sustainable. This was partly because of a top-down approach to project formulation and design which failed to bridge the gap between policymakers and beneficiaries. NGOs had risen to fill this gap and had evolved their own approaches to problem solving at grass roots levels.

The question today is how can NGOs cooperate in a meaningful way with governments and donor agencies in pursuing their basic needs programs. It is important for policymakers to understand that their delivery systems are often not sufficient or even efficient enough, that the package of inputs cannot be fully absorbed by those they are intended for and that there is no follow-through to help stabilize a project. NGOs, those who have gained recognition in the field, are prepared to bear the consequences of their programs, they are accountable in a very direct way to their beneficiaries, and because they work and live in the area, they may have to face the consequences of their mistakes, but this enhances their credibility. Thus, the NGOs' proximity to the people helps to design more realistic projects in operations, in identifying goals and in maintaining sustainability.

The stages by which NGOs would develop a community project would involve a process of identification of specific needs, the mobilization of field workers living with the people whose leadership is acknowledged, and the organization of field committees, which would encourage participation of the people to find solutions to their own problems and demonstrate their capacity to shoulder responsibilities. The final step in this process of infrastructure build-up would be the creation of village level institutions, which would encourage sustained efforts and continue the momentum after field workers and NGOs have left the people to manage their own systems. This process by itself takes from one to three years.

Kenneth Cheetham described his experiences of drilling tubewells for a Philippine NGO. NGOs were, in most situations, the most appropriate means of implementing rural water supply and sanitation. There were many regions where hard rock drilling for water was necessary. It was advantageous for the NGO to purchase versatile equipment, including an integrated training package. Community deepwells with handpump would cost less than $2,000 per unit.

VI. CONCLUSIONS AND RECOMMENDATIONS

Although there were no formal conclusions to be framed, four working groups were set up representing the governments, NGOs, consultants and international funding agencies, to discuss the issues identified by the participants (see the attached Summary of Issues). All the groups agreed that women's needs should be central to self-help water supply and sanitation projects and that such projects should comprise an integrated package including water supply, sanitation, drainage, health and hygiene education, training and income generation wherever possible. The design and implementation of such a package would almost certainly be conducted by NGOs working closely with village women's groups. However there is also scope for local consultants and local governments to be involved. Technical advice, which might include hydrogeological information or water quality testing, could be supplied by relevant government agencies. On the administration of funds, there was no clear indication as to the nature of the credit or method of disbursement (e.g. cash, kind, services, revolving funds, etc.) although it was accepted by all that credit should be made available on the easiest terms possible and that social and/or group responsibility rather than material assets should be the basis for collateral. The groups recommended that the design of projects should be location-specific as replication is not always appropriate and that the implementing agencies (government or non-government) always keep the expressed needs and opinions of the intended beneficiaries in focus. All felt that pilot projects were essential to work out the problems of acceptability, sustainability and replicability.

In the concluding plenary session a *statement* was discussed and suitably modified. It reflects a broad consensus that the handpump option, as a private sector initiative, would be of great support to government efforts to bring to their people the basic needs of life:

1. *The objectives of the study and seminar have been realized and all study countries have expressed a desire to consider proceeding with pilot projects.*

2. *The country papers and the consensus of the working groups will need further study and analysis by all parties. The governments and various funding agencies should get together to discuss the funding of pilot projects, which by consensus of this seminar will in scope consist of an integrated package of at least water supply, sanitation, drainage, health and hygiene education, training and income generation and will focus on women.*

SUMMARY OF ISSUES

Funding. On what credit terms? Interest? Should credit policy be a government responsibility? To whom should the loan be made? Who should administer the funds-credit scheme? What should be the relative share of cost to government/family?

Roles. How is NGO selected? Does project aim to strengthen NGOs? What should be the roles of NGO/government? What should be the roles of funding agencies? How do we ensure equitable policies of government in water supply and sanitation to urban-rural areas? Is there a role for bilateral agencies? To what extent are consultants needed? Could they replace NGO?

Implementation. Mechanism for coordination among WS&S agencies? Should drilling equipment be purchased by NGO? Strong monitoring needed? Who designs and implements the project? To what extent should marketing be employed? Can participatory methods of gathering data be used to avoid surveys? How is training to be handled? Education?

Technical. How is the quality of handpump ensured? What investigations are needed for water research? Can conventional drillers compete with village drillers? Water quality – how should this be addressed? What pump? Standardization?

Project. How should villages be selected? How do we evaluate success? Do we need a project? How are projects replicated country-wide? What is the scope of an integrated program? How to decide? To include income generation? Who are beneficiaries?

Women. To what extent do we make women the focus of the project? What does women's participation mean? How do we tackle the "awareness" problem? How do we get women involved? What is the impact of women on water and water on women? What is the role of women's organizations?

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

It was generally accepted that the family handpump, in comparison with the conventional community handpump, offered advantages of savings in time and energy, convenience, privacy, prestige, reliability and better health. It also offered greater hope than the community handpump, for involving and benefiting women the main procurers and users of water. It was desirable for women to become co-owners and managers of their own sources of water.

One step in that direction would include acknowledgement of women's perceptions regarding water supply and sanitation as differing from those of men. Another would be to define precisely what women's participation means.

It was more important for women to be involved in the decision making than to have physical participation which may actually increase their workload.

The results of the study indicated an expressed demand for the family handpump of around 10 per cent of households interviewed in Thailand, around 20 per cent in Indonesia and Pakistan and about 70 per cent in Bangladesh and Philippines. However, there was a general demand for some form of self-help family water supply and sanitation in all the study countries of the order of 80-90 per cent of households interviewed. Pakistan appeared to be a special case where, due to the strong cultural influences relating to women, several of the villages surveyed already had 100 per cent coverage by family-owned handpumps. Unfortunately this had also created serious drainage problems for the communities. Generally latrines were seen as a higher priority in Pakistan. Family-owned handpumps were common in many of the villages in the other study countries and there was a widespread custom of the owners of these facilities allowing neighbors to use the handpump at no cost. The idea of ownership of a handpump being shared between families (in order to improve affordability) was rejected in all countries. It was found that sanitation facilities (latrines) were lacking in most of the villages surveyed. A need obviously exists for health education: health was seldom given as a reason for wanting a family well with handpump or a latrine; convenience and privacy were the main reasons. In some countries such as Thailand and to a lesser extent Indonesia, electric pumps were an affordable alternative to handpumps for the family well. It was evident that in order to be attractive, the credit system would have to adopt a principle of

collateral based on group or social responsibility rather than property ownership.

It can be concluded from the studies and the seminar that:

1. While there is a significant demand specifically for the family handpump, there is a very great demand for some form of self-help family water supply and sanitation in rural Asia.

2. Family water supply and sanitation will greatly benefit village women.

3. Village women are willing and able to take the lead role in implementing self-help family water supply and sanitation projects.

Recommendations

The seminar participants were unanimous in agreeing on the need for a self-help family water supply and sanitation pilot project in each of the study countries as a logical follow-up to this study. It was also agreed that the scope of such a project should include water supply, sanitation, drainage, health and hygiene education and income-generation elements in an integrated package. Women must be made the focus of the project and their participation should be facilitated at all levels.

A number of specific issues regarding credit terms and implementing agency roles were discussed, but as a result of the differing findings it was recommended that such issues should ultimately be decided through a country or location specific approach.

It was apparent that the question of who would be the beneficiaries will largely be determined by the degree to which governments wish to become involved. Only with government subsidies could the poorer people participate. In the event that governments were not providing subsidies, the major implementing role would more naturally fall to the NGOs.

The participating government agencies (for women's affairs) need to consider their Country Paper within the overall context of these Proceedings. A source of grant funds in the order of US$100,000 is required in each country, partly to seed a revolving credit fund for the pilot project and partly for pilot project management and administration. The Bank has indicated that its role in the studies and in the seminar is as a catalyst. In order that the benefits of the study and of the seminar may be realized, it would be appropriate for the Bank to continue in this catalytic

role at least until suitable sources of funding for the pilot projects have been found. To this end it is proposed that the Proceedings be used by the Bank to promote interest among potential funding agencies.

SEMINAR PAPERS

THEME PAPER – THE FAMILY HANDPUMP

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CONTENTS

I. INTRODUCTION

This paper is a study of the concept of family-owned wells with handpumps. There is almost no literature currently available on that specific subject, but there is much useful literature available on subjects which are very pertinent to the feasibility of family-owned wells with handpumps. I have drawn extensively on that literature and the many references are quoted at the end of the paper. My practical experiences are derived from work with WHO on Rural Water Supply in Central Java, Indonesia, Bank missions to several other Asian countries and some experiments with the design and use of a PVC direct-action handpump.

The paper discusses the family handpump under specific topical headings, but as can be seen from the contents, most of these are interrelated and therefore comprise an integrated view.

II. BACKGROUND OF RURAL WATER SUPPLY AND THE DECADE

The first half of the International Drinking Water Supply and Sanitation Decade (1981-1990) featured the somewhat traditional approach to water supply and sanitation in developing countries, whereby government institutions evaluated the needs of the people in the water supply and sanitation sector and government provided, through various sources, the funds for development in this sector. Due to entanglement in bureaucracy, implementation of projects was slow. There was an overemphasis on piped water supplies for urban areas, whereas in many developing countries the majority of the population resides in rural areas. Furthermore Decade targets had been over optimistic. So by mid-Decade rural coverage with water supply improvements was poor. The problem was further aggravated by a growing number of projects, which within a short time of completion were broken down, abandoned, or functioning much below capacity.

Recent global consultations on the Decade have concluded that it will be necessary to adopt a strategy of minimal improvement in service level but maximum coverage with much more emphasis on basic rural water supply. Indeed global analysis of needs and resources suggests that wells equipped with handpumps will be an appropriate choice for the majority of the 1,800 million low-income earning people in need of improved water supplies in the remainder of this century. Perhaps Jim

Howard (OXFAM) said it all when he stated, "Of all the hundreds of publications I have seen concerning the Water Decade, few are as important as the modest but excellent book Hand-Dug Wells (S.B. Watt and W.E. Wood) and the outstanding booklet Shallow Wells (DHV)".

It is now being recognized that an essential ingredient to success is the adoption of a bottom-up approach where real demand is measured by the expressed need of the end users and their willingness to pay for the cost of an improved water supply. Successful water and sanitation projects must respect social and cultural standards. The project development process must involve not only engineers but also technicians, sociologists and health professionals, all interacting with the potential beneficiaries in order to create self-reliance and self-sustained action. An integrated approach is needed. Water supply cannot stand alone without complementary support from sanitation, drainage, and health and hygiene education.

III. DEFINITION OF FAMILY HANDPUMP/SHALLOW WELL

A handpump may be used to lift water from a tubewell or from a covered dugwell. It may also be used to lift water from a below-ground rainwater cistern wherever rainwater harvesting is feasible.

The term *family handpump* has probably never been coined before, but for the purpose of this paper and this project, it could be defined as a handpump normally owned by an individual family and used by not more than 20 persons. It would most often be used on a shallow dugwell or tubewell, where the maximum depth to water level did not exceed about 12 meters. However, the excavated depth of a shallow dugwell could be as great as 20 meters and the drilled or jetted depth of a "shallow" tubewell could be as much as 50 meters.

There may also be some instances where the family handpump ownership is shared between two or three neighboring families.

There is nothing new about the family handpump, just the term. To quote from Community Water Supply - The Handpump Option: "The large majority of handpumps in use in developing countries today are suction pumps serving only one or a few families. There are several million in use in China, over a million in Bangladesh and hundreds of thousands in other Asian countries. These pumps even though they have serious drawbacks, are cheaply produced by local manufacturers, are durable enough for their light use and can easily be maintained by their users." There is in fact a big difference between a community handpump and a family handpump as shown in the following:

	Family Handpump	**Community Handpump**
Well type	Shallow	Mostly deep
People served	5-20	50-500
Cost of Installation	$50-200	$500-5,000
Handpump Source	Village market	City/Import
Driller Source	Village market	City
Purchaser	Family	Government/UNICEF
Owner	Family	Community
Maintenance	Family	Institution/Community
Spare Parts Source	Village market	City/Import
Average life	10 years	5 years

IV. ADVANTAGES AND DISADVANTAGES OF THE FAMILY HANDPUMP

In comparison with a community well with handpump, or any river or spring source, the family-owned shallow well with handpump offers the following advantages:

(i) By virtue of its close proximity to the house more water will be used for washing and bathing and household hygiene therefore better health should result.

(ii) A shorter carrying path for water means less chance of contamination. Water quality may be improved resulting in better health.

(iii) Time will be saved in drawing or collecting water.

(iv) It offers greater convenience for washing and bathing alongside the handpump.

(v) Energy will be saved in bearing water.

(vi) It allows the potential use of water for a garden plot to grow vegetables which may increase family income.

(vii) It raises the dignity and prestige of the family.

(viii) Provision of the facilities may be undertaken independent of government funds.

(ix) Pump maintenance is reduced due to lighter use/abuse.

(x) Simpler technology can be used due to lighter use.

(xi) A large number of family handpumps in a community minimizes maintenance problems because many people are familiar with the pump repair, spares are available in the village market and alternative water sources are close by in the event of pump shutdown for repairs. It also produces more employment in the drilling and pump manufacturing industries.

(xii) In the case of a low yield, aquifer extraction is more evenly distributed allowing optimum use of the aquifer.

(xiii) Ownership will improve care and maintenance. There are fewer institutional or organizational problems. It relieves government of any future replacement or maintenance responsibilities.

(xiv) It will allow more time for the education of children otherwise employed fetching water.

(xv) It raises the dignity of women by reduction of water bearing.

(xvi) It reduces health and disfigurement risks to women caused by water bearing.

(xvii) It gives privacy for washing and bathing.

Some disadvantages or points of concern which should be borne in mind when considering the use of a family handpump include:

(i) A considerable potential for community pollution unless the drainage is carefully designed for disposal of wastewater or irrigation.

(ii) A potential for pollution of wells placed too close to family latrines.

(iii) A potential in low-lying areas for pollution of shallow wells during flooding.

(iv) The possible reduction of enjoyable community gatherings at water collection points.

(v) A possible financial burden on the family.

(vi) Problems of land ownership in the siting of the well.

In comparison with the family-owned unprotected well the family-owned shallow well with handpump offers these advantages:

(i) Less chance of contamination

(ii) Improved safety for children

(iii) Prestige to the owner

(iv) Easier extraction of water

Some disadvantages could include:

(i) Extra cost

(ii) Water cannot be seen

(iii) Handpump maintenance

V. SOCIOLOGICAL ASPECTS

The attitude of country people all over the world is surprisingly similar in a number of ways. Anything imposed from outside (and to the villager, anyone beyond his own small community is usually "foreign") is regarded with suspicion and accepted with reluctance even when it is obviously to the villager's benefit.

Although an "outsider" may perceive that a family-owned shallow well with handpump could greatly benefit a given family in a given village, it is essential that the family themselves strongly desire that facility. It must rank as a top priority felt need in that family. That felt need may of course be induced as a result of social marketing methods or education. However, the best people to convince potential owners are not outsiders,

but their neighbors who already have that facility. It is by example that a good idea will replicate itself.

In general, local technologies should be investigated and these improved and built upon as they are more likely to meet the needs of the rural poor. So project facilitators are cautioned not to promote a specific technology but to find an appropriate technology.

A standard design or blueprint approach cannot work; there are too many variables, often even within one village. The "blueprint approach" should be replaced with a "learning approach", where the special needs of the people are met. Among other things, this learning approach should take account of local values and beliefs.

VI. SELF-HELP

The family handpump scenario embodies the principle of self-help to counteract an unhealthy dependence on government. There is evidence to show that most people would opt for more self-help if it was actively promoted and encouraged with appropriate incentives. When we look at rural water supply and what governments have been able to do and have the capacity to do in the future, it is surprising that more attention has not been given to promoting self-help. The advantages are uplift of the community from poverty by enhancing the dignity of the people and fewer operational, maintenance and financial responsibilities for the government. A self-help project has sustainability because the people have invested their time, energy, and finances in something they truly desire.

Now let us look at the other side of the story, one which is unfortunately all too common today in developing countries. It can be illustrated by this little story. "There was once a man living in a village whose son was working in the city. His son came to visit him and brought him a gift - a new shirt and trousers. The father was happy and thanked him profusely. Six months later the son received a parcel containing the shirt and trousers and a note which read 'Please, the shirt and trousers need to be washed and mended. I am waiting for your action since I have nothing to wear.'" People in rural areas of developing countries may respond to technical and social guidance to develop and strengthen their capabilities. The mistake arises when sponsoring agencies over-support a community project (especially financially). This actually cripples that community and its people for ages.

VII. HEALTH AND HYGIENE EDUCATION

The classic water-borne diseases such as cholera and typhoid can be transmitted from person to person in a host of ways including the faecal contamination of hands, food or utensils. These transmission routes are unlikely to be affected by improvements in water quality. For example, the water pumped up from the depths of a tubewell is only as clean as the cupped hand of the person who drinks it. More important are the improvements in hygiene which become possible when water is available in greater quantity for use in the house, to wash hands, dishes, food, etc. It has been said that the simple practice of washing hands is the most important scientific and medical development of all time. Water- washed diseases which are prevented by good hygiene include diarrheal diseases, cholera and typhoid, eye diseases (trachoma) and skin diseases (scabies). In many rural areas of developing countries, women do not know about the relation between household hygiene and disease. That is why an essential component of any family handpump project must be a health and hygiene education program. Such a program should not be shot like a bullet at a target audience. It requires sensitivity to the villagers' perceptions of their basic human needs and of the benefits of water supply and sanitation. Health education efforts should include information and instructions on how to improve traditional water sources.

VIII. MARKETING THE FAMILY HANDPUMP

There is no reason why the family handpump could not or should not be professionally marketed to women at the village level.

Basic marketing principles to apply include:

(i) develop a good product;

(ii) diversify the product to satisfy needs of diverse consumers;

(iii) remember the customer must be satisfied;

(iv) keep costs to a minimum and price realistically;

(v) offer product guarantees, easy credit and a simple low-cost service contract; and

(vi) promote and publicize.

Advertising principles to apply include:

(i) know your audience;

(ii) choose the effective medium;

(iii) do not underestimate time required to change habits;

(iv) be creative;

(v) do not sell on basis of health if your consumer wants it for convenience, privacy or status; and

(vi) do not even think of advertising unless you are sure that

a) the product is right
b) the price is right
c) product guarantees are in writing
d) credit is available
e) service contracts are in force
f) product can be delivered in two weeks.

IX. ENGINEERING

A family handpump does not exist in isolation; it needs a water source such as dugwell, tubewell, underground cistern, etc. Similarly a good water supply does not exist in isolation; to derive optimum benefits it needs the complementary support of good sanitation, good drainage and appropriate health and hygiene education.

Groundwater Aspects

Water quality varies enormously throughout the rural areas of developing countries. The quality as perceived by the users is mostly measured in terms of color, taste and hardness, whereas the quality as perceived by public health engineers is measured in physical terms through turbidity, in bacteriological terms through faecal coliforms and in chemical terms through iron, chloride, magnesium and calcium ions. But in a remote village it is more often a case of having to use what is there; what

has always been there. It has been observed that sometimes the principal source of iron in tubewells is actually the galvanized iron casing, rising main and pump rods which have corroded in aggressive water. A solution which is now quite common is the use of PVC or other thermo-plastic materials below ground. There are also commercially available, relatively inexpensive, iron removal kits currently being used in developing countries. Family wells should not be sited too close to family latrines and it is important to minimize pollution by constructing an appropriate concrete apron which directs wastewater away from the source. Off-set handpumps are another method of protecting well water. In low-lying areas, where flooding can occur, polluted shallow wells are common. It behoves the engineer to come up with some practicable proposals to improve such conditions. However, there are also situations like increasing salinity of groundwater, where little can be done at the village level, since the cause (possibly overpumping of the aquifer) may be more regional. In such a case, rainwater-harvesting technologies could provide alternative sweet water sources to fulfill all family drinking and cooking requirements the year round.

If shallow groundwater is present anywhere in a village, then the village people can usually tell you where it can and where it cannot be found. However, if a single family is going to stake a large sum of their savings on a tubewell or dugwell, to be newly located near their home, it would be prudent to do some hand-augured test bores first. The choice of a dugwell or a tubewell is mostly dictated by the hydrogeology of the district. It is seldom that there is to be found a comparable number of dugwells and tubewells in the same district. Dugwells have two characteristics which tubewells do not have. Firstly, the people can see the water and if the handpump breaks down they can still get water. Secondly, a dugwell allows two steps of development which may make it more affordable: an unprotected stage and a covered handpump stage. For a given depth, it should also provide more water than a tubewell. However, the advantages of a tubewell lie in being able to tap deeper aquifers and in affording more protection against pollution. The shallow groundwater aquifers which would be the source of water for the family handpump are unfortunately known to be slowly dropping and in many parts of Asia are already beyond the reach of suction handpumps.

Dugwells for family use are generally 750-1,500 millimeters in diameter and usually do not exceed about 15 meters in depth. They are often lined with bricks, concrete rings, or concrete blocks and have a climbing ladder or rungs inside. However, many dugwells are unlined. It is essential that an access hatch be provided in the concrete cover to a dugwell when a handpump is installed. A concrete cover over a dugwell

may not be readily accepted in some countries for cultural and religious reasons. Alternatives may have to be found.

Tubewells can be constructed in different ways such as augering (also known as drilling or boring), percussion, well pointing and jetting. The most common method adopted for family-owned tubewells has been the inexpensive jetting technique. In this technique, water is pumped down through a hollow drill rod and out through a hole in the jetting bit. The greater the force behind the water, the better the cutting action and resultant penetration. A variation on the basic jetting technique which is greatly used in Bangladesh where the soils are soft alluvials is known as the Sludger method. This could be classified as 'hydraulic percussion' because drilling fluid is used and the 'tools' are moved up and down. Using this method which requires no engine power, a three-man team can complete a 50-meter deep tubewell in about three hours using a 40-millimeter GI pipe. One question which needs to be studied and answered is whether contractors with small, conventional engine-driven drilling equipment can compete with backyard/village drillers for the family tubewell market.

The Handpump

Most of the family handpumps in existence today are suction-type ones which can be used for water depths of up to about seven meters. They generally have cast iron bodies and a lever handle and are available in the village market for $20-30 excluding pipework. However, with the falling levels of shallow, groundwater aquifers throughout Asia, the most important consideration is the development of a cheap family-type handpump for lifting water from up to 12 meters deep. The UNDP/World Bank Global Handpumps Project has concluded that there is a good future for direct- action PVC handpumps such as the Tara (in Bangladesh) to meet such demands. Unfortunately at the moment, the price of the Tara handpump is still well above what people at the village market would consider for family use. Other PVC direct-action handpumps include the Wavin, the Blair and the IDRC-UM. All are still undergoing development testing. At the moment price is paramount for a family handpump. While the Jetmatic cast-iron handpump (Philippines) which is good for pumping from 25 meter depths is available on the market for about $35, there is still a long way to go for the newer direct-action pumps to displace it as a family handpump, e.g. the Blair PVC pump retails at $90. Developers of new handpumps should also be guided by the professional marketing approach mentioned earlier in this paper. Of special concern to women and children will be the ease of operation. Another development which is

occurring in Asia is the use of cheap electric pumps as an alternative to a handpump in rural areas where electrification is available. Electric pumps are available for around $50.

Drainage

One of the most important points to consider in any family handpump project in a village is the drainage of wastewater from the facility. In this respect, the village leaders, be they men or women, must be involved in determining acceptable drainage courses from any given well location because each one will affect the community as a whole.

X. ECONOMICS

The cost of a family dugwell with a handpump in the developing countries of Asia ranges from $100 to $300 and for a family tubewell with handpump from $50 to $200.

As to whether or not these are affordable for families, the best measure is to assess the number of families who already have these facilities – mostly obtained without the benefit of credit or economies of scale in a village project.

It is also necessary to remember that we may be looking only at a potential 10 per cent to 20 per cent slice of the demand in rural water supply - not everyone in a village will desire a family well with handpump and not everyone can afford it.

Let us examine a typical case and see if it appears affordable to the 'average' family.

Annual household income		
(this may also include that of the extended family)	=	$1,000
Cost of family well plus handpump	=	$ 150
Annual repayment over three years (no interest)	=	$ 50

This represents 5 per cent of household income which appears affordable.

The question of whether or not these families should pay interest on their credit must be considered. The personal opinion of the author is that these families are trying to provide themselves with a basic human need and that every encouragement should be given to them to help themselves. Therefore at least initially, until the 'project' is proven and self-sustaining,

it would be better to operate an internal revolving fund and avoid major interest payments.

Another matter for consideration is whether or not there should be a government subsidy. It could be argued for example that if government expenditure on rural water supply equates to say $10 per capita then such an amount should be justified as a one-off subsidy towards a privately owned family well with handpump. The advantage to government is that there is no further responsibility for replacement or maintenance unlike the more conventional rural water supply schemes it constructs. However, while government subsidy sounds like a good incentive, it must be tempered with the knowledge that along with that subsidy will probably come a tangling with bureaucracy which could have the undesirable repercussion of frustrations with slow implementation.

The Grameen Bank in Bangladesh has shown that it is not necessary to have collateral to provide credit to the landless poor. So for a village family handpump project, the collective strength of a women's group or organization should provide an acceptable substitute for collateral on the loan and make administration simple.

XI. IMPLEMENTATION

The very idea of a self-help family well with handpump project evolved from the need to look for an alternative development mechanism to supplement the efforts of governments improving water supply to hundreds of millions of people in rural Asia.

We are looking for a bottom-up, rather than top-down approach. We are looking for an implementing agency which is very familiar with grass-roots village life and the desires of village people - especially women. We are also looking for action, not reports and bureaucracy. Mostly we are looking at a small-scale operation which will mushroom under its own energies without continual reliance on external inputs.

The logical implementing mechanism is the use of a strong, locally-based NGO, to work with a women's group or organization in each village. Ideally that NGO should already be known to villagers in that district and trusted for its sincerity and accomplishments.

So what role should governments and funding institutions play? Firstly, a catalytic role to get a pilot project off the ground and later a supportive role without too much interference. For example, seeding money for a revolving fund would be required initially but only of the order of $50,000-100,000. NGOs would need to be approved by government and government could provide support such as health and hygiene education at

the village level. However, the strength of an NGO lies in its flexibility and its ability to assess and act quickly, efficiently and effectively at the village level, so it does not make sense for government or international funding institutions to be too closely involved in implementation.

Earlier in this paper it was mentioned that the blueprint approach to design is not feasible, but rather a learning approach should be adopted. For this very reason, it should be the NGO and local village women's groups who design the project specific to their needs, not government or any funding institution or any consultant employed by them. The NGO may of course seek technical advice from such organizations and consultants but that should be a matter for their judgment. At least in the initial pilot project phases there is no reason why the NGO should not accept the seeding monies and administer the revolving fund itself. This 'project' could also be a means by which NGOs in each of the developing countries of Asia are strengthened mostly by interaction among themselves but also through possible international support and training.

XII. A PILOT PROJECT – GENERAL SCENARIO

A pilot project scenario is now presented. It may well differ from that proposed by the individual country papers to be presented later. It has however been devised keeping in mind that the objective of a pilot project is to show the general scenario can work; thus simplicity is essential.

1. Government selects two of the strongest NGOs in the country as implementing agencies. This is to promote an element of competition.
2. Funding agency provides (as technical assistance grant to government) each NGO with $50,000 equivalent in local funds for two uses:
   (i) Administration and implementation of the project; and
   (ii) Seeding monies for the credit scheme.

3. NGOs determine villages and locations to be selected for the project. Where strong demand was expressed from villages in the initial study of 20 villages, then those villages should of course be considered first. The NGOs will have the best judgment of how many villages can be included within a pilot project covered by $50,000.
4. NGO and women's groups in the selected villages design and implement their own schemes seeking external assistance if needed.
5. Government conducts a tripartite review of the project after 12 months attended by NGO and funding agency, wherein the NGO presents a statement of expenditure of funds and results achieved.

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THEME PAPER – WOMEN AND WATER

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CONTENTS

I. INTRODUCTION

The idea of involving women in water supply and sanitation projects is certainly nothing new. Ever since the International Drinking Water Supply and Sanitation Decade began, there has been talk of involving women. Today we begin a regional seminar on how to involve women in projects that promote adoption of the family handpump. We explore why the family handpump might be especially beneficial to women. We also focus on how NGOs might take an active facilitating role in this process.

This paper briefly reviews progress made during the decade in involving women in water supply and sanitation and discusses why a focus on women is important. Next, issues that seem to be more specific to the promotion of the family handpump are addressed. These issues include (i) defining what is meant by women's participation; (ii) defining the roles of NGOs and government bureaus of women's affairs; (iii) the importance of offering the handpump, latrine, drainage and hygiene education package; (iv) other development needs of women, children and villages; (v) issues of credit management; (vi) people without land ownership or tenure; and (vii) evaluating success.

These issues come not only from the literature but also from personal experience working and living in Asian countries and studying Asian women. As an anthropologist, I have lived among women in purdah in Iran and observed the hardships of women in Philippine urban slums. I have also worked in People's Republic of China, Indonesia, Papua New Guinea, Sri Lanka and Thailand on women and water issues. I present this overview today with some understanding of the enormous cultural differences that exist among women in Asia.

II. BACKGROUND ON WOMEN AND THE WATER DECADE

In the mid-70's an important study on rural water supplies, *Drawers of Water* by White, Bradley and White, underscored the importance of water programs to women. This book and other studies that followed showed that when men's and women's division of labor was broken down, in most societies, women more than men haul water, use water for domestic chores, attend to family sanitation and hygiene and take care of the sick.

Experience in the rural water sector was showing that within five years, up to half of all new water supply systems were not functioning.

In order to achieve a greater rate of success, the focus turned to women. During the Water Decade, not only was community participation to be given greater attention, but women's participation was to be particularly sought. At that time, planners were asking if women could be trained to operate and maintain systems, could they be involved in designing and siting systems, and what appropriate technology features needed to be considered when designing for women?

Around the same time, the concept of community participation in planning, designing, operating and maintaining water systems came into vogue. At first, planners thought that by involving household heads, the women's views would be heard. Community participation remained a rather vague notion for several years and meant many different things to different people. To many it meant contributed labor. To others it meant working through village leaders. Gradually the concept of the water users groups composed of household heads evolved. These early experiences demonstrated that community participation actually, in most instances, meant men's participation. Men were usually the community leaders, and they were always defined as household heads if a man lived in the house. Somehow, even though women were encouraged to come out of their homes and participate, they chose or were required by tradition to remain passive. Planners were not quite sure how to involve the women.

Thus it became evident that in order to achieve women's participation, a special effort would be required. Ancient cultural constraints and barriers to women participating in the public arena would need to be addressed. More women would need to become involved in community organization; house-to-house surveys and interviews would require women interviewers. Women's involvement meant involving women at every level. Women role models were needed so that women at the village level would feel more comfortable assuming new roles. The idea of the field of water supply and sanitation being a masculine field needed to be changed – the field had to be feminized if women's participation was to be achieved.

The UN Women's Decade (1975-1985) also became an agent in the push to involve women in all development projects. Researchers on women's health emphasized that women become disfigured from carrying water their whole lives, they may suffer serious injury from falls, problems during pregnancies may be aggravated and they experience serious energy drain and chronic fatigue as a result of water carrying. The hours spent hauling water prevent them from participating in other activities such as literacy classes and training courses. Women were encouraged to take out small loans to begin chicken and goat raising or other income-generating

projects, but women often complained that there was no time for such activities, unless water supply could be brought closer to home.

Children's issues also became important. Child survival is greatly influenced by potable drinking water, environmental sanitation and nutritional and sanitary preparation of weaning foods. Mothers need to receive hygiene education and the means to keep their environment clean. As the main teachers and caretakers of children, women need to be reached directly.

The UNDP Promotion of the Role of Women in Water and Environmental Sanitation Services (PROWWESS) was set up early in the Water Decade to conduct some research and provide more guidance on how to achieve women's participation. Their publications and many more produced by organizations such as the Asian Development Bank, International Reference Center for Community Water Supply and Sanitation (a UNDP project in The Hague, Netherlands), the World Bank, WHO, and UNICEF have resulted in considerable and significant information.

In the last ten years, a great deal of progress has been made in feminizing the field of water supply and sanitation at the international level, and to some extent, at the central national levels of government. Many attempts have been made to obtain women's participation at the village level, and there have been several impressive achievements. But those working at the field level recognize that much remains to be done.

During the earlier part of the Water Decade, the concept of women's participation was met with much amusement and some resistance in a number of countries. This no longer seems to be the case. The importance of involving women is now accepted at the highest levels of government and by all the international agencies working in water supply and sanitation. The only questions that still plague us are the "how" questions, and through the efforts of various public and private organizations who are publishing their experiences, these questions are now being slowly answered. It is important that these "how" experiences reach the grass-roots workers.

While it has taken nearly the whole decade to feminize, at least conceptually, the field of water supply and sanitation at the more central levels, and at the village level, the importance of involving women at grass roots as decision-makers, planners, designers and health educators is still met with some skepticism. This too will change with time. Successful projects from Indonesia and Thailand have shown that many obstacles to women's participation are relatively easy to overcome just through community preparation for a project and through the women themselves demonstrating their capabilities. The obstacles include men's low opinions

of women's capabilities, women's low opinions of themselves, women's shyness about coming out to participate and women's inability to speak in public and take on leadership roles. Some traditions that seemed to offer formidable obstacles at the start have been shown to be as thin as veils.

III. THE IMPORTANCE OF INVOLVING WOMEN

Women must become involved in providing water supply and sanitation to their communities and in their homes, for they still are the main water carriers and water managers. They, more than anyone else, know what they need and what design features benefit them. They know the suffering of family members who become ill (due to lack of proper water and sanitation), as they are the main health caretakers.

The family handpump concept offers greater scope than community water projects for involving women. That is because it focuses on the home and may not require women to participate at the community level, which has been found somewhat difficult to achieve in certain societies; especially in societies where women are in purdah or otherwise socially prohibited from taking community leadership roles, it may be more acceptable for them to become involved in providing water to their own households.

The five study countries represent widely divergent cultures, with different status and roles for women. In the Philippines and Thailand, women traditionally may hold leadership positions, are not strictly confined to the home and often handle the household purse. While in these countries men more often are community leaders, the concept of women's involvement will not be foreign and the idea of women taking loans or operating a revolving credit fund will not seem unnatural.

In Pakistan and to a large extent in Bangladesh, women's roles are much more clearly defined within the private sphere of the home. Many of these women are in purdah and may never expect to leave their compounds their entire lives. Women in these countries do not traditionally make household decisions involving money and may have little experience with taking out loans and repaying them. Younger wives may have no authority in their husband's homes while mothers-in-law may have great authority but reinforce patriarchal hierarchies. For Pakistan especially, it will be necessary to understand how the family unit operates in seeking women's participation.

Indonesia, with its various sub-cultures and varying roles and traditions regarding women, cannot be easily characterized, which emphasizes the fact that there can be no blueprint for women's

participation in this family handpump concept; each country will need to come up with its own plan to involve women appropriate to the culture. Indeed, within each country, so much cultural variation will exist that each culture area, or even perhaps each community, may have to be considered individually.

It is important to involve women not only because they are the main water carriers and managers but also to be sure they are involved in development – that they are the beneficiaries not only of the improved water supply but also of the new training and skills, and the new economic opportunities that development projects often offer.

For rural water supply, most countries are now committed to a "bottom-up" approach. No one is more on the bottom than women. Involving women in water supply projects provides an opportunity to elevate the status of women in society. For many it will be the first time their opinions are sought. Some no doubt will receive training in setting up revolving credit funds or in hygiene education or handpump repair. The family handpump project may afford women time for literacy classes, mother's classes, vegetable growing or livestock raising, the selling of surplus produce and a chance to increase their personal income. All of these spin-offs of easier access to water supply are status-enhancing.

Experience from past projects has shown that it is necessary for men and women to work together to achieve success in improving village water supply. The focus on women for this family handpump project is not to treat them as "separate" from men, but to ensure their participation alongside men. It gives due attention to their roles in procuring and managing water.

IV. THE IMPORTANCE OF LEARNING WOMEN'S PERCEPTIONS

In many parts of Asia, women's lives are very different from men's. If one were to do a survey to determine people's priorities for development, the priority of a family handpump and a latrine would be different for the men and the women. Men often spend much time out of the home and use toilets in the mosque or other public places. For them a latrine in the home may not be a priority. However, for the women who are largely confined to the home, a latrine is often a high priority. Likewise, with regard to handpumps, for those carrying the water, the women, a family handpump might be a high priority, but for the men it may be less important.

It is so essential to learn women's perceptions that the time has probably come for elimination of the concept of interviewing the

"household head" in sociological and engineering surveys. The usual cultural definition that the eldest male is the household head results in far more men than women being interviewed. The perception that the household head speaks for the household must be dispelled. The household head usually speaks for himself and this presents a serious bias in results. Continuing to use this term in interview schedules and reports helps to perpetuate the very social construct that serves as a barrier to learning women's views. Future research on community participation for water supply and sanitation should report the responses of women and men, boys and girls.

V. BENEFITS OF THE FAMILY HANDPUMP TO WOMEN

Any water supply project that reduces women's time in carrying water is immediately beneficial. The family handpump reduces that time to nearly zero. Although women may miss the contact they have had with other women while collecting water at a previous communal source, that can be more than made up for through the formation of women's groups and classes.

The two main benefits of the family handpump is its positive effects on women's health, and hopefully the entire family's health, and the production of leisure time that may be usefully applied to other activities.

Much has been written about the importance of water supply and sanitation for reducing water-related diseases. Rather than review that literature here, it may be useful to focus additionally on some health issues related to water carrying. Some of the health problems that plague women who carry water long distances have already been touched upon, such as disfigurement, falls, energy drain and chronic fatigue. In an indirect but important way, the distance to water supply may also have effects on pregnancy outcomes, infant survival and even maternal mortality rates. Women in some settings expend a tremendous number of calories each day carrying water. The greater the distance and the more time it takes, the greater the energy toll on their bodies. It is not unusual at all to see pregnant women in developing countries carrying water. Energy that should go toward the fetus is being directed to water carrying. Low birth weight infants have a much lower chance of survival than do infants of normal weight at birth, and women in underserved areas of the world also produce a higher proportion of low birth weight babies. Some of those infants are born too early, others are simply malnourished at birth. In either case, the family handpump should conserve women's energy, resulting in better pregnancy outcomes.

Maternal mortality rates in underserved parts of the world are also high. Malnourished women have more miscarriages and more die in childbirth than well-nourished women. Again, water carrying contributes to this malnutrition due to its enormous energy drain. Women carrying water up to six weeks after delivery are at higher risk for hemorrhage that may lead to death. While these negative effects of water carrying on women are not often given attention, they may be just as serious over time as the impact of poor water quality and sanitation on the incidence of water-related diseases.

One problem in getting women in developing countries to accept family planning is the high death rate among infants and children. In a small way the family handpump can contribute to better child survival and thus to better acceptance of family planning.

The greater proximity of water to the home may have other nutritional benefits. As women's time is freed for other activities and water is readily accessible, it may be possible in some areas to encourage kitchen gardening. Food products from these endeavors can be consumed to enhance the nutritional quality of the family diet, and surpluses can be sold, generating further income for the family. With that extra money, families might be able to afford soap, toothbrushes and other small items that improve health status but may be currently thought of as luxuries. Studies of women's status all over the world show that as women earn higher incomes, so their status is increased in the family and community. It is much more likely that these benefits will actually accrue to women and their families if a handpump project plans for them in advance. Should such a project include an income-generating project for women who could find the time for an extra activity?

VI. WHAT DO WE MEAN BY WOMEN'S PARTICIPATION?

"Women's participation," what does it mean? Past projects have shown that there is need for a clear definition.

Individuals harbor assumptions about what is meant by women's participation. For some, women's participation means that women's NGOs facilitate the project. For others, it means that the NGO sends a female community organizer as well as a male. And for others it means achieving the participation of village women.

Certain projects from both Indonesia and Thailand have reported that for them women's participation meant a women's NGO facilitated community participation in a village water supply project. In the case of one Indonesian project described in the literature, this was considered to

be a disadvantage. The NGO leaders, some from within the village and some from without, suggested to the village women leaders what they needed. The village women, wishing not to oppose the women leaders, never really expressed their perceived needs. It was only during a meeting with a community development specialist, who raised the issue of starting cottage industries, did the actual desires of the village women come forth. It turned out that they were not enthusiastic about the same issues as were the NGO leaders.

A second question is, what level of women's participation is expected? One project from Indonesia reported that a women's participation project was actually run 80 per cent by men. The NGOs facilitating the project more often appointed male community organizers, and water user's committees were nearly all men. Should planners set targets on levels of women's participation?

If one sets a target of involving village women, then a third question arises: which village women should be targeted for participation? It may happen that only the more affluent or politically connected village women come forward. Or perhaps only older women may feel free enough to participate, but by custom, they may not allow their daughters-in-law to become involved. Thus, who composes the target group and how can they be reached? A recent WHO publication suggests beginning a project by mapping the "women's cultural landscape" of a village to identify the various castes or classes of women, the poorer and richer, the better and less educated. This mapping may be less necessary for a family handpump project than a community water supply project, if the goal here is to reach every individual family. Yet community issues may arise where women's participation across the board is desired and such maps would be helpful in determining who has been included and who still needs to be reached.

A fourth question is, who may be preventing women's participation? It is often assumed to be the men, but another view is that it is actually patriarchal society in general, and both men and women observe the rules of society. Those living in certain parts of Asia will agree that it is often the mother-in-law who determines the wives of her sons and who keep them in purdah. Even in areas where women are permitted to leave the compound, younger wives are often kept in a low status position by hard labor, such as water carrying and toiling in the fields. Some in the household may not wish to see the burden of younger females lightened, since they also may have had to endure in the past such hardship. Even women themselves may not believe they are worthy of development activities.

VII. NGOs AS FACILITATORS OF WOMEN'S PARTICIPATION

The participation of NGOs in the family handpump project offers a fresh and hopefully less bureaucratic approach to facilitating project design and implementation. Women's NGOs are in a particularly favorable position for involving women at the local level. They provide ready role models of women leaders and will instill confidence in local women that they too can accomplish many things. NGOs are often perceived by local populations as being sympathetic to local needs and more flexible in meeting them.

On the less positive side, NGOs in some areas, especially NGOs in rural or remote areas and women's NGOs, are frequently weak. It may be necessary to strengthen some NGOs as a first step before embarking on the handpump project. Stronger NGOs can offer advice and assistance to the weaker ones. All the NGOs in the countries concerned may need to forge links to help one another.

A few other words of caution may also be in order. Some NGOs are linked to government, such as NGOs formed from wives of government personnel and NGOs that receive heavy government subsidies. At times these organizations can be very hierarchical and bureaucratic. Sometimes they are perceived at the local level as an extension of government. In areas where development projects quickly spring up just before election time, the project can be viewed as a "political stunt," and therefore not trusted, even though an NGO is leading the way.

The NGOs chosen to lead the family handpump project should be careful to avoid the images and realities that bureaucracies often bring to villages. A humble learning approach where villagers can truly take the lead in their own development is the safest course and the one that will allow the shyest members of society to be heard.

VIII. THE ROLE OF GOVERNMENT BUREAUS OF WOMEN'S AFFAIRS

Government bureaus of women's affairs will no doubt play an important role in the handpump project by assisting NGOs to involve women. These bureaus will be familiar with similar development projects that have succeeded in involving women and can share such information.

As the lead agency for setting priorities on women's development, government bureaus of women's affairs may be able to describe how the handpump project can be linked with other development projects for women. Women-in-development officers may already be living at the field

site chosen for the handpump project and their advice, guidance and cooperation can be sought.

IX. FAMILY HANDPUMPS – NOT IN ISOLATION

The modern approach to improved water supply is to offer it together with latrines, drainage and hygiene education. This combination offers the greatest chance for reducing many diarrheal diseases that cause chronic morbidity, poor growth in children, and infant and child mortality.

Among women nearly everywhere, privacy is very important. Women rarely like to go into open fields or behind bushes for fear of being seen, and women in some societies report that they go out only at night. In one Filipino village, the women said that the latrine was necessary in preventing early unwanted pregnancies and forced marriages. As they explained, when their teenage girls must go to the bushes to relieve themselves, men may see their exposed bodies and that may result in unplanned pregnancies and early marriages. Who would have thought that latrines also could be linked to family planning?

In their desire to achieve privacy, women without latrines are forced to use the cow shed attached to the house or even the rooftop which is then rinsed out through a drain spout into the street. Likewise, the "chamber-pot" or bucket method currently used in many places pollutes the community environment when emptied out-of-doors by women at night.

Hygiene education is necessary for realizing the health benefits of water supply and sanitation programs. Simple messages of hand washing, methods of purifying polluted water, proper storage of clean water, proper use and maintenance of latrines and good street sanitation are required.

Drainage must also be attended to, as poor drainage is a serious health hazard and good drainage is often a perceived need of villagers that should be met. No program should be undertaken without these elements addressed.

Water supply projects have been shown to be an entry point for many other health and development activities.

In some cases during the early discussion stage, communities may say that water supply and sanitation are not their first priorities. They may wish for a school building, a health clinic or a mosque. How should NGOs handle these requests? Should water supply and sanitation be marketed to raise them as priorities? Should NGOs take a more integrated approach to village development and decide to take on other projects as needed?

A second concern is: to what extent should NGOs be prepared to take on the other development needs expressed by women? Some planners believe that only small steps should be taken to change people's behavior. In the case of the family handpump, these steps might include assisting women to get loans, installing a handpump and a latrine, teaching water purification techniques and hand washing, and planning a drainage project. When these are complete, the women may wish for more classes and projects. They may begin asking for nutrition education, family planning information, and day-care or pre-schools for their small children. Rarely would they see a handpump project in isolation from all of their other needs and desires. How can NGOs link with other organizations to form a more integrated development program?

X. WOMEN AND CREDIT MANAGEMENT

Women and credit management is probably one of the more interesting challenges facing the handpump project. For women in some societies, who traditionally do not hold money or make financial decisions for the family, this will be an entirely new concept. They may be afraid to take on that responsibility, and their families may not even allow them. Is one of the goals for women in development in this project to help women become more experienced in money handling, to teach them about loans, bank accounts and credit arrangements?

Several countries in the developing world, such as Bangladesh, India, Nepal and some African countries, have already made progress in arranging credit for women with little or no collateral and little or no formal education. In some cases, national banks have been required to give women loans under specially endorsed government programs. In other cases, women's banks have been formed by women's groups. Women have been shown to be very good credit risks, with few ever defaulting on loans.

Perhaps arranging loans will not be so difficult as convincing women and men that women should take out the loans. Some Filipino women, who, like Thai women, are quite used to handling money, have said somewhat jokingly that they would rather have the men take out the loan, so that if there is any default in payments, the men would have to go to jail! Let us hope that no one ends in jail as a result of a family handpump project. But on the serious side, can women's groups provide group insurance against an individual's failure to pay?

This brings up once again the advantage of combining the handpump project with income-generating activities for women. Showing the family how the loan can be repaid is just as important as providing the loan itself.

Another concern expressed by rural people is the possibility of investing in the digging of a well and a handpump and then not finding water of acceptable quality. Do women's groups or the lead NGOs need to provide insurance in case no water is found after a household has taken a loan for a handpump and well?

An issue surrounding the credit management for the project is how the revolving funds will be handled. Should facilitating NGOs revolve the funds through 20 villages and then move the funds to 20 more villages, or should revolving funds stay in villages after project completion and be used by women there for future development projects that they may wish to undertake? If the latter decision is taken, who will replenish the seed money of the NGOs to carry on their work in handpumps and sanitation throughout the rest of the country?

These and other questions concerning credit management may require technical assistance from other NGOs or government agencies.

XI. PEOPLE WITHOUT LAND OWNERSHIP OR TENURE

There is a serious problem in helping people with no land ownership or tenure to obtain handpumps and latrines. Such people without security of residence are reluctant to invest in permanent structures. They are also often the poorest members of society and the hardest to reach and serve development programs. Because of their impermanence, they seem to miss out on every chance to better their conditions.

In one project in Thailand, planners were able to convince the Buddhist monasteries to invest in facilities for such families that would be shared communally. Arrangements were made for each landless family to contribute some time to planning and some labor. They also contributed to keeping the facilities clean. A second group in the same project, unable to invest in water supply and latrines, were single-living elderly people who, while owning their home, had no money and no relatives to contribute labor to keep down costs. It was decided to include these people among the landless group. The families concerned had a special arrangement with the monastery - these were not public facilities - they were to be used by certain families only. In that sense, they had joint-ownership with the monastery and the ownership aspect of the project was very important.

This problem of families who cannot, for one reason or another, take advantage of the project, needs to be given serious consideration. It is likely that ways can be found for them to have special arrangements within the framework of their own cultural setting.

XII. EVALUATING SUCCESS

Evaluation of the success of a project is important for obtaining funding for the future. Participants in this handpump project may wish to begin looking for ways to evaluate individual projects and identify measures of success.

Traditional measures of project success are the percentage of households having latrines and handpumps before and after the project, the number of people trained in hygiene education and the number of drainage problems existing before and after the project.

Since the project focusses on women in development, measures of women's participation may also be appropriate. A May 1988 WHO/PROWWESS workshop on the Final Review of Case-Studies of Women's Participation in Community Water Supply and Sanitation suggested several simple measures of women's participation. Some of these are:

a. whether a local women's group was involved in planning, implementing or evaluating the project;

b. whether a women's group was formed or strengthened to participate in the program;

c. the percentage of men who accept women's involvement before and after the project; and

d. a 1-7 scale to measure degree of women's participation: (i) women do not come to meetings; (ii) women come but stay outside and listen; (iii) women sit in meeting but do not talk; (iv) women talk in meetings; (v) women question, challenge, "vote"; (vi) women lead and ensure action; and (vii) women plan ahead and take long-term responsibility.

To determine the impact of the project on women, the workshop recommended the following measures:

a. the amount of time women spend collecting water before and after the project;

b. whether the project resulted in any income-generating activities for women;

c. how many women received education or training;

d. whether any women emerged as community leaders as a result of the project; and

e. men's perceptions of women's capabilities and women's perceptions of their own capabilities before and after the project.

(The workshop report has many other suggestions that may be useful to individual projects. Even though the report addresses women's involvement in community water supply projects, the results still have many applications to family handpump projects.)

Some NGOs may feel that this type of evaluation is beyond their capabilities in time, money or personnel. However, evaluations can be carried out by other entities. Universities are often seeking research projects for their professors and graduate students, and they may welcome the opportunity to apply for a grant to evaluate the health and economic benefits of the handpump project.

XIII. CONCLUSION

A family handpump project focusing on village women raises some issues that will be encountered in the field. This Seminar provides an opportunity to address these issues with colleagues. The issues mentioned in this paper may not be the most pressing ones based on your experience gathering data in the 20 villages of your respective countries. This overview may however have broken the ice on some important issues.

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COUNTRY PAPER – BANGLADESH

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CONTENTS

I. INTRODUCTION

With a view to achieving the target of the International Drinking Water Supply and Sanitation Decade (1981-1990) of the United Nations, this project came into being as a regional study in five Asian countries, namely Bangladesh, Indonesia, Pakistan, Philippines, and Thailand. The study was funded by the United Nations Development Programme (UNDP) and executed by the Asian Development Bank (ADB).

Welfare and Women's Affairs was given the role of executing agency of the technical assistance (TA) project. Two consultants, a sociologist (team leader) from Bangladesh Consultants Ltd. (BCL) and a rural water supply engineer from Development Design Consultants (DDC), were appointed for conducting the study.

The objective was to explore the extent to which individual families in developing countries can satisfy their basic water supply needs by self-help through family-owned shallow wells (mostly with hand pumps) and the extent to which such strategies would involve and benefit women.

II. METHODOLOGY

The study was hampered by severe time constraint and other limitations on conducting the village surveys. Consequently, errors and omissions could not be avoided in collecting data and information from the villages. However, every effort was made to keep these to a minimum by cross-checking information collected through more than one source.

Several meetings were held with the Department of Women's Affairs to discuss the plan of action and selection of the 20 representative villages in four regions of the country.

Before collection of data from the selected villages, questionnaires were pretested in the Bhaluka upazila of Mymensingh district. The questionnaires were modified on the basis of the experience of the pretest.

The representative villages were to be selected on the basis of some criteria set by the Bank for data collection. It was very difficult to select the villages matching the criteria because the information required was not available at national level. Therefore, firstly, districts and upazilas were identified at national level on the basis of secondary data (especially data on groundwater level) collected from United Nations Children's Fund (UNICEF), Master Plan Organization (MPO), Bangladesh Water

Development Board (BWDB), Department of Public Health Engineering (DPHE) and other related departments or organizations. Secondly, the representative villages were selected by adopting a random sampling method, going to the district and upazila level government officers and involving them also. The study locations under the respective regions are shown on the attached location map and are listed in Table 1.

Several types of questionnaires were used for collecting data and information from the villages and involved government and non-government organizations (NGOs) and institutions.

The methods adopted during data collection are listed below:

- interviewing village committees
- holding public meetings in the villages
- holding discussions and meetings with the personnel of concerned Government, NGO and other institutions
- interviewing heads of households in the villages
- personal observations in the villages

Two local consultants, a sociologist (team leader) from BCL and a rural water supply engineer from DDC mainly, collected the data. Six interviewers from BCL were also utilized in the village-level data collection.

III. FINDINGS

Primary and secondary data have been collected keeping in view the scope of works and the purpose of the study. The data collected have been analyzed and tabulated in appropriate tables. The inferences are summarized below.

Socio-economic Conditions in the Study Villages

According to Table 1, the population and number of households in the 20 villages surveyed total 32,340 and 5,201, respectively; the population in most of the villages under study ranges between 1,300-2,200, while the number of households are between 200-350. Average family size has been observed to be around 6.5 which compares with the national average of 5.64 .[1]

1 Statistical Yearbook, 1989.

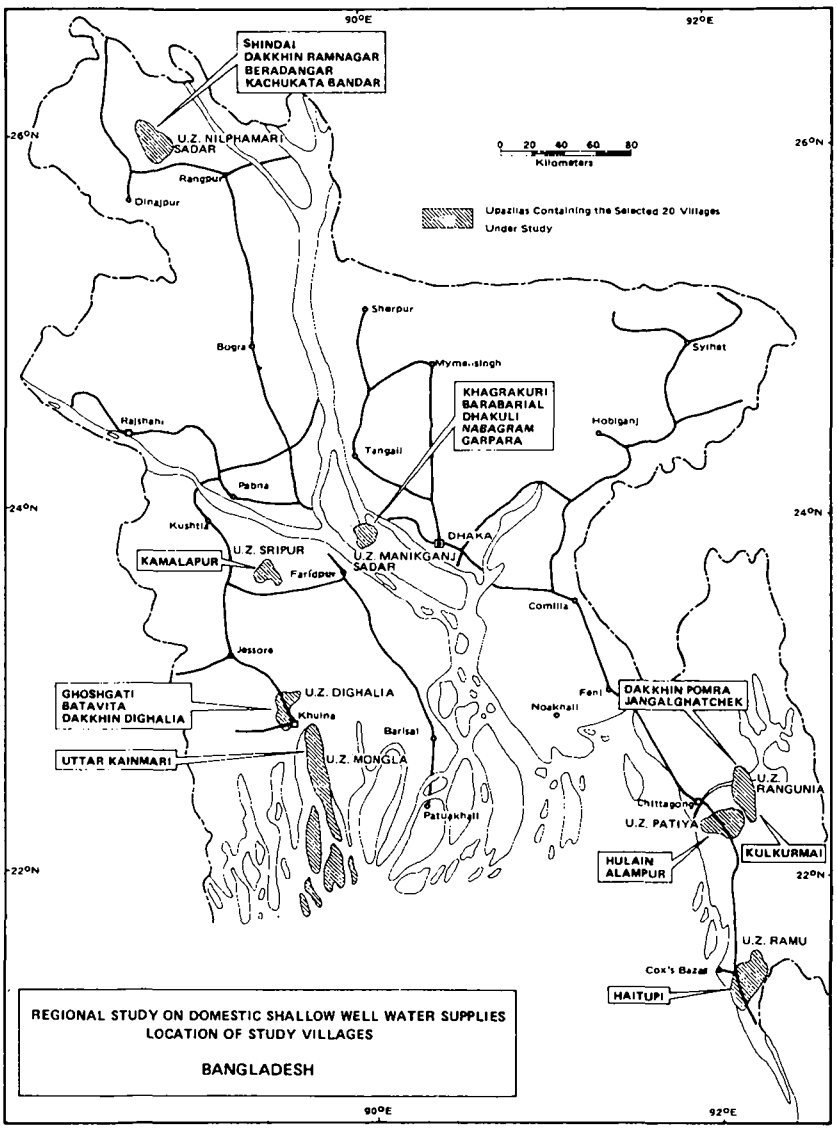
90°E
92°E
26°N
24°N
22°N
SHINDAI
DAKKHIN RAMNAGAR
BERADANGAR
KACHUKATA BANDAR
U.Z. NILPHAMARI SADAR
Rangpur
Dinajpur
0 20 40 60 80
Kilometers
Upazilas Containing the Selected 20 Villages Under Study
Sherpur
Bogra
Mymensingh
Sylhet
KHAGRAKURI
BARABARIAL
DHAKULI
NABAGRAM
GARPARA
Rajshahi
Tangail
Hobiganj
Pabna
Kushtia
DHAKA
KAMALAPUR
U.Z. SRIPUR
Faridpur
U.Z. MANIKGANJ SADAR
Comilla
Jessore
GHOSHGATI
BATAVITA
DAKKHIN DIGHALIA
U.Z. DIGHALIA
Khulna
Barisal
Feni
Noakhali
DAKKHIN POMRA
JANGALGHATCHEK
UTTAR KAINMARI
U.Z. MONGLA
Patuakhali
U.Z. RANGUNIA
Chittagong
U.Z. PATIYA
KULKURMAI
HULAIN
ALAMPUR
U.Z. RAMU
Cox's Bazar
HAITUPI
REGIONAL STUDY ON DOMESTIC SHALLOW WELL WATER SUPPLIES
LOCATION OF STUDY VILLAGES
BANGLADESH

Table 1. **Study Villages – Bangladesh**

SI No.	Name of Village	Population	No. of Households	Households Surveyed	Average Household Size
01	Khagrakuri	1,403	250	216	6
02	Dhakuli	1,172	211	204	6
03	Nabagram	2,145	408	123	5
04	Bara Barial	1,502	305	138	5
05	Garpara	1,330	199	124	7
	Total	7,552	1,373	805	6
06	Dakkhin Pomra	1,963	450	140	4
07	Kulkurmai	612	118	118	5
08	Jangal Ghat Chek	576	74	68	7
09	Alampur	881	122	86	7
10	Dakkhin Hulain	2,185	361	87	6
11	Haitupi	1,990	248	109	8
	Total	8,207	1,373	608	6
12	Beradanga (CKG)	2,000	240	138	8
13	Sindai (BDC)	2,400	285	103	8
14	Dakkhin Ramnagar	1,489	286	98	5
15	Kachukata Bandar	2,154	419	101	6
	Total	8,043	1,230	440	7
16	Uttar Kainmari	1,500	200	92	7
17	Ghoshgati	1,583	286	75	8
18	Bativita	1,480	251	62	6
19	Dakkhin Dighalia	2,080	270	105	7
20	Kamalapur	1,895	218	105	9
	Total	8,538	1,225	439	7
Grand Total		32,340	5,201	2,292	6.5

CKG = Chowdhurypara, Kismat and Ghunpara
BDC = Buri Danga Colony

Note: Villagewise, 1988 population and number of households have been found from 1981 census record by considering the annual growth rate of 2.6 per cent.

Village population and household numbers were made available by asking the leaders/elite of the villages where population census data were not available.

Bangladesh is basically an agrarian country. About 61 per cent of the rural population earns its living by working as farm laborers. The study reveals that in the 20 villages the majority of the population is engaged in farming or in farm labor. In this study the farm laborer has been defined as a person working on another person's land. There are other minor professions such as day laborers in non-farming jobs such as industrial laborers, carpenters, masons, fishermen, boatmen, hawkers, businessmen, etc.

Sources of Income

The two major sources of income of the population of the 20 villages are from (i) sale of crop (41 per cent) and (ii) wages for day labor (39 per cent).

In some regions, however, the picture is a little different. In the Khulna region industrial labor contributes more than agricultural labor while in the Chittagong region (Jangleghat Chek village), the occupation is largely marine fishing and income is derived from this source. In all other villages agricultural labor dominates.

The lowest income group was found in the villages of Rajshahi Division (Tk8,400 per head per year) and even the average for all the study villages (Tk14,000) is significantly lower than the national average of Tk28,800 per head per year. The people in the villages of Nilphamari Sadar upazila have the lowest average annual income, well below subsistence levels. They do not have enough work for all the days in the year. Even a farm laborer has to accept wages as low as Tk5 and one meal in exchange for a whole day's labor.

In some villages where, say, marine fishing is the main profession, the major income comes from the sale of catches. In the North Kainmari village (Bagerhat) the primary source of income is prawn cultivation while the bulk of the income for Kamlapur village of Magura district comes from the remittances of people working in cities and abroad. The literacy rate of this village is also significantly high.

Ownership of Land and Type of House

As is usual in rural Bangladesh, the majority of the houses of the villages under the study are poorly built. No permanent (cement and brick) structures were found among the surveyed houses, which do not conform to any construction standard. About 60 per cent of the houses were made of corrugated sheets over timber frames and the remaining 40 per cent were a temporary type built with straw, bamboo and mud. When

questions were asked about ownership of land, almost everybody claimed to have the ownership of the house plot but only 10 per cent have ownership of agricultural land.

Sources of Household Illumination

Four out of the 20 villages surveyed have access to electricity, the people of the remaining 16 villages still use kerosene for domestic lighting. National statistics in this respect claim that only 1.59 per cent of the families have electricity in their homes and the remaining 98.41 per cent[1] have to depend on traditional kerosene lamps.

Health Care

The indications obtained through the survey of the villages under study reveal that the health education and health care facilities available to the rural population are similar to those available to the rest of rural Bangladesh. The majority of the families do not have the basic necessities of life like food, safe drinking water, sanitary systems or even a livable house. Thus the families suffer constantly from diseases and the status of child health is far below acceptable levels.

An analysis of the results shows that the population is widely affected by diseases like diarrhea, dysentery, worms, fever, malaria, malnutrition, skin diseases, measles, etc. Nilphamari district appears to have some exceptions. Goiter and leprosy complicate the scene. Most of these diseases are carried by water or are due to the absence of acceptable sanitation systems. The death rate on account of these diseases is quite high, particularly among children where the rate has gone up, as is evident from national statistics. The present child mortality rate in Bangladesh is 13.1 per cent in the age group of 1-4 years.

Rural Leadership

The development of a village is largely dependent on its quality of leadership. The study team put questions in this respect to the people individually and in group meetings. The answers received, when analyzed, revealed that at least seven villages have good leadership while the remaining 13 villages have mediocre leadership.

1 Population Census Survey 1982, BBS.

Rural Credit System

Bangladesh Krishi Bank and Sonali Bank are the two major credit financing institutions which service rural development programs. Almost all of the villages under the study indicated the presence of these two institutions in the activities and programs. Interest rates are around 16 per cent per annum and terms of repayment are 3-5 years with land as the normal collateral. Grameen Bank is offering considerable assistance to the villages under the Manikganj upazila. It provides loans (mainly for income-generating activities) without collateral to the landless poor at 16 per cent interest with security provided through group responsibility and an intimate knowledge of borrowers by Bank staff maintained at the village level.

Besides these, people often obtain credit from local money lenders for a period of a few months, in which case they have to pay high rates of interest like 120 per cent per annum. Often friends and relations extend a helping hand to the villagers in times of need.

Water Supply, Sanitation and External Assistance

Government expenditure on rural water supply and sanitation amounts to no more than about $5 million per year. UNICEF/DPHE records indicate about 10 per cent of the rural population use some 600,000 private wells, 70 per cent use some 700,000 public wells and the remainder use other sources such as streams, ponds, springs, etc. The Bureau of Statistics records indicate about half of the rural population have sanitation facilities such as latrines.

The current cost of a private shallow tubewell with handpump is Tk1,500-2,500 and a water seal latrine, Tk500-1,000. Nineteen out of 20 villages studied have some water supply and sanitation facilities available under the joint collaboration of DPHE and UNICEF. Only Kainmari village in Mongla upazila was the exception. However, Kainmari has some low-cost latrines provided by government agencies. Tubewells could not be sunk due to the salinity of the water. The people depended mostly on a few ponds and rainwater for drinking and cooking while tubewell water could be used for washing and cleaning only.

The study results show that the amount of financial assistance available from the Government or UNICEF is grossly insufficient to provide adequate drinking water to the total population. People agree that the benefits of tubewells sunk under government and UNICEF assistance went to the well-to-do section of the community and that access to these facilities is limited to a minority of the population. Apathy and

distance further constrain the poorer people, who in most cases remain content with collecting tubewell water for drinking purposes only. Richer people, who now own and maintain their own tubewells apart from having access to public tubewells, are not keen anymore on the maintenance and upkeep of the government tubewells. This neglect adds to the suffering of the poorer sections when these tubewells go out of order.

In five villages surveyed in the Manikganj upazila, the villages have indicated that they have received financial and technical assistance from the Bangladesh Rural Development Board (BRDB) in providing rural water supply. Besides BRDB, NGOs like Bangladesh Rural Advancement Committee (BRAC) and Grameen Bank have played important roles in these villages. In addition to the village survey, UNICEF sources indicate that as many as 44 different NGOs are now working in association with UNICEF to provide similar services all over Bangladesh.

NGOs in Rural Water Supply and Sanitation

Bangladesh Rural Advancement Committee

The activities of BRAC, one of the largest NGOs in Bangladesh, include formation of landless men and women's organizations at the village level, income and employment-generation programs for the poor, nonformal education and training programs, child survival and primary health care programs. It obtains funds totalling around Tk120 million annually from sources such as UNICEF and the Ford Foundation. Families can obtain credit in cash or kind for housing, income and employment activities and tubewells and latrines. Loans vary from Tk500-6,000 and no collateral is required. Interest rates are 8-16 per cent per annum and repayment periods are 1-5 years.

Village Education Resource Center (VERC)

This NGO provides services to other NGOs in training and consultancy. It is involved in low-cost tubewell and latrine distribution, integrated rural development, income-generation and literacy. Sources of funding include WATERAID (UK) and IDRC (Canada). Credit for small business employment is provided to individuals (Tk300-1,000) with collateral provided by group agreements. Terms are 16 per cent interest per annum with repayment over 1-5 years.

NGO Forum on IDWSSD

This is a coordinating body set up for the Water Decade and supported by UNDP, which does not provide credit but which arranges NGO assistance for tubewell and latrine construction and disseminates printed information on water supply and sanitation such as newsletters, flip charts, brochures and posters. It also conducts workshops and seminars.

Thengamara Mahila Sabuj Sangha (TMSS)

TMSS is involved in primary health care, day care centers, safe water supply and production of latrines. It is funded by UNICEF and other international aid agencies. Assistance is provided in physical terms through provision of cement and the forms for manufacturing concrete rings, slabs and latrine pans. TMSS also provides credit to individuals for agricultural activities.

Water Supply and Sanitation in the Study Villages (see Tables 2 and 3)

In the villages surveyed about 26 per cent of the population get their water for drinking and other purposes from government tubewells, 16 per cent from their own wells, and 58 per cent from ponds, rivers and wells owned by others. There appear to be no handpumps on dugwells, and tubewells appear to be much more prevalent than dugwells. People have claimed that distance is the major constraint to water collection for daily use. Most of them have to collect water from an average distance of 50-100 meters. However, the percentage of population having to negotiate a distance between 100-200 meters or more is also quite high. The distances from which people collect water in the Dakkhin Hulain and Almapur villages of Patia upazila in Chittagong are much more than those above. There they have to collect water from distances more than one kilometer. In this area the water table is within 3-4 meters but salinity is so high that it cannot be used for drinking purposes. Sweet water can be obtained at greater depths and deep tubewells are required to tap it. A deep tubewell is expensive and out of reach of villagers. In Uttar Kainmaru village in the Mongla upazila, water is available within shallow depths as well, but it is unsuitable for drinking being highly saline. People in this area depend on open ponds and rainwater for drinking water. It was observed during the survey that rainwater collected had been stored in the same container for months and was being used for drinking. Besides

Table 2. Water Supply and Sanitation Service Levels from Household Surveys in 20 Study Villages – Bangladesh

SI No.	Name of Village	Village Population	No. of Households	Households Surveyed	Sources of Water %			Main Problem	Latrine Use (%)			
					Public Well	Private Well	Others		Public Pit	Private Pit	Private Hanging	None
01	Khagrakuri	1,403	250	216	30	11	59	D, Q	1	5	74	20
02	Dhakuli	1,172	211	204	20	15	65	D, NR	-	1	75	24
03	Nabagram	2,145	408	123	25	17	58	D	-	5	73	22
04	Bara Barial	1,502	305	138	25	20	55	D, Q	-	-	76	24
05	Garpara	1,330	199	124	19	20	61	D	-	3	92	5
06	Dakkhin Pomra	1,963	450	140	53	9	38	D, Q	-	1	40	59
07	Kulkurmai	612	118	118	56	8	36	D	2	3	59	36
08	Jangal Ghat Chek	576	74	68	27	2	71	D	-	-	16	84
09	Alampur	881	122	86	56	6	38	D, Q	-	-	50	50
10	Dakkhin Hulain	2,185	361	87	52	-	48	D, Q	-	-	49	51
11	Haitupi	1,990	248	109	12	40	48	D, Q	-	4	50	46
12	Beradanga (CKG)	2,000	240	138	25	37	38	D	-	-	6	94
13	Sindai (BDC)	2,400	285	103	13	17	70	D	-	-	15	85
14	Dakkhin Ramnagar	1,489	286	98	17	21	62	D, Q	-	-	1	99
15	Kachukata Bandar	2,154	419	101	3	51	46	D	1	-	-	99
16	Uttar Kainmari	1,500	200	92	-	-	100	D, Q	-	1	8	91
17	Ghoshgati	1,583	286	75	42	6	52	D	-	7	20	73
18	Bativita	1,480	251	62	10	3	87	D	-	2	48	50
19	Dakkhin Dighalia	2,080	270	105	-	5	95	D	-	7	24	69
20	Kamalapur	1,895	218	105	23	14	63	D	-	-	86	14
Total/Average		32,340	5,201	2,292	26%	16%	58%			2%	48%	50%

D = distance
NR = not reliable
Others = tubewell, pond, river and canal
CKG = Chowdhurypara, Kismat and Shunpara
BDC = Buri Danga colony
Q = Quality

Source: Field survey.

Table 3. Water Supply and Sanitation Facilities in 20 Study Villages – Bangladesh

	Village Name	Popu-lation	Dugwells		Tubewells		Handpumps		Latrines	
			Public	Private	Public	Private	Public	Private	Public	Private
1	Dhakuli	1,172	-	-	12	10	12	10	-	180+(10)
2	Nabagram	2,145	2	4	14	23	14	23	0+(3)	396+(9)
3	Barabarial	1,502	2	3	10	2	10	2	-	305+ (0)
4	Khagrakuri	1,403	-	1	15	19	15	19	0+(1)	225+ (6)
5	Garpara	1,330	-	8	5	5	5	5	-	194+ (5)
6	Dakkhin Hulain	2,185	-	-	13	5	13	5	0+(8)	240+(43)
7	Alampur	881	-	-	4	1	4	1	0+(1)	75+ (7)
8	Dakkhin Pomra	1,963	-	-	19	10	19	10	0+(1)	330+(25)
9	Jangalghatchek	576	-	-	3	6	3	6	-	10+ (1)
10	Kulkurmai	612	-	-	4	6	4	6	0+(2)	34+(60)
11	Haitupi	1,990	-	-	10	8	10	8	-	210+ (5)
12	Shindai	2,400	1	26	3	2	3	2	-	3+ (0)
13	Dakkhin Ramnagar	1,489	3	25	9	7	9	7	-	5+ (3)
14	Beradanga	2,000	1	8	7	4	7	4	1+(0)	2+ (2)
15	Kachukuta Bandar	2,154	2	7	8	2	8	2	1+(2)	1+ (4)
16	Ghoshgati	1,583	-	1	9	3	9	3	-	269+(10)
17	Bativita	1,480	1	-	33	40	33	40	0+(1)	215+(35)
18	Dakkhin Dighalia	2,080	-	-	21+1*	4	22	4	0+(2)	233+(35)
19	Uttar Kainmari	1,500	-	-	-	-	-	-	-	170+(30)
20	Kamalapur	1,895	-	5	15	34	15	34	0+(1)	197+(20)
	Total	32,340	12	88	215	191	215	191	2+(22)	3294+(310)

Note: Figures in parentheses of last 2 columns indicate sanitary latrines only. All others are open, hanging type.

* Deep tubewells each having total depth greater than 200 m.
All other tubewells under the column "Tubewells" are shallow.

the Patia upazila in Chittagong and the Mongla upazila in Bagerhat and Khulna district, nobody complained about salinity in groundwater. When questioned about other aspects like water quality, some reported excess iron content (particularly in Manikganj area) and some reported sand coming out along with tubewell water. In some areas of Chittagong, Nilphamari and Khulna, tubewells are reported to work less efficiently during the dry season (April-May) of the year.

Only 2 per cent of all the households surveyed have their own hygienic pit latrines, 48 per cent use improvised latrines and about 50 per cent do not have any latrines; they use the fields. The total number of latrines in the 20 villages approximates to one per nine persons, but only about 10 per cent of these are assessed as sanitary. In the absence of a safe water supply, people, particularly the children, are easy prey to diseases like diarrhea, dysentery and other fatal diseases, resulting in a high death rate.

Preference of Water Source (see Table 4)

Hand pumps with tubewells are largely in use all over Bangladesh now whereas in the past, dugwells were common. Even now dugwells are used to supply water for various uses. Among the surveyed villages, in all villages of the Nilphamari Sadar upazila and in some villages of Manikganj and Khulna, dugwells have been found in use. These wells are circular and small in size and lined with earthen or concrete rings but the tops are always open.

When asked about their preference among dugwells, wells with a hand pump and tubewells with handpumps, people have opted for tubewells with handpumps. However, some people in Manikganj have shown interest in dugwells with a hand pump. The reason may be a suspected excess of iron in the water associated with tubewells.

People in 18 of 20 villages were interested in family-owned wells and tubewells. Only the people of Dakkhin Hulain and Alampur villages desired the tubewells for groups of people through government or other financial assistance. There is a possibility of tapping a sweet water aquifer which requires the installation of deep tubewells at costs out of reach of the villagers. People of Uttar Kainmari in Mongla opted for digging more special types of ponds to collect rainwater because there are no accessible sweet-water aquifers in this area. But again the use of pond water as drinking water is far from acceptable from the health point of view. It is recommended that to improve the supply of drinking water in the Mongla and Khulna region a more scientific and specific approach be adopted.

Table 4. Water Supply and Sanitation Preferences from Household Surveys in 20 Study Villages – Bangladesh

SI No.	Name of Village	Village Population	No. of Households	No. of Households Surveyed	Household Income (annual)	Women's Organization	Health Educ. Prog.	Main Priority	Family Handpump Demand %
01	Khagrakuri	1,403	250	216	Tk12,000	Yes	Nil	W&S	63
02	Dhakuli	1,172	211	204	10,000	Yes	Nil	W&S	52
03	Nabagram	2,145	408	123	24,000	Yes	Nil	W&S	44
04	Bara Barial	1,502	305	138	11,000	Yes	Nil	W&S	67
05	Garpara	1,330	199	124	9,600	Yes	Nil	W&S	72
06	Dakkhin Pomra	1,963	450	140	19,200	Yes	Nil	W&S	74
07	Kulkurmai	612	118	118	21,600	Yes	Nil	W&S	68
08	Jangal Ghat Chek	576	74	68	7,200	Yes	Nil	W&S	85
09	Alampur	881	122	86	29,000	Yes	Nil	W&S	97
10	Dakkhin Hulain	2,185	361	87	18,000	No	Nil	W&S	100
11	Haitupi	1,990	248	109	14,400	Yes	Nil	W&S	70
12	Beradanga (CKG)	2,000	240	138	6,000	Yes	Nil	W&S	78
13	Sindai (BDC)	2,400	285	103	7,200	Yes	Nil	W&S	79
14	Dakkhin Ramnagar	1,489	286	98	12,000	Yes	Nil	W&S	85
15	Kachukata Bandar	2,154	419	101	8,400	Yes	Nil	W&S	91
16	Uttar Kainmari	1,500	200	92	12,000	Yes	Nil	W&S	15
17	Ghoshgati	1,583	286	75	15,000	Yes	Nil	W&S	93
18	Bativita	1,480	251	62	16,000	Yes	Nil	W&S	52
19	Dakkhin Dighalia	2,080	270	105	15,000	Yes	Nil	W&S	97
20	Kamalapur	1,895	218	105	20,000	No	Nil	W&S	68

CKG = Chowdhurypara, Kismat and Ghunpara
BDC = Buri Danga Colony
W&S = Water and Sanitation

Source: Field Survey.

Affordable Amount of Credit Repayment

It was found that in reply to the question "how much money could you pay back each year" for a loan given to construct a private well or water supply arrangement, the respondents' replies did not match the average earnings of the regions. For example, although average annual household incomes of the surveyed villages in Rajshahi Division was Tk8,400 compared to Tk13,200 of households in Dhaka Division, the respondents in the Rajshahi villages indicated that they would be willing to pay up to Tk462 per year compared to Tk260 in Dhaka Division. Table 5 compares the annual average household earnings with the amount the households are willing to pay as repayment installments of loans for water supply purposes.

Table 5. **Average Annual Repayment Installments (Taka)**

Division	Annual Household Income	Average Annual Repayment (from survey)
Dhaka Division Villages	13,320	260
Chittagong Div. Villages	18,233	608
Rajshahi Div. Villages	8,400	462
Khulna Division Villages	15,600	1,056

This highlights an important finding of the survey. In spite of their comparatively greater degree of poverty, people in Rajshahi are willing to spend larger amounts to obtain a safe and secure water supply than in the other higher-earning divisions. This is because of the acute shortage of water in these areas.

IV. SUMMARY OF TECHNICAL ASPECTS

The Department of Public Health Engineering (DPHE) is the sole government agency responsible for implementation of rural water supply and sanitation schemes throughout the country. UNICEF is DPHE's main

funding agency for the purpose. Some NGOs are also working in this field taking the tubewell materials from DPHE.

Until now, the shallow tubewell with a No. 6 handpump (suction type) has been the major and popular source of water supply for drinking and other needs of the rural population. Another suction type handpump, the Rower pump, although used by many people, has not officially been endorsed by DPHE for use in lifting drinking water due to a design which allows contamination of the pumped water. It is normally used to lift water from a river or pond rather than a tubewell.

Handpumps are available in village markets which are never farther than 12 km from any of the 20 villages under study. The current cost of a shallow tubewell with handpump is Tk1,500-2,500. About 30,000 No. 6 handpumps and 6,000 Rower handpumps are sold annually to the private sector. By contrast a water seal latrine will cost Tk500-1,000.

With the extensive use of power pumps and handpumps in the country for drawing groundwater for irrigation, the serious depletion of groundwater tables has resulted in major problems for shallow tubewells with a suction type handpump drilled in new areas of the country.

Dugwells with handpumps are not popular in the country. A few of this type are in existence in the Hill Tract areas only. Before the massive installation of shallow tubewells with handpumps during the last two decades, dugwells used to play a vital role in supplying drinking water for the rural people. Nowadays, dugwells are becoming redundant and being replaced by shallow tubewells with handpumps. But the survey record shows that dugwells are still largely used in the northern region, e.g. Nilphamari.

The drilling of a shallow tubewell (ranging from 10 m to 76 m) is done by a very simple, popular and low cost, traditional "sludger" method throughout the country. The drilling cost is approximately Tk15 per meter by this method.

In general, groundwater from aquifers is potable and free from coliforms and other harmful bacteria for most of the areas of the country. Shallow groundwater in the coastal belt is unusable, unless treated, due to high salinity problems. Hence, expensive deep tubewells are installed in this area to get sweet water.

Shallow groundwater in some flat areas of the country has a high iron content (about 4-10 ppm). However, it is reported that people are habituated to drink water up to 8 ppm of iron content without adverse effect.

The depletion of the groundwater table has resulted in a challenging task for DPHE to identify some low-cost handpump models to lift water beyond the limit of the cheaper suction type handpumps. Such pumps

known in Bangladesh as deepset, were until recently, more expensive and more difficult to install, required a larger diameter upper tubewell casing and usually required special equipment and trained manpower for maintenance. To reduce cost and ensure easy maintenance a new design of deepset pump known as the Tara has been developed in Bangladesh. This direct action PVC handpump can be operated in water tables down to 12 meters, beyond which it becomes hard to pump. The pump has a high yield, can be installed using the traditional sludger system, and can be easily maintained by the users without handtools. It is half the cost of the conventional deepset pump and can be made in Bangladesh. However, there is still a need to identify one or two more handpump models for deepset tubewells to avoid a monopoly of Tara pump manufacturers and to fulfill the requirement for a great number of such pumps best suited to different regions of the country as a replacement for shallow-well handpumps. There is also a need to further reduce the cost of the Tara handpump to make it affordable for private purchase.

In spite of the depletion of groundwater tables in many parts of the country, there is still scope to install cheap, shallow tubewells with a No. 6 handpump for individual families to provide water near the home. Actually shallow groundwater is still estimated to be available to about 85 per cent of the rural population of Bangladesh. It is reported from the households surveyed by the sociologist in the villages selected for this study that the majority of the people opted to have their own family tubewell if it could be arranged on an interest-free loan with a low repayment rate.

V. A FAMILY HANDPUMP SCENARIO

The following family handpump scenario is suggested by the consultants.

The Government of Bangladesh will identify and engage the NGOs as implementing agencies who are already involved in women-development activities and water supply and sanitation at the village level. The Department of Women's Affairs will act as executing agency on behalf of the Government for supervising and monitoring the activities of the NGOs.

The NGOs should work with Government (supported by UNICEF) to assess the actual demand in a specific region for family-owned shallow tubewells with handpump. A public relations and health and hygiene educational thrust at the village level is to be followed up by village socio-economic and technical surveys.

The NGOs will discuss the results of the survey with government officials. The NGOs and Government will identify an appropriate funding agency to provide and distribute initial seeding capital. The terms of repayment are to be preferably credit without interest repayable in 3-5 years. Guarantees/collateral should not be required and the role of the NGO in collecting repayments from the individual families is to be defined. The rate of repayment should not be less than Tk30 per month.

The NGO on the basis of people's choice and professional advice (from UNICEF and DPHE), select two standardized and affordable shallow-well handpumps to be made available locally for sale through the women's group in the village.

The NGO will contract a local driller to drill the required number of tubewells in the village and assist in handpump installation.

Individual families will buy and install (with credit) the handpump of their choice to use and own.

Individual families should help one another in installing the handpump on the tubewell, providing at the same time washing and bathing facilities. Some technical advice would initially be provided (through DPHE/UNICEF) for the first two or three installations in each village.

Operation and maintenance training of women is to be provided by pump manufacturers/suppliers.

Individual families will repay the NGO for credit provided for handpumps, tubewell drilling and construction of the platform.

Individual families will maintain the pumps and obtain spare parts for pumps from the NGO in the village until the credit is repaid. The NGO will liaise with the pump manufacturers/suppliers. It is expected that when a lot of shallow tubewells will be installed in the village then the spare parts will be available in the village market.

The NGO will be responsible for implementing the project and will report to the government funding agency at predetermined intervals.

The NGO with the concurrence of the Government will operate a revolving fund for use of future buyers in a village or cluster of villages.

For effective implementation of the project the NGO should form a project implementation committee at the village level, involving representatives from different sectors and beneficiaries. At least 60 per cent of the committee should be women.

VI. THE COUNTRY SEMINAR – SUMMARY AND RECOMMENDATIONS

The Seminar on "Women and Water: The Family Handpump" was formally inaugurated by Mr. Rezwanul Haque Chowhdury, Honorable Minister for Social Welfare and Women's Affairs, on August 6, 1989 in the auditorium of the National Museum.

The three-day program was divided into technical sessions and each session had a separate chairperson from different Ministries and the Planning Commission. Ms. Tajkera Khair, sociologist and team leader, and Mr. A.S.M. Imdadul Islam, rural water supply engineer for the project, presented the seminar papers on the study. After the presentation of seminar papers, open discussions were held among participants. There was an extensive exchange of ideas and views leading to conclusions and recommendations. Women representatives from 20 villages, delegates of local handpump manufacturers, DPHE, credit institutions and international agencies (ADB, UNICEF, WHO) were also present and took part in discussions.

The following resolutions were adopted unanimously after discussions in the country seminar:

Extent of demand for family handpump:

* About 70 per cent of the total number of households interviewed expressed interest in the family handpump. Water supply ranked as first priority and sanitation ranked as second priority in the interviewed households.

Main problems with water supply expressed by people:

* The main problem is the distance negotiated to collect water. Drying up of tubewells by the depletion of the water table (i.e. beyond the suction limit of handpump) every year is a major problem for the country as a whole.

Preferences for dugwells/tubewells/drilling:

* People prefer tubewells. The common and preferred method of drilling is the sludger method. All shallow tubewells are drilled by this method.

Standard installations proposed:

* The standard installation proposed is a family tubewell plus handpump. The average cost of a shallow tubewell of 30 m depth with No. 6 pump, PVC pipes and strainers is about Tk2,500 including installation and cost of platform.

Financing and credit:

* The most promising sources of financing might be the Sonali Bank and Bangladesh Krishi Bank who are already providing services in almost every upazila of Bangladesh.

Realistic terms of credit:

* Repayment period of credit should be 3-5 years without interest and the minimum repayment amount should be fixed at Tk30 per month. (Note: If the source of financing is a credit institution, a loan without interest will require subsidization of the operating and management costs of the credit institution. In addition, funds will be required by the NGO for implementation costs.)

Role of Government/NGOs/women:

* Government should play the main role, involving local NGOs which are already involved in women's development and in rural water supply and sanitation activities. Women's organizations at the village level should be the focus.

Pilot project:

* Participants endorsed the need for a pilot project along the lines proposed by the consultant and indicated the original 20 study villages should be given priority.

Others:

* An appropriate water development policy should be determined at national level to ensure the availability of groundwater for domestic use. Proper methods of extraction of groundwater resources throughout the country should be ensured.

* Income-generating activities should be introduced among the beneficiaries. This could be done by using excess water from tubewells for kitchen gardening, seedbed preparation, minipond pisci-culture, pearl culture, mushroom culture, etc. Rower pumps are also being used for this purpose in many parts of the country. Besides these, other income-generating activities like poultry, farming, rearing silk worms, duck-cum-fish farming and other cottage industries could be implemented to supplement the family income and thus help beneficiaries to repay credit more easily.

* The platform of tubewells must be raised in flood-prone regions. Latest technology should be adopted in this regard.

* Health education programs should be provided for the beneficiaries.

* Government tax on tubewell equipment should be abolished so that the villagers can buy the handpump at a low cost.

* Training on recommended income-generating activities should be organized.

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COUNTRY PAPER – INDONESIA

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CONTENTS

I. INTRODUCTION

Background

The lack of clean water sources in the rural areas is very closely related to rural women's burden. In most countries, women are the main water users for domestic purposes. These include water for drinking and cooking, washing clothes, bathing the children, etc., and it is the women's responsibility to provide water for the family. To do this, many of them have to carry heavy loads of water to their homes which are relatively far away from the water sources.

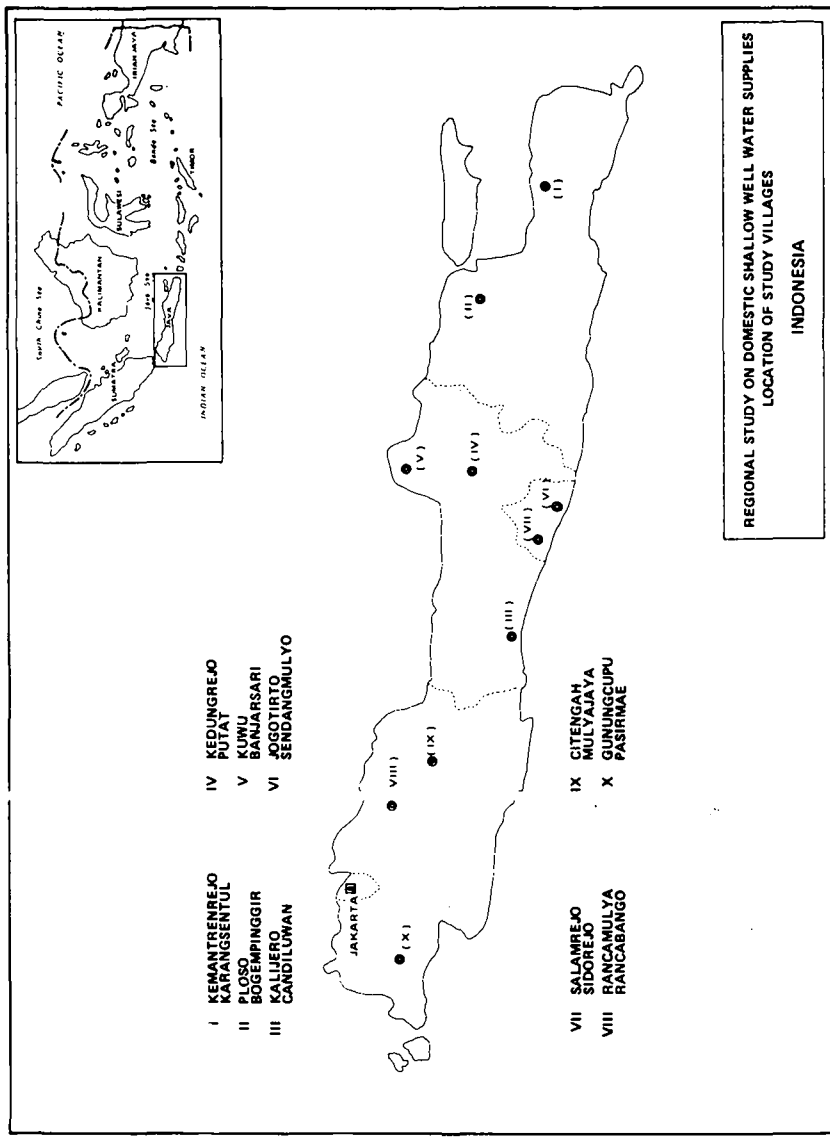
Indonesia with 175.6 million people, 127.2 million (72 per cent) of which live in the rural areas, is one of the developing countries with a great need for sufficient and reliable water supply sources and proper sanitation for its rural population. In recent years the Indonesian Government has been spending about US$60 million per year on rural water supply and US$12 million per year on rural sanitation. Despite these efforts it is estimated that only about 32 per cent of the rural population have adequate clean water supplies and even less have satisfactory sanitation (latrines). It is thus apparent that self-financing and self-help for rural water supply and sanitation are needed.

Objectives

The general objective of this study was to explore the extent of the demand for a self-help domestic water supply through shallow wells equipped with handpumps, by gathering data on sociological, economical as well as technical aspects.

II. METHODOLOGY

Each study country was required to survey 20 representative villages. The Ministry of Women's Role – in agreement with the local consultants – decided that the survey should be conducted in four provinces on the island of Java. Ten districts (Kabupatens) were chosen out of the four provinces and two villages were chosen in every district. (See the location map of Indonesia for the location of these study villages.)


I KEMANTRENREJO
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II PLOSO
BOGEMPINGGIR
III KALIJERO
CANDILUWAN
IV KEDUNGREJO
PUTAT
V KUWU
BANJARSARI
VI JOGOTIRTO
SENDANGMULYO
VII SALAMREJO
SIDOREJO
VIII RANCAMULYA
RANCABANGO
IX CITENGAH
MULYAJAYA
X GUNUNGCUPU
PASIRMAE
JAKARTA
REGIONAL STUDY ON DOMESTIC SHALLOW WELL WATER SUPPLIES
LOCATION OF STUDY VILLAGES
INDONESIA

The provinces and the districts were chosen by the Ministry of Women's Role, while the choice of villages was made by the local district officials (Bupati) based on the criteria set by the Asian Development Bank. The criteria were as follows:

- availability of groundwater no deeper than 10 meters,
- no piped water scheme for the next five years,
- village population of not more than 2,500, and
- existence of a strong women's organization.

The consultants visited all the 20 chosen villages in 10 districts of the four representative provinces. Meetings were held with village committees, women's organizations and community members. In these meetings the consultants discussed the possibility of families financing their own water supply and sanitation facilities and listened to the reaction and opinions of the villagers. Later, families in the villages were also interviewed. The consultants also met Government and Bank officials at the local, district, provincial and national levels. Some non-government organizations (NGOs) with several years of experience in implementing community water supply projects were also interviewed.

Besides interviews, the consultants observed and examined the groundwater conditions, the nature of existing dugwells, and the condition of existing handpumps. They also took water samples for laboratory examination.

In some districts due to the high density of population, it was hard to find a village with a population of less than 2,500. In others it was hard to find a village which had water problems and a strong women's organization. The consultants visited each of the villages chosen to see whether the village could be used as a pilot project site. From the 20 villages chosen, there was only one which needed to be substituted by another. Table 1 gives the population of the study villages.

Table 1. **Names of Study Villages and Populations (Indonesia)**

Province	District	Subdistrict	Village	Population	Household
East Java	Sidoarjo	Krembung	Ploso	1,962	414
		Balungbendo	Bogempinggir	1,685	281
	Pasuruan	Gondangwetan	Karangsent	3,349	740
		Rejoso	Kemantrenrejo	2,659	614
Central	Kebumen	Kebumen	Kalirejo	4,132	688
Java		Adimulyo	Candiwulan	3,863	360
	Grobogan	Purwodadi	Kedungrejo	3,850	940
		Purwodadi	Putat	3,516	884
	Demak	Dempet	Kuwu	1,983	318
		Gajah	Banjarsari	2,692	571
Yogyakarta	Sleman	Berbah	Jogotirto	8,426	2,118
		Miggir	Sendangmulyo	7,743	1,656
	Kulon-	Sentolo	Salamrejo	4,782	962
	Progo	Lendah	Siderejo	7,200	1,421
West Java	Sumedang	Wado	Mulyajaya	1,918	515
		Sumedang	Citengah	1,007	243
	Subang	Patokbeusi	Rancamulya	5,172	1,389
		Patokbeusi	Rancabango	9,205	2,273
	Pandeglang	Cimanuk	Gunungcupu	1,816	312
		Cimanuk	Pasirmae	2,056	386

III. RESULTS OF SURVEY

Technical Aspects: General Findings

- Almost all the villages surveyed are in need of new water supply facilities or improvement of the existing water supply facilities.
- A number of villages have problems with groundwater quality which is either brackish or polluted.
- Some villages have problems with the availability of well water during the dry season.
- Most of the villages surveyed are in need of proper sanitation facilities.
- Need of assistance is greater in areas where there is no shallow groundwater available.
- Many villages do not have proper drainage for waste water.

Water Sources and Facilities (see Tables 2 and 3)

Of the 20 villages surveyed, there are 12 villages that use groundwater as the only water source. In the other eight villages, besides groundwater the villagers also use surface water, either from springs or rivers, for their domestic water source. About 70 per cent of the people interviewed walk more than 50 meters and 30 per cent walk more than 200 meters for water. The mother participated in the fetching of water in 86 per cent of households interviewed and in around 40 per cent she was the sole procurer of water. In contrast the father participated in fetching water in 50 per cent of households but was the sole procurer in only 5 per cent.

Banjarsari village of Demak District, Central Java Province has a unique way of counteracting the drought. During the dry season, as the wells go dry, the villagers drain the river water to their wells so that the function of the wells changes to that of a water tank. This is possible because there is an irrigation canal that flows through the village near the houses.

Groundwater is the main water source in all the villages surveyed. From 423 families, respondents of the 20 villages, 84 per cent utilized groundwater as their main water source 87 per cent of those used dugwells whereas only 13 per cent used tubewells. Table 2 shows the source of water for the surveyed households while Table 3 presents data on the water supply and sanitation facilities in each of the study villages.

In all the villages surveyed there are shallow wells with a depth from two to 12 meters. There are only two villages in which there are also some deep wells (more than 12 meters). The topography of these two areas is such that in any one village the groundwater depth is not the same. The climate also influences the groundwater level in the wells. In the dry season most well water goes down and there are some which run dry. Drought is faced by villagers at Kuwu and Banjarsari. Not only do most of the wells go dry, even those which have water cannot be utilized because the water turns brackish. Villagers who experience difficulties in obtaining water from their wells in the dry season tend to go to nearby rivers and canals as alternative sources.

Water Quality

One village, Candiwulan, has problems with dugwell water. Most of it is brackish and emits a foul smell. However, there are several drilled wells at the same place which produce fresh and clean water because the drilled well usually goes to a depth of seven to 18 meters while dugwells are usually only about four to five meters deep.

Table 2: **Source of Water in Surveyed Households of 20 Study Villages (Indonesia)**

Village	Total Households	Surveyed Households	Dugwell Users	Tubewell Users	Other
Ploso	414	18	18		
Bogempinggir	281	23	18	5	
Karangsentul	740	25	24	1	
Kemantrerejo	614	24	21	3	
Kalirejo	688	20	20		
Candiwulan	360	21	21		
Kedungrejo	940	22	22		
Putat	884	22	19	3	
Kuwu	318	19	19		
Banjarsari	571	20	11		9
Jogotirto	2,118	20	19		1
Sendangmulyo	1,656	20	16		4
Salamrejo	962	20	20		
Sidorejo	1,421	21	21		
Mulyajaya	515	22	7	1	14
Citengah	243	24	6		18
Rancamulya	1,389	21	4	17	
Rancabango	2,273	25	8	17	
Gunungcupu	321	2,020	14	1	5
Pasirmae	386	16	16		
Total	17,085	423	308	48	67
% of Total		100	73	11	16

Table 3: **Water Supply and Sanitation Facilities in 20 Study Villages (Indonesia)**

Village (1)	No. of Households (2)	DGW + TW (3)	DGW (4)	DGW + HP (5)	Tubewells (6)	HP (7)	EP (8)	Latrines (9)
Ploso	414	388	380		8	8	2	360
Bogempinggir	281	188	60	2	58	58	3	25
Karangsentul	740	820	700	4	116	120	40	245
Kemantrerejo	614	566	508		58	58	4	65
Kalirejo	688	554	550	1	3	4	3	10
Candiwulan	360	386	355	1	30	31		70
Kedungrejo	940	33	21		12	12		12
Putat	884	52	18		34	34		40
Kuwu	318	90	87		3	5		20
Banjarsari	571	39	36		3	3		78
Jogotirto	2,118	1,640	1,467	2	173	175	20	200
Sendangmulyo	1,656	653	601	1	51	52	5	20
Salamrejo	962	415	395	1	19	20		37
Sidorejo	1,421	871	846	1	24	25		100
Mulyajaya	515	19	12	1	6	7		11
Citengah	243	5	2		3	3	1	5
Rancamulya	1,389	275	30	2	243	245	2	15
Rancabango	2,273	485	15	4	466	470	2	200
Gunungcupu	312	146	100	1	45	46		5
Pasirmae	386	59	51	1	7	8		4
Total	17,085	7,616	6,234	22	1,360	1,384	82	1,512

(3) Number of dugwells and tubewells
(4) Number of dugwells
(5) Number of dugwells with handpumps
(6) Number of tubewells with handpump
(7) Number of handpumps
(8) Number of electric pumps
(9) Number of latrines

Water samples taken from the villages surveyed show that 75 per cent are visually clean and clear. But from the laboratory tests, 88 per cent show that the groundwater is corrosive and 25 per cent have unacceptable amounts of iron.

Bacteriological tests especially for coliform show that only three villages fulfill the permissible standard for a drinking water supply. Most villagers however stated that they do not have diarrhea because they drink boiled water.

Construction of Wells

Field observations showed that the construction quality of dugwells varies. The standards, which include a platform for safety and hygienic purposes and a well lining for stability, are rarely followed.

As for tubewells, almost all of them have a platform, but the underground construction (casing pipes, filters and foot valve) is rarely completed. Shallow tubewell costs (all-inclusive) are in the order of $4.80/meter for tubewells 0 to 10 meter deep, and $5.80/meter for tubewells 10 to 20 meter deep.

The Handpump Condition

There is a 25 per cent failure rate for handpumps. From interviews with village leaders and the community and from field observations, it was found that the percentage of failures was greater in public or community handpumps. Some of the reasons included poor construction and installation, high frequency of usage, corrosion (because of water quality), poor maintenance and repair (no sense of ownership), unavailability of spare parts and tools, and poor quality of handpumps. Most individually or family-owned handpumps (many are used by more than two or three families) still operate because maintenance and repair is better, though many of these handpumps are also not in good condition.

As stated by village heads, there have been significant variations in the durability of the public handpumps in several villages. For example, the 40 handpumps in one village are regarded as public handpumps because they were given by the district heads. The village head stated that if completely free handpumps were installed for the public, then the handpumps will not be maintained properly. So he offered the handpumps to the villagers on condition that those who wanted a handpump in their yard would bear the cost of installation. It was further agreed that the handpumps would be owned by the families who installed them but would be shared with their neighbors. This way the sense of

ownership helped to sustain the water supply. There were similar cases in other villages where a family was given the handpump and in return was responsible for its maintenance and repair. Thus there have been strong tendencies towards individual ownership and a realization that it is the best way of making sure that a facility like a handpump can be better maintained.

Cost of a Well

The cost of a dugwell varied from about Rp100,000-Rp200,000, while a dugwell with handpump would cost Rp160,000-Rp274,000. Tubewells with handpumps varied from about Rp150,000-Rp210,000, but tubewell drillers were only available in about 40 per cent of the villages.

Latrines

A number of the villages surveyed are still in need of proper sanitation facilities. Information provided by village heads indicated a ratio of about one latrine to every 10 households in the study villages (see Table 3).

The Handpump Industry

The handpumps used in the villages were all of local manufacture although the brand names were not Indonesian, such as Dragon, Dragon SS, Kawamoto, Yamato, Pacific Pump, etc. Common problems mentioned are problems with the valve, broken handle, rust, etc. Water quality affects the performance of pumps. Most groundwater in the surveyed area is corrosive. The handpumps used in the villages are made of cast iron. This is detrimental to the water quality as well as the durability of the handpumps.

The NGO Yayasan Dian Desa has used PVC handpumps in some villages in Yogyakarta Province. PVC handpumps have a simple design so that even village women can repair and maintain them. The pumps proved to be of good quality so that even after three years minimal repair is needed. There are no problems with rust or corrosion because all the parts are made of PVC and plastic; the stand pipe is made of concrete. However, the PVC handpumps are not yet locally produced so the cost is still high.

Handpump Manufacturers

The manufacturers themselves admitted that they can produce the same brand in different qualities. Apparently there is no standard by which to evaluate the quality of handpumps. The difference in the quality of the handpumps, even of the same brand, can be gauged by the different prices given by the manufacturers as presented below:

BaturJaya, Klaten :	1st quality	–	Rp28,000
(shallow well	2nd quality	–	Rp20,000
suction type)	3rd quality	–	Rp17,500
UD. Anwari, Tegal :	1st quality	–	Rp55,000
(shallow well	2nd quality	–	Rp25,000
10-meter type)	3rd quality	–	Rp23,500

Socio-Economic Aspects: General Findings

Village leaders and communities surveyed showed great interest in having domestic water sources but a low cash flow was preventing most families from having their own facilities. Villagers perceived domestic or improved water supply and sanitation facilities as a convenience rather than a factor for better health.

Self-financing (through arisan) is not new to most villages. However, only two out of the 20 villages surveyed have started activities to meet the villagers' need for either water supply or sanitation facilities. Others concentrate more on public concerns such as roads and mosques. With regard to domestic concerns, the main preference is for family-owned rather than small group or community-owned facilities.

In the villages of Yogyakarta and Central Java Provinces, dugwells with pails are common. Most villagers in these areas (especially the women) said that they do not feel that it is hard work to get water from wells. There is also the tradition that dugwells are property that can be passed on to the next generation.

Besides tradition, habit and past experiences, the villagers' knowledge of handpumps has also had a strong influence on their choices. The failure of most handpumps has set a bad precedent. In the villages surveyed in Yogyakarta and Central Java, previous handpump projects have not been successful. Most of the handpumps in those villages were abandoned after relatively short periods of use, i.e. about a year. The reasons vary. Some broke down because of corrosive water, in others the water quality was not acceptable and therefore remained neglected.

Economic considerations also influence the choice. One reason given by those who prefer dugwells over handpumps is that dugwells are more cost-effective and last as long as the villagers live with minimum maintenance and repair. Villagers feel more comfortable using dugwells which are property that they own and can be inherited by the next generation; moreover, the water tastes better.

Their reasons for not wanting handpumps are: (i) that water is foul-smelling and yellow; (ii) they are difficult to maintain; and (iii) once the water level drops the handpump is useless. Wells can be deepened if need be, but wells with handpumps would be too costly.

Table 4 shows that villagers in Central Java and Yogyakarta prefer dugwells. On the other hand, villagers in East Java and West Java prefer drilled wells with handpumps. They seem to place a higher value on the convenience factor, i.e., it is easier to operate. They are more inclined to opt for handpumps with some preconditions such as good quality and proper installation.

Besides the above preferences, there is a strong desire for electric pumps, in villages where there is electricity. Those who want electric pumps may not have considered the cost of electricity. They seem to rate prestige and convenience as important factors in making their choice.

Extent of Demand for Family Water Supply and Sanitation Facilities

The demand for water supply and sanitation facilities can be seen in Table 4. Fifty-nine per cent of the total respondents stated that they need water supply facilities, while 26 per cent stated that they need latrines. Fifteen per cent of the respondents do not want loans for water supply or sanitation facilities. They do not have the capacity to repay loans and are not sure whether it is possible to get clean water with dugwells or handpumps, especially in areas with polluted water and with drought problems. Another reason is that the potential handpump owner's house may be very small and too close to other houses so that there is no place for the handpumps or the latrines.

Preference in Ownership Pattern

An individually owned domestic water supply facility is the majority's preference. Shared payment or shared ownership is not acceptable because tension may be created between partners over repayment, repairs and other related disputes. Also, the ownership of the handpump is a prestige issue.

Table 4: **Water Supply and Sanitation Preferences in Surveyed Households of 20 Study Villages (Indonesia)**

Village	House-holds Surveyed	Dugwell	Dugwell with Handpump	Tubewell with Handpump	Electric Pump	Latrine	No Credit Wanted
Ploso	18	1		14	3		
Bogempinggir	23	3	2	4	2	9	3
Karangsentul	25	1	2	8	3	6	5
Kemantrerejo	24	1	1	2	6	11	3
Kalirejo	20	6	3	2	8	1	
Candiwulan	21	8	2	6	5		
Kedungrejo	22	12				3	7
Putat	22	10				10	2
Kuwu	19	9	2	3		2	3
Banjarsari	20	17	1	2			
Jogotirto	20	11			1	6	2
Sendangmulyo	20	8	1	1	1	8	1
Salamrejo	20	13				6	1
Sidorejo	21	11				8	2
Mulyajaya	22	5		9		3	5
Citengah	24			9		4	11
Rancamulya	21	0	2	3		10	6
Rancabango	25		3	10	3	8	1
Gunungcupu	20	2		11	1	2	4
Pasirmae	16	5		4		3	4
Total	423	123	17	70	39	109	65
% of Total	100	29	4	17	9	26	15

Financing and Credit

Financing aspects very often become a major constraint in many water supply projects, more so if progress depends mainly on the Government's financial support. The family-owned pump may help to develop programs which minimize the Government's part and increase community involvement and contribution. This may only be possible if the program is designed and implemented in ways which will ensure sustainability and replicability.

In general, most communities still wait for free assistance from the Government for their water supply and sanitation facilities. However, to most villagers, the concepts of self-financing and credit with interest are not new ideas because there are informal credit institutions in most villages, usually run by village women's organizations. The most common system used as a means of self-financing is arisan , which is collecting a certain amount of money or a part of the harvest from members for special purposes.

During meetings and interviews it became apparent that the construction cost of the new facilities was the primary concern. The monthly cash income of the surveyed families in the 20 villages mostly ranged from Rp25,000-Rp 100,000 with an average of around Rp50,000. This did not include other factors which should be counted such as from where they derived their fish, vegetables or daily meal. About 60 per cent of the families have the capability of repaying Rp2,000-Rp5,000 per month with an average of around Rp3,000 per month.

In most villages, the PKK (Family Welfare Promotion Group) has what is called "saving and lending activities". With such activities the villagers, especially the women who belong to the group, are capable of using credit facilities. This kind of credit is managed informally but it has interest rates ranging from 1.5 to 5.0 per cent per month and a loan duration ranging from one to three months. The maximum loan ranges from Rp10,000-Rp50,000 according to the group's financial resources. This is the choice of most women in arranging credit because they usually need only small amounts of money and it is an easy procedure with no formal letters and no collateral required. Furthermore, it offers flexibility if one cannot pay at a certain time. Most of the PKK committee members who are involved in the administration of these lending activities stated that repayment performance is good, averaging 80 to 90 per cent recovery.

The perception of the people regarding banks as formal credit institutions varies. However, the majority admit that while they have nothing against the banks, they are somewhat afraid to approach them for a loan because (i) banks only lend to business people, (ii) they need

collaterals of land, car or motorcycle certificates; (iii) they have complicated procedures, and (iv) people doubt their own ability to repay on time, e.g. due to a crop failure.

There are three different banks which operate at the village level: Bank Republic Indonesia (BRI), Bank Umum Koperasi Indonesia (BUKOPIN), and Bank Pembangunan Daerah (BPD). The officials of all three showed a positive response to the idea of credit for water supply and sanitation facilities, although none has had experience in this field to date. As an example, one bank currently offers loans up to Rp250,000 repayable in 10 months at 3 per cent per month interest rate. No collateral is required other than a letter of recommendation from the village head. There is also some flexibility in the repayment schedule which could be weekly, monthly or every harvest.

IV. ORGANIZATIONS AND IMPLEMENTATION

The Village Women's Organization: PKK (Pembinaan Kesejahteraan Keluarga)

In all of the villages surveyed PKK groups exist. The Family Welfare Promotion Group (PKK), which consists of the wives of government officials, is an NGO but the Government still supports some of its programs. PKK is a community development movement with a bottom-up approach in which women play a central role as motivators. It is also responsible for enhancing women's participation in family health, and is actively involved in hygiene and sanitation improvement.

Almost all PKK in the villages surveyed showed their willingness to support a family water supply through self-financing methods either in motivating or assisting in the necessary administrative work. But, they also insisted that credit should be more formally organized and that it should involve the village head.

The LKMD (Lembaga Ketahanan Masyarkat Desa)

Like PKK, LKMD (Village Institution for Village Resilience) is a semi-government organization at the village level. The philosophy of LKMD is that it is formed by and for the community. LKMD's task is to unify government activities and tap the initiative of gotong royong (self-help) of the community in all aspects of life.

Non-Government Organizations (NGOs)

In Indonesia there are hundreds of local, national and international NGOs who work in the rural areas. Their main aim is to assist the rural community to develop themselves to improve their living conditions. The activities vary. There are only a few NGOs who work in the field of rural water supply and sanitation. In Java, there are two national and one international NGOs who have several years of experience in implementing rural water supply programs. The two Indonesian NGOs are Yayasan Mandiri based in Bandung and Yayasan Dian Desa based in Yogyakarta. The international NGO is CARE Indonesia, with the head office in Jakarta and several branch offices in and outside Java.

Yayasan Mandiri means "foundation for self-reliance". Founded in 1972, the Mandiri approach is through community involvement, initiative and responsibility in designing and implementing a project. Yayasan Mandiri perceives itself as a catalyst for development. After helping a community identify its most pressing needs in terms of concrete projects, it tries to help the community with the organizational, technical and management skills needed to implement the project. But the community itself must agree to supply the necessary energy and enthusiasm and take eventual responsibility for the project.

Yayasan Dian Desa is an appropriate technology group working for rural development. In the language of the people of Indonesia, Dian Desa means "light of the village". To many of these people Dian Desa also means a way to a better life. Since its establishment in 1972 Yayasan Dian Desa's primary concern has been the availability of clean water for people in rural areas. Dian Desa believes that until the lack of drinking water is overcome it will be impossible to implement programs aimed at improving people's standard of living. With all their time and energy spent on subsistence needs like obtaining water, people view anything beyond as unaffordable luxuries.

Dian Desa has already implemented a family handpump project in some villages under a credit system. This involved the field testing of PVC Unimade Mark II handpumps. After three years all 120 handpumps (eight of which are communal) are still in good condition. Dian Desa involved women both in repair and maintenance of the handpumps and in the credit repayment. Results to date are quite good with 95 per cent recovery of repayments.

CARE Indonesia is an international development agency which concentrates on health activities and so rural water supply has attracted considerable attention. Since 1988 CARE has changed its strategy in rural water supply from subsidized to self-financed projects. In the latter

projects, CARE has been able to negotiate with some local banks (e.g. BRI, BPP) to provide credit.

Training

Training needs to be provided to village-level participants. Operating credit in a self-financing program will involve the collection of large sums of money. For facilitating the relationship with banks, calculating the interest, etc., there is a need to improve the skills of the committee and others who will be involved in the project. The lack of technical skill is also identified as a problem in the maintenance and repair of existing handpumps. Unavailability of spare parts and tools is also an obstacle to proper maintenance and repairs.

V. CONCLUSIONS AND RECOMMENDATIONS/ PILOT PROJECT

General. Since the surveys have shown there is indeed a demand for self-help family water supply and sanitation with women as the focus, a pilot project would be the best means of demonstrating the feasibility of this approach.

In all the villages surveyed, the villagers still strongly hold the idea that what is called a "project" is immediately perceived as a "gift" from the Government. However, they showed a greater degree of willingness to self-finance their water supply and sanitation facilities after it was shown to them that their economic burden would not be so great and they would benefit from individual ownership. A pilot project should be designed to discard the government "gift" mentality and to reinforce a more progressive outlook. Perhaps, the best way would be to ensure that the implementing agency was independent of the Government. The pilot project also needs to be designed so that (i) the community is involved in planning and implementing the project, (ii) the community can control the quality of the materials and construction, and (iii) the people can be taught the technical skills to carry out repairs and maintenance and obtain the necessary tools and spare parts which should be made available locally.

Preferences for the kind of facilities for water supply vary. In Central Java and Yogyakarta the majority prefer dugwells whereas in East and West Java the majority prefer drilled wells plus handpumps. Some villages already have electricity so the villagers proposed electric pumps instead of handpumps. This is considered a progressive idea and also an

option for the government electricity program which, so far, has only been utilized for lighting purposes.

Credit and Affordability. Self-financing water supply projects may possibly only be applied in communities with relatively good economic conditions and repayment capability. Villages with a majority of poor families may need a different approach for their water supply program.

The priority concerns of the family, when introduced to the idea of water supply with self-financing are the cost of the facilities and the duration of repayment. Therefore it is very important to keep the total cost as low as possible (e.g. by saving on labor costs) without sacrificing quality of workmanship.

The credit scheme to be used in the pilot project should be made as formal and as similar as possible to bank regulations, i.e. the terms of interest and collateral. Of course there should also be some flexibility so that it will not cause the rural people to lose confidence in their ability to repay.

To attract villagers, many government officials and village leaders suggested the idea of offering credit without interest. The consultant does not agree. If the project is to be sustainable, then from the beginning, it should be so designed and the loan repayment schedules be implemented as expected in the future. A lenient start to a program would neither educate the people nor bring a change in attitude unless they realize their own capability to do something for themselves. Of course the commencement should not be too difficult as to be discouraging. A one per cent per month interest rate is therefore considered a fair rate for the start of a self-financing water supply program and a three year duration for the loan would be best.

Most village leaders and the PKK committee suggested that there needs to be a collateral in order to build the community's responsibility over the loan they take. Of course it is the best way to ensure good repayment performance. There, are however, a lot of families which do not have any valuable property which can be used as collateral. The question is, should these people be excluded and not be given the chance to get credit to fulfill their water supply needs? Besides, the President himself has also suggested the possibility of non-collateral loans to villagers. There is a case for developing a progressive collateral system which may consider the pressure of traditional and social responsibility as a means to ensure repayment. Incentives of say one per cent of collections should be given to PKK members collecting dues. The accumulated repayment should be used to extend loans to additional clients in the village and possibly in a neighboring village (micro-diffusion of a sustainable program).

Technical Aspects. Because rural communities may not be able to tell low quality handpumps from better ones, it may be wise, at the pilot project phase, to allow the implementing agency to take responsibility for the supply of handpumps. Attention should be given to using improved handpumps with PVC parts below ground in order to resist corrosion. Actually if a PVC handpump can be produced locally the cost may be affordable. It is even possible that the implementing agency could set up their own PVC handpump production center, ensuring quality control. Also in areas where there are no local drillers it may be appropriate if the implementing agency is equipped with drilling equipment, so that they can provide their services to the villagers at lower costs than commercial drillers.

Also due attention needs to be given to the relative distance in the siting of latrines and wells to avoid cross-pollution and to design community drainage as well.

Implementing Agency. The overall responsibility of a pilot project should be in the hands of the implementing agency but to ensure sustainability, the villagers should be involved from the beginning. They should participate in the whole process and be given the necessary training by the implementing agency. The implementing agency should have proven experience working on rural water supply projects in cooperation with village communities. It should have flexibility in operation, being relatively free from bureaucracy; it should have managerial, organizational and technical capabilities; it should manage the initial funds to circumvent formal banking procedures. Project sites should be within reach of the implementing agency. NGOs are the appropriate organizations as the implementing agency for a handpumps and appropriate water supplies strategy, but the Government should be responsible for the ratification of the program.

Management. It is suggested that a project committee consisting of the village head, one person from LKMD, one from PKK and one from the implementing agency be formed to manage the project at the village level. However, this should be discussed with the village community so that they are comfortable with the committee. It may for example be possible to include an influential person from the village instead of the LKMD.

For the pilot project, there needs to be financial support as an initial fund to start the project. This fund would be used for two purposes: (i) as credit for the families wishing to construct water supply and sanitation facilities, and (ii) for management costs of the implementing

agency. At the beginning, the management costs may be a relatively high proportion of the total project cost, but hopefully this will gradually decrease as the project is expanded and more clients are served.

Training. The pilot project is also meant to transfer appropriate skills to the local people – especially, drop-out teenagers could be targeted. They would be trained in using drilling equipment and constructing wells as well as installing handpumps and electric pumps. In such a way they may be able to start their own living as entrepreneurs. Handpump or electric pump owners would also be trained to repair and maintain their own pumps. A reference manual on installation, maintenance and repair and a set of basic repair tools should be provided to every owner. Spare parts would be available from the project committee. A one-year guarantee of the equipment will also help build up village trust in the project.

VI. COUNTRY SEMINAR CONCLUSIONS

The Country Seminar on women's role in water supply and sanitation was held as part of the Regional Study on Domestic Shallow Well Water Supplies initiated by UNDP and ADB. The seminar was conducted by the Ministry of Women's Role on 21-22 August 1989 in Bogor.

The 59 participants included representatives from the 20 study villages, government agencies related to health and water supply, the Department of Rural Development, and women's organizations along with other NGOs and handpump manufacturers.

There was a consensus at the Country Seminar that future development efforts in rural water supply and sanitation should particularly consider:

(i) *Women's roles and participation.* Facilities must be built in accordance with the felt needs and desires of the women's population. Women should actively participate in decision making and in every phase of implementation.

(ii) *Community participation and self-reliance.* The vast Indonesian population and limited GOI development budget is one obstacle to meeting the needs of the rural community. Therefore there is a need to encourage community participation and self-reliance in order that rural people may fulfill their own needs and not depend on government

assistance. This may be enhanced through an increased understanding of water-related health problems and environmental factors which contribute to these problems.

(iii) *Development of program sustainability.* Existing facilities should be fully utilized and maintained and improved. A strong organization with adequate mechanisms to oversee and manage project implementation is needed which will apply a bottom up approach to development through the community, specifically women.

(iv) *Local implementation and management.* Existing local organizations such as PKK and LKMD should be used in accordance with the existing policies of the Ministry of Interior.

COUNTRY PAPER – PAKISTAN

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CONTENTS

I. INTRODUCTION AND BACKGROUND

Pakistan is a developing country of Asia with China to its North, Afghanistan to its North-West, Iran in the South-West, India in the East and the Arabian Sea in the South. It is divided into four administrative provinces, namely, North Western Frontier Provinces (NWFP), Punjab, Sind and Baluchistan. Its capital is Islamabad.

The total population of the country is about 101 million, with about 70 per cent living in rural areas. About half of the rural population lives in very small villages which rarely figure in the programs of the Government Departments or in the planning and execution of development projects; some of them are not included even in a basic needs program.

Rural Water Supply and Sanitation Situation

The current rural water supply and sanitation situation in Pakistan is summarized in Table 1. Annual government expenditure based on the Sixth Five-Year Plan (1983-1988) was of the order of 1.27 billion rupees for rural water supply (84 per cent piped; 16 per cent tubewells with handpumps) and 0.13 billion rupees for rural sanitation/drainage.

It is recognized by the Government of Pakistan (GOP) that the lack of a potable water supply is a major cause of many serious diseases. Although reliable statistics regarding the incidence of waterborne diseases are not available, it is well known that contaminated water is one of the principal agents of disease and death in the country. The provision of potable water and proper sanitary facilities will do much to reduce the incidence of disease in the country. However, the task of providing the necessary coverage to the entire population of the country would, keeping in view even the rather low government benchmarks, be too great a task to be completed in the near future. The constraints involved are not only financial but also the unavailability of required equipment and the low project implementation capacity of the executing agencies.

II. VILLAGE SURVEY OF WATER SUPPLY AND SANITATION

The main objective of the present study is to explore the extent to which individual families in rural Pakistan can satisfy their basic household water supply needs by self-help through family-owned shallow wells

(mostly with handpump), and the extent to which such a strategy would involve and benefit women.

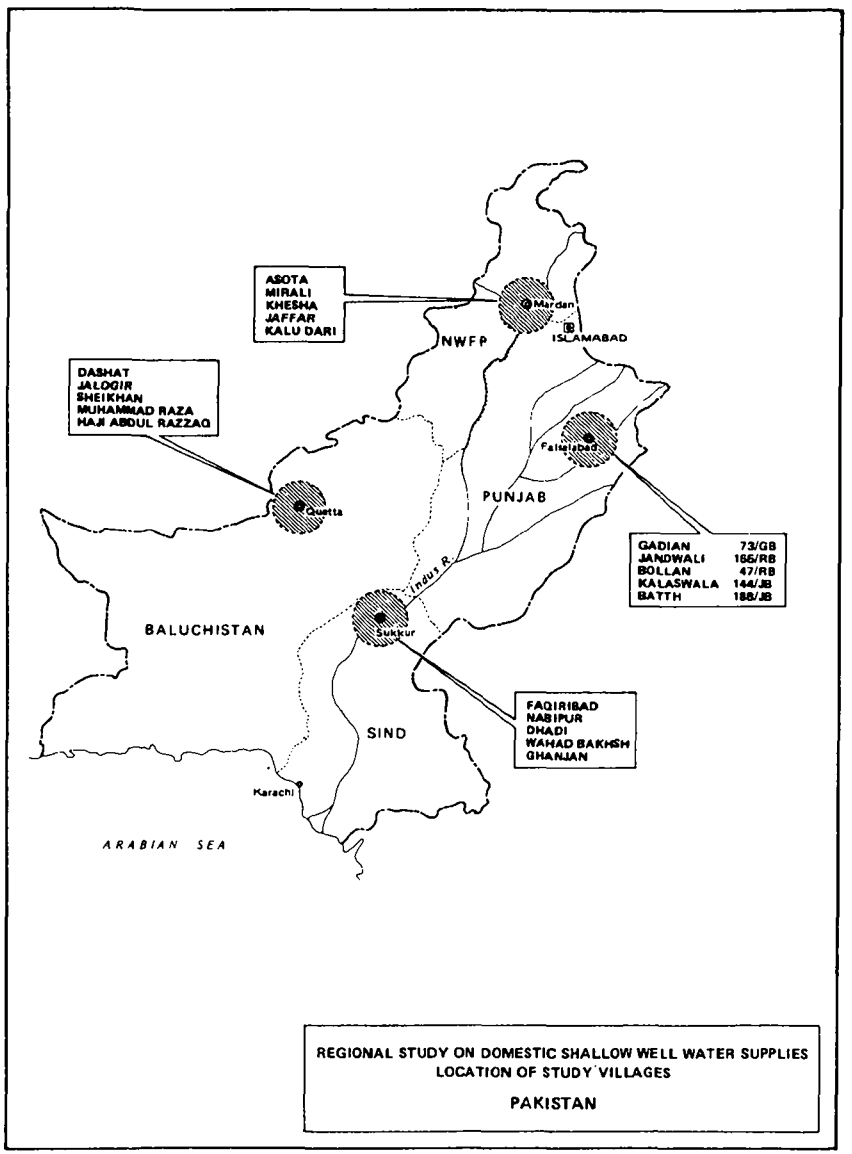
Table 1. **Service Levels of Rural Population (71 million) in Pakistan (1987)**

	Water Supply	%	Sanitation	%
A.	Piped – house connection	05		
B.	Pipes – standpipe	13	Private latrines	23
C.	Wells with handpump	22		
D.	Other wells	18	Public latrines	01
E.	Other public sources (river and spring)	42	No sanitation facilities	76
	Total	100	Total	100
	Family water supply estimated	45		
	Community water supply estimated	55		
	Total	100		

Sources:
1. Literature research.
2. Consultant's estimate.

Keeping in view the wide geographic and economic variations in the country, it was thought appropriate to take the four provinces of Pakistan which would give an adequate idea of the geographic, economic and socio-cultural issues involved. Five villages were selected from each cluster around a focal city. The location of the study villages is shown on the location map. For the selection of villages, the following guidelines were kept in view:

- year round availability of groundwater at depths not exceeding 10 meters;
- no piped water supply scheme in the village;
- village population to be 500-2,000 persons;
- geographic spread of the villages; and
- distance from the focal city to be 10-15 km.



The research team consisted of a sociologist and an engineer who spent one day in each village for the collection of information. The sociologist visited 20 households in each village and interviewed the lady of the house or a relatively senior woman. An effort was made to pick households in such a way that they broadly represented the different socio-economic strata of the village.

None of the villages visited had any functioning women's organization. There was only one situation in the province of Sind where the local Cooperative Societies Department was in the initial stage of organizing a Women's Cooperative Society in village Dhandhi. A group interview was held with the village committee but every village did not have a formal village committee. In this case the sociologist interviewed the available local leaders.

Since the consultants were not conversant with all regional languages and dialects, the services of local interpreters were utilized. The information collected through interviews was supplemented by personal observations of the local situations by the consultants.

III. DATA ANALYSIS

The results which are summarized in Tables 2, 3, and 4 presented considerable variations because of differences in precipitation, topography, groundwater and other resource related factors. Not only did the sources of water supply vary, but the quality of water also showed diversity. Notably, less than 10 per cent of the families interviewed had latrine facilities but 60 per cent already had their own private water supplies through either dugwell or tubewell. This may be compared with the national statistics given in Table 1. The data indicated an overall demand of about 20 per cent for the family handpump, with drainage and latrines attracting more attention.

In Punjab, in the villages around the focal city of Faisalabad, there was no scarcity of groundwater. For example, in all the villages under study almost every household had a handpump. Those few who did not have their own had access to a neighbor's pump. In this part of the country the issues were more related to the quality than to the quantity of water. Broadly, in this area the problems that emerged were (i) water salinity, (ii) sweet groundwater but unfit for drinking, (iii) contamination of groundwater through seepage due to poor handpump technology and improper drainage, (iv) untreated canal water, and (v) poor or improper sanitation.

Table 2. **Water Supply and Sanitation Facilities in 20 Villages of Pakistan**

		Village Name	Population	Dugwells		Tubewells (Electric Pump)		Tubewells (Handpump)		Latrines	
				Pub	Pri	Pub	Pri	Pub	Pri	Pub	Pri
Punjab (Faisalabad)	1	114/JB Classwala	2,000				11		150		4
	2	118/JB Baath	8,000				9		1,000		30
	3	165/RB Jandwali	1,500	1	3				150		35
	4	47/RB Bal	6,000	1	2		6		200		10
	5	73/GB Gadian	5,000				20				4
NWFP (Mardan)	6	Asota Sharif	2,900		500		6		15		6
	7	Mirali/ Swabi	2,000	** 3	80	1 **		*	65		4
	8	Khesha/ Swabi	1,500		110	3		1			6
	9	Kalo Deri/ Rustam	500		45		9		1		6
	10	Jaffer/ Machhi	4,000		320		1		1		
Sind (Sukkur)	11	Fakirabad/ Rohri	800		5		1	1	20		1
	12	Nabi Shah/ Rohri	1,000		1		1		1		1
	13	Dhandhi/ Arore	1,000		5				50		
	14	Wahid Bux Sial/Pannu	1,000		1				55		
	15	Ghunje/ Pannu	1,000		3				60		
Baluchistan (Quetta)	16	Killi Mohd. Azeem/Kalat	500	1	1	1	4				
	17	Jaloogir/ Kuchlak	500		1						
	18	Killi Sheikhan	300		2						
	19	Killi Malik Kutt	4,000		60	** 3	5				3
	20	Killi Haji Razaq	500		50						5
TOTAL			44,000	6	1,189	8	73	2	1,768	0	115

* Installed by IRDP. ** For irrigation.

Table 3. **Water Supply and Sanitation Services from Household Surveys in 20 Villages of Pakistan**

		Village Name	Households		Source of Water			Main Problem **	Latrine Use	
			Total	Surveyed	Public Well/ H.P.	Private Well/ H.P.	Other *		Private	None ***
Punjab	1	114/JB Classwala	200	20		/18	2	d,f,g	4	16
	2	118/JB Baath	1,000	20		/20		g	8	12
	3	165/RB Jandwali	150	20	/7	/13	canal	c,d,e f,g	3	17
	4	47/RB Bal	400	20	/3	/17	canal	c,d,e f,g	6	14
	5	73/GB Gadian	500	20	/5	/15	canal	c,d,e f,g	6	14
NWFP	6	Asota Sharif	640	20		12/	8	a,b,c		20
	7	Mirali/ Swabi	200	20	2TWs	12/	8	a,b,c		20
	8	Khesha/ Swabi	120	20		8/	12	a,b,c,d		20
	9	Kalo Deri/ Rustam	20	20		9/	11	a,b,c f,g		20
	10	Jaffer/ Machhi	350	20		5/	15	a,b,c f,g		20
Sind	11	Fakirabad/ Rohri	100	20	/5	/10	5	a,b,c f,g	3	17
	12	Nabi Shah/ Rohri	80	20		/5	15	a,e,f,g		20
	13	Dhandhi/ Arore	150	20	/6	/7	7	a,b,d f,g	2	18
	14	Wahid Bux Sial/Pannu	80	20	/6	/8	6	a,b,e f,g		20
	15	Ghunje/ Pannu	100	20	/8	/12		a,b,c f,g		20
Baluchistan	16	Killi Mohd. Azeem/Kalat	50	20		20/		a,b,e f,g		20
	17	Jaloogir/ Kuchlak	40	20		20KZ		a,b,c d,f,g		20
	18	Killi Sheikhan	25	20		20KZ		a,b,c d,f,g		20
	19	Killi Malik Kutt	250	20		12/	8	a,d,f,g	2	18
	20	Killi Haji Razaq	41	20		10/	10	a,d,f,g		20
		Total	4,526	400	/40	128/125	107		34	366

* "Others" include neighbor's handpump, dugwell, canal, spring, river.
** a = scarcity of water; b = well goes dry; c = water is muddy; d = water is saline; e = distance to water; f = poor drainage; g = no sanitation.
*** "None" includes open field and solid excreta disposal over the wall.
KZ - karez, an underground flowing water channel.

Table 4. Social Survey in 20 Villages of Pakistan

		Village Name	Population	No. of Households	Annual Household Income	Women's Organization	Main Priority	Water Supply Priority	Handpump Demand
					Rs				
Punjab	1	114/JB Classwala	2,000	200	15,000	None	Drainage	2	2%
	2	118/JB Baath	8,000	100	10,000	None	Drainage	3	5%
	3	165/RB Jandwali	1,500	150	12,000	None	Drainage	2	2%
	4	47/RB Ballan	6,000	400	10,000	None	WS	1	*
	5	73/GB Gadian	5,000	500	10,000	None	Drainage	2	5%
NWFP	6	Asota Sharif	2,900	640	10,000	None	Sanit	2	40%
	7	Mirali/Swabi	2,000	200	8,000	None	Sanit	1	40%
	8	Khesha/Swabi	1,500	120	6,000	None	Sanit	3	15%
	9	Kalu Dari	500	50	10,000	None	Sanit	2	20%
	10	Jaffar/Machi	4,000	350	90,000	None	WS & Sanit	3	30%
Sind	11	Faqirabad/Rohri	800	100	6,000	None	WS	1	25%
	12	Nabipur	1,000	80	3,000	None	WS	1	2%
	13	Dhandhi/Arore	1,000	150	20,000	None	WS	1	30%
	14	Wahid Bux/ Sial Pannu	1,000	80	20,000	None	WS	1	30%
	15	Ghunje Pannu	1,000	100	14,000	None	Sanit	2	30%
Baluchistan	16	Dashat	500	50	5,000	None	WS	1	40%
	17	Jaloogir/Kucklak	500	40	18,000	None	WS	1	40%
	18	Killi Sheikhan	300	25	13,000	None	WS	1	40%
	19	Mohd Raza	4,000	250	20,000	None	WS	1	40%
	20	Killi Haji Razaq	500	41	15,000	None	WS	1	40%

* Brackish water.

Three out of the five study villages had saline groundwater which was unfit for drinking. Despite this fact almost every family had a handpump in the house and the water was used for a variety of uses other than drinking. For drinking water, people used canal water either directly or indirectly by installing a handpump near the canal. Some families whose farms were near the canal had installed handpumps in their fields, while some more affluent families had installed motorized pumps and pipelines to bring water to their house in the village. Acting on the belief that "whoever provides water to others is blessed", the owners of such pumps let others take water for drinking purposes. In the other two villages almost every household had a handpump in its compound. The water was used for all purposes except cooking, for which canal water was preferred.

In the North Western Frontier Province, the study was conducted around the focal city of Mardan. The source of domestic water supply in the villages surveyed was predominantly dugwells. A little less than half (48 per cent) of the families contacted had dugwells in their houses, whereas in other cases, water was carried either from the neighbor's house or from the community well and distance was not a problem. Only two houses had motorized pumps. The dugwells were not lined and were open to contamination. There were frequent cases of collapse of the sidewalls of the wells. During the rainy season these wells prove to be a real hazard both due to contaminated water and as a possible risk of accidents. On the other hand, during the dry season, the water level becomes too deep and in some cases wells go dry.

The quality of water was reported to be good for drinking, cooking and washing. However, groundwater was saline in the uplands of the settlements. The affected families carried water from other homes or community wells in the sweet water zone.

Regarding latrine arrangements, all men went out in the fields. Women had some rudimentary arrangement in the house. There was no proper arrangement for the disposal of excreta. Due to cultural factors, women were confined to the four walls of the house. Small kids, old women or other members of the family disposed of the excreta in the fields. Given a choice between the installation of a latrine or a handpump, in contrast with men, 60 per cent of the women of this area wanted to have a proper latrine in their house for reasons of convenience and privacy. There was no knowledge of the health hazards of leaving human excreta lying about in the house.

Nobody preferred the communal atmosphere of the village well to a private well. Preference for a private well or handpump was due to the local cultural restrictions placed on the movement of women outside their

home. The local leadership was too weak, even non-existent, to inspire people to unite for community projects.

Women's organizations were not operative in any of the villages under study. Regarding the organization of women for taking up a water supply improvement program, the village leaders did not agree, despite the fact that domestic water supply arrangements were a woman's job. In some villages the idea of youth organizations handling such problems was well taken. A youth organization in one village was quite active and had won first prize in the district for a development program. There was a possibility of starting a female youth organization, particularly in places where girls' schools were in existence. To summarize for NWFP; (i) distance to fetch water did not emerge as a big problem, (ii) people were quite used to the idea of dugwells, (iii) water was likely to be contaminated, (iv) people were unaware of health problems related to contaminated water, (v) there were only a few favorable responses to adopting handpumps, and (vi) proper toilets for women were nonexistent, whereas men used the fields.

One might make the following observation as to the reasons why the improvement of domestic water supply was given such low priority in NWFP.

a. Making arrangements for water for domestic use has been the job of women, so any improvement benefits only the women; it reduces their drudgery. Therefore, men do not see this as an issue at all. There are two aspects to this:

    1. Women did not really see the work as backbreaking, the time and energy consumed in carting water did not compete with some other activity or even leisure. The impression was that neither men or women thought any other way. In some areas where men too were inconvenienced by distance, there was enthusiasm shown for a better water supply; and

    2. The area of health education needed strengthening. People did not seem to think that the existing water supply was highly susceptible to contamination which might lead to waterborne diseases.

b. For men, their only need for water was for drinking purposes. For bathing, they always went out and in most cases used bathrooms attached to the mosque. As a matter of fact young unmarried male members spent the minimum possible time in

the house. Therefore, for men, water supply improvement with the installation of handpumps remained a low priority area.

c. In the more rigidly patriarchal societies, the decisions were primarily made by patriarchs and domestic water supply was a low priority area for men; therefore, the idea of water supply improvement was not of significance.

d. The installation of handpumps on dugwells and its maintenance involves initial and running cost. People were not motivated enough to bear the extra cost, due partly to ignorance of the benefits and partly to socio-cultural constraints.

Around the focal town of Sukkur in Sind, the source of water supply was predominantly through handpumps. One-third of the households visited had family handpumps. Thirty-one per cent procured water from their neighbors' handpumps, while 16 per cent depended upon community handpumps. All the families of one village (Nabipur) under study had to resort to a distant community dugwell despite the fact that two community handpumps were installed by the local landlords. This village was inhabited by tenants but the managers of the landlords did not allow them to draw water from the community handpumps. Being poor economically and due to the uncertainty of their land tenure status, no one ever thought of installing a family or community handpump.

Except for Nabipur, all the residents of other villages did not have "distance" as a water problem. For the people of Nabipur, the dugwell was at a distance of one and a half kilometers. Thus, the scarcity of water and distance involved in carting were the most expressed problems of this village.

The quality of drinking water in the sample villages was reported to be quite good, except for Faqirabad where women regarded it fit only for washing. Some local leaders in this village said that some families in the village also drank canal water.

For purposes of carting water from long distances, both human and animal energy was used. Women, mostly married/elderly, or children carried the water. Camels and donkeys were also used for transporting water. Water carried by animals was mostly looked after by men.

Except for Nabipur, where the installation of handpumps was a possibility, in all the other villages the initial reaction to the concept of the women-water-family handpump scenario was rather poor. Men were hesitant to involve women in the decision making about handpumps as well as their maintenance.

Regarding latrine arrangements, except for Nabipur, all men went out in the fields but most of the women had their rudimentary arrangement in the house. Due to the location of Nabipur in the desert area, everybody went out in the open for defecation purposes. In the other villages, people opted for a handpump rather than a latrine if they have to arrange for it through credit.

For purposes of credit, not very many people availed of any institutional facility. For small amounts, the villagers could borrow money from informal sources which could be the landlord, the local shop-keeper or local money lender, available for several villages. In two villages, the local leaders had the experience of working with a cooperative society for loan purposes.

The sanitation condition of those villages where groundwater was being used through tubewells/dugwells was poor. There were open drains which did not have a regular cleaning arrangement and water from the drains did not have any safe disposal arrangement.

On the whole, the family handpump culture had been adopted by the people where they could afford it and where groundwater was sweet. Side by side, the notion of the community handpump was also prevalent and was mostly used by those who primarily could not afford otherwise. Such families consisted mostly of tenants who probably did not foresee security in their tenure and who could be asked any time to leave the place. It was found that the residents of the village most inhabited by tenants had to cover the longest distance (1.5 km) to get water.

The idea of loans was prevalent to some extent. This could be strengthened through institutional organization.

Sanitation conditions were poor. There were instances of water seepage around the handpump which could contaminate the water. Hence the installation of handpumps needs improvement.

Drainage needed a lot of improvement in the villages where handpumps are prevalent.

The village people lacked health education as indicated by the fact that they did not know much about the relationship between contaminated water, improper sanitation and the waterborne diseases. They could relate only to fever, vomiting and dysentery as health problems.

Decision making in these villages was in the hands of men; hence, the organization of women without the approval of their menfolk did not seem workable. There were some chances of organizing women into some kind of cooperatives through the Department of Cooperative Societies.

Baluchistan around the focal town of Quetta presented a picture of contrasts. None of the villages visited had handpumps as their source of water supply. The sources of domestic water supply in the five villages

under study were private dugwells, public dugwells, karez (underground flowing water) and rainwater collected in ditches/ponds.

In two communities, namely Muhammad Raza and Haji Razzaq, the groundwater was sweet. Hence, a substantial proportion of the families had family dugwells. In the other villages, either the groundwater was too deep or it was brackish; therefore, people depended on other sources. In village Dashat, there was only one public well at a distance of 1.5 km. The water was very deep so animal (camel) power was used to draw the water from the well as well as its transportation to the village. Because of the shortage of water there was no drainage problem. Instead of latrines, the people of this village used open fields.

In terms of water supply, the most deprived communities under study were those living in Jalogir and Sheikhan. Groundwater was too deep and it was saline. In Jalogir, karez was the main source, whereas the residents of Sheikhan depended on rainwater. At both these places, the water was stored in highly unhygienic ditches from where every possible living being could drink. Rainwater supply was the least reliable source.

Quantity of water supply, its quality and distance, were the perceived problems related to water. The women complained about the apathy of people at the community as well as the state level towards water supply. They were quite critical of their menfolk not giving much attention to this problem which was primarily faced by women.

Though water collection was primarily the job of women, it was rather age selective. Children and young adult married women usually did this job. It was a time-consuming and tiring job. Except for Dashat, most of the females had some improvised arrangement for defecation in the house. It was to be carried out at night or with the other family garbage to the fields. Nevertheless, it looked like they had gotten used to it. Nobody complained about it and they did not feel the necessity of any change. As a matter of fact their top priority was water.

People were least conscious about the quality of water except for its taste. Neither were they clear about any relationship between diseases and contaminated water. Drainage was a problem in only a few places. These communities need health education.

Most of the people of these villages were unfamiliar with loans. They were more familiar with government/other agencies working for them.

General Conclusions of Field Survey

The following is a summary of conclusions of the field surveys conducted by the sociologist and water engineer:

1. The magnitude of water and sanitation problems is different in various parts of rural Pakistan.
2. The technologies in use for water supply and sanitation vary in different areas.
3. Awareness about water-sanitation-health-prosperity linkage is almost nonexistent.
4. Elements of health education are not visible.
5. Drainage and disposal of waste water and solids is a major problem.
6. Women are playing a major role in almost all parts of the country to provide water in the house.
7. Women's organizations are almost nonexistent in rural Pakistan particularly for water supply and/or sanitation.
8. The domestic water supply and sanitation concept is well accepted and the major reasons were both a real demand and the cultural pattern of rural Pakistan.
9. There is a demand and need for domestic water supply and sanitation systems in rural Pakistan.
10. A substantial part of the rural population living in smaller villages can be served through domestic water supply and sanitation.

It is worth mentioning that some rural communities were provided with surface drains linked with the village pond, while in the majority of cases there was no adequate arrangement for proper drainage. The question of preference for a latrine was at times answered with a counter-question: where should we drain the wastewater? Therefore the perceived absence of a drainage facility was a constraint in changing the traditional latrine practices.

Levels of expectations varied. One of the major reasons for this variation is the support that the government agencies as well as international agencies have given to those areas. For example, in rural Punjab or NWFP, where the government has not undertaken any water supply or sanitation project, the self-owned handpump and dugwell are a welcome prospect and even the poorest people are willing to take the credit offered. However, in areas like some parts of Baluchistan, where international agencies have provided expensive community pumps or a motorized pumped water supply system, the people do not want to accept the handpump solution but ask for more expensive solutions because others have obtained them free. An effort should therefore be made to develop policy and criteria for different technologies for various conditions and populations. In a village of Sind the team of consultants observed a

novel example of a handpump used more or less automatically for social forestry. A handpump installed in the compound of a primary school discharged in a furrow-like drain and over 50 eucalyptus trees were planted on the periphery of this drain/furrow. The trees, "very happy" ones, provided shade during severe summer noons and promised a substantial dividend for the effort. Domestic water supply could thus be combined with social forestry and micro irrigation components to meet income- generating needs.

IV. TYPES OF RURAL WATER SUPPLY TECHNOLOGY

The issues discussed in this section of the report are the various technologies for water supply and sanitation which can be replicated.

Dugwells

Dugwells are one of the most common means of groundwater exploitation in almost all parts of Pakistan. Dugwells are even now commonly used in NWFP and Baluchistan for domestic water supply and micro-irrigation. Most of these wells are unlined and uncovered. The water from these wells is invariably contaminated and a source of disease. These wells are from one to three meters in diameter and are dug to about one meter below the groundwater table. This means people are using groundwater only from the uppermost levels of subsoil water which is in closest contact with the source of contamination.

During field surveys it was found that often the water goes dry in these wells. From observations it was found that while groundwater did fluctuate within normal range in some areas, the situation was aggravated by the caving in of the sides of unlined wells. One or two slumps would fill the already minimum depth of water with mud and slush and the users would spend a lot of labor and money to repair the wells.

Most of the well digging is done manually by local labor of which there was no shortage, nor were they underused. The concrete cylindrical linings of wells were being manufactured in these areas but their use was reported to be very slow. The manufacturers said that this was due to lack of awareness of the benefits of clean water.

The lining of wells, making concrete covers, raising of the parapet high enough from ground level to prevent contamination of the well and providing a handpump on the top is a sound technical solution for the urgent water supply problems of the area.

Handpumps

Handpumps offer a great scope and hope for providing water to the majority of the Pakistan rural population within the minimum possible time. The technology to provide water to the majority of the rural population living in small communities already exists to suit most geographic locations. Indicative costs of handpumps in Pakistan for the various levels of groundwater are shown in Table 5.

Table 5. **Handpumps Used in Pakistan (Cost Pak Rs)**

Type of Handpump	Consolidated Results of Top Manufacturers		
Shallow well suction type	Brand 1	Brand 2	Brand 3
Cost range	950	870	600
Shallow well 10 m type	Brand 1	Brand 2	Brand 3
Cost range	6,500	3,700	3,200
Deep well 50 m type	Brand 1	Brand 2	
Cost range	11,900	9,800	

All the suction type pumps are locally made in small shops and were available in markets no more than 45 km from any of the study villages. The difference in prices is mainly due to the quality of pipe, strainer and other parts. The design of the system is the same all over the country. The shallow well 10 m type has been recently developed by international agencies like UNICEF, GTZ, UNHCR, etc., mainly for Afghan refugees who are residents in the mountainous regions where groundwater is deeper. The deepwell types are imported brands of handpumps installed by international agencies and the Agha Khan Rural Support Programme and are installed mainly in NWFP and Baluchistan.

Tubewells

Drilling facilities are easily and readily available at village levels in shallow groundwater areas. Tubewell drillers report costs of

Rs7,000-8,000, inclusive of materials for a 10 m tubewell. For medium to deep groundwater areas, however, motorized rigs of different types are required in various parts of the country. Drilling costs for a 20m tubewell (diam. 150-250 mm) will range from Rs25,000-30,000.

Groundwater

The potential for use of the shallow well family handpump in Pakistan can be gauged from Table 6 which shows the current population living in areas of shallow groundwater availability.

Table 6. **Groundwater Resources – Pakistan**

Water Resources		Rural Population
A. Shallow Groundwater Available	46.2 M	65%
B. Deep Groundwater Available	21.3 M	30%
C. No Groundwater Available	3.5 M	5%
	71.0 M	100%
D. Existing Piped Water Supply	13.1 M	18.5%
E. Existing Handpumps	15.3 M	21.5%
Minimum Family Handpump Potential = A - D - E =	17.8 M	25%
Maximum Family Handpump Potential = A - E	30.9 M	44%

Shallow Groundwater = water level not more than 12 m below surface throughout all seasons and water quality favorable.

Source:

1. Table 2.1, "World Bank SAR on Pakistan Rural Water", *Health and Sanitation Sector Review*, February 2, 1988, p. 44.
2. *Economic Survey of Pakistan*, 1988-89.

Rural Credit

The Agricultural Development Bank of Pakistan (ADBP) provides formal credit with an interest rate of about 14 per cent per annum to farmers throughout most of Pakistan. There is, however, no formal credit line or scheme for water supply and sanitation facilities. The informal credit system, which is quite strong in rural Pakistan and operates with interest rates of 20 to 30 per cent per annum, has not reported cases of lending for water supply and sanitation purposes. There was also no report on rural women using formal credit facilities.

In Punjab and NWFP, the villagers made use of informal sources such as relatives, friends and even shopkeepers. They would be willing to pay back in easy installments over a period of two to three years if the money came from other agencies. In Sind, not very many people availed of any institutional facility. For small amounts, the villagers could borrow money from informal sources which could include the landlord, the local shopkeeper or local money lender in some villages. In two villages, the local leaders had experience of working with a cooperative society set up for loan purposes. In Baluchistan there was no reported case of credit use or borrowing for water supply and sanitation.

Government Agencies

The following government agencies are involved in rural water supply and sanitation:

Federal and Provincial Planning and Development Divisions/ Departments

Master planning, coordination, monitoring and evaluation of the sectoral programs and projects are dealt with by this agency.

Public Health Engineering/Public Works Department (PHED)

This department is a technical and executing agency which deals with the installation of new, and the rehabilitation of existing schemes and the planning and execution of large schemes such as the construction of piped water supply projects.

Local Government and Rural Development Department (LG&RDD)

The LG&RDD, a provincial department, also undertakes the implementation of small manual schemes, e.g. dugwells, handpumps,

gravity schemes, drainage, latrine projects, training of villagers as operators; and carries out health education programs along with community organization in some provinces.

Health Department

This department mainly deals with the preparation of a hygiene education program.

Others

The Sind Arid Zone Development Authority (SAZDA) undertakes surveys for the identification of good quality groundwater sources for small water supply projects in the arid zone of Sind.

The Water and Power Development Authority (WAPDA) undertakes major irrigation and power projects in Pakistan. It also undertakes extensive and intensive groundwater investigations for waterlogging and salinity and recommends remedial measures. Its data is invariably used for planning of regional water supply projects.

The Education Department undertakes special courses and designs curriculum for health education and training of the staff.

NGOs and Women's Organizations

There were no women's organizations in any of the study villages. Many of the women were of the opinion that the attitudes would change as soon as a definite project is initiated. In some villages the idea of youth organizations handling water and sanitation problems was well taken. For example, the youth organization in Asota was already quite active. There is a strong possibility of organizing female youth organizations, particularly in places where there are girls' schools. At the national level, there are a number of women's organizations. They, however, are more urban than rural. These include the Pakistan Women Association, the Business and Professional Women Organization of Pakistan, and the Business and Agricultural Professional Women Organization of Pakistan.

Agha Khan Rural Support Programme (AKRSP), an NGO working in northern areas, is also involved in the organization and implementation of "Water Supply Projects through Village Organizations".

V. SUMMARY AND CONCLUSIONS OF THE COUNTRY SEMINAR

Upon the conclusion of the study at a three-day country seminar, the following recommendations were adopted by the participants.

Domestic handpumps with shallow wells including tubewells are feasible options for the supply of drinking water to rural areas. It is recommended that a pilot project be launched as soon as possible to lead up to a major project. The provision of handpumps should not be seen as a last resort but the beginning of a development process. It was stressed at the seminar that location-specific planning and problem-solving strategies be adopted for rural water supply and sanitation projects and that there should be no conflict or overlap with other projects in the country.

Specific Recommendations

It was further recommended that:

1. Rural populations should be made continually aware of the importance of clean drinking water and sanitation.

2. Since this project addresses the needs of smaller villages, adequate planning systems should be developed by the government to include other relevant issues such as sanitation and health education. Awareness of health related to water and sanitation needs to be raised for community motivation.

3. Water supply and sanitation projects should be integrated with the other income-generating activities promoting community participation.

4. Women's cooperatives which manage credit and subsidy facilities should be promoted.

5. The existing infrastructure of women's and youth organizations for water supply and sanitation projects should be reinforced.

6. This is a family option or a private sector concern. However, for those who cannot afford the costs, all possible sources should be tapped to attract financial support from institutions like Zakat Fund, People's Works Programme, national, international, statutory and voluntary organizations.

7. Provision should be made for training local artisans and mechanics to maintain and repair the handpumps and other sanitation facilities.

8. A research and development program should improve upon the present quality of handpumps.

9. Government should take measures to develop rural water supply and sanitation standards for Pakistan.

10. Laws and rules should be made to protect aquifers from pollution.

11. Provision should be made for periodic water quality inspections.

12. Facilities like latrines should be integrated in the scheme and a marketing facility be provided for systems that are best suited to the particular rural community.

13. There should be an adequate system of project monitoring and evaluation. Project proposals should be refined with the participation of the beneficiaries.

VI. PROPOSED PROJECT SCENARIO

It has been established during the surveys, the country seminar and from the literature research, that family water supply (through shallow wells) and sanitation (through latrines) is one feasible option for the achievement of national targets of rural water supply and sanitation.

Need for Policy Formulation

Water supply and sanitation facilities were ranked very high by the rural communities. The modality and levels of expectations varied in different parts of the country. One of the major reasons for this variation, as stated earlier, is the existing level of support that the government agencies as well as international agencies have given in those areas. For example, in rural Punjab or NWFP, where Government has not undertaken any domestic water supply and sanitation project, people realize the dimensions of the problem. Their condition is so bad that they are willing to risk taking loans to buy their own facilities. On the

other hand, where international agencies have ordinarily provided expensive community pumps or motorized water supply systems people ask for more expensive solutions because others get them free. It is for this reason that guidelines should be drawn up by the Government of Pakistan for developing rationale and criteria for different technologies for various conditions. Such a policy statement should indicate population limits in various provinces for the adoption of a piped water supply or handpump and dugwell system. In the absence of such a policy there is a risk of overlapping of activities and wastage of resources. These population limits could be: NWFP = 2,000, Punjab = 5,000, Sind = 3,000, and Baluchistan = 1,500.

Demand for Family Water Supply and Sanitation

It is estimated that a project to serve 15 to 20 million people with family water supply and/or sanitation could be implemented in Pakistan. This would include about 1.2 million family handpumps and about 1.8 million latrines. In addition, about one million handpumps need to be rehabilitated. It is emphasized that in most of Pakistan (with the exception of deserts with rough terrain) drainage facilities in terms of open drains must precede any water supply and sanitation development. The proportional cost allocation proposed for a project scenario with a total cost around 12 billion rupees is:

(i)	Shallow well + handpump 0-10 m	10%
(ii)	Shallow well + handpump 10-20 m	18%
(iii)	Rehabilitation of handpumps	2%
(iv)	Latrines	12%
(v)	Drainage*	58%
		100%

* It is envisaged that community drainage improvements would be financed by Government.

Women's Organizations

Apart from cooperation in the larger technical programs, women's programs and organizations also have great potential for motivating and assisting communities and households to improve their drinking water supply, sanitation and hygiene with their own efforts.

Elsewhere, women's groups have started income-generating projects and have used the money earned to construct rainwater collection tanks, protect wells, and improve kitchens.

Occasionally, women are more systematically trained to carry out community improvements. Courses in water supply, sanitation and appropriate technologies have been organized for women.

Local women's groups may be supported in their efforts to improve water supplies and sanitation by urban or national women's organizations like APWA or the Professional Business and Agricultural Women's Organization, etc.

In general, however, the potential of women and their organizations in this sphere has not yet been fully acknowledged. Their participation deserves more recognition. A family-owned handpump scheme should encourage the women of Pakistan to play a role in the development of the country.

The Ministry of Women's Development is the ideal agency to co-ordinate the project with other ongoing projects in the water supply and sanitation sector.

COUNTRY PAPER – PHILIPPINES

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CONTENTS

I. INTRODUCTION

This study, which forms part of the "Regional Study on Domestic Shallow well Water Supplies", was undertaken by consultants from the DCCD Engineering Corporation who were commissioned by the Asian Development Bank.

The United Nations Development Programme (UNDP) provided the technical assistance fund for the project, which was conducted simultaneously in four other countries, namely, Bangladesh, Indonesia, Pakistan and Thailand.

The sociological and engineering reports were prepared by two female consultants – a sociologist with experience on women in development in rural areas, and an engineer with experience in the installation of simple water supply and sanitation sources in rural areas. The study was undertaken in coordination with the Department of Social Welfare and Development (DSWD) through the Bureau of Women Welfare (BWW).

While the study was conducted at a time when the International Drinking Water Supply and Sanitation Decade (1981-1990) is coming to a close, it comes at an opportune time when the Philippine Government is focusing on the provision of water supply to every community in the country through the Accelerated Rural Water Supply Program (Republic Act 6716) signed by President Corazon C. Aquino on 17 March 1989.

II. STUDY AREAS AND METHODOLOGY

Selection of the 20 villages for the study was based on the following criteria:

- year-round availability of groundwater in the study area at depths not exceeding 10 meters below ground surface;
- no piped water system for the study area within the next five years;
- village population at 500-2,000;
- the presence of a women's organization in the village, if possible; and

- geographic spread of the villages and representation of different cultures.

The location map shows the location of the study villages throughout the Philippines.

Basic data for this study was sought from women's organizations, non government organizations, rural credit institutions, handpump dealers, handpump manufacturers, tubewell drillers, government agencies and rural village households.

The related government agencies include:

- Department of Social Welfare and Development (DSWD)
- Department of Public Works and Highways (DPWH)
- Local Water Utilities Administration (LWUA)
- Metropolitan Waterworks and Sewerage System (MWSS)
- Department of Health (DOH)
- National Water Resources Board (NWRB)

Information was obtained through primary and secondary data collection including key informants and surveys using open-ended interviews among the above respondents. The study areas include 13 villages in Luzon and seven in the Visayas.

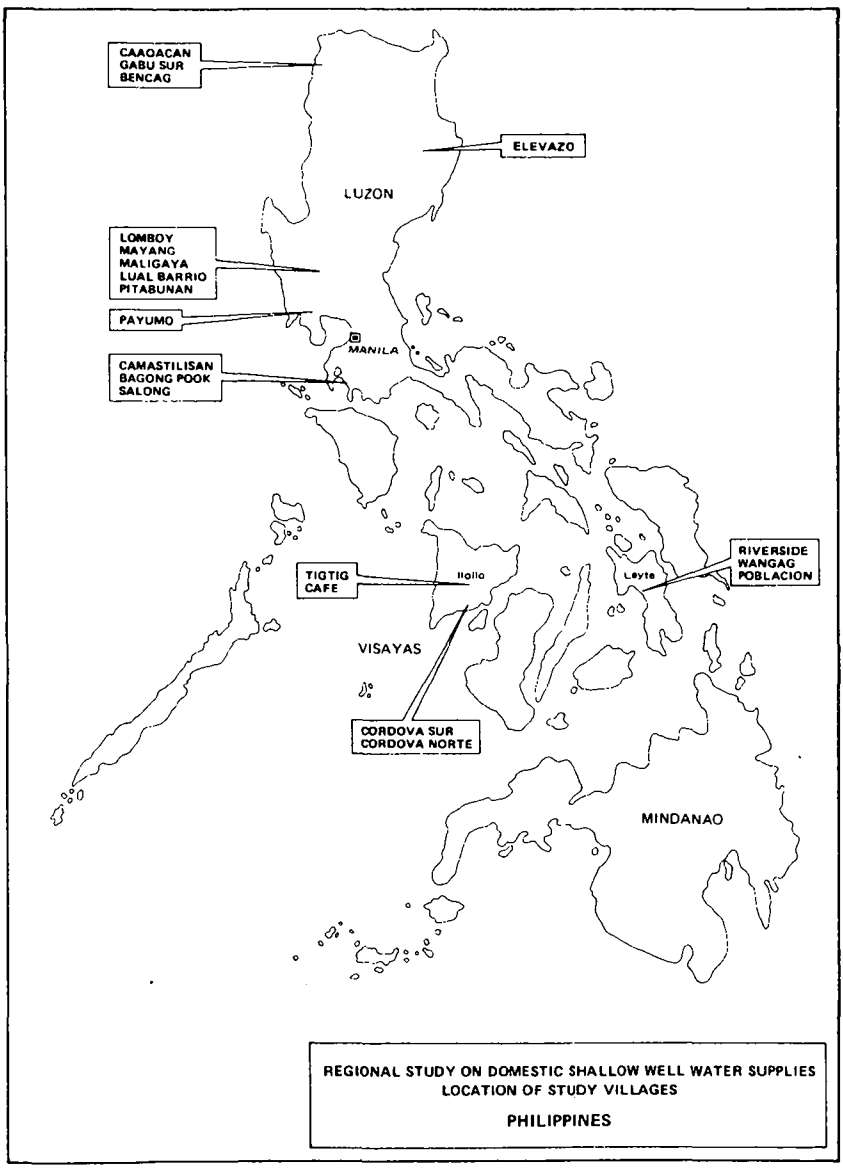
The output of this study consists of two working papers setting out the findings and recommendations on the demand for shallow wells with handpump and a women/water/family-owned handpump scenario.

III. FINDINGS

Service Levels Rural Population (see Table 1)

The 1987 rural water supply coverage indicates that 45 per cent of the rural population drew water from wells and springs while 39 per cent are still unserved or underserved, drawing water from sources which are of doubtful quality. Only 16 per cent of the rural population has piped water systems. This shows that not much emphasis has been given to the provision of safe and adequate water to the rural areas.

Rural sanitation coverage for the year 1986 indicates that there were 69 per cent with sanitary toilet facilities (water-sealed or pour-flush types), about 15 per cent with unsanitary toilets (pit privies) and about 16 per cent with no toilet facilities at all.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MANILA
CAMASTILISAN
BAGONG POOK
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Table 1. **Service Levels of Rural Population – Philippines**

Water Supply		**Sanitation**	
I. 1987 rural population:	33.83 mn	I. 1986 rural population	33.10 mn
	%		%
A. Wells/springs	45.46	A. Served	61.87
B. Piped system	15.96	B. Unserved/underserved	38.13
C. Unserved/underserved	38.58		100.00
	100.00		
II. 1987 rural households:	4.19 mn[a]	II. 1986 rural households:	5.51 mn[b]
	%		%
A. Shallow tubewells	36.00	A. Sanitary toilets	69.13
B. Deep tubewells	28.00	B. Unsanitary toilets	14.99
C. Dugwells	14.00	C. Without toilets	15.88
D. Developed springs	11.00		100.00
E. Rivers/ponds/ undeveloped springs	7.00		
F. Rain collectors	4.00		
	100.00		

a Accounts only for 74 per cent of total barangays.
b Based on 1986 rural population and average household size of six.

Sources: DOH (1986)
DPWH, LWUA (1987)

The last survey on water supply and sanitation facilities was undertaken by the National Census and Statistics Office in 1980. The results show that the general trend in coverage did not vary much between 1980 and 1987.

Government Expenditure on Rural Water Supply and Sanitation

The Philippine Government's expenditure for the year 1987 for water supply outside the Metro Manila area amounted to about 735 million pesos ($33 million) and 56 million pesos ($2.5 million) for sanitation. Government policy for rural water supply and sanitation financing includes a 90 per cent grant and 10 per cent equity for Level 1 (simple point source) water supplies and 40 per cent grant and 60 per cent equity for latrines.

Water Resources for Domestic Water Supply (see Table 2)

If the population projected to the year 2000 is to be served primarily by groundwater, 30 per cent may draw water from shallow wells, 47 per cent from deepwells and 23 per cent from other sources such as rivers, rainwater cisterns, etc.

Handpumps

Handpumps of cast iron and steel are manufactured in foundries, machine shops and factories. Production volume is highly dependent on demand. In the Philippines, suction pumps known as the Pitcher and Jetmatic handpumps which come under different brand names, are commonly used for shallow tubewells. Distribution of these handpumps is generally through dealers. Some manufacturers supply the handpump needs of the water agencies and do not sell their brand in the market.

The estimated life of a shallow well handpump ranges from five to 20 years if privately used and from three to 20 years if it serves the community.

NGOs/Women's Organizations

There are many local NGOs in the regions, as well as national, umbrella or network NGOs. From the PHILDHRRA inventory of NGOs, depressed regions in the Philippines registered the least number of NGOs.

Village women's organizations are either initiated by a national government agency or organized by local officials. Informal organizations indicated by women respondents also exist at the village level.

Table 2. **Groundwater Resources – Philippines**

Water Resources Allocation[a]	Area		Projected Population (2000)	
	Square kilometers	%	Pop (mn)	%
A. Shallow groundwater[b]	50,900	17	22.58	30
B. Deep groundwater	122,758	41	35.16	47
C. Difficult area/Others[c]	125,752	42	16.92	23
	299,410	100	74.66	100

a Water resource allocation is based on the safe yield concept which advocates groundwater withdrawal in an amount within the total net inflow and was computed for all 73 provinces in the Philippines.

b Shallow groundwater is found in areas suitable for construction of wells with depths of not more than 20 meters and where the static water level is generally within 6 meters below ground surface.

c "Difficult area" is where groundwater supply is minimal and the probability of encountering nonproductive borehole is high, while "Others" include the segment of the population to be supplied with water from rivers, ponds, rainwater and the like.

Source: Rapid Assessment of Water Supply Source, National Water Resources Council, May 1982

The Tulungan sa Tubigan Foundation is the NGO in the Philippines specializing in water supply and could be a lead implementing organization. There are various national women's organizations which are either professional, socio-civic or religious which a project on health and sanitation can involve as potential motivators, coordinators or even implementors.

Water Supply and Sanitation Facilities (see Tables 3 and 4)

The mode of drawing water in the study areas is very much dictated by the soil type, income level, available materials and technology, and traditional beliefs. As such, it has been observed that there is some regional preference on the type of wells installed.

The most common source of water is a well, shallow or deep, and dugwell or tubewell. About 95 per cent of households interviewed used a private well as their source of water. Combining the results of all the study villages, 65 per cent of the private wells were tubewells (with handpumps), 15 per cent were dugwells with handpumps and 20 per cent were dugwells. Shallow tubewells were found in most of the study areas. Most of the public wells are deep tubewells installed by the Government or local politicians and civic groups.

Public latrines of the pour-flush type were found only in two areas. Privately owned latrines are usually located in a separate structure at the back of the house and may either be of the pour-flush or pit privy type. Around 70 per cent of respondents had their own private latrine and 28 per cent resorted to throwing away waste. The survey showed that the average for all the study villages was one private latrine for every 7.6 persons.

The most common problems of water quality in the study areas are turbidity, bland or acrid taste and iron stains. Iron was found beyond the permissible limits of drinking water standards. However, so long as the water is considered potable, i.e. bacteriogically safe, it is utilized by the villagers in the absence of any other water source of a better quality. Other than the communal sources, households without their own water source have access to the wells of a neighbor or a relative within the village.

Handpumps Available to the Study Areas

Handpumps are openly sold in the local market through hardware stores which usually stock different types and brands. The distance to the nearest handpump market from the study villages averaged around 15 kilo-

Table 3. **Water Supply and Sanitation Facilities in the 20 Study Villages – Philippines**

Village	Popula-tion	Dugwell		Dugwell + HP		Tubewell		Latrine	
		Public	Private	Public	Private	Public	Private	Public	Private
Calaca, Batangas									
Camastilisan	3,000	0	2	0	0	0	93	0	180
Bagong Pook, Dacanlao	500	0	0	0	0	5	33	0	20
Salong	2,400	0	4	0	12	2	117	1	120
Laoag City, Ilocos Norte									
Caaoacan	1,109	1	85	0	42	0	0	6	64
Gabu Sur (Proper)	1,200	0	50	0	8	8	11	6	88
Bencag (Sitios 2 & 3)	415	0	24	1	19	0	8	0	66
Dinalupihan, Bataan									
Payumo, Saging	2,250	0	52	0	0	2	65	0	315
Iloilo									
Tigtig, Sta. Barbara	630	0	16	0	11	1	5	0	95
Cafe, Sta. Barbara	740	0	45	0	18	2	5	0	180
Cordova Sur, Tigbauan	717	0	47	4	6	2	0	0	158
Cordova Norte, Tigbauan	1,282	0	80	0	50	2	0	0	205
Cauayan, Isabela									
Elevazo, Nagrumbuan	550	0	0	0	0	0	32	0	56
Albuera, Leyte									
Riverside, Antipolo	1,000	0	0	0	0	3	9	0	162
Wangag, Danula-an	1,500	0	2	0	3	3	100	0	240
Poblacion, Balugo	2,076	0	2	0	149	4	122	0	583
Tarlac									
Maligaya, San Roque, La Paz	1,032	0	0	0	0	0	47	0	138
Lomboy, La Paz	2,500	0	0	0	0	5	300	0	389
Mayang, La Paz	1,500	0	1	0	0	6	60	0	100
Lual Barrio, Lawy Capas	1,000	0	0	0	0	10	240	0	180
Pitabunan, Concepcion	1,000	0	0	0	0	1	149	0	122
Total	26,401	1	410	5	318	56	1,396	13	3,461

Table 4. **Water Supply and Sanitation Facilities Used by Surveyed Households in 20 Study Villages – Philippines**

Village	Population	No. of Households (HH)	Households Surveyed	Surveyed Sources of Water[a]				Surveyed Latrine		
				Public Wells	Private Wells	Others	Main Problem	Public	HH with Private	HH Without
Calaca, Batangas										
Canastilisan	3,000	300	45	0	45	0	turbidity	0	26	19
Bagong Pook, Dacanlao	500	100	38	5	33	0	poor quality on rainy days	0	13	25
Salong	2,400	400	83	2	81	0	poor quality on rainy days	0	33	50
Laoag City, Ilocos Norte										
Caaoacan	1,109	212	46	1	45	0	threat of contamination	2	22	22
Gabu Sur (Proper)	1,200	107	70	8	62	0	threat of contamination	3	50	17
Bencag (Sitios 2 & 3)	415	83	52	1	51	0	poor quality on rainy days	0	43	9
Dinalupihan, Bataan										
Payumo, Saging	2,250	450	59	2	57	0	w/ iron and acrid taste	0	47	12
Iloilo										
Tigtig, Sta. Barbara	630	105	18	1	17	0	red color	0	16	2
Cafe, Sta. Barbara	740	180	22	1	21	0	none	0	22	0
Cordova Sur, Tigbauan	717	158	23	2	21	0	open wells	0	22	1
Cordova Norte, Tigbauan	1,282	218	20	2	18	0	none	0	18	2
Cauayan, Isabela										
Elevazo, Nagrumbuan	550	80	20	0	20	0	rust like color but no stains	0	13	7
Albuera, Leyte										
Riverside, Antipolo	1,000	250	12	3	9	0	yellowish color	0	12	0
Wangag, Danula-an	1,500	300	21	0	21	0	turbid with iron stains	0	20	1
Poblacion, Balugo	2,076	400	17	0	17	0	none	0	16	1
Tarlac										
Maligaya, San Roque, La Paz	1,032	172	21	0	21	0	fishy smell and taste	0	19	2
Lomboy, La Paz	2,500	489	20	0	20	0	bland taste	0	19	1
Mayang, La Paz	1,500	300	20	2	18	0	bland taste	0	19	1
Lual Barrio, Lawy, Capas	1,000	300	20	0	20	0	iron stains	0	12	8
Pitabunan, Concepcion	1,000	166	21	0	21	0	iron stains	0	17	4
Total	26,401	4,840	648	30	618	0		5	459	184

a As surveyed by the water supply engineer.

meters. Sales for the Pitcher type are usually brisk as they are cheaper (250-350 pesos) than a Jetmatic handpump (550-650 pesos). The handpump dealers were usually found in the main town of the municipality or at the provincial capital.

Three types of handpumps were found to be commonly used in the study areas. Of the shallow well handpumps, the Pitcher and Jetmatic handpumps were used, while Magsaysay handpumps were used with the deep tubewells installed by the Government. It has been observed that in some cases, the Pitcher or Jetmatic handpumps are operated beyond the manufacturer-specified maximum operating depth resulting in frequent breakdowns of the moving parts.

Tubewell Drillers

"Backyard" drilling is not uncommon in the study areas. The jetting and driving methods utilizing manually operated tools and equipment are the most common means of well construction up to depths of 20 m. Water enters a well through the open end of the pipe or through perforations sawed in the sides of the pipe.

The cost of tubewell construction is relatively cheap. Pipe and drilling costs for a 10-meter deep tubewell would be around 800-1,200 pesos and for a 20-meter deep tubewell around 2,500-3,000 pesos. In some instances, the driller is assisted by local residents to reduce the cost of services.

Rural Credit

Credit facilities are generally available from a cooperative rural bank, a rural bank or a government bank in the town or municipality, while private commercial banks are established in the cities or capital towns. Interest rates on agricultural loans range from 12 to 24 per cent per annum, while the period of repayment is less than a year with loans guaranteed by land title, livestock credentials or chattel mortgage. Informal credit sources are also available on mutually agreed terms.

Social Survey of Preference in 20 Villages (see Table 5)

If credit is available, 70 per cent of respondents would like to avail of it, either for improvements to existing family handpumps/wells, or for new shallow wells with handpumps. Generally the concept of the family handpump is already well established in most of the surveyed villages. Water supply, however, is indicated as a second priority to livelihood projects in some villages in terms of the overall needs of the community.

Table 5. **Social Survey in 20 Study Villages – Philippines**

Village Name[a]	Village Population	Households Surveyed	Annual Household Income Pesos	Women's Organizations	Main Priority	Water Supply Priority	Family Handpump Demand[b] %
Batangas							
1. Camastilisan (B)	3,000	45	4,894	None	Livelihood	2nd	20
2. Bagong Pook (S)	500	38	11,684	Women's organization	Livelihood	2nd	30
3. Salong (B)	2,400	83	6,125	None	Livelihood	2nd	50
Laoag City							
4. Gabu Sur (B)	1,200	46	8,810	Mothers' Club Samahan ng Kababaihan ng Barangay	Health and sanitation	1st	80
5. Bengcag (S)	415	70	3,052	Women's organization	Irrigation	2nd	70
6. Caaoacan (B)	1,109	52	3,985	Catholic Women's Organization	Livelihood, health and sanitation	1st	85
Dinalupihan, Bataan							
7. Payumo (S)	2,250	59	10,150	Women's organization	Irrigation and water supply	1st	85
Iloilo							
8. Tigtig (B)	630	18		Women's organization	Water supply	1st	90
9. Cafe (B)	740	22	9,500	Women's organization	Water supply in school	1st	85
10. Cordova Sur (B)	717	23	9,300	Balikatan Parents'Feeding Committee	Water supply	1st	100
11. Cordova Norte (B)	1,282	20	12,775	Parents' Committee Balikatan	Water supply	1st	75
Cauayan, Isabela							
12. Elevazo (S)	550	20	9,100	Green Ladies	Health center	2nd	80
Albuera, Leyte							
13. Balugo (S)	2,076	12	15,280	Day Care Parents' Committee	Livelihood	2nd	60
14. Wangag (S)	1,500	21	12,271	Mothers' Class	Livelihood	2nd	64
15. Riverside-Antipolo (B)	1,000	17	4,125	None	Water supply	2nd	66
Tarlac							
16. Lual Barrio (S)	1,000	21	14,415	None	Water supply	1st	95
17. Pitabunan (B)	1,000	20	9,507	F.P. G. Parents' Committee	Water supply	1st	100
18. Lomboy (B)	2,500	20	16,311	Buklod Diwa	Agricultural loans	3rd	88
19. Mayang (B)	1,500	20	11,511	Buklod Diwa	Water and sanitation	1st	100
20. Maligaya (S)	1,032	21	7,960	Buklod Diwa	Water and sanitation	1st	100

a S = Sitio, B = Barangay

b Includes existing handpumps for improvement; some bias in the sample because some officials advised only community members without own pumps should be available for interview.

The average annual household income is around 9,500 pesos, with the lowest average household income in a village at about 3,000 pesos and the highest being reported at near 16,000 pesos. Almost every village has a women's organization which is capable of assisting villagers and implementing agencies as motivators, educators and evaluators.

IV. NARRATIVE COMMENT FROM VILLAGE WOMEN

Rural households unanimously expressed the importance of water and sanitation. Certain limitations however, were expressed by women and families from low-income and fishing and agriculture-based economies. Foremost among these is the problem of low cash flow. If loans are provided, they are doubtful of being able to repay it. This usually applies to the landless, hired labor, inland fishermen, tenants of small upland holdings (rice and coconut) and unemployed household heads - some of whom are dependent upon remittances by a member of the family or relative employed overseas. The former are generally underemployed with cash incomes obtained from seasonal wage employment. Farmers of small landholdings (owners or lease tenants), on the other hand, indicated apprehensions over credit schemes as they are already burdened by payments being made for agricultural loans, from formal and informal credit sources, irrigation water user's fee for irrigated lands, land transfer amortizations and the continual loss or damage to crops from typhoons and floods. General seasonality of economic activities is another consideration. Except for irrigated lands, rice, the major crop, is harvested only once a year. Deep-sea fishing is possible only five months in a year. After the peak season, wages from hired labor are adequate for subsistence alone.

Another constraint is the lack of security of tenure over the land. Apprehension was signified over making investment in a utility which the household may lose with relocation or when evicted by the private landowner.

The situation, however, is different for occupants of government land or "squatters" on the land of politicians (who had indicated some security of tenure for occupants), who expressed their desire for development in order to reinforce their stake or claim over the property.

The concept of women implementing a project drew amusement from the women themselves. When men (in mixed community meetings) inquired as to why women should implement this project, some remarked that since men are usually the ones to manage and apply for credit and are responsible if financial mismanagement or insolvency results from non

payment of loans, in this instance the women could be hauled off to prison and the menfolk would be left in the village. There were reservations expressed regarding women as project managers. The project's success would depend upon leadership, commitment and capability of the women leaders identified.

Another issue which drew spirited discussion among women pertains to priorities when availing of credit for water and sanitation. While both are considered important to a household, mixed responses are obtained in different areas though there is a tendency to concur with the respondent just interviewed. In coming up with a decision, there is usually consultation with other women listening to the interview being conducted. Generally water is preferred because it will facilitate household chores, while other women express the desire to put up backyard piggeries, but acknowledge that cleaning would be an arduous task if they still had to fetch water. On the other hand, sanitation proponents argued that households with teenage girls must ensure their privacy, otherwise young men would take advantage of girls who have to use the fields and provide a cause for early marriage. In another village, the discussion focused on people caught throwing their wrapped "disposable" into their neighbor's backyard before daybreak.

A question which cropped up in a few villages was: Should the project credit be provided in terms of cash or in material loans? Comments were made that if cash is given out they would rather invest the capital in income-generating activities or repair the house than invest in an outhouse when the dwelling itself needs the improvement.

The "elite" in the communities also tend to indicate lower levels of affordability (despite ownership of some property and a permanent housing structure). Some members of this group expressed fear of the possibility of garnishment of their small properties in case of default in payment. The lower-income group were less cautious since they perceived that the only way they would lose was by repossession of the utility.

Another point of contention is associated with the quality of water: Who pays the cost of installation and the pump if the desired quality (taste, odor, smell, etc.) is not obtained?

Some doubts were also expressed about households paying for the installation of a handpump since provision of basic utilities like water is conceived as a responsibility of the Government. In relation to this, the general contention is: In a piped system, the government pays for the cost of installation with the community paying only a user's fee.

In some villages where good water quality can be obtained at depths beyond 12 m, the households would still like to avail of tubewells on credit.

The women interviewed expressed willingness to shoulder the additional costs involved.

Water-borne diseases like diarrhea and cases of amoebiasis are widespread. However, this is attributed more to having eaten something which is incompatible with one's constitution than with water potability, hygiene and sanitation.

V. CONSULTANT'S ANALYSIS AND COMMENT

The survey results have indicated a demand both for shallow wells with handpump and toilet facilities in Philippine villages. The provision of household shallow wells on credit will complement the Government's program on community wells with its "Accelerated Rural Water Supply Project".

To minimize bias towards the relatively affluent and enable equity in participation and access to a project, local human resources such as "backyard" drillers and local technology must be maximized. While water is considered a primary household need, other needs are equally important. Therefore the demand for water sources in an area must be carefully determined. If a tubewell is not utilized as expected, there is a good chance that it was not a high-priority need and that the beneficiary may renege on the repayment.

A financial management system must consider the income-generating limits of farming and fishing - whether public or private, while NGOs and rural credit institutions as fund managers must consider practical and affordable terms.

Women as implementors of a family handpump project are generally viewed with favor. Some villages have to formally organize women's groups where existing women's organizations are still to mature. A pilot scenario of a women-water-family handpump project should be considered not only in terms of water provision, but a vehicle for priming women's organizations and promoting the role of women in development in a community-managed project. Social preparedness of a village, however, must not be a precondition for project participation. This should be corollary to the delivery of project benefits and institutional development and must not be viewed as essential to project success. Rather, the efficient and effective management of project resources should be the measure of acceptability.

NGOs in the Philippines, with their qualities of flexibility and innovativeness, have developed viable working arrangements with the Government resulting in efficient and effective collaboration in various

endeavors. This has evolved from a mandate of the new Philippine Constitution of 1987 which provides that, "The State shall encourage non-government community-based or sectoral organizations that promote the welfare of the nation". Similarly the country's Medium Term Philippine Development Plan 1988-1992 regards NGOs as partners. The maturation of most local NGOs, however, is held back by inadequate local resources whether public or private.

A pilot project, therefore, must view the role of NGOs in ways not only as resource managers and a source of technical support, but must consider its potential dynamic role in the national government's thrust towards decentralization and local autonomy. The revised Local Government Code provides more resources, authority, responsibility and power to local governments, i.e. provinces, cities, municipalities and barangays. Strengthening the professional and technical competence of locally based NGOs will enhance and ensure a sustainable NGO-government partnership in development. This is congruent with the 1987 Constitution's established principle that NGOs would be provided the opportunities to contribute to the economic and social development of the country.

To sum up, a women-water-family handpump project must proceed within the framework of established constitutional principles and national policies on more active people's participation through involvement in community organizations and non-government bodies and a pursuit of the attainment of decentralization and vigorous local autonomy.

VI. THE COUNTRY SEMINAR

The country seminar, organized by BWW, was held at the National Training Laboratory of the DSWD/BWW from 25 to 27 July 1989.

The main objective of the country seminar was to evaluate the demand for and affordability of the family-owned shallow well with handpump, develop a potential credit mechanism and assess the overall reaction to the proposed women-oriented development.

Participants to the seminar included the women representatives from the 20 study areas and DSWD's women specialists in the regions represented.

The DSWD Secretary, Honorable Mita Pardo de Tavera, in her welcome address focussed on the role of women and the importance of water. Invited to address the participants were representatives from the international agencies, UNDP and UNICEF, and from the government

agencies, DPWH (on its rural water supply program) and DOH (water potability and purification).

Invited from the private sector were an NGO, a tubewell driller, a civil-sanitary engineer, a handpump manufacturer and an officer of the Rural Bankers Association of the Philippines. A representative from the National Economic and Development Authority (NEDA) was among the participants. The participants were introduced to the Tulungan sa Tubigan Foundation – an NGO established solely for water supply development.

An evening workshop for the village women representatives dwelt on the identification of issues and recommendations for project implementation. From among them, a representative to attend the regional seminar was elected. The three-day seminar terminated with a half-day field trip to see shallow well handpumps installed by local officials, a household and a women's group in the nearby municipality of Angono.

VII. ISSUES, RECOMMENDATIONS AND CONCLUSIONS

The issues discussed are grouped into the following categories: (1) demand for shallow well handpumps; (2) technology preference; (3) financing, credit and affordability; and (4) pilot project scenario.

Demand for Shallow well Handpumps

Water is a priority among rural households with 73 per cent of those interviewed expressing an interest in availing of credit for a family handpump. All the village women representatives at the seminar expressed the need for the project in their area.

Household distance from a water source is the primary problem. Water quality and reliability may be a problem, but is not so important as long as these are tolerable and the water could be used for drinking or other household purposes if a good option is not found within the area.

Technology Preference

Culturally acceptable technologies are indicated in preferences expressed: dugwells with handpumps in Ilocos and Iloilo provinces, where they are predominant, and tubewells in the other areas where they are extensively used. The concept of "backyard" drilling was found acceptable. However, the drilling method would depend upon the available technology in the area: digging, driving or jetting.

The use of a manufactured well screen was preferred by the participants after realizing its advantages in terms of discharge rate and well life span.

A consensus about a shallow tubewell with concrete platform and its other physical details was arrived at. The seminar participants also concurred with all-inclusive cost estimates for a tubewell at 4,700-5,200 pesos and for a dugwell with handpump at 4,900-5,500 pesos. Examples of typical designs are shown in Figures 1 and 2. These estimates assume that materials locally available, i.e. sand and gravel, may take the form of the project participants' counterpart contribution and be taken out from the project cost or obtained at a price lower than the project estimate.

Financing, Credit and Affordability

The potential sources of financing for seed capital were bilateral or multilateral development agencies with the NGO as fund conduit.

Two provinces (Leyte and Iloilo) opted from the start for two years repayment schedule with 25 per cent of the cost (basically labor) to be subsidized by the project participants. No other sources of subsidy were identified except for drilling which the NGO could provide. This option was accepted after some deliberations.

Pilot Project Scenario

The following scenario was envisioned:

(a) An interagency approach with DSWD as lead agency. Government agency support will include health and hygiene education, training for livelihood and leadership, technical assistance and capital assistance for income-generating projects;

(b) NGO Tulungan Sa Tubigan to oversee project implementation at the national level, act as fund conduit and provide technical services; and

(c) A women's organization at the village level will manage the project.

All 20 study villages are to be included in the pilot stage with about ten households from each village obtaining material loans as initial beneficiaries.

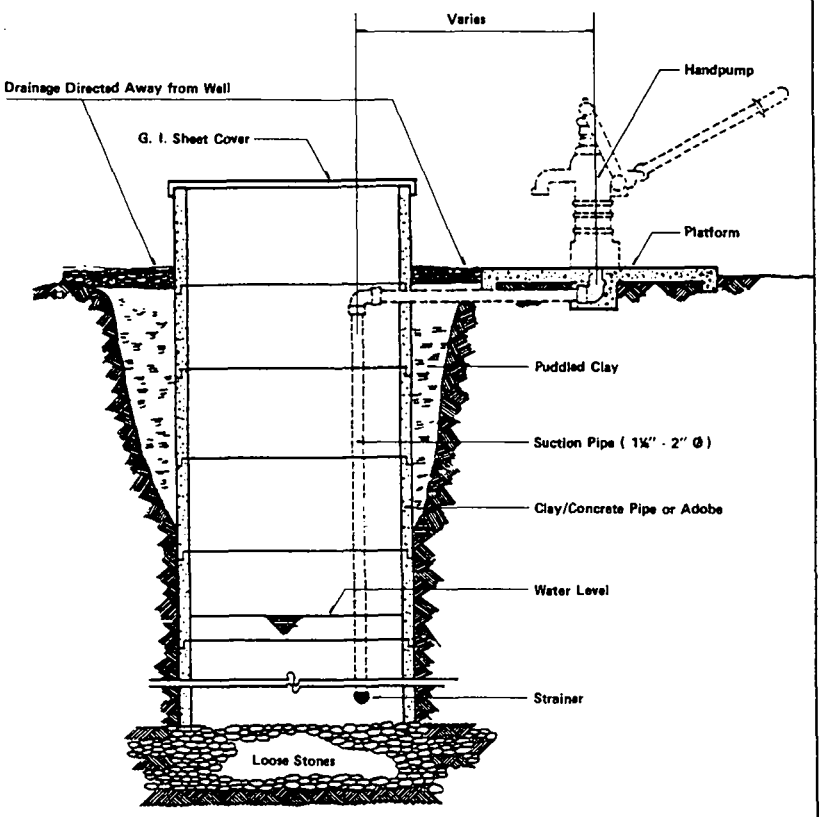

FIGURE 1
PHYSICAL DETAILS OF A DUGWELL WITH HANDPUMP
(PHILIPPINES)

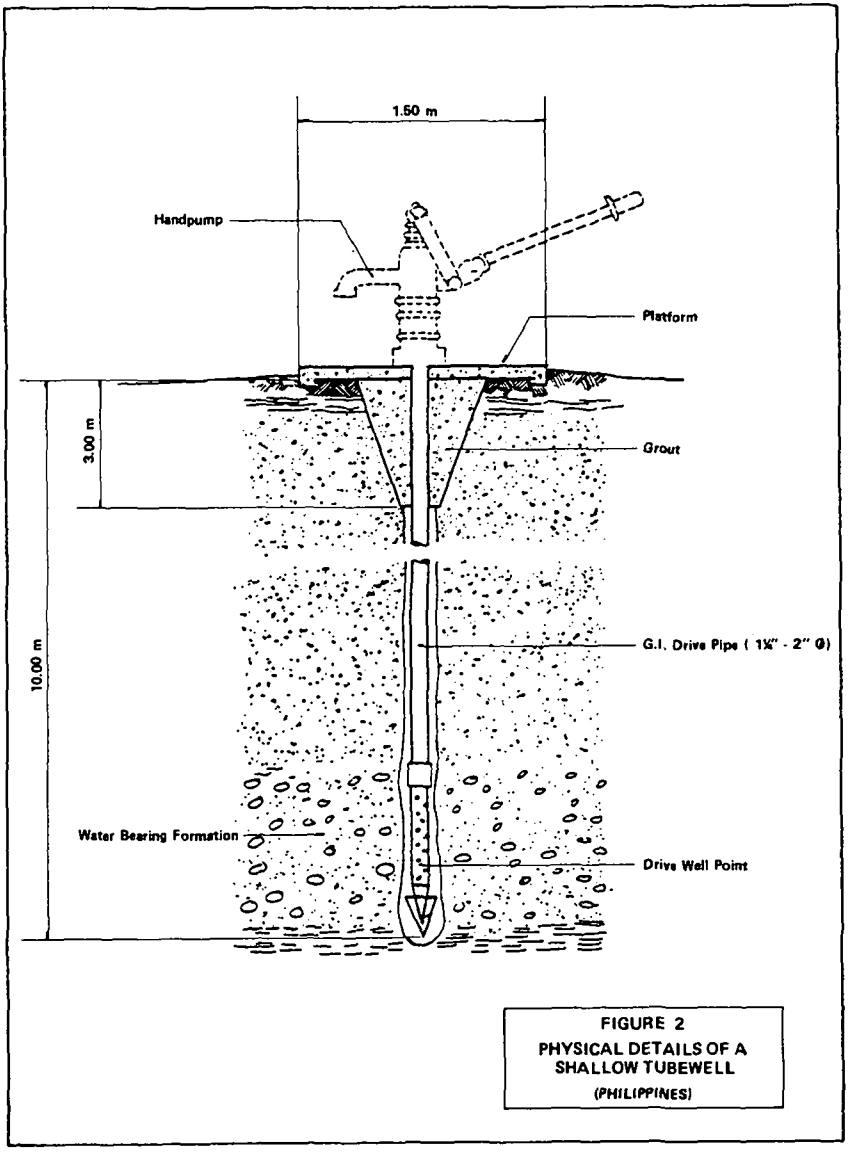

FIGURE 2
PHYSICAL DETAILS OF A SHALLOW TUBEWELL
(PHILIPPINES)

COUNTRY PAPER – THAILAND

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CONTENTS

I. RURAL WATER SUPPLY AND SANITATION IN THAILAND

The Thai Government has, for a long time, been aware of the problem of providing safe drinking water supply in rural areas of the country and various measures for tackling the problem have been implemented since the First National Economic and Social Development Plan (1961-1966). Programs included the construction of wells with handpumps, improvement of shallow wells, and construction of piped water systems, cement rainwater storage containers and ponds. In these operations, many public agencies such as Ministry of Public Health, Ministry of Interior, Ministry of Industry, Ministry of Agriculture and Cooperatives, and Ministry of Defense have taken responsibilities.

The Fifth and Sixth National Economic and Social Development Plans cover the period 1982-1991, substantially coinciding with the International Drinking Water Supply and Sanitation Decade (1981-1990). As one of the members of the United Nations, Thailand adopted the aims of the Decade and has been working in every way toward the goal of achieving adequate drinking water for all people at its end. It recommended that at the end of the Sixth National Economic and Social Development Plan (1991), 95 per cent of rural people should have access to a safe drinking water supply. In 1983, the Thai Government had prepared the Master Plan for Rural Water Supply and Sanitation so as to provide clear guidelines for its related agencies to work in the same direction. Furthermore, the Action Plan for Rural Water Supply was developed in 1987. An Action Plan for Rural Sanitation was prepared in 1989 under the direction of NESDB. Table 1 summarizes the rural water supply and sanitation service levels in Thailand. In 1987, the Government committed a total annual expenditure of around US$115 million to rural water supply of which about 80 per cent went to subsidy of rainwater containers, about 10 per cent to deepwells, and the remainder to a mixture of ponds, piped and shallow well water supplies. By contrast only US$2 million was committed to rural sanitation.

II. OBJECTIVES

1. To study the socio-economic conditions of the people in the target area, including drinking and domestic used water supplies and sanitation.

Table 1. **Service Levels of Rural Population (39.32 million) Thailand 1987**

	Water Supply	%	Sanitation	%
A	Piped - house connection 474,997 households	6		
B	Piped - standpipe 5,634 villages	11	Private latrines	64
*C	Private well + HP 273,780 wells	4		
*D	Private well 1,015,074 wells	13	Public latrines	
**E	Public well + HP 57,322 wells	11		
**F	Public well 144,473 wells	28	No sanitation facilities	36
G	Other public sources (river and spring)	15		
H	Rainwater 4.8 million people	12		
	Total	100	Total	100
	Family water supply A + C + D + H	35		
	Community water supply B + E + F + G	65		
Total		100		

* one private well = one household
** one public well = 15 households

Rural households = 7,657,168
Number of villages = 52,909

Sources: 1 Provincial Water Works Authority.
2 National Economic and Social Development Board.
3 Thailand Country Profile.
4 Sanitation Division.

2. To explore the feasibility of promoting domestic shallow well water supplies by means of the development or improvement of existing dugwells or drilled wells together with handpump installations on the basis of self-help through women organizations in the villages.

3. To propose possible strategies in implementing a project of domestic shallow well water supplies under the socio-economic conditions of rural Thai people.

III. METHODOLOGY

Selection of Villages

Firstly, all four geographical regions were included in the study to give a geographical spread of villages and representation of different cultures of the country.

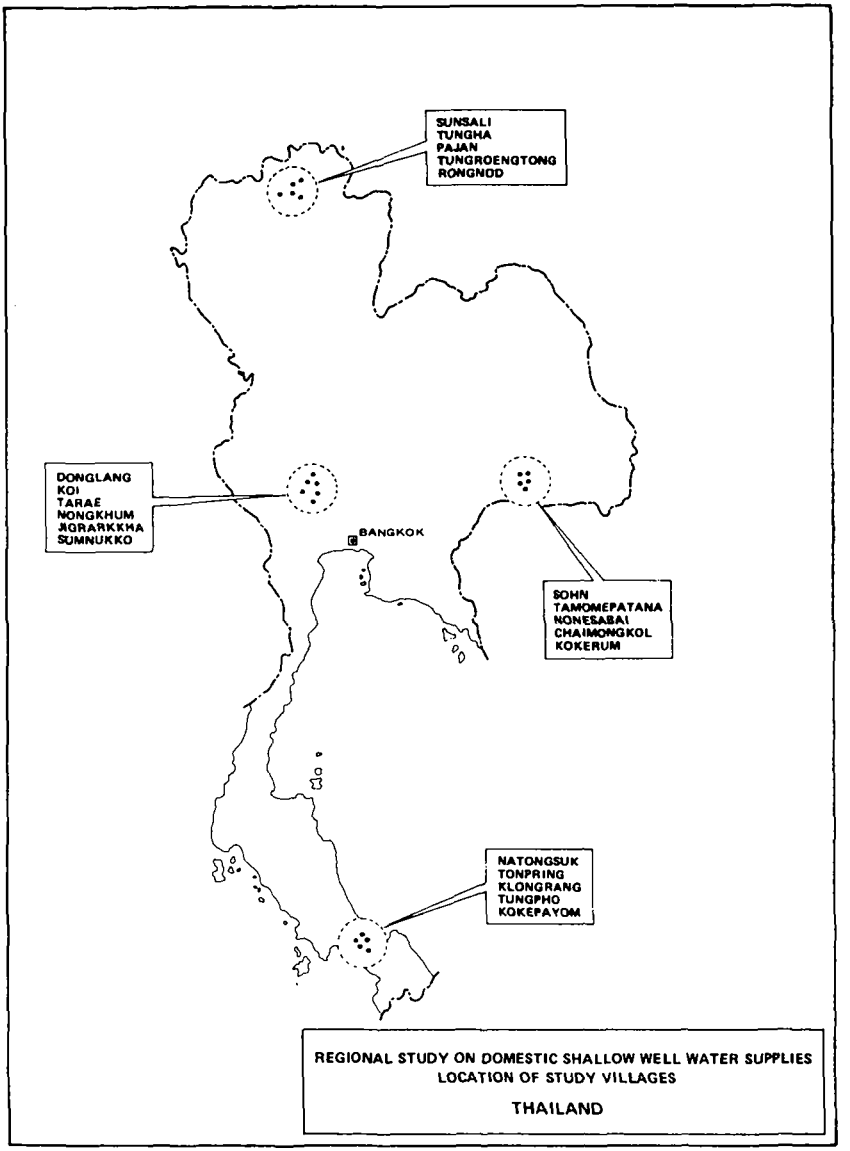
Secondly, provinces and districts were selected from each region. Each selected province and district should have at least five villages with the following characteristics:

(1) village population of 500-2,000;
(2) no piped water service in the villages;
(3) year-round availability of groundwater in the village at depths not exceeding 10 meters;
(4) presence of a strong women's organization in the village; and
(5) village located outside the municipality or sanitary district.

Thirdly, after selecting one district from each region, five villages located within 40 kilometers from a focal town were chosen for the study. The location of the study villages are shown on the map of Thailand.

Survey Respondents

All households in the selected villages were interviewed through questionnaires which focussed on household water supply sources and problems, needs for the family-owned shallow well with handpump, credit and affordability to pay back. A randomly selected 20 households from each village were then interviewed with additional questions on socio-economic and demographic aspects. Although the target population amounted to 3,618, contact could not be made in all cases and only 3,363 households were actually interviewed.


SUNSALI
TUNGHA
PAJAN
TUNGROENGTONG
RONGNOD
DONGLANG
KOI
TARAE
NONGKHUM
NGRARKKHA
SUMNUKKO
BANGKOK
SOHN
TAMOMEPATANA
NONESABAI
CHAIMONGKOL
KOKERUM
NATONGSUK
TONPRING
KLONGRANG
TUNGPHO
KOKEPAYOM
REGIONAL STUDY ON DOMESTIC SHALLOW WELL WATER SUPPLIES
LOCATION OF STUDY VILLAGES
THAILAND

The respondents were wives of the heads of households. The heads of households or adults in the family who could make a decision in household activities were interviewed if the wives were not at home.

Public and private agencies concerned were consulted both at the central and regional levels. These agencies included Community Development Department, Health Department, Public Works Department, Local Administration Department, Department of Mineral Resources, and the Girl Guides Association of Thailand.

Questionnaires

The data for this study were collected by the use of questionnaires. The survey materials were developed by the research team according to the guidelines provided by the Asian Development Bank. Finally, 12 questionnaires were constructed; seven for the socio-economic survey and five for the survey of technical aspects.

Before collecting data in the study area, these questionnaires were pretested in two villages namely, Nangtan Mu 1 in Tambon Kohka and Saladonglarn Mu 1 in Tambon Sala, both of the Kohka district in Lampang Province. Results from the pretest were incorporated for the improvement of the study.

Data Collection

For the north, northeast and central regions, interviewers were local villagers and members of the Girl Guides Association working in the area. For the southern region, students from the Prince of Songkhla University were used as interviewers, since villagers in that areas were busy working in the rubber plantation with good pay and it was difficult to recruit volunteers. All interviewers were informed about the objectives and design of the research, interviewing technique, and administrative procedures. Then, they were trained to use the structured questionnaire before being assigned to collect data. During the period of data collection, representatives of the Girl Guides Association and the Community Development Department cooperated very well with the research team by facilitating and helping to check the accuracy and completeness of all questionnaires in the field. Data collection was done during April 21-May 26, 1989.

As a result of data collection, 1,059 households in the north, 776 in the northeast, 867 in the central zone, and 661 in the south were interviewed.

IV. RESEARCH RESULTS

The Socio-economic Condition of the Study Groups (see Table 2)

Approximately 64 per cent of the interviewees were housewives or female household leaders. The average age was 43 years old. Rice farming was the main occupation for 90 per cent of them. In addition, 58 per cent of the total respondents did not have a second occupation. For those who had a second occupation, most of them were private employees or laborers, and 9 per cent of them were traders.

Most of the constructed houses were permanent. Houses were made from bricks with concrete or wood or half wood/half concrete. Roofs were made from cement tile and galvanized iron sheet. About 86 per cent of the total respondents have access to electricity and 13 per cent still use kerosene lamps. The latter group mostly lived in Donchedi District, Suphanbur Province. The average annual family income of the total respondents was about 28,000 baht.

According to the survey, 22 rais (1 acre = 2.5 rais) is the average size of a household landholding. In addition, 76 per cent of the study group were the landowners, 11 per cent worked on the land of their parents, and 4 per cent had both their own land and parents' land from which to make a living.

Regarding health problems, approximately 56 per cent of the total study group did not have any problem, and 19 per cent had minor problems such as cold and headache. The southern group seemed to be most healthy followed by the groups from the central, the north and the northeast, respectively. About 57 per cent of the study population in the northeast had some health problems, of which 30 per cent of them had diarrheal disease during the past six months.

Water Supply and Sanitation Service Levels in the Study Area
(see Table 3)

The most frequently used drinking and domestic water supply sources for villagers in the study area were as follows:

Drinking Water Supply Sources.

In the north, most of the study group used dugwells as a drinking water supply source, of which 64 per cent of this group had their own well without handpump, and 31 per cent used their neighbor's dugwells. About 48 per cent purified drinking water by using a local filter and/or boiling.

Table 2. Social Survey of 21 Study Villages in Thailand

	Village Name	Village Pop.	No. of Households	Household Income per year ($)	Women's Organ.	Health Educ. Progr.	Main Priority	W.S.[a] Priority	FHP[b] Demand
1.	Sunsali	2,050	315	1,417.1	Yes	Yes	Household Facilities	2	4
2.	Tungha	1,200	270	398.8	Yes	Yes	Electric Pump	3	16
3.	Pajan	700	172	586.1	Yes	Yes	Electric Pump	2	13
4.	Tungroengtong	586	152	493.2	Yes	Yes	Electric Pump	2	1
5.	Rongnod	671	170	750.7	Yes	Yes	Well	1	1
6.	Sohn	756	177	1,191.6	Yes	Yes	Well	1	45
7.	Tamomepatana	714	170	355.5	Yes	Yes	Latrine	2	23
8.	Nonesabai	1,548	188	1,570.7	Yes	Yes	Well	1	3
9.	Chaimongkol	619	99	882.8	Yes	No	Latrine	2	3
10.	Kokerum	1,135	212	744.9	Yes	Yes	Latrine	2	28
11.	Donglang	865	135	598.8	Yes	Yes	Well	1	70
12.	Koi	665	141	1,549.1	Yes	Yes	Rainwater Tank	1	2
13.	Tarae	1,266	228	2,233.3	Yes	Yes	Rainwater Tank	1	5
14.	Nongkhum	550	114	1,125.3	Yes	Yes	Well	1	44
15.	Jigrarkkha	799	145	2,079.5	Yes	No	Well	1	6
16.	Sumnukko	883	156	899.3	Yes	No	Well	1	23
17.	Natongsuk	945	144	1,305.1	Yes	Yes	Latrine	2	2
18.	Tonpring	774	142	1,074.1	Yes	Yes	Well	1	1
19.	Klongrang	646	130	1,083.2	Yes	Yes	House, Latrine	3	3
20.	Tungpho	720	144	1,058.7	Yes	Yes	Well	1	3
21.	Kokepayom	1,044	214	1,019.6	Yes	Yes	Latrine	2	2

a Water supply ranking as priority.
b FHP = family handpump.

Table 3. Water Supply and Sanitation Service Levels from Household Surveys in the Study Villages (Thailand)

	Village Name	Village Pop.	Households Total	Households Survey	Main Source Drinking Water % Public Well	Private Well Own	Private Well Neighbors	Others	Main Source Domestic Water % Public Well	Private Well Own	Private Well Neighbors	Others	Main Problem	Latrine Use % Public[a]	Private Latrine Own	Private Latrine Neighbors	Bush
1.	Sunsali	2,050	315	315	0.3	79.4	19.0	1.3	0.3	81.2	17.9	0.6	Quantity Quality	0.6	94.6	4.5	0.3
2.	Tungha	1,200	270	266	3.8	57.2	36.4	2.6	1.5	68.3	28.7	1.5	Distance Quality	1.5	86.1	12.0	0.4
3.	Pajan	700	172	177	-	86.3	13.1	0.6	-	86.3	13.1	0.6	Quantity Quality	0.6	87.0	10.0	2.4
4.	Tungroengtong	586	152	152	-	43.0	56.3	0.7	-	50.3	37.3	12.4	Distance Quality	0.7	85.5	13.8	
5.	Rongnod	671	170	155	-	57.9	42.1	-	-	59.7	38.3	2.0	Quality	0.6	87.8	11.0	0.6
6.	Sohn	756	177	159	45.6	4.4	29.1	20.9	40.5	21.5	35.5	2.5	Quantity	1.3	45.2	5.1	48.4
7.	Tamomepatana	714	170	170	0.6	3.5	23.5	72.4	5.3	31.2	61.8	1.7	Distance	0.6	10.0	2.9	86.4
8.	Nonesabai	1,548	188	162	17.4	14.3	57.1	11.2	16.7	40.4	42.9	-	Distance	-	40.1	6.2	53.7
9.	Chaimongkol	619	99	91	18.7	28.6	43.9	8.8	9.9	46.1	41.8	2.2	Distance	-	17.6	3.3	79.1
10.	Kokerum	1,135	212	194	63.9	8.4	24.1	3.6	46.6	17.8	25.7	9.9	Distance	2.1	15.7	2.6	79.6
11.	Donglang	865	135	125	2.4	6.4	41.6	49.6	57.6	10.4	20.8	11.2	Quantity Distance	4.0	54.4	0.8	40.8
12.	Koi	665	141	132	2.3	-	-	97.7	2.3	0.7	2.3	94.7	Quantity	0.8	81.8	17.4	
13.	Tarae	1,266	228	220	0.5	0.5	0.5	98.5	0.9	2.3	-	96.8	Quality	2.3	88.6	5.0	4.1
14.	Nongkhum	550	114	113	23.4	2.7	16.2	57.7	8.1	6.3	16.2	69.4	Distance	1.8	50.9	20.5	26.8
15.	Jigrarkkha	799	145	137	1.5	2.9	-	95.6	2.2	11.7	2.2	83.9	Quantity	2.2	88.9	5.8	5.1
16.	Sumnukko	883	156	140	7.2	2.9	12.2	77.7	30.0	7.8	13.6	48.6	Quantity	5.0	43.9	3.6	47.5
17.	Natongsuk	945	144	133	3.7	66.9	22.6	6.8	4.5	74.4	21.1	-	Quality Quantity	0.7	50.4	6.8	42.1
18.	Tonpring	774	142	118	3.4	47.9	48.7	-	10.2	48.3	40.7	0.8	Quantity	-	74.4	3.4	22.2
19.	Klongrang	646	130	106	5.7	65.7	25.7	2.9	5.7	67.0	23.5	3.8	Quantity	-	63.8	6.7	29.5
20.	Tungpho	720	144	132	1.5	56.8	34.9	6.8	3.0	57.5	35.6	3.9	Quantity	2.3	63.6	12.1	22.0
21.	Kokepayom	1,044	214	172	-	74.8	24.6	0.6	-	78.8	21.2	-	Quantity	1.2	58.8	4.7	35.3

a Latrine in school or temple in the village.

In the northeast, approximately 34 per cent of the study group used neighbor's dugwells. The second, and third drinking water sources were public dugwells or public drilled wells, and rainwater, respectively. About 22 per cent boiled their water.

In the central region, the majority of the study group or about 65 per cent were accustomed to rainwater and about 10 per cent used neighbor's dugwells. In the case of rainwater, the villagers drank directly without any purification. In the case of dugwell water, 50 per cent use alum for sedimentation.

In the south, the most common drinking water supply source was private dugwell without handpump and 31 per cent used their neighbors' dugwells. About 16 per cent boiled water before drinking.

In summary, the most common drinking water source for villagers in the rural area in the north, northeast and south was the shallow dugwell which either belonged to them or their neighbors. Most of these wells were unprotected dugwells without any kind of pump installation. Bucket or simple machine was used to draw water from the wells. People mostly drink water without any purification and store drinking water in particular containers. The people in the central region prefer to drink rainwater. If the latter is not enough, other sources such as dugwell, irrigation canal and river will be used and the water will be treated with alum, then kept in the water containers.

Water Source for Domestic Use.

In this case, water for bathing and washing is mainly considered. The result of the study showed that most of the north group used water from their own private dugwells without handpump and in the northeast, neighbors' dugwells were the main sources. In the central region, 66 per cent of the study group used an irrigation canal by pumping and storing water in their own ponds near their houses. In the south, most of the respondents used private dugwells, and to a lesser extent, neighbors' dugwells.

In respect of the total study group, 41 per cent of the respondents used private dugwells without handpump as the most frequently used water source, 25 per cent and 19 per cent used neighbors' dugwells and irrigation canal or river, respectively. Only 0.4 per cent used water from private dugwells with handpumps which is equal to those who used public dugwells. The result of this report supports previous studies which indicate that although public handpumps have been installed in rural areas, the rural people have not yet accepted the handpump. The reason may stem from the fact that at present most villages in Thailand have

access to electricity. The people whose economic status is moderate can afford electric pumps and have already bought an electric pump for their convenience. On the other hand, the handpumps, particularly the ones which have been installed at public wells, are easily broken and often out of order.

With regard to the distance from home to the most common drinking water source, the northeast was the region for which average distance from home to the most common drinking water source was the farthest. It was about 375 meters. The distance from home to the most common water source for domestic use is quite different. Families in the central group were farthest away at an average of 247 meters. A reason for this is the preference of people for drinking water from a dugwell where they thought they could get safe drinking water. Though far away, people still went to fetch it for their families.

Of the total study group, the average distance from home to most common drinking water source was 213 meters, and 143 meters was the average distance from home to most common water source for domestic use. In this aspect, most respondents had to fetch water daily. The average time spent for fetching water for a household was 35 minutes a day.

The methods of fetching water were different in each region. In the northeast, buckets and pushcarts were the most popular. In other regions, people preferred to carry water by buckets. In using pushcarts, cement jars, galvanized and plastic cans were used for keeping water on the cart.

The average number of trips per day to fetch water is different in each region: five trips for the central and four trips for the rest of the regions. Housewife and daughter were the principal water providers.

Remarkably, the central and the south groups preferred taking a bath and washing at water sources. But those in the north and the northeast preferred to fetch water and take a bath or wash at home. This may be because of the northern subculture or because of the sympathies of the northeast people that they had to share the water source with their neighbors. If they took a bath or washed at the water source it might cause inconvenience to the others and some public wells have a regulation not allowing people to do so.

Each region had different problems of water supply, e.g. 80 per cent of the northeast group complained about the long distance in fetching water whereas others complained about quality and quantity.

Water Supply Facilities in the Study Area (see Table 4)

Public water supply facilities

In the study area, in the total 21 villages there were 66 public water sources. The majority (57 per cent) were dugwells, 32 per cent and 11 per cent were drilled wells and ponds, respectively.

Public dugwells

Most (80 per cent) of the public dugwells had concrete casing, although about 30 per cent of these had no concrete platform. Most of public dugwells (74 per cent) were open, had no cover and no pump installation. Considering the visible quality of water, it is noticeable that most of the public dugwells had no problems with iron or hardness. The depths of public dugwells were between 3-10 meters, the depths to water during the dry season were between 2.5-9.5 meters. Approximately 84 per cent had year-round water supply.

Public drilled wells

Most of these public drilled wells had a well maintained platform but only about half had a satisfactory handpump installation. Most public drilled wells had no problem with iron and with water hardness. The public drilled wells were constructed by government agencies, such as Department of Mineral Resources, Department of Public Works, Health Department, the Office of Accelerated Rural Development and the National Security Command Headquarters (NSC). The depths of public drilled tubewells varied from 10-76 meters.

Public ponds

There were seven public ponds in the study area. The size of these clay ponds was approximately 100 x 200 meters and 3-4 meters in depth. These ponds reserved water for the dry season. If the pond was deep and old, the water would be clearer than in shallow or newly dug ponds.

Private wells

Of the total population (3,363 households), 1,791 households or about 53 per cent had private well water supply source.

Table 4. **Water Supply and Sanitation Facilities in the Study Villages (Thailand)**

	Village Name	Population	Dugwells		Tubewells[a]		Handpumps		Latrines	
			Public	Private	Public	Private	Public	Private	Public	Private
1.	Sunsali	2,050	-	260	2	-	2	15	-	292
2.	Tungha	1,200	1	185	1	1	1	8	-	229
3.	Pajan	700	-	135	2	1	-	4	-	134
4.	Tungroengtong	586	-	86	-	5	-	-	-	128
5.	Rongnod	671	-	70	-	28	-	-	-	137
6.	Sohn	756	15	41	1	1	2	2	-	71
7.	Tamomepatana	714	1	54	1	1	-	1	-	17
8.	Nonesabai	1,548	1	52	1	25	-	-	-	61
9.	Chaimongkol	619	-	38	-	1	-	-	-	16
10.	Kokerum	1,135	2	19	1	21	1	-	-	28
11.	Donglang	865	-	15	5	-	5	-	-	68
12.	Koi	665	-	7	-	-	-	-	-	101
13.	Tarae	1,266	-	4	-	2	-	4	-	194
14.	Nongkhum	550	1	10	-	-	-	1	-	57
15.	Jigrarkkha	799	-	30	-	-	-	1	-	120
16.	Sumnukko	883	-	15	3	-	3	1	-	62
17.	Natongsuk	945	1	104	1	-	1	1	-	63
18.	Tonpring	774	5	50	-	-	-	-	-	87
19.	Klongrang	646	1	77	2	-	-	1	-	68
20.	Tungpho	720	1	79	-	1	-	-	-	84
21.	Kokepayom	1,044	9	138	1	1	1	3	-	101
	Total	19,136	38	1,469	21	88	16	42	-	2,118

a Motorized pumps.

Of the 1,791 households, 82 per cent had private dugwells, 13 and 5 per cent had private ponds and drilled wells, respectively.

Private Dugwells

The results of this study showed that 58 per cent of household dugwells had concrete lining; 24 per cent and 18 per cent had brick and clay lining, respectively. Remarkably, most private dugwells in the south had concrete lining, while about 65 per cent of private dugwells in the northeast were clay wells.

In addition, most private dugwells had no platform, no cover and had not yet been fitted with a pump. To draw water from the well, people mostly used a bucket with rope or simple machines, such as a pulley or wood sheaves.

Type and Condition of the Pump (Private Dugwells)

Of the total private dugwells, 33 per cent had pump installations of which 90 per cent used electric pumps, 7 per cent and 3 per cent used handpumps and other motor pumps, respectively. Of the total pumps, 87 per cent were in good condition. This may be because they are private and the owners have used these pumps carefully. If there is any damage, they have to repair their pumps by themselves. Handpumps were available in the market at distances no greater than 30 km from any of the study villages. The cost of the handpumps in the market was about US$16-27. By contrast an electric pump can be purchased for around US$60 in the market. Interestingly, the factory cost of both handpump and electric pump is found to be at least half of the market price.

Depth of Private Dugwells and Depth of Water in the Dry Season

The depths of private dugwells varied generally from 4-12 meters. In some parts of the south, the depth of the well was 17 meters with water at the 15-meter level since the well was located in the highland.

Groundwater in the central area was so deep that people could not dig shallow wells; most villagers had dug private ponds with the exception of Donglang Village where the groundwater table is shallow.

The depth of water during the dry season in the four regions was generally not more than 9 meters. Of the total 1,702 private dugwells and private ponds in the four regions, 81 per cent had year-round water availability. People in the northeast faced problems of water insufficiency the most. Considering the physical quality of water in private dugwells,

most of the private dugwells had no problems with iron content or water hardness.

Characteristics of Private Drilled Well

In the four regions, there were only 88 private drilled wells or about 5 per cent of the total private wells. Most of the private drilled wells were in the northeast and to a lesser extent in the north. The majority of people preferred to use PVC pipe for their drilled wells. Most of the private drilled wells had no platform. In the study areas the cost of drilling a shallow tubewell of 10 m depth was around $23-28, whereas one of 20 m depth was $38-45.

Types and Conditions of Pumps (Private Drilled Wells)

Considering 88 private drilled wells in the study area, 83 per cent had installed electric pumps, 12 per cent and 5 per cent had handpumps and other motor pumps, respectively. Seventy-eight per cent of the total number of pumps were in good condition but in the dry season about 10 per cent could not be used due to lowered water levels.

The depths of the private drilled wells were between 10-15 meters in the north, 10-63 meters in the northeast, 6-100 meters in the central region and 10-100 meters in the south. These wells could all be drilled by local drillers.

Private Ponds

There were 234 private ponds in the study area of the central region since the underground water level is very deep. There is no private pond in the other regions. In the central region, some villagers had to drill more than 90 meters in order to get water. Most people living there are farmers; the Government, therefore, has constructed irrigation canals. For these reasons, most people like to dig ponds of 8 x 10 meters and 2-3 meters in depth close to their house. They transfer water from the irrigation canal to store in their ponds and leave it until it is clear before using. In addition, this pond is also used for household fisheries and vegetable gardening. The number of those who had private ponds was 27 per cent of the total households in the central region.

Latrine Situation

The result of this survey revealed that 90 per cent of the sample group in the north own latrines, whereas in the northeast region only about 26 per cent own their latrines.

Of the total households in four regions, 65 per cent had private latrines. Nearly all of these were pour-flush latrines. The remainder defecated in the field or behind the bush and used their neighbors' latrines, respectively.

Priority (Well or Latrine)

In this study, most people in the north gave priority to latrines rather than private wells. In other regions, priority was given to wells rather than latrines. Of the total households in four regions, drilled wells were most preferred by 32 per cent, 31 per cent preferred dugwells, 13 per cent preferred dugwells with handpumps and 23 per cent preferred other types of water supply source such as private well with electric pump, pond, and piped water system. The main reason for desiring either a private well or latrine is the same, that is mainly convenience. In the south, 30 per cent gave the reason of privacy.

The total number of those who did not have private wells or had private water source already, but were not yet satisfied and frequently used neighbors' wells, was 1,826 households. About half wanted drilled wells and half dugwells.

An important result of this study showed that of 3,116 households, 46 per cent wanted electric pumps while only 9 per cent wanted handpumps, and 2 per cent other motor pumps. In addition, 30 per cent did not want any pump and 13 per cent had not yet decided.

Need of Loans for Water Supply and Sanitation

Interviewing those who had not yet owned a latrine, 94 per cent wished to have their own.

About half the households in the survey were interested in taking out a loan of up to 4,000 baht for family water supply or sanitation facilities. For repayment, a period of 2-4 years was generally preferred but some opted for monthly repayments while others wanted them to coincide with sale of their crops.

In the study group, 1,480 baht was the average amount that the household could pay back per year but this ranged from 1,100 baht in the northeast to 2,175 baht in the south.

Demand for Shallow Well Handpump

From the physical aspect, there is a potential of about 11-17 million people who could be served from their water supplies through shallow wells (see Table 5). However as indicated in the results of the surveys, demand for a family handpump would probably be less than 10 per cent of that figure.

Table 5. **Groundwater Resources – Thailand**

	Water Resource	**Rural Population**	
A	Shallow groundwater available	17.69 mn	45.01 %
B	Deep groundwater available*	17.45 mn	44.40 %
C	No groundwater available	4.16 mn	10.59 %
		39.30 mn	100.00 %
D	Existing piped water supply	6.62 mn	16.84 %
	Minimum family handpump potential = A - D =	11.07 mn	28.17 %
	Maximum family handpump potential = A =	17.69 mn	45.01 %

* In areas where shallow groundwater is not available. Shallow groundwater is where the water level is not more than 12 meters below surface throughout all seasons and water quality is favorable.

Sources: NESDB (Groundwater)
PWA (Piped Supplies)

In consideration of the socio-economic status of the study area, the people had water supply and sanitation needs but differing views on the use of credit. Remarkably, people in the north prefer to live without being in debt; they prefer to have a simple life. The existing condition of dugwells in the village was good enough for them. They would not buy a handpump on an installment basis. However, in the other three regions studied, the idea of credit was more readily accepted.

More than half of the people surveyed replied that if they had adequate water after water supply improvements, they would earn additional income by growing vegetables and raising animals, which would be approximately 2,000 baht per year. This income could be used to alleviate the loan repayments for water supply improvements. Therefore, this project should be possible if the term of repayments is at least two years by allowing the people to repay once a year after the harvesting season, or after selling their agricultural products.

Interviewing village committees showed that many of the villagers believe that water from a well with a handpump has a bad taste and odor due to the high iron content in the water which they do not prefer to drink. This will be one factor affecting handpump demand.

Women's Role

Focusing on the women promotion issue, this study revealed that the people mostly agreed with the idea to support women's participation in water and sanitation activities, especially women being assigned to be responsible for loan management. This will be compatible with the tradition of Thai culture where women are purseholders and safe water providers for the families.

However, only one-fourth of the total respondents answered that women in the family were members of women's organizations in the village. Therefore, if women are assigned to be responsible for this project, it should encourage the development of women's organizations. Agencies concerned need to provide training for women so that they will gain knowledge, understanding and awareness of the significance of water supplies and sanitation and know-how to manage a revolving fund.

With regard to the readiness of agencies to implement projects promoting women's role in water supplies and sanitation, both public and private sectors have worked for women development for a long time. For the private sector, the Girl Guides Association of Thailand (GGAT) has done this work officially since 1957. GGAT has done some activities in the field of women, water supplies and sanitation such as in Surin Province and has some experience in village revolving fund management. Other

national NGOs to support the water supply and sanitation sector include the Population and Community Development Association and the World Vision Foundation of Thailand. There are also several national coordinating bodies involved with women's affairs in Thailand. These include the National Commission on Women's Affairs, the National Council on Social Welfare of Thailand, and the National Council of Women of Thailand. In conclusion, for the private sector, GGAT is more appropriate than others to implement a project on the basis of self-help through women's organizations at the village level. However, NGOs have a limitation on manpower if the projects are going to be implemented at the broad level of the whole country at the same time.

In respect to the government sector, the Community Development Department, Ministry of Interior, has sponsored women development programs since 1962. The specific objectives of the Department's policy are: to mobilize women's potential through the establishment of women's organizations at every level and promote women's participation in all levels of the decision-making process, and to promote rural women in income-generating activities to increase the family's income. At present, training courses are being implemented for Village Women Development Committees (VWDCs) to arouse in women awareness of their potential to fully participate in the development process of the community. To date, about 36,000 groups of VWDC have been established all over the country.

Interviewing NGOs which have activities concerning water supply and sanitation in the study area, it showed that from their experience in coordination with public agencies to support development activities in the village, official regulations and procedures have some red tape and often affect the project.

In summary, each area has different conditions when considering the readiness to implement the project. In some areas, women's organizations at the village level are strong. Others do not have women grouping in real terms. Therefore, if women's organizations are assigned to implement the project, the problems mentioned above must be carefully considered.

Credit

With respect to the feasibility of using existing rural credit institutions in the study area to provide credit for people in this project, it was found that out of 19 formal credit institutions only six were interested in this project.

In addition, loans from formal credit institutions require collateral or guarantee. Some institutions permit group guarantee. The interest rates at present are between 12.5-15.0 per cent per annum. Most

institutions would like to have a loan paid back within one year if the loan does not exceed 4,000 baht or US$150.

This project will be highly feasible, if the interest rate of the loan provided for water supplies and sanitation is less than 12.5 per cent per annum. To motivate people's participation in the project, the term of repayment should be 2-4 years depending on the repayment capacity of the villagers in each area. In addition, group guarantee should be allowed, that is each member of a women's organization will be guarantor of its group members.

V. STUDY CONCLUSIONS

Although improving a shallow well by installing a handpump is the most economical method, to some extent the achievement of its implementation in Thailand should take the following into consideration:

1. *The strategies must be compatible with the daily way of life of people in providing safe drinking water.* For project achievement, one strategy that should be implemented is providing a training program on revolving fund management; another is education on the risk of drinking and using unsafe water, including benefits family members will get from drinking and using safe water.

2. *The strategies of well improvement and pump installation should meet the real need of the people.* Although domestic shallow well water supplies with handpump are the most economical way to provide safe drinking water, the survey on pump installation needs of the people in four regions showed that 46 per cent of the sample group wanted electric pumps while only 9 per cent and 2 per cent wanted handpumps and other motor well pumps, respectively. This may be because most people in the rural area of Thailand have access to electricity. Those who are not poor prefer to buy the electric pump, since there are many advantages such as simple use, convenience, modernization, dignity and prestige. The other factors affecting the popularity of the electric pump are the imitative behavior of villagers and the widespread advertising of the electric pump by manufacturers. To support both electric and handpump installations on the basis of their own economic status and demand will enhance project achievement. Current estimates show that the all-inclusive cost of a handpump on a 10 meter deep dugwell is around $270 whereas the same on a 10 meter deep tubewell is only about $100. By contrast the

all-inclusive cost of an electric pump with 10 meter dugwell is about $285 and on a 10 meter deep tubewell about $145.

From past experience a permanently sealed dugwell has not been accepted by rural people. They believe that a permanent cover obstructs the contact of air and water. This has some effect on water quality and taste. In addition, people like to clean their well at least once a year during the dry season. Permanently sealed covers create inconvenience for well cleaning. The owners of a dugwell which has good tasting water allow many people to use it and do not make a permanently sealed cover because of the belief that giving water to others is a merit in Buddhism. To make a permanently sealed cover and not to allow others to drink water is a sin. For this reason, it is difficult to have a handpump installation on a permanently sealed dugwell in Thai rural areas. Development on this aspect should be gradually implemented trying to find out appropriate ways of implementation so as to meet the real needs of the people and should have some good examples for them to imitate. For example, in the north and the south some of the people have their own shallow well with a stainless steel or galvanized cover that can be opened or closed at anytime. In addition, some people in the south also have locked such a cover. Therefore, the pump should be installed at the side of the well. There is no problem to promote platform development, since the people would like to use wells conveniently.

3. *This project should also promote other means of water supply provision and sanitation, particularly latrine development.* In some study areas such as in the northeast and the central areas some villagers need most rainwater tanks or giant cement jars, while in the north and the south some villagers need most to have latrines. Therefore, this project should be concerned with their needs and promote the implementation in a way that will meet the need of the target population.

4. *The depth and size of dug or drilled wells should be appropriate for households.* Interviewing local drillers and villagers showed the appropriate depth of a private dugwell which villagers can dig by themselves so that the well will have year-round availability of water is 6-10 meters. But some areas have geographical constraints, e.g. some respondents in the south have their houses on high land. While local well-diggers have been able to obtain water by digging wells as deep as 17 meters it should be noted that the soils must be strong enough. Otherwise, the walls may slip and be dangerous for those who are digging the well. Also if the well is so deep, people may not have enough oxygen for breathing while they are digging the well. In the south, therefore, people

like drilling the basement of the dugwell as deep as they can get adequate water, then place a PVC pipe for the underground water to be pushed through the pipe by pressure and water will be stored in the well. This method is appropriate and is not dangerous. It consumes a smaller amount of budget than the method of digging a deep dugwell.

Considering the household budget of the rural people and the adequacy of water in the well for one family, the appropriate size of a dugwell in general is 80 centimeters in diameter. A concrete lining can easily be placed and the rural people will spend a small amount of money for making a cover and constructing a platform. In addition the concrete lining can be bought anywhere in the rural area, that is why the people prefer to use this type of lining.

From the interview of local drillers and the survey of existing drilled wells in the study area, the appropriate depth of a drilled well which rural people can afford is about 10-25 meters using PVC pipe and the diameter is about 50 mm. The thickness of PVC is based on the satisfaction of the owner. At present, people do not like to use iron pipe because they believe that it increases iron content in the water and it is expensive.

5. *Type and characteristics of pumps should be considered.* Thai people in the rural areas mostly have some experience in using handpumps. It is economical and convenient but not modern when compared with an electric pump. Handpumps installed with a public well are easily broken because many people use them. To repair these handpumps, 2-3 people have to work together in order to take the pump out. This experience has given a bad impression and has had some effect on demand for the handpump. However, some people still use handpumps because they are economical and appropriate to their economic status. Some people have also installed a handpump together with an electric pump to give them more convenience.

This project should take certain characteristics of the handpump into consideration. The handpump to be promoted should be light, easy to be repaired, and durable. The valve should not leak easily. The family-owned handpump should be well maintained and with such good characteristics, the owner may be able to repair his own handpump by himself. If the efficiency of the handpump has been improved and it is appropriately promoted by using an advertising strategy, a shallow well handpump project will be highly feasible.

The electric pump which should be promoted is the piston pump because it is durable and can pump water adequately. A low electric bill and a reasonable price are the qualifications of this kind of electric pump. However, many people in the rural area of Thailand use various kinds of

automatic electric pumps. In addition, small electric submersible pumps have been used by some villagers.

If all the recommendations mentioned above are applied for the implementation of this project, project achievement will be enhanced. Subsequently, people in the rural areas will have a good standard of living and good health. This will have some impact on other development projects in rural areas.

VI. COUNTRY SEMINAR COMMENTS

The country seminar in Thailand was held between 12-14 July 1989 at YMCA, Chiengrai Province. It was composed of 59 participants from the public and private sectors. The latter consisted of the local drillers, pump manufacturers, and representatives of GGAT, representatives of rural credit institutions, women's groups including the VWDC from 20 villages, and representatives from the university who had taken part in the survey study since the beginning of the project.

Information Presented by a Local Driller from Northeastern Thailand

The drilling rig that he uses is a semi-automatic rotary jet model with a drill bit which can drill through hard soil or rock. The rig can drill about 100 meters deep. Mostly private wells are about 15-45 meters deep depending on locality. Generally, in the south of the northeast, drilled wells are over 20 meters deep. The labor costs of drilling a private tubewell (50 mm in diameter) is about 100 baht per one meter. Cost of PVC pipe materials used for preparing a handpump installation is about 600-700 baht (excluding handpump) and for an electric pump installation about 900-1,200 baht (excluding electric pump). A few people use handpumps. However, among those who use electric pumps, most of them use horizontal cylinder piston pumps which cost about 1,500 baht each. Some people prefer an automatic electric pump. The total cost of a private tubewell with handpump installation is about 3,500 baht ($140) and that for an electric pump is about 5,500 baht ($220).

Information Presented by Pump Manufacturers

One factory has been producing pumps for more than ten years and has outputs according to the demand of sales agents who are selling various brands of pumps. Last year (1988), it produced over 20,000 handpumps and about 9,000 electric pumps. On the average, it is able to

produce about 1,000 handpumps and 500 electric pumps per month. The suction head of both kinds is about 6-7 meters. The people in the rural area are in need of pumps but pumps sold in the market have much higher prices than those ex-factory. It would be very beneficial to the poor people in the rural areas if the project makes purchases directly from the plant with some agreement.

Concerning the automatic pumps, the price is a bit higher than other electric pumps. However, an automatic pump is much more suitable for a private well in the rural areas due to its easy operation, economy and easy maintenance. If it is used as indicated in the instructions, it can be used for a long period of time. The water runs whenever the faucets are turned on.

Information About Loans in the Rural Areas

The Bank of Agriculture and Agricultural Cooperatives (BAAC) is a state enterprise taking deposits from the people but making loans only to farmers who are clients of the bank. Other people, even merchants or BAAC employees, do not qualify for loan application.

For application to be a member client of the Bank, at least five farmers have to form a group before filing application to BAAC at the district level without any fees or service charge. To take loans, there must be collateral or "group guarantee". In the latter case, two members in the group will jointly guarantee the loan. In such a case the amount of loan which is provided by BAAC will not be greater than 30,000 baht per person. A higher amount of loan needs guarantee by a loan mortgage. The plot of land may belong to anybody. In this case the maximum loan will be from 30,000 to one million baht.

For a short-term loan, the repayment is normally made within one year after selling rice or another agricultural product. If a loan is for buying a pump, consideration is given to the life span of the pump, say five years. In such a case, installments are authorized for a five-year period. The interest rate for a 30,000 baht loan is 13 per cent per annum. The calculation is done on a daily basis without any compounding which is different from that at a commercial bank. For a long-term loan, the interest is 16 per cent per annum.

Comments of the Girl Guides Association of Thailand

To carry out the women and water supply project, the Government and the private sectors have to cooperate with each other. Both sectors have strengths and weaknesses. The government sector is inflexible in

project operation due to its regulations, but it has adequate manpower. In contrast, the private sector is more flexible but has insufficient manpower.

As each village has different situations, we should not set a standard model of water supply only by using a shallow well or a well with handpump. The first thing to consider is the quantity of water. The quality of water should be the second priority. In practice, from experience in the villages, water is not the first priority for the people in every village. The first priority is their occupation. If they are successful in their occupations, they will be motivated and will agree to have safe water supply.

VII. PILOT PROJECT SCENARIO

Concerning the roles of government agencies in this project, the country seminar discussion concluded that at least two agencies should be involved. One is the Ministry of Public Health, especially the Health Department which should take charge of advising and providing techniques for improving water sources to the people. The other is the Ministry of Interior, especially the Community Development Department which should function as a coordinator, advisor and supervisor of the project.

In addition, in some areas other concerned agencies such as Ministry of Agriculture and Cooperatives, Ministry of Education, and universities should participate to enhance the achievement of the project's objectives. At the village level, most of the people in the study areas agreed that the women's organizations should participate in water supply and sanitation activities. The representatives of VWDC who joined the seminar commented that VWDC should have an active role in giving information for better understanding of the goal of the project. Besides, VWDC should coordinate with government agencies and non-government organizations in the project implementation. VWDC should be responsible for project financial management.

For the pilot project, firstly, it should be implemented in the study areas. The number of villages which will participate should depend on the budget allocated. The seminar also recommended that support should not be only for shallow wells with handpumps. Rather, other models that the people desire and are suitable to local situations should also be supported. For example, if they want to improve their wells or have rainwater tanks, the project should support these activities also.

An appropriate NGO to implement the project is the Girl Guides Association of Thailand (GGAT). GGAT's role should include the

formulation of an action plan, giving advice to the people, and coordinating with other agencies concerned in providing materials for the project.

In addition, if in that area there are other NGOs such as the Population and Community Development Association, it will be helpful to bring them in and ask them to support project management, especially the provision of loan funds.

COUNTRY OVERVIEW

PEOPLE'S REPUBLIC OF CHINA

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CONTENTS

I. THE SITUATION OF WATER SHORTAGE IN RURAL AREAS AND SOLUTIONS TO DRINKING WATER SUPPLY PROBLEMS

There are a lot of villages in China's rural areas facing the problem of insufficient supply of drinking water. The problem mainly exists in the following four areas:

(i) the loess plateau of the northwestern part of China where there is little rainfall and a shortage of water resources;

(ii) the Karstic mountainous area in the southern part of China where, although the rainfall is abundant, the runoff can hardly be accumulated due to severe seepage;

(iii) the coastal islands and islets with saline underground water; and

(iv) some parts of the northern provinces with an excess of harmful fluoride.

To be more precise, a drinking water problem exists in various degrees in more than 20 provinces except Shanghai.

Since the founding of the People's Republic of China in 1949, the Government has paid great attention to the drinking water supply problem. Up to now, drinking water has been supplied to over 100 million people in rural areas accounting for a significant percentage of the population who suffer from the shortage of drinking water. Since the Chinese Government attended the meetings of the International Drinking Water Supply and Sanitation Decade (1981-1990), drinking water supply projects in China have entered into a new period of vigorous development. From 1981 to 1988, there have been an additional 62 million people with access to drinking water.

"To develop various kinds of effective projects based on practical considerations" is the principle by which to solve the problem of a drinking water supply in China. By the end of 1988, there were more than two million shallow wells throughout the country which supply drinking water to a population of about 15 million. Among them, there were 670,000 family-owned shallow wells with handpumps, supplying drinking water to 3.35 million population (on average, five persons share the water from one well with a handpump).

II. TECHNICAL DESCRIPTION OF DRINKING WATER SUPPLY PROJECTS

Shallow Well with Handpump Where the Water Level is Less Than 10 Meters Below Surface

The main types of wells are tubewells and open wells with lifting devices from water wheel to handpump. In addition, mini electrical pumps are also used by some rich families. Along with the gradual growth of farmers' incomes, thanks to the rapid economic development in rural areas in the late 1970s, the single-piston handpump has been widely used in China.

In general, a shallow well can be constructed by two laborers. The procedure is, first of all, to select a drilling rod with a diameter of 30 mm/40 mm/50 mm according to the requirement, and dig a cone-shaped earth pit, then fill the pit with water; second, keep the drilling rod straight and push it into the earth pit up and down for several cycles until the rod enters the ground water stratum and the required depth is met. Then, pull out the drilling rod and insert the rising main (steel, PVC) into the hole. The upper end of the main is sealed and connected with the flange of the handpump by screws; third, to wash the well by filling with clean water and lifting out the silt water with the handpump until the inlet of the lower end of the rising main is situated in a clear water zone.

Collecting Rain Precipitation from a Roof Catchment

This is suitable for some areas where average annual rainfall is over 400 mm. It fully utilizes the roof catchment of a house to collect the rainfall and direct it into purification filters. Water is then stored for drinking. The system consists of the following six parts as shown in the attached Figure 1.

1. Run-off catchment
   - to receive run-off from the roof of the building.
2. Water-catching channel
   - to collect the water from the run-off catchment by a channel which is made of an iron plate or plastic.

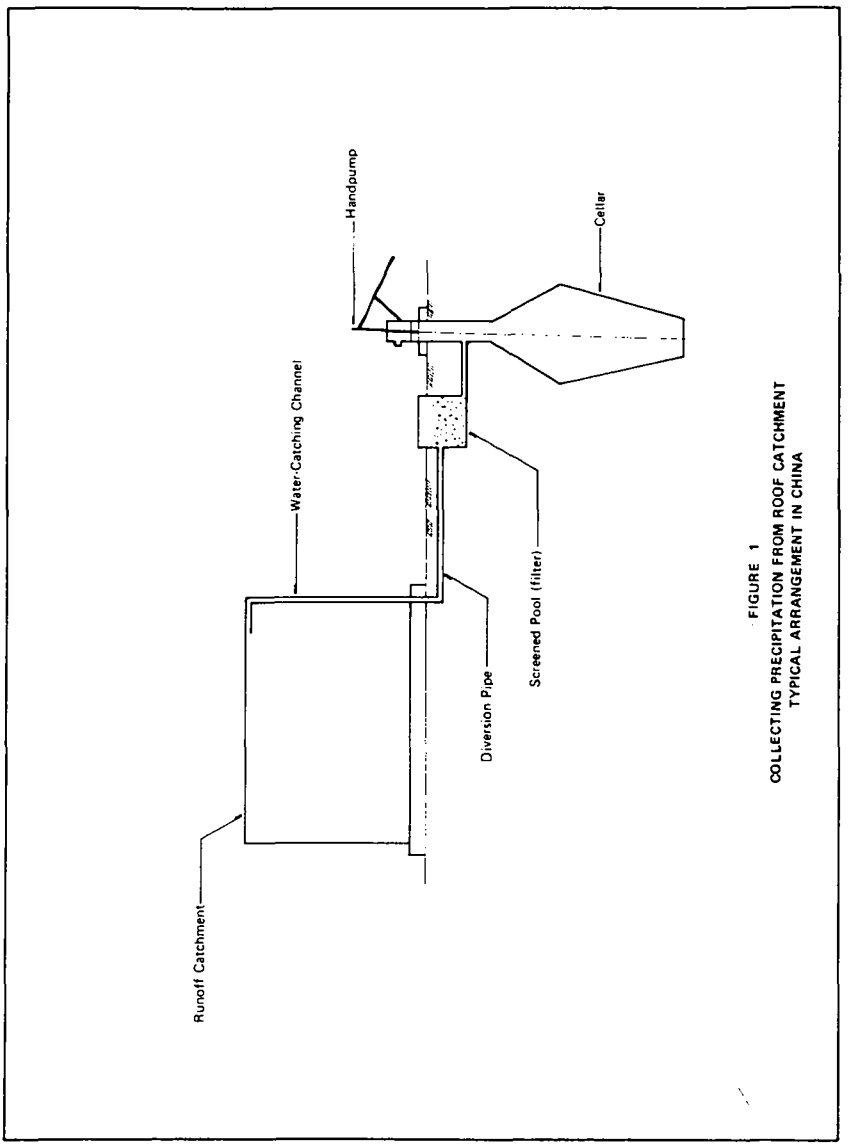

FIGURE 1
COLLECTING PRECIPITATION FROM ROOF CATCHMENT
TYPICAL ARRANGEMENT IN CHINA

3. Diversion pipe
   - the pipe which connects the run-off water channel with the screened pool (storage pool).

4. Screened pool
   - which is constructed with brick or rubble lined with cement mortar and used for the purification of water. The screened pool requires a certain amount of sand and aggregates so that water can be filtered. In order to avoid the dirty water flowing into the pool at the beginning of rainfall, an outlet should be set up in front of the pool which can also be used when the cellar is full of water.

5. Cellar storage pool
   - the purified water of the screened pool is diverted into the cellar.

6. Handpump
   - this is installed in the cellar to lift water to the surface for drinking.

In addition, there are more than 2 million small storage projects, diversion projects and pump stations including ponds and reservoirs spread over different areas utilizing different water resources to meet the needs of a rural water supply. In some loess areas in the northwestern part of China, the annual rainfall is less than 200 mm and it is difficult to catch the rainfall run-off. To provide drinking water in these arid areas, a lot of large, multipurpose diversion/lifting projects mainly for irrigation have been carried out. Villages located near the irrigation channel have been supplied with drinking water by setting up a number of storage pools. However, the farmers have to pay the water charges for the maintenance of engineering works.

In order to construct and manage the wells scientifically for farm-use, the Department of Farmland Irrigation and Drainage of China's Ministry of Water Resources published "The Technical Criterion of Farmer-use Wells" in September 1986, based on the experiences of the construction and management of several million wells in China. This manual includes suggestions on how to collect the basic design materials, the evaluation of the potential of underground water, the planning and economic evaluation of the well area, as well as design, construction and

management. It is a guiding document for grassroots water resources units (particularly at county and village levels) to help farmers in well construction.

In addition, in northern China where the drilling work is comparatively heavier, there are many drilling teams at county level of the Bureau of Water Resources to help local farmers to construct wells. Capable technicians are sent by village management sections to offer services such as evaluation operations and maintenance work. They are also responsible for organizing the training course to extend the technical knowledge to farmers. The spare parts of the equipment which are easily damaged are available in the villages. In short, a lot of technical guidance and service networks for lifting devices concerning family-owned wells with handpumps have been set up for construction, operation, maintenance and management, so that farmers will not be worried about problems during operation. It lays a firm foundation to promote the development of family-owned wells with handpumps.

In general, the service life of a family-owned well with handpump is about 20 years. It depends on a fairly stable water level and local underground conditions.

China now has more than 80 types of handpumps. According to their mode of operation, they can be divided into the hand and the foot pedal pumps, the two-person-pull and the animal-driven types. In terms of working principles, the handpumps include piston, diaphragm and gear accelerating-centrifugal types. Their flow-rate varies from 1 m^3/hr to 25 m^3/hr, with a lift range of 2-40 meters and suction head of 1.5-8.0 meters. Among them, the handpump used for the shallow well is very simple in structure. The model SYB-100 handpump produced by the Changsha County Light Machinery Plant in Hunan Province has a flow rate of 2.2 m^3/hr and a maximum suction of seven meters. This pump is selected as the standard type in China and is recommended abroad. Currently, 150,000 handpumps are provided by Chinese manufacturers every year.

According to the Project INT/81/026 and the "Proposal for Laboratory and Field Testing of Drinking Water Supply Handpumps and Animal and Human Powered Irrigation Pumps in the People's Republic of China" commissioned by UNDP, the World Bank and the China Academy of Agricultural Mechanization Sciences (Beijing), 24 types including 300 units of domestic and foreign handpumps have been tested. Undoubtedly, this will promote the development of the handpump both in China and in the Asian region.

III. TYPICAL COSTS FOR THE MOST COMMON INSTALLATIONS

1. Family-owned Shallow Well with Handpump (Tubewell)

Costs:	(1)	Handpump and pipes	100 yuan
	(2)	Well and installation	100 yuan
		Total	200 yuan

2. Typical Costs of Water Cellar with Handpump

Costs:	(1)	Handpump and pipes	100 yuan
	(2)	Cellar and installation	250 yuan
		Total	350 yuan

Annual income of a family may vary from 2,000 to 3,000 yuan.

Funding Arrangement

In order to solve the problem of drinking water supply in the rural area, the Government has adopted some supporting policies in which subsidies are provided for well construction while other agricultural credit facilities with low or no interest are also offered. Generally, the costs of the main construction materials including pipes, cement, blasting materials, etc. are provided by the Government (about 40 per cent of total capital investment), while costs of mechanical equipment are covered by farmers with no interest or low interest credit (30 per cent to 40 per cent of total capital investment). Other expenditures, including the payment of labor, is borne by a farmer's collected funds (20 per cent of total investment). However, the proportions mentioned above are not fixed. The policy will provide higher subsidies and more loans to the economically backward areas and less to the richer farmers. According to some uncompleted statistics from 1980 to 1987, the total financial subsidies provided by the Government for drinking water supply was 1 billion yuan (US$250 million). The total agricultural grant was also 1 billion yuan and that paid by farmers themselves was 0.8 billion yuan (including the payment of labor).

Benefits of Drinking Water Supply Project

The rural area where people suffer severe shortages of water is always a very poor area. With the supply of drinking water, the life of villagers has been improved greatly.

Reduction of the work burden promotes the development of production. It is estimated that about one-third of total labor had to fetch water from far away in those arid areas. This greatly affected the development of agriculture. For example, about 250 persons in Yongan village, Changping town, Fusui county, Guangxi region had to fetch water from as far as 5 kms away during 5-6 months per year. The average per capita income was only 105 yuan, until the problem of drinking water was solved. Once manpower was transferred to the agriculture sector the production and the economy developed rapidly. As a result the average per capita income increased to 450 yuan.

Insufficient water will inevitably affect food production, and environmental factors and sanitation problems may cause some diseases. People in some areas who drink water with excessive fluoride suffer from fluorosis of the bone, a disease that causes stiff joints and deformed bones. The victims are unable even to take care of themselves in their daily lives. With the supply of safe drinking water, it is expected that the people's health will be greatly improved.

It has improved the relations between the villagers and the Government. The unity between villages could be promoted because the conflict between villagers resulting from seeking water in arid regions can be avoided.

As is well known, women undertake the main housework in China's rural areas. So, it is the women who will gain the largest benefits from a water supply project. They can take the initiative in planning, implementing, constructing and managing a water supply project.

Time and improved conditions which may become available to women could promote the development of agro-based small industry and improve production in rural areas, helping the villagers to increase their income. For example, after setting up the drinking water wells in Xiating village, Laishui county, Herbei province some 250 farmers or 17 per cent of all the villagers were encouraged to start business ventures like raising duck, pig, sheep and chicken. The annual income per capita has increased from 180 yuan some time ago to 400 yuan.

It promotes the development of education. Students used to bring drinking water to school in the water shortage areas, while the school had to close during the severe dry season. With an improved water supply, the situation has changed a great deal.

Prospects

Although China has achieved great success in solving the rural drinking water problem, some problems still exist such as the rapidly increasing population, the ever greater erosion of silt in hilly and mountainous areas, more water polluted by waste gases and industrial effluent and the obsolescence of some drinking water projects etc. So China still faces an uphill task in supplying drinking water to its people. Up to now, 90 million people, mostly in rural areas, are still suffering from the shortage of drinking water.

IV. CONCLUSIONS

Water sources are one of the most important factors affecting economic development, particularly in rural drinking water supply. It affects the health of the people and the relationship between villagers and the Government. Generally speaking, it is always the poor area where there is a shortage of water. It is difficult for farmers or villagers to afford to implement a drinking water supply project. So it is necessary for the Government or a credit agency to give some financial support, grant or loan to local farmers.

Because of the varieties in topography, geography, hydrology, geology and the distribution of rainfall in different regions, it would be sensible "to develop the various kinds of effective projects, based on practical conditions" and to consider diversified measures to solve the drinking water problem. However, the family-owned well with handpump which has the advantage of low cost, reliable operation and easier management should be promoted widely in the alluvial plain with its resources of shallow fresh water.

In order to better manage the existing water supply projects and further promote the shallow well with handpump, it is necessary to set up technical service networks including equipment manufacture, construction installation and maintenance as well as extending the know-how to farmers in rural areas.

COUNTRY OVERVIEW

INDIA

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CONTENTS

I. INTRODUCTION

India today implements the largest handpump program in the world. It is necessary to know the physiography of the region to appreciate the same. There are three main land regions: firstly, the Himalayan mountain system in the northern part; secondly, the fertile northern plains, the most thickly populated region; and thirdly, the Deccan plateau. Apart from this there are four smaller land regions, namely, (a) the East Coast Belt; (b) the West Coast Belt; (c) the Central Highlands and (d) the Islands.

For India, it has been estimated that only 29 per cent of groundwater potential and 37 per cent of surface water sources are being exploited so far. It is expected that ground water exploitation will go up to 40 per cent by the year 2000.

The drinking water requirement would not be more than 4 to 6 per cent of the available groundwater potential and 10 per cent of the surface water potential.

II. STATUS OF DRINKING WATER IN RURAL INDIA

Water, an absolute necessity of life, can also prove to be a carrier of suffering and death if not properly treated and supplied in adequate quantity. At the beginning of the present Water Decade, 31 per cent of the rural population was provided with safe drinking water supply facilities. This does not mean that 69 per cent of the rural population did not have any water supply. In fact, it means 69 per cent of rural population were without any safe drinking water supply available within reasonable distance and had to depend on water sources, such as shallow wells and ponds, most of which go dry during summer or are highly polluted and a risk to health. Most of these water sources are family-owned but highly susceptible to pollution and thereby are potential health hazards.

On the other hand, the drinking water sources created through Government are mostly tapping sustainable sources available throughout the year and designed to provide protection against pollution. Moreover with this arrangement, the water quality surveillance program has also been incorporated to take up any corrective measure as and when required.

For rural water supply the target for the Decade was fixed at 100 per cent population coverage. A country-wide survey was conducted to identify problem villages with the following criteria:

(a) No source of water is available within 1.6 km distance, 100 meters of elevation difference or available water is at a depth of more than 15 meters.

(b) Biological contamination of the source of water.

(c) Chemical contamination of the source of water such as with fluorides, chlorides and iron, etc.

III. COVERAGE

At the start of the Water Decade program, 362 million of the rural population were without safe drinking water. Today, leaving about 116,000 villages, the rest of the 600,000 villages of India have been provided with safe drinking water. However, the population coverage will be to the tune of approximately 90 per cent with 40 liters per capita per day (lpcd). The future objective would be to cover the entire population with the minimum supply of safe drinking water of 40 lpcd.

In the rural water supply sector, the country is faced with repeated and severe drought. In order to give a boost to the rural water supply sector, the Government of India in September 1985 decided to shift the subject from the Ministry of Urban Development to the Department of Rural Development, thereby integrating the rural water supply and sanitation program with other rural development and employment programs. In 1986, a further input was given to rural water supply with the launching of the National Drinking Water Mission with an objective of coverage of the whole country by 1990 with safe drinking water supply in rural areas. The main tasks of the Water Mission are:

(a) To adopt scientific source finding and development;

(b) To lay emphasis on water harvesting and conservation of water;

(c) To introduce new drilling rigs and equipment for water prospecting;

(d) To bring about a new dimension by application of science and technology inputs in an integrated manner for generating cost-effective long-term solutions to predominant problems associated with rural water supply;

(e) To give importance to a computerized management information system for data collection, analysis, monitoring and evaluation; and

(f) To link up all the technological improvement to the ultimate goal of improvement of life of an ordinary villager and to involve him/her in the process.

India is a vast country and has a large population. In order to provide water in a sustained way, the solution is to use groundwater which if properly developed would provide safe drinking water sources without additional cost of water treatment. In the present program in which nearly 200,000 tubewells are drilled in a year and a large number of piped water supply schemes also installed, the percentage of spot sources amounts to nearly 85 per cent. This reduces the overall capital cost as well as operational and maintenance cost. Hence it would not be unfair to call the entire rural water supply program of India a major handpump program thus providing water to nearly 50,000 villages and populations of 25 million in a year. The technology for rural water supply should be village level operation and maintenance (VLOM) which means India Mark II or India Mark III handpumps which symbolize the success of the Decade in India.

IV. HANDPUMP TECHNOLOGY

The major thrust of drinking water supply programs for rural areas is installation of handpumps. About 80 per cent of the rural population are to depend on handpumps to meet their daily drinking water needs. Though there are various types of handpumps available, the major thrust so far is on installation of the India mark II handpump. About 1.2 million handpumps have so far been installed in this country, with an annual installation of about 150,000 units of this type. Though in general one handpump is provided for about 250 people, there are quite a good number of handpumps available in the hamlets having about 100 people per pump. This pump is easy to install, durable and could be maintained easily with properly trained staff. The average cost of each pump is about

US$160. The cost of installation including borehole and platforms, drainouts and leaching pit may be US$700.

V. INDIAN EXPERIENCES

From above, it is clear that in India in fact, the experience shows a distinct shift from the approach of family-owned shallow wells, to moderate or deeper wells and community water supply with the help of India Mark II installation all over the country. In fact in the sixties it has been found that as shallow wells tap water from surface or sub- surface aquifers which tend to go dry with the fluctuating monsoon and which tend to get contaminated with the seepage of surface water pools, they need to be replaced by deeper and VLOM handpumps all along the Indo-Gangetic plains.

Various studies and reports in India has shown that there is a necessity of full involvement of rural women in both installation and operation and maintenance and follow-up activities for improvement of personal health and hygiene, and for optimal utilization of resources and India Mark II installation. The emphasis should be more on community water supply if it is meant for safe drinking water purposes.

While there is no objection to provision of credit facilities to the village women for installation of family-owned handpumps in their households, looking at the population of very large countries in these regions, it may not be feasible to provide such a loan facility for a large number of individuals. Certainly such credit facilities would facilitate installation of a large number of handpumps as well as provision of water. But the danger will lie in maintenance of the technical qualities and the quality of water which is possible to be controlled in a community handpump which may be costlier but would be steady and long lasting.

However, this certainly does not mean that there is no possibility of domestic shallow well handpumps in India. In fact a large demand of water supply is still for shallow open wells/handpumps for other than drinking purposes. However, such pumps would be restricted only to a certain geological area and the danger of contamination of water in such pumps would still be there unless it is protected.

VI. WOMEN AND RURAL WATER SUPPLY IN INDIA

The rural area is inhabited by 70 per cent of India's population – both a resource and a constraint. The logistics of a centralized maintenance system of drinking water sources have proved to be very

cost-intensive. The thinking is therefore to decentralize maintenance, monitoring and functions. Women, being the biggest users, collectors and handlers of water, have a major role to play in rural water management as:

(i) caretakers,

(ii) health educators and animators promoting the total concept of environmental sanitation,

(iii) a bi-monthly maintenance team, and

(iv) handpump mechanics.

As Caretakers:

A water committee or *pani panchayat* of women members is given the responsibility of keeping all the handpumps of the village in clean, sanitary condition. This involves:

(i) cleaning of platforms and drains;

(ii) planting of kitchen garden to absorb excess outflow of water; and

(iii) reporting via postcard to district maintenance team if the handpump is out of order.

As Health Educators and Animators:

They are paid a stipend every month by the Government. The more literate and extrovert and eager women are chosen. They are then trained in all the aspects of domestic health education such as clean handling of water, domestic sanitation (water-related), diarrhea control and oral rehydration, dehydration treatment, sunstroke treatment and education about the endemic diseases of that area.

As a parallel development most necessary to promote health standards in a village, rural sanitation is being promoted. NGOs are being financed to execute low-cost sanitation projects. Animators are given demonstration toilets for their homes. In rural areas a toilet is seen as a luxury (not a need) and is therefore a *status symbol.* The emphasis is on a total concept of sanitation, including environment, personal hygiene, domestic, food, solid waste disposal and waste water disposal.

Bi-monthly Maintenance:

Functions include (i) checking of nut and bolt of head assembly, (ii) removal of inspection cover and checking for any dirt, pebbles, etc., (iii) greasing of chain assembly once or twice a month, (iv) checking firmness of handpump pillar base, (v) checking sufficiency of water flow, and (vi) informing government official of the need for major repairs.

Women as Handpump Mechanics:

Women play a vital role in the rural economy of India – in a culture where women are actively involved in economic production, it is much easier to instruct them technically. Women are given an honorarium of 200 rupees per year to take care of 10 handpumps.

They also maintain records of their handpumps. There are, however, some minor constraints such as the weight of the tool kit and the inconvenience of a sari during handpump repairs.

EXPERIENCES IN THE USE OF HANDPUMPS FOR WATER SUPPLY

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CONTENTS

I. INTRODUCTION

Millions of handpumps are in use in Asia, most of them suction pumps, that serve one to five families each. In well-watered areas all over Asia, where most of the population lives, shallow groundwater is used as a source of water supply. Wells for suction pumps are cheap to build, since they usually require only a small-diameter galvanized iron pipe to be driven into the soft soil. The handpump is locally-made and may cost only one-tenth of the price of a community pump for deeper wells. Such systems can therefore be afforded in many countries by individual households and are thus an attractive method of water supply. Wells that accommodate deep-set handpumps are much more expensive, and so are the pumps. This means that deep-set handpumps can only be afforded by communities rather than individual households.

Suction pumps have decisive advantages and disadvantages, which are discussed below. The main advantage is that water is available near the house, encouraging the use of large amounts of water for hygiene and convenience. Most pumps are installed and maintained by the household with very little, if any, public sector intervention. Their most serious limitation is that they can pump only from a maximum of about seven meters from ground to pumping water level. With groundwater levels falling in many parts of the world, suction pumps may become inoperable and must then be replaced by other supplies. Another problem is the poor quality of the water pumped, which is caused by the need to prime the pump after the water column has been lost through a leaky footvalve and in some cases, contamination of the shallow aquifer from households, agriculture or industry.

The only other technology besides suction pumps that provides water right next to the home is a piped supply. If it is well operated, it provides better service than suction pumps but is neither affordable nor sustainable for many communities, especially where villages are small and scattered and where there is no reliable electricity supply. Nevertheless, many Asian countries have recently stepped up the construction of piped schemes in rural areas which utilize safe water at the source, such as a deep well, and can include household connections at an initial cost that may be less than double that of a well with a household suction pump.

II. THE HANDPUMPS PROJECT

Recognizing that handpumps will continue to play an important role in increasing the coverage of the rural population with adequate water supplies, UNDP and the World Bank together initiated a project in 1981 for the Testing and Technological Development of Handpumps for Community Water Supply (INT/81/026 and INT/87/013). The field tests concentrated on deep-set handpumps which generally served larger populations and had more problems of durability and maintenance than suction pumps. Besides, a panel of experts including representatives from the health field recommended at the start of the project that, due to the serious risk of contaminating the well water through priming of the pump, suction pumps should not be actively promoted.

A number of suction pumps were nevertheless included in laboratory and/or field tests at the request of participating governments and rated according to their performance (see S. Arlosoroff, et. al., Community Water Supply – The Handpump Option, World Bank Publication, 1987). In retrospect it can be said that the Project has contributed relatively little to the improvement of suction pumps, nor could it have done so, even with laying greater emphasis on them. This is because of their extremely low cost, ease of maintenance (all moving parts are above ground), and their low durability requirement because of the very small number of users per pump.

Concern about the risk of pumping water that may be organically polluted in rural areas is somewhat less now than some years ago. Well-designed studies of the health benefits from water and sanitation-related interventions have, in the meantime, shown that improvements in water quality alone, without parallel improvements in sanitation and hygiene, are not likely to appreciably reduce the incidence of infectious diseases.

In the beginning, the Project concentrated on improving hand-pump designs and the quality of manufacturing through the laboratory and field testing of the pumps available in the market at that time. Most of these pumps were originally developed for single-family use in the industrialized countries, and could not withstand the many hours of daily use by a community in developing countries. The test results were communicated to the manufacturers, who responded by making their products more durable. Some manufacturers, often with the assistance of aid agencies, also introduced major design changes to make the pump easier to maintain. While the initial objectives remain part of the program, the focus of the Project has shifted to the demonstration of technologies and methods of implementation, leading to large-scale replication of

systems that can be sustained in satisfactory operating condition for many years.

III. CHOICE OF TECHNOLOGY

If one classifies the rural water supply technologies available to planners by the type of service provided to the users, the main options are yard taps (household connection), stand posts (public taps) and handpumps. Handpumps can be further divided into suction pumps for 1-5 households and deep-set pumps for communities. The options differ not only in the potential benefits, but also in their costs, and in their demand on physical (water and energy) and organizational resources (manpower and institutions).

Clearly, yard taps are preferable since they can provide safe water, save time in fetching water, and increase water use for hygiene and convenience. But they also make greater demands on resources compared with handpumps. Unless the required inputs are assured for the construction and operation of the schemes, building them will lead to failure, wasted resources, and the frustration of unfulfilled expectations. It is far better to start on a lower level of technology which will provide the expected service with reliability for as long as it is needed. Later, when the resource availability has improved, for example through the provision of a continuous electricity supply, the scheme can be upgraded to a higher service level.

Many piped supplies have failed or are highly unreliable. Water may be available only for a few hours a day due to power cuts in the electric grid, a shortage of fuel in the case of diesel pumping, or insufficient water available at the source for motor pumping. Prolonged system failure also occurs because the equipment cannot be repaired promptly (lack of funds, spare parts or skilled manpower). Unless there is effective and universal metering, much water is also wasted.

Handpumps use groundwater, avoiding costly water quality protection or treatment of surface water. Furthermore, the yield required from the well when lifting water with a handpump (up to 1 or 2 m^3/hr, depending on the water level) is much less than for a motor pump. This means that wells with handpumps can be built in many places where the yield from the aquifer is insufficient for motor pumping.

Handpumps also have their disadvantages and some schemes have had a high failure rate, but better handpump technology and a growing recognition that a number of factors must be given adequate attention in

the planning and execution of schemes have increasingly led to better performance. (See Annex 'Planning Community Handpump Projects').

IV. SUCTION PUMPS

Even though suction pumps were not the main concern of the UNDP/World Bank Handpumps Project during the testing phase, the following observations can be made from the experience gained with a number of suction pumps during the field tests.

Advantages:
- very low capital cost of well and handpump,
- easy to maintain,
- requires no or very little public sector input,
- provides water supply very near to the house,
- easy to operate (also by women and children), and
- easy to produce locally.

Millions of households in Asia use suction pumps, probably far more than they use deep-set pumps. For them the advantage of having a water point available right next to the house seems to override most other considerations. Not only is the time spent to fetch water reduced to a minimum but water use is increased, and the need to store water in the house is eliminated (which does away with the main point of recontamination). This choice is reinforced by the desire of each household to have an installation under its own control rather than sharing one with a number of other households, as is the case of community handpumps.

Limitations:

Suction pumps can or should be used only under the following conditions:

- the pumping water level is, in all seasons, well within seven meters and has not been falling over the years;
- there is no serious chemical pollution of the shallow groundwater;
- suction pumps are used by individual households and maintained in the private sector; and
- the households can afford their own well and pump but not a piped scheme with household connections.

It is also recommended that only well-made pumps that normally do not require priming are used and if priming is temporarily necessary before repair, only clean water is used for this or, alternatively, that all drinking water is boiled.

The reason why the use of suction pumps should be restricted to one or at most a small group (such as five) of related households is that the sense of ownership and responsibility for maintenance is much stronger in private than for community installations. Experience has shown that community pumps tend to wear out faster because of greater use and be less well looked after, which means that if these are suction pumps they are frequently out of order.

Suction pumps must be primed by pouring in water from the top before pumping. The use of contaminated water for this purpose is a health hazard. Moreover, in some areas, the shallow groundwater is unsuitable for drinking, being at times too saline or containing organic pollution from human or animal wastes, or chemical pollution from agriculture or industry. The problem of water quality is even worse in urban areas, where in some cities many people do not have connection to piped water, or where the water supply is intermittent. When the groundwater level is sufficiently high, these people rely on open wells and suction pumps drawing seriously polluted water.

In China, where groundwater quality has been extensively monitored and compared with the national drinking water standard, organic and chemical pollution of the shallow aquifer are quite common. The water supply strategy, as formulated by the National Patriotic Health Campaign Committee and contained in the Seventh Five-Year Plan, is to gradually replace suction pumps in the densely-populated areas with piped schemes. But the high cost of piped supplies as compared with handpumps (see below) and the shortage of materials prevent this policy from being more rapidly implemented.

In reality, it seems the poor quality of water pumped rarely inhibits households from installing suction pumps. Their use is in the first instance limited by the groundwater table. With groundwater levels falling in many parts of the world, suction pumps become inoperable and must be replaced with other pumps.

The second most important limiting factor appears to be affordability. A well with a suction pump is cheap but may cost roughly the same per capita when used by only one household as a deep-set handpump used by a whole community. This is illustrated with a comparison of representative capital cost figures from China and the Philippines.

	China		Philippines	
	Suction	Deep-set	Suction	Deep-set
Well	75	2,200	180	2,525
Handpump	15	410	32	318
Platform and installation	20	300	70	429
Total capital cost (US$)	110	2,910	282	3,272
No. of users	6	200	16	150
Per capita cost (US$)	18	15	18	22

Sources: Philippines – Department of Public Works and Highways, Typical Level I (Point Source) Program of Work and Materials Specifications, pp. 3 and 11.
China – Field observations.

The above cost figures are government guidelines in the Philippines and actual, representative 1988 costs in China. The Chinese suction pumps are indeed meant for only one family and are usually very simply made. On the other hand, the suction pumps in the Philippines are meant for small community use and are, therefore, assigned a larger number of users in the above table. Individual households in the Philippines tend to buy inferior suction pumps from the market at a lower cost for their exclusive use, bringing the per capita cost to about the same as in the table.

Alternatives:

When the above conditions for the application of handpumps do not exist, the alternatives depend on the conditions but are basically piped schemes when affordable and feasible. Otherwise, deep-set community handpumps are recommended. Their relative merits have been discussed above under "Choice of Technology".

In comparison with handpumps, piped schemes have higher capital and recurrent costs. The 1988 capital cost of piped schemes with metered household connections in the World Bank-assisted Rural Water Supply Project in China was around US$35 per capita; the operating cost without amortization of capital about US$0.08 per cubic meter. Since a nuclear family of four people in the newly-built schemes rarely consumes more than 3 m3 per month (although there are schemes with a domestic consumption of more than double that figure), the annual recurrent cost amounts to US$0.72 per capita without amortization. These amounts may appear small until they are compared with the average annual income in

the countries where the Project has been built, ranging between US$100 and US$325 per capita. In contrast to piped schemes, there are no operating costs for handpumps and most repairs to suction pumps are made by the user himself, often with improvised materials at a negligible cost.

A promising innovation in pump design retains some of the advantages of suction pumps while avoiding its major drawbacks. It is called the direct action pump because it operates on the same principle as the deep-set pump but without a lever. The connecting rod, usually a hollow pipe, has a T-bar mounted on top and the piston attached to the bottom. The whole assembly is moved straight up and down to activate the piston. Even though in due time this pump type may replace suction pumps, at this time it does not measure up to them in terms of cost, durability and ease of maintenance. The only country where direct action pumps are being applied on a large scale is Bangladesh, where several thousands of the locally-made Tara pumps have been installed for an average of about 40 users each at a cost of roughly US$200. Careful monitoring of a number of these installations has revealed that trained women caretakers can, and in fact do, carry out the repairs of many of the pumps thereby enjoying a better social and economic status in the community. UNICEF has adopted the Tara pump for its joint program with the Government in favor of the commonly used cast iron suction pump. Groundwater tables are falling in Bangladesh to the extent that suction pumps do not work any more in some areas, particularly in the north.

The dilemma of choosing the right kind of water supply technology is exemplified by the situation in one of the demonstration areas for deep-set community handpumps in Langfang, near Beijing. Until recently most households relied on suction pumps in their courtyard but, with falling water tables, the majority have either ceased to yield water altogether or yield very muddy water. Several communities built piped schemes with yard taps, employing local public construction companies. Many of these are inoperative now due to flaws in the design resulting in sand from the well clogging the distribution network, inability to get spare parts, or lack of funds for repair or rehabilitation. With neither suction pumps nor the yard tap in operation, the users had to resort to transporting water in large drums by mule cart from the irrigation wells in the fields and storing it in the courtyard. After the community handpumps were installed by the Project, people preferred the short walk to these pumps to ferrying water from the fields.

The World Bank-assisted Rural Water Supply Project in China provides for piped schemes, except for a number of suction pumps in two

counties. These pumps are intended for use by 1-5 households each and were included at the request of the respective provincial water supply offices. They are being installed in well-watered areas where the population density is relatively low, and where the per capita cost of a piped supply would be higher due to the larger conveyance cost. It has been observed during supervision missions that coverage of the population in the participating counties was nearly 100 per cent in the high-income counties (average per capita income around US$270), while generally only the concentrated population near the roads was included in the low and medium-income counties. In low-income areas (still only around the national average), many households have so far not decided to seek connection to the scheme because of cost. They and the population outside the perimeter of each piped scheme continue to draw water from the old sources, including wells with suction pumps.

V. CONCLUSIONS

To continue or accelerate the pace of constructing rural water supply systems in Asia and possibly meet the target of full coverage by the end of the Decade, handpumps have to play an important role. They have a smaller per capita cost for installation as well as operation and maintenance, as compared to piped schemes, and are far less demanding on energy and organizational resources. While it is true that they provide a lower level of service than a piped scheme with yard taps, an upgrading of handpump wells to piped schemes should be considered for the future.

To reiterate a point, suction pumps provide a quick, cheap and convenient water supply option for millions of people in Asia, but they have clear limits of applicability, particularly as a long-term solution. As water tables are lowered and aquifers run the risk of contamination, it should be envisaged that handpumps will gradually be replaced by piped schemes.

ANNEX – PLANNING COMMUNITY HANDPUMP PROJECTS

The long-term success of community water supplies using handpumps depends on several kev factors:

- Community participation,
- Maintenance system,
- Handpump,
- Well, and
- Financing.

Community Participation

Most communities in developing countries need assistance with the construction of wells with handpumps, but they should be encouraged to participate to the maximum extent. If they are placed merely in the role of recipients, the wrong type of technology may be chosen, the water outlets located in unsuitable places, the scheme may not be kept in operating condition, and ultimately the user may reject it. Strong community participation is essential for the successful long-term maintenance of handpumps, which can only be achieved if the community is closely involved right from the planning stage.

An early dialogue with the community also allows the planners to gauge the community's demand for such a scheme. If the proposed installation is not valued or its benefits inadequately understood, the community will not be willing to make the required contribution. At the same time, the role of the public sector in the scheme has to be clearly defined, with the community and complementary inputs identified which could greatly enhance the benefits from a water supply, such as health education and sanitation.

Maintenance System

Handpumps are maintained through different institutional arrangements depending on prior practice in that country, type of pump, depth of water table, extent of external donor involvement, and other factors. Maintenance systems for community handpumps can be divided

into those with community management of maintenance and those with central management of maintenance, usually by a government agency. The key question is who chooses when maintenance or repair is done and by whom. With community management, a water committee finances and organizes all handpump maintenance and repair. Only in this way will adequate preventive maintenance be done and necessary repairs promptly carried out without incurring a heavy cost. When a team of mechanics and helpers has to drive in a motor vehicle several miles to a village to repair a pump, the transport cost and staff time is very high while the cost of the repair itself may be minimal.

With community-based maintenance, on the other hand, repairs are carried out either by a village (male or female) caretaker or an area mechanic. The latter covers several pumps and earns part or all of his livelihood through this trade. Little transport is required (no motor vehicle), preventive maintenance is easier, and the response time is shorter. The community collects money for a maintenance fund, out of which the repairer and the spare parts are paid.

Handpump

Community maintenance is only feasible when the pump has been specifically designed for easy maintenance. (Suction pumps fall by their nature into this category.) As a result of the laboratory and field tests conducted by the Project, the following design criteria are recommended for community handpumps:

1. Ease of maintenance,
2. Durability,
3. Ease of local manufacture with constant high quality,
4. Standardization on one or two pump types, and
5. Cost effectiveness.

Well

The well is usually the most expensive part of a handpump scheme. Drilling cost must be kept down through the well-managed use of drilling equipment appropriate for the situation, and through choosing the right well diameter and well depth. Wells must be designed to prevent the entry of sand, which can cause rapid wear of pump components and may

severely shorten the life of the pump. A properly constructed well will outlast even the best handpump by many years.

Extractable groundwater exists under much of the earth's surface. Even though handpumps only require a relatively small yield from the well (1-2 m3 per hour), their effectiveness and reliability depend on the knowledge of local groundwater conditions. Seasonal movements of the water table and competing demands, especially for irrigation, have an influence on the well depth and the pump setting.

Widespread use of irrigation pumping may lead to a lowering of the groundwater table. Irrigation wells may cause nearby handpump wells to go dry, particularly those with suction pumps, as has been experienced, for example, in Bangladesh and in the northern part of China. If large-scale use of wells with handpumps is to be made, the long-range effects of irrigation pumping must be studied and, if necessary, legislative measures taken to safeguard groundwater resources for domestic use.

Financing

Only in relatively well-to-do places in developing countries is the community able to pay for a rural water supply scheme entirely from its own resources. Those communities are likely to demand piped schemes with household connections. More often, the community is not able to afford a rural water supply (in addition to all the other improvements needed such as roads and health care). Subsidies and loans are then provided, but in some countries it has been very difficult to collect loan payments.

To mobilize the maximum contribution that a community can afford, their intimate involvement is essential right from the planning stage. The financial contributions expected from the different sources must be agreed upon before the start of construction work, and the contribution of the community linked, as much as possible, to direct inputs.

EXPERIENCES OF PROWWESS/UNDP AND SOME LESSONS LEARNED

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CONTENTS

I. PROWWESS

PROWWESS stands for Promotion of the Role of Women in Water and Environmental Sanitation Services. Created in 1983 in response to the challenge created by the International Drinking Water Supply and Sanitation Decade, its strategies emphasize the need for community and especially women's involvement in the sector.

PROWWESS is part of the Division of Global and Interregional Programme of the United Nations Development Programme (UNDP) with headquarters in New York. It started with funding from Norway and UNDP and has since received additional funding from Canada, Finland, and USA. PROWWESS is the only worldwide program that focuses on women's involvement in the International Drinking Water Supply and Sanitation Decade.

The program has three main objectives. It seeks to demonstrate:

(i) how to get women and communities involved in decision making during planning, implementation and evaluation;

(ii) the beneficial impact of women's involvement in water and sanitation issues and of water and sanitation on women; and

(iii) strategies for replication.

PROWWESS has a complement of two full-time and one part-time professional staff, and two support staff members. International and local consultants are hired whenever necessary.

II. SOME OPERATING PRINCIPLES

1. *Human capacity development* – In all our projects we include a strong training component and work through local institutions and staff. This enables us to build local capacity at the individual and institutional level, while keeping the core PROWWESS staff to a minimum.

2. *Participatory principles* – Much of our effort has been spent in developing participatory tools for training and more recently for planning, evaluation and research.

PROWWESS has made use of the SARAR training methodology developed by Ms. L. Srinivasan, who together with a team of consultants has held training workshops at the national and regional level in Africa and in Asian countries including Indonesia and Nepal. All training activities are conducted within the context of ongoing programs and bring together engineers, managers, sociologists, health educators, extension workers and representatives of government and non- government organizations (NGOs).

In response to demand from the field, a manual on training methods is currently being finalized and a video film has been produced to assist those interested in the application of SARAR techniques to their own water and sanitation projects.

One example of a participatory technique is the "pocket chart", a useful tool for data gathering by village people. The pocket chart can be made of cardboard or cloth and consists of rows and columns of pockets. The top row could depict pictures of different water sources and the side column could depict different uses of water. Villagers may cast a vote using a piece of paper or stone to indicate which water source they use for what purpose. This process not only results in reliable assessments but is useful in building people's confidence in their own abilities.

We constantly explore alternatives to didactic approaches and methodologies to ensure that control is vested in community people rather than outsiders. Thus in data collection, we emphasize the involvement of people in self-surveys, rather than a sole dependence on questionnaires and interview techniques. In planning, we have used techniques such as "story with a gap", in which people draw their existing situation and an improved situation and draw existing resources and constraints. They then outline steps that will need to be undertaken to change their existing situation.

In health education, we try to complement social marketing techniques and emphasize alternatives to posters, slogans and flip charts. For example, health games have been developed such as adapted versions of snakes and ladders, or card sorting games involving pictures of sick and healthy children and practices related to poor and good health. One of the most important effects of using participatory methods is that the process of involvement marks the

beginning of change of self-initiated action. This of course is essential to achieve sustainability.

3. *Forging links* – To achieve Decade goals we actively promote partnership between national agencies in the country and among external support agencies. Thus in Mexico, we have worked with UNICEF in health education, and in Lesotho and Kenya with UNDP-supported and IBRD-executed sanitation and water projects. We also help bridge the gap between NGOs and national governments.

III. LESSONS LEARNED

In our experiences in over 1,000 communities in 20 countries, we have learned much about how to get women or users involved in water and sanitation development. Five principles of overall importance are outlined below:

1. *To obtain women's involvement we must go beyond women; to obtain water we must go beyond water.*

There has been a tendency to interpret women's involvement too narrowly. Experience shows that women's (and men's) involvement in water and sanitation projects has implications for every project component, including choice of technology, community organization strategies, affordability and cost recovery, human resource development, sanitation and health education, as well as applied research, monitoring and evaluation.

As long as women's involvement is viewed as one project component, women's involvement especially in large-scale water and sanitation programs will continue to remain peripheral.

Similarly, it is also clear that while water utilities should remain water utilities, to create sustainable systems and simultaneously reach the poorest will require an integrated area-based approach, where improved water and sanitation facilities are linked to other development efforts and include water resource management, access to credit markets, health facilities and training in income-producing activities.

2. *Successful projects are ones in which managers have become "managers of change" rather than "managers of construction schedules", so that projects evolved and grew beyond the objectives originally conceived.*

This may be a characteristic of projects at this particular time in the context of the Decade. We have seen water and sanitation projects change in Asia and Africa. In Bangladesh, the Urban Volunteers Program in the slums of Dhaka started essentially as a program to deliver oral rehydration salt packets to slum dwellers and gradually changed to become a primary health care program, with emphasis on health education but included activities like distribution of vitamin A tablets. In Kenya, a small project in Kwale started as a handpump testing project changed and expanded to become an integrated water and sanitation project.

These projects that have attempted to involve beneficiaries including women have a managerial style (distinct from the characteristics of large, centralized construction programs) that attempts to facilitate user involvement in decision making, predict unpredictability, expect change and hence build adaptability to changing situations in their programs.

For the community management approach PROWWESS has leveloped a planning and evaluation framework. It is called PEGESUS nd it combines management tasks with overall goals. PEGESUS stands for Partnership to Evolve and Grow Effective and Sustainable Utilization of Systems. PEGESUS is detailed in a recent PROWWESS publication.

3. *Women's participation does not preclude men's or children's participation nor does women's participation equal the number of women physically present or involved in a project/program.*

Women's involvement does not translate to a number of women vs. the number of men present at meetings or being trained. Physical presence is not always a reliable indicator of involvement given the great diversity of cultural and economic contexts. The presence of women as the sole criterion can be misleading.

Similarly, women's involvement is not an "all or none" phenomenon, but needs to be considered in terms of needs of different categories of women (age, wealth, caste, religion) and also needs to be linked to the effectiveness of programs. Thus, while it is critical to make special efforts to train women as pump mechanics and to ensure their success, it may be self-defeating to train women exclusively. Experiences from India, Indonesia, Kenya, and Lesotho show that while there may be great reservation about women's mechanical or construction abilities initially,

when trained, women are as effective as men. In contrast to men, they tend to work in pairs or small groups and are often quicker to undertake repairs.

The most effective indicator of women's involvement at all levels, from villages to higher-policy levels within governments and international agencies is involvement in decision making. This criterion is crucial to avoid creating a situation whereby we actually increase women's workload by projects that are meant to decrease their workload.

4. *To involve women, create sustainable systems and reach the poorest, water and sanitation programs must include or be linked to economic development and poverty alleviation programs.*

In analyzing successful programs, we have found direct support for microenterprise development or linkages established with broader poverty alleviation programs crucial. In Indonesia for example, we found that the driving force for women's and men's involvement in water user's groups was not water improvement but to increase cash incomes through vegetable and fruit production. Some families put money earned from vegetable production into their monthly water maintenance fees.

A similar trend has been found in innumerable projects around the world. In a project in Kenya, women and men started a variety of income-producing activities including production of khanga (cloth) and began seeking advice on credit and marketing.

If we expect poor people, especially women to pay for water and sanitation facilities, we must provide or create opportunities for earning increased incomes.

5. *Evaluation indicators must go beyond counts of construction completed. Unless indicators of success are directly contingent on people's participation, it is very unlikely that such participation will become institutionalized.*

Although each project is likely to have its own unique goals, we find it important to identify overriding goals and indicators that go beyond construction counts and stop before trying to assess health impact. In order to centralize women's involvement, it is important not to have separate indicators of success for women's involvement but integrate them within an overall framework applicable to all low-cost water and sanitation programs promoting community management.

Derived from the PEGESUS framework, we have emphasized three broad indicators of success, defined each indicator and suggested methods of measuring these indicators. The three indicators are:

(i) effective use

(ii) sustainability

(iii) replicability

IV. WOMEN AND WATER – THE FAMILY HANDPUMP

The basic differences between "family" and "community" handpumps arise not only because of the technology, but in the ownership.

The success of the "family" handpump is based on the decision of an individual household to invest in purchasing a handpump. The factor determining the success of a "community" handpump is the organizational factor that leads to a sense of "joint" ownership of the pump and consensus on its maintenance and use among a group of households in a community.

Thus, technologies for water and sanitation such as household connections, rainwater tanks, water jars and household latrines have more in common in strategies of implementation than communal facilities of any sort.

If we accept the premise suggested for a self-help project, then we have a program in which the private sector has an important role to play. For such a program, important principles can be drawn from a national sanitation project in Lesotho; the issues that were faced by the project and the strategies that evolved. These issues will need to be resolved by parties considering a family handpump project.

The Lesotho National Sanitation Program started as a small pilot project in the Mohales Hoek district of Lesotho. The total direct costs of the household latrines are borne by householders. Indirect subsidies are provided through training of local community people or entrepreneurs like Local Latrine Builders (LLB), as initial motivation for campaigns to generate an interest in household latrines and in health and hygiene education activities. Each district program is managed by a district sanitation coordinator, two technical assistants from the Ministry of Interior and two health assistants from the Ministry of Health. NGOs are involved to increase coverage of the program.

Coverage issues

In each district, small geographic areas are chosen based on availability of drinking water, incidence of waterborne diseases, presence of a health clinic and interest of local authorities and chiefs. Once local builders have been trained and the quality of construction assured, the government team moves to the next geographically contiguous area. The family handpump coverage will be limited by the availability and depth of groundwater and some assessment of potential interest in improved household water techniques.

Target population

The target was the individual household which could afford payment of material and labor charges to build a latrine. This by definition eliminated the poorest groups, many of whom are female-headed. The family handpump project may also not reach the poorest group.

Affordability, subsidies and credit

The objective was to create a rural sanitation (latrine) program that was sustainable and did not demand heavy investments from the government, therefore it was decided in its early stages not to institute any direct subsidies. Despite pressure, the decision to introduce subsidies linked to income has been delayed, to avoid management problems and to ensure saturation of the population that can afford latrines without subsidies.

A credit program was started in one district through existing credit unions income, however management problems have limited its effectiveness and as yet no formal credit program exists for latrine building. Interestingly however, women's groups and revolving credit societies have extended credit to their members to build latrines. Some female latrine builders also informally extend credit (no interest) to individual families and have reported full repayment. Credit collection is never an easy task and when subsidies are considered, institutional issues will have to be carefully worked out. It is expected that when subsidies are introduced they will be in the form of materials (latrine components) rather than in cash. One important example of credit recovery extended to the poor without collateral and its use for water and sanitation facilities is the Grameen Bank in Bangladesh from which important lessons can be learned.

Women

Experience shows that despite the fact that half the households in Lesotho are headed by women, the decision to invest in a household latrine is not made without the man/husband's permission and agreement. Since a majority of the able-bodied men are at any given time in South Africa as migrant laborers, the project sends letters to miners selling the virtues of a latrine.

Female village health workers who are volunteers have proved to be important in creating an initial demand for latrines, in quality control, in house-to-house visits and in health education activities.

Special efforts have also been made to train women as latrine builders. This has been more successful in the north of Lesotho where women are traditionally involved in house construction. Studies have shown that although many men and women drop out, those women who continue successfully market their latrine building skills from village to village and develop reputations as skilled, honest builders.

In most countries in Asia, women and children are the most common drawers of water and hence have a vested interest in ensuring that water and sanitation facilities continue to function. It is also true that compared to men, women, especially older, married women have greater residential stability and are more physically present in the villages than men. To that extent, it will be important to ensure that women are included in the outreach activities and are included in training for handpump installation and repairs. These new skills may provide women with new confidence and become a valued source of income.

Role of Agencies

Water and sanitation facilities in rural areas that are based on full cost recovery are perhaps the least effectively managed by government bureaucracies. In Lesotho, the Government is responsible for indirect costs related to management of the program, costs of training, and health education activities. Government personnel also play important roles in monitoring the quality of construction and prices; the prices are negotiated between individual householders together with the latrine builder. It is difficult to see a major role for governments in the implementation of a family handpump project.

Perhaps a model similar to Lesotho in terms of institutional responsibilities is worth exploring. International agencies may have a catalytic role to play in further development of affordable village-level operation and maintenance (VLOM) direct-action handpumps, and in

working with local manufacturers to produce quality handpumps if none exist that have potential for large-scale replication.

While NGOs may be effective intermediaries in a family handpump project, large-scale replication cannot be expected from NGOs. Hence, if a family handpump project is going to utilize NGOs as the executing agency, it should clarify that this does not assume that NGOs are the only effective agencies for execution of such projects.

Demand Creation or Marketing

In Lesotho, demand creation or marketing strategies developed through trial and error. During the early stages, awareness of the program was raised through community meetings and marketing efforts were left to individual entrepreneurs. However, it was found that the demand for latrines remained low.

Two changes were then introduced. Large communal meetings were used for giving basic information and were followed by more intensive discussion through smaller learning groups which included men and women. Secondly, the two-week on-site training course for latrine builders was altered and marketing strategies were included in the course. As the local builders were learning their skills, the health worker tried to solicit some orders so that the builders would get some building experience immediately after completion of the course. Selling of latrines is usually more difficult than water facilities.

Health Education

A recently completed health impact study in one district in Lesotho shows that diarrhea rates are down by 30 per cent for young children in areas where people have built latrines and there is a change in health behavior, specifically increased use of water and hand washing. Monitoring by project staff shows that the latrines are being used and are kept clean.

In water projects, there is ample evidence to show that unless water, sanitation and hygiene education go together the health impact of improved water facilities may be lost. However, it is also clear that private entrepreneurs are unlikely to engage in health education activities unless they are clearly related to increased sales. Hence, within the family handpump project increased health education activities should be the responsibility of the executing agency.

To summarize, it is obvious that every type of water and sanitation project is unique. However, the key differences related to management

and organizational tasks are determined by whether a technology is individually or communally owned.

In the past, NGOs were underutilized by the international and government agencies. However, there is a tendency now for every agency to choose the same national NGO, resulting in overextending the capacity of the NGO. We do not consider the strength of an NGO as a precondition for selection. Rather we have found that if the NGO has strong, visionary leadership and some organizational network, then the process of being involved in further development work strengthens the NGO and results in further building local capacity. This results in the emergence of new strengths rather than overextension of existing strengths and abilities.

Secondly, if we work with NGOs that have a good relationship with government, then there is a positive two-way spill-over effect that enhances sustainability and replicability. For example both in Kenya and in Indonesia, we found that because the NGOs worked closely with government staff, the approach used by the NGOs in community organizing was learned by the government extension staff and government funds supported some of the future activities of the NGO. In Indonesia, as a result of the NGO/government partnership, major changes resulted within the workplans and funding procedures of the provincial planning board and in the Ministry of Health.

The country studies in this publication mark the beginning of the most important stage, that of implementation. We look forward to learning from these country experiences.

WOMEN IN DEVELOPMENT POLICY AND ACTIVITIES AT ASIAN DEVELOPMENT BANK

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CONTENTS

I. POLICY

This describes the Bank's women in development (WID) policy in general and its operations relating to women's involvement in the water supply sector in particular.

In July 1985, the Bank approved a policy on the role of women in development. The policy provides a broad framework for Bank assistance to developing member countries supporting their efforts to integrate women more effectively in the development process. It suggests that the Bank's approach in providing such assistance include the following elements:

(i) the Bank should adopt a pragmatic approach in promoting the role of women by providing financing for those projects which would directly benefit women or would facilitate their participation in development;

(ii) in the context of a country's broader socioeconomic objectives and priorities, the Bank should support those projects in social infrastructure (such as health and population, education and training, water supply, low-income housing) which provide direct benefits to women and in such sectors as agriculture and rural development and small-scale industries which create income-generating and employment opportunities for women;

(iii) the Bank's concern for the role of women in development should be reflected in a broad range of projects, though such an approach cannot automatically be applied to every project;

(iv) any project which is aimed at promoting the role of women should be required to meet the same technical, economic and financial criteria as are applicable in evaluating other projects of the Bank;

(v) the Bank should take account of the role of women at every important stage of the project cycle, particularly project identification, preparation, appraisal, implementation and post-evaluation;

(vi) the Bank should undertake efforts to promote increased awareness on the part of its staff of the role of women in development in Developing Member Countries (DMCs), and develop suitable approaches and staff instructions; and

(vii) the Bank should seek to build a socioeconomic data base on the role of women in development in DMCs, and should *consider sponsoring or co-sponsoring workshops, seminars and training courses on promoting the role of women in development.* (Editor's italics).

One of the main features of the Bank's policy is the **pragmatism** of its approach. Considering the varied cultural, traditional, religious, political and socioeconomic influences in the DMCs, the Bank does not define an "ideal" role for women, instead it recognizes that the scope and thrust of Bank operations in WID will need to be designed to suit the special circumstances of individual DMCs and their development objectives and priorities. The scope and the nature of Bank operations regarding WID will thus vary from one DMC to another and even from sector to sector - or from project to project. Another notable feature of the Bank policy is the comprehensive consideration of WID issues. The policy states that in promoting the role of women, the Bank should also seek to minimize or eliminate any potentially adverse effects on women that might result from a Bank-financed project. Such adverse effects should be identified and appropriate corrective measures incorporated in the project scope.

Needless to say, women play an important role in the water supply sector and their needs and interests must be spelled out in order to ensure women's access to tangible benefits derived from the projects. Water supply projects have the great potential of reducing or eliminating women's traditional role as water bearers. Projects should build on women's traditional responsibilities for supply and management of family water needs, and directly involve women in selection, design and operation/maintenance of new systems.

II. WATER SUPPLY AND SANITATION GUIDELINES

Having recognized the implication of women in the water supply sector, in 1986 the Bank commissioned a study to prepare guidelines on how WID considerations would be integrated into the work of the Water Supply Division. Coincidently, the consultant who was engaged to carry

out this study was this seminar's consultant, Ms. Mayling Simpson-Hebert. She prepared three case studies on the Bank's urban water supply projects, namely, Indonesia: IKK Water Supply Sector; Papua New Guinea: Water Supply and Second Water Supply; and Sri Lanka: Water Supply Sector. At that time, the Bank operation in the water supply sector focused primarily on urban settings. Therefore, the report does not speak much to the rural sector. Nevertheless, her report contains a number of suggestions which are applicable to the rural sector. Indeed, as symbolized by this seminar, the major thrust in the water supply sector has gradually been shifting to a more rural focus.

Based on the findings and recommendations of the Report, guidelines in the water supply and sanitation sector were issued in September 1987. The guidelines identify the following main areas where women may be more involved in projects:

(i) Women and women's groups consulted on design, location, financing and cost recovery programs, and the like;

(ii) Appropriate technology provided for water and sanitation facilities: appropriate to community financial capabilities and cultural conditions, and appropriate to the use and maintenance by women;

(iii) Women in the community (and sometimes women's groups) assigned responsibility for operation and maintenance of water and sanitary facilities;

(iv) 'Women' a central component of health and hygiene programs as teachers and as targets of information and training; and

(v) The jobs created through water supply projects assigned to women as well as men.

By using these guidelines and more detailed checklists developed in the light of (i) socio-cultural and institutional context; (ii) health and hygiene; (iii) technology; and (iv) women's participation and access, it is expected that the Bank will formulate projects responding to women's needs; and such projects ultimately benefit the community as a whole. These guidelines and checklists have been used by Bank staff and consultants during the project preparation stage.

In closing, I would like to emphasize again that in the water supply (including sanitation) sector, a focus on women represents a way to make

projects more successful on economic as well as other grounds. As the Bank moves to projects involving smaller communities and more rural settings, the need to involve the community in decision making about water facilities, level of services required and affordability of facilities and services become increasingly important. Women act as key change agents in these areas. This seminar, which explores the extent to which individual families can satisfy their basic water supply needs reveals certain concrete strategies for the Bank's current thrust. I appreciate the initiative taken by the Water Supply Division to hold a seminar like this which combines women's needs and interests (software) and technical inputs responding to those (hardware). A project is not viable if either of them is lacking. In this regard, I would like to stress that this seminar is not a conclusion, but a starting point from where we orient toward concrete actions. I would be more than happy to see in the near future, any participant country initiate, based on the findings of this particular seminar, a family handpump project targeting women on a large scale.

NON-GOVERNMENT ORGANIZATIONS AND WOMEN AND WATER PROJECTS

Kaye Bysouth
Managing Director
International Development Support Services
Victoria
Australia

CONTENTS

I. GENERAL

With increasing attention being given to poverty alleviation and a simultaneous recognition that the benefits of many rural development projects were not proving sustainable, a number of development agencies have begun to look closely at mechanisms for ensuring greater participation in projects. The increasing use of NGOs for this purpose reflects the generally expressed belief that such organizations have a comparative advantage over traditional government agencies in those situations where, to achieve a sustainable impact, the enthusiastic participation of the target community is required.

The elements of the NGOs' comparative advantage are that they are in greater proximity with the target beneficiaries, leading to greater trust between the development agency and the people, they have greater commitment to improving the miserable plight of people, and greater flexibility and responsiveness in operations.

In terms of cost effectiveness, the growing professionalism of larger NGOs means that their own operational costs may not now be significantly less than those of a government agency. At the village level however, NGOs have a demonstrated capacity to mobilize voluntary efforts on a massive scale.

The most effective NGOs have abandoned welfare or social service approaches in favor of a systematic technology, both for ensuring the participation of the poor and institutionalizing that participation via the creation of on-going beneficiary organizations.

This community development strategy involves:

1. *Identification* – Careful analysis of the specific needs and problems of a target community, including consideration of the level of social stratification in the community and the potential of local organizations to accurately and adequately address the needs of the poor.
2. *Mobilization* – This involves field workers living with the poor to gain their confidence and working with the poor to form informal groups to analyze the information collected in step one and identify key issues and areas where support is needed. At this stage, the field worker also encourages people to consider their rights and responsibilities in relation to their own development, to overcome internal disagreements and to understand

the role of Government, etc. The stage often also involves various cultural programs to re-awaken the motivation of the poor to improve their conditions and to re-awaken the hope that has often been destroyed by previous failed attempts to "develop" them.

3. *Organization* – Once community interest has been mobilized, this must quickly be crystallized into a formal mechanism capable of taking action. Small groups are therefore usually formed through which communities are encouraged to take some small steps to improve their own conditions. It is imperative that this action springs from the group's own ideas, using their own saved funds (however meager) and managed by themselves. The better NGOs will not provide internal inputs until groups are proven capable of taking some action alone and unaided. At this point, the field worker can begin to withdraw and only after this has occurred can training, technical support and credit be supplied.

4. *Institutionalization* – Even once formed, the groups of the poor are very vulnerable; therefore, it is necessary to strengthen these primary groups in an on-going way. This involves establishing secondary groups (comprising representatives of say 10 primary groups 150-200 households) and eventually tertiary groups at district level, comprising representatives of secondary groups. This reinforces the values and discipline of the primary groups, helps in the mobilization of resources and gives the poor a stronger voice.

This process can take 3-12 months for social preparation (up to organization stage) and up to five years to institutionalize the groups to the tertiary stage.

NGO experience has shown that unless and until the poor have developed organizations of their own, with the capability to plan and implement their own development initiatives, external inputs cannot be absorbed.

Although governments can and do involve themselves in the process of beneficiary group formation, few have the management systems and decentralized structure to permit decision making which takes account of

local conditions. Governments are also reluctant to foster the horizontal and vertical linkages in beneficiary groups which allow the poor to make serious demands for improved goods and services.

Effective beneficiary group formation therefore requires the involvement of intermediaries between government and the people. Where effective NGOs exist, they may be involved in this activity. Where they do not exist, some strategy must be developed to deploy community organizers outside of the formal structure of government, to maximize beneficiary capability to absorb the resources available through government and donor initiatives.

NOTE: Country by country assessments of NGOs are given in the Asian Development Bank report *'Co-operation with NGO's in Agriculture and Rural Development'* – August 1989.

II. WOMEN AND WATER PILOT PROJECTS

A number of the country papers at the seminar referred to the need to explore the real needs and aspirations of women, to design projects within people's capabilities and to promote the self-reliant development of target communities.

But what does this mean, if for example, some people do not regard water as the highest priority, or if they do not see the relationship between water and good or better health, or if they want water but not the family handpump, or if they want credit but for income generation activities?

There is little point talking about self-reliance, if we provide all sorts of inputs but deny people the basic right to make sensible decisions about their own development.

So what can be done in the current context?

What is required is consideration of the strengths and weaknesses, potential and constraints of all partners to the process of development such as:

- Specific target group
- NGOs/Intermediaries
- Government
- Technical Advisors/Consultants
- Donors/Banks

A further aid to this approach requires consideration of the desired change and how each of the development partners can be assisted to achieve that end. This involves asking the following:

- What is the strategy to remove the obstacles?
- What is the strategy to increase the strength of the factors promoting development?

Taking this approach, it is possible to design projects which take account of the real constraints and potential for development. For example, in Bangladesh, the need of the target group is great and the willingness to participate, considerable. However, generally very poor women lack even the basic skills required to take advantage of development inputs. Fortunately, NGOs are strong and the expertise available in relation to community development is considerable. By contrast, the Department of Women's Affairs is relatively weak and would need institutional strengthening, or else an alternative government link point would need to be established. The donor or Bank attempting to assist a women and water project involving community development in this context would need to be prepared to take all these levels into account in project design. All of these factors can, however, be addressed if there is willingness and honesty on the part of project planners.

TUBEWELL DRILLING
FOR
RURAL WATER SUPPLY

Kenneth Cheetham
Vice President
Luxfield Co. Ltd.
Manila

CONTENTS

I. TYPES OF WELLS

Wells are classified into five types, according to their method of construction. There are dug, bored, driven, jetted and drilled wells.

A dug well is one in which the excavation is made by the use of picks, shovels, spades, or digging equipment such as sand buckets or clamshell buckets.

A bored well is one in which the excavation is made by the use of hand or power augers.

A driven well is one which is constructed by driving a pointed screen, referred to as a drive point, into the ground. Casings or lengths of pipe are attached to the drive point as it is being driven into the ground.

A jetted well is one in which the excavation is made by use of a high velocity jet of water.

A drilled well is one in which the excavation is made by either percussion or rotary drills. The excavated material is brought to the surface by means of a bailer, sand pump, suction bucket, hollow drill tool, or hydraulic pressure.

II. ADVANTAGES

Each type of well has its particular advantages, which may be ease of construction, type of equipment required, storage capacity, ease of penetration into certain types of formations, or ease of safeguarding against pollution. Dug, bored, driven and jetted wells all share one common advantage, that of small equipment requirements for well construction. Further, skilled personnel requirements for these types of wells are very small. In the case of drilled wells the advantages of ease of penetration, ease of construction, and ease of safeguarding against pollution, are more predominant. The latter advantage is also true for driven and jetted wells. Drilled wells also have the advantage of providing better quality and larger quantities of water at greater depths with less time and labor. This is also true for jetted wells where greater depths can be achieved. Although drilled wells have more functional advantages, usually the other four types of wells are considered the most economical for construction for tubewells with handpumps since the equipment is portable and the material requirements are small. However, rig manufacturers have recently developed more versatile and economical

mechanical rigs principally for the handpump field thereby accelerating the NGO and government sector performances in this field.

III. LIMITING FACTORS

Dug and Driven Wells. Limited yields are obtainable from any one well point. Construction is slow and laborious when tightly compacted soil is encountered. There is excessive wear and tear on equipment due to driving. It is difficult to penetrate formations of hardpan and rock with the tools and equipment provided.

Jetted Wells. Jetted wells are limited to shallow depths. The jetting method cannot overcome rock barriers and formations of hardpan and clay.

Drilled or Bored Wells. As compared to the other types of wells, equipment and materials for drilled wells are bulky and costly. Drilled wells are dependent upon skilled personnel.

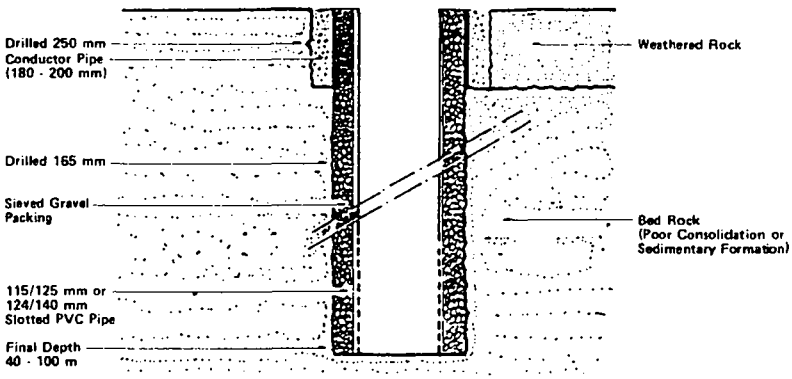
IV. SANITARY WATER WELLS

The most important part of planning a water well is the design. It is very important to consider the ground formations so that a safe well is achieved. Designs of drilled sanitary wells for handpumps in two typical types of formations are shown in Figure 1. Diameter and depths are adjusted depending on the drilling method used.

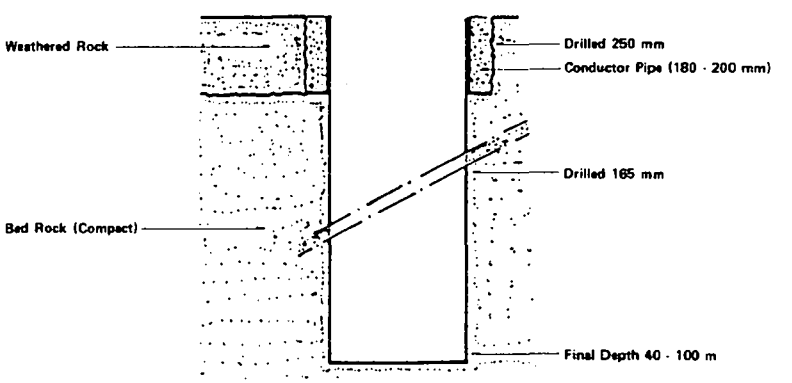
V. PROJECT EXPERIENCE

Choice of Equipment for Project A

High mobility of the drill rig was a priority factor due to the long distance between bore holes. Other important factors were the need for simple and robust rig design as well as long service and maintenance intervals. The unit needed to be able to drill 100-125 millimeters diameter wells down to 100 meters depth in hard rock formations using down-the-hole-hammer methods. It also needed to have the capacity for installing casing through overburden to a depth of 30 meters. An air-driven Aquadrill 461 rig with an XR350Dd air compressor was chosen. Both units fitted on Mercedes Benz, 4x4 trucks. Drilling accessories included



CASED 'SOIL' WELL WITH GRAVEL PACK



HARD ROCK 'OPEN' WELL

FIGURE 1 - SANITARY WELLS

drill pipes for 120 meter depth, Atlas Copco down-the-hole-hammers, COP42 with 115, 140 and 152 millimeters bits and 200 millimeter roller bits for air flushing. For overburden drilling ODEX 115 equipment with steel casing for 20 wells was included together with welding, cutting and bevelling tools. Spare parts for two years of operation were included in the package.

Results of Project A

Total number of holes drilled	200
Total meters drilled	10,912
Average well depth (meters)	54.5
Number of dry holes	43
Number of wells cased	157
Average casing depth (meters)	11.2
Maximum depth drilled with ODEX (meters)	42
Total number of working days (net)	373
Average meters drilled per day	29.2
Average number of days per well (net)	1.87
Average number of days per well (gross)	3.30

Operating Cost (Project A)

Based on the 200-well project, net operational cost in US dollars per well drilled was:

Labor cost - instructor + 3 helpers	340
Fuel for vehicles/compressor, etc.	825
Oil	70
DTH bits (250 meters bit life)	110
DTH hammers (4,000 meters life)	22
ODEX bits	20
Rig spares	5
Casing (11.2 meters per well)	120
Total cost per well	$1,512

Program Package (Project B)

Through many years of experience in the Asian region related to potable water projects, both at government level and with non-government organizations, I believe that the best way to provide potable water and sanitary conditions to the rural area is through a non-government

organization that has the depth of knowledge and planning ability to carry out a well designed program of their choice. It is necessary however to provide it with appropriate equipment and technical training in the field. Such a program could be as follows:

Project scope	–	76 tubewells with handpumps
Areas	–	Regional villages
Types of well	–	Deep well 18 Shallow well 19 Artesian well 39
Time factor	–	1 year
Participants	–	1 drill master 1 mechanic/driver 1 hydrogeologist 6 technical staff 5 beneficiaries
Drill rig specification	–	Based on a hand-manageable, lightweight concept with high performance and versatility capability for working in areas with difficult access. Designed to handle down-the-hole drills, rotary and auger equipment for applications such as shallow wells 60 meter depth x 75-150 millimeter diameter. Rig to be mounted on a trailer or pick-up type vehicle. The basic unit (base/mast/rotation unit/prime mover) should be designed to be hand transported and quickly assembled on remote sites.
Air compressor	–	Trailer mounted with 12 bar pressure and 175 liter per second delivery.
Geological equipment	–	Equipment for measuring resistivity.
Technical training program	–	The purpose of this is to transfer technology in drilling and other related services to locals. The training program would comprise three weeks theoretical (at NGO premises) and five weeks practical for each of two groups of 10 participants. The program would include ground prospecting

by use of the resistivity method, use of different drilling methods, handling and maintenance of drilling equipment, compressor, etc. and design of different types of wells in sedimentary and crystalline rock. The practical training would be carried out during the project well drilling on-site.

The estimated total cost of Project B which includes multi-purpose drilling rig, and accessories ($81,000), air compressor and test pump ($45,000) resistivity equipment, spare parts and technical training program is US$150,000. Such a program has been in operation now in the Philippines for over a year with the NGO Tulungan sa Tubigan Foundation. Their performance to date has been admired by other NGOs who have now started cooperation with them on future projects in the Philippines. Their costs related to their handpump projects are very encouraging - averaging 35,000 pesos per tubewell plus handpump. This type of operation and performance can be extended to other Asian countries with financial and technical support from funding organizations, thereby alleviating the suffering of the poor throughout Asia.

PROGRAM AND PARTICIPANTS

SEMINAR PROGRAM

Day 1 (29 August 1989)

OPENING CEREMONY

Introductions by Seminar Coordinator
Mr. Arthur McIntosh
Project Engineer, Water Supply Division,
Asian Development Bank

Welcome and Opening Remarks
Mr. In Yong Chung
Vice-President (Projects),
Asian Development Bank

Address
Mr. Mohammed Farashuddin
Deputy Resident Representative, Manila,
United Nations Development Programme

Inaugural Address
Dr. Mita Pardo de Tavera
Secretary, Department of Social Welfare and Development
Government of the Republic of the Philippines

Group Photo

Introduction of Individual Participants
and Seminar Organization

FIRST PLENARY SESSION

Chairperson from UNDP (New York)

Presentation of Theme Paper
The Family Handpump
Mr. Arthur McIntosh
Project Engineer, ADB

Presentation of Theme Paper
Women and Water
Ms. Mayling Simpson-Hebert
Consultant to ADB

SECOND PLENARY SESSION
Chairperson from Indonesia

Presentation of Country Paper – Philippines
Ms. Lily Hidalgo (Sociologist)
Local Consultant to ADB

Questions and Discussion

Presentation of Country Paper – Thailand
Ms. Kamontip Khatikarn (Sociologist)
Local Consultant to ADB

Questions and Discussion

THIRD PLENARY SESSION
Chairperson from Pakistan

Presentation of Country Paper – Indonesia
Ms. Christina Sudjarwo (Sociologist)
Local Consultant to ADB

Questions and Discussion

Presentation of Country Overview –
People's Republic of China – (PRC)
Mr. Shen Lunzhang/Mrs. Chen Fengshu
Government of People's Republic of China

Questions and Discussion

Day 2 (30 August 1989)

FOURTH PLENARY SESSION
Chairperson from the People's Republic of China

Presentation of Country Paper – Bangladesh
Ms. Tajkera Khair (Sociologist)
Local Consultant to ADB

Questions and Discussion

FIFTH PLENARY SESSION
Chairperson from Thailand

Presentation of Country Paper – Pakistan
Ms. Kishwar Ijaz (Sociologist)
Local Consultant to ADB

Questions and Discussion

Presentation of Country Overview – India
Mr. Gourisankar Ghosh
Government of India

Questions and Discussion

SIXTH PLENARY SESSION
Chairperson from the Philippines

Presentation about UNDP-PROWWESS
Ms. Deepa Narayan-Parker
UNDP PROWWESS – New York

Presentation about UNICEF
Mr. Cesar Yniguez
UNICEF – Manila

Presentation about WHO
Dr. Ali K. T. Basaran
WHO – Manila

Presentation about Handpumps
Mr. Gerhard Tschannerl
The World Bank

Presentation about ADB and Women in Development
Ms. Yuriko Uehara
Women in Development Specialist, ADB

SEVENTH PLENARY SESSION
Chairperson from Bangladesh

Discussion about Handpump Manufacture
Mr. Alfredo Sy
Baesa Foundry Shop – Manila

Presentation about Tubewell Drilling
Mr. Kenneth Cheetham
Luxfield Co. Ltd. – Manila

Presentation about Drilling Equipment
Mr. Fumiaki Ichino
Kano Boring Co. Ltd. – Japan

Presentation about Rural Credit
Mr. Alfred Bretschneider
Cooperative Union of the Philippines

Presentation about NGOs
Ms. Kaye Bysouth
International Development Support Services
Australia

Participants identity "Issues for Working Group Discussion"

Day 3 (31 August 1989)

WORKING GROUP SESSION

Four working groups:
(1) Government
(2) NGOs and women's organizations
(3) Consultants
(4) International organizations

Each working group discusses the issues identified by participants on Day 2. Chairperson for each working group records comments/conclusions.

Sightseeing Manila

Day 4 (01 September 1989)

EIGHTH PLENARY SESSION

Seminar Conclusions and Recommendations

1) Seminar Consultant (Issues)
2) Seminar Coordinator (Objectives)

CLOSING CEREMONY
Chairperson – Seminar Coordinator

Final Response – Bangladesh
Final Response – Indonesia
Final Response – Pakistan
Final Response – Philippines
Final Response – Thailand
Concluding Remarks by *Mr. S. V. S. Juneja,* Director
Infrastructure Department, ADB

Completion of Seminar Evaluation Form by Participants

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	2. Mr. Abdus Samad Bhuiyan Joint Secretary Ministry of Social Welfare & Women Affairs Dhaka, Bangladesh Tel. 240415
	3. Mr. Abdul Qader Siddiqui Director, MIDAS (Micro Indus. Dev. Assistance Society) (NGO) House No. 56 Rd # 7-A Dhanmondi R.A., Dhaka, Bangladesh Tel. 310335-6
	4. Ms. Hosneara Begum Secretary Thengamara Mohila Sabuj Sangha (NGO) Thengamara, P. O. Gokul Dt. Bogra, Bangladesh Tel. 6175
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	3. Ms. Intarsih Tjokrosuwondo Assistant to the Office of the Minister of State for Role of Women (Asst. III) Jl. Merdeka Barat No. 15 Jakarta, Barut, Indonesia Tel. 3805562-63 Ext. 148
	4. Ms. C. Haksari Hardojo Head of Committee on Economic & Dev. KOWANI: Indonesian Council of Women 58 Imam Bronjol – Jakarta Pusat Jakarta, Indonesia Tel. (021) 364921
	5. Mr. Susetyo Sabar Rachman Head of Section of Evaluation Directorate of Water Supply Directorate General of Human Settlements 1 Rd. Patah 1, Kebayoran Baru Jakarta, Indonesia Tel. 7398063
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	3. Mr. S. H. Rizvi Additional Secretary Ministry of Women's Development Government of Pakistan Islamabad, Pakistan Tel. 822410
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	3. Ms. Virginia Gueco Bureau of Women's Welfare 518 Lawy, Capaz, Tarlac, Philippines

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	3. Ms. Siriluck Thedvisarn Trainer Girl Guides Association of Thailand 5/1-2 Prayathai Rd. Bangkok 10400, Thailand Tel. 2450641, 2450242, 2453599
	4. Ms. Pannee Salabsang Chiengrai Provincial Women Committee Chiengrai Governor's Residence, Chiengrai, Thailand Tel. 711788

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	2. Ms. Chen Fengshu Chief of Div. of Drought Prevention Senior Engineer Dept. of Rural Water Conservancy and Soil Conservation Ministry of Water Resources P. O. Box 2905, Beijing China, P.R.C. Tel. 361512 Tlx. 22466 NWREP CN

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Mr. Kenneth Cheetham	Vice President Luxfield Company Ltd. 28 Israel St., B.L.S., Bicutan Paranaque, Metro Manila, Philippines Tel. 842-5089

Mr. Gerhard Tschannerl	The World Bank 1818 H St., Washington, DC 20433, USA Tel. 202 477-1234
Mr. Alfredo Sy	General Manager Baesa Foundry Shop 14 Marcel Drive, Tandang Sora Quezon City, Philippines Tel. 903621
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Mr. N. Collier	Deputy Director, Infrastructure Department
Mr. J. M. Gomez	Manager, Water Supply Division
Mr. I. Powell	Project Engineer, Water Supply Division
Mr. D. Bucher	Development Policy Officer, DPO
Mr. L. D'Ursel	Economist, Infrastructure Department
Mr. C. M. Melhuish	Sr. Sector Planning Specialist, IFOD
Ms. A. Santos	Seminar Secretary
Ms. M. Bobila	Seminar Secretary